Chapter 7
Sociological Theory, Constructal Theory, and Globalization
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7.1. Introduction

Constructal theory, as formulated by Bejan and his associates (2000, 2005), is a bold endeavor “to develop a predictive theory of social design” in the form presented as the constructal law: “for a flow system to persist in time (to survive) its configuration must change in time such that it provides easier access to its currents.” The invitation of an engineer/physicist for dialogue with the social sciences, particularly my own discipline of sociology, is highly welcome, since such invitations and settings conducive for interaction are all too rare. The flows and structures of complex social systems are very much sociological concerns, since social change has been a primary focus of sociological theory from its 19th century foundation to the present. A continuing feature of modernity is social change, and sociologists have utilized a variety of models and modes of explanation to cope with social change, even, to predict some of its outcomes. On the contemporary scene it has become increasingly recognized in the past 15–20 years that the problematic for macrotheory is to provide the conceptual framework for dealing with the emergent phenomenon of globalization as the unit of analysis, and with it a set of attending questions: the relation of globalization to nation-states (that have served as the units of analysis at the macro level) and the bearing of globalization on the “new international order” promised at the beginning of the 1990s with the implosion of the Soviet Empire and the triumph of neo-liberalism in the economic and political realm that followed the successful close of the first Gulf War. Tacitly, globalization as a master process seemed to entail the global distribution of democracy at the political level and open free markets at the economic level. The vast transformation of the rest of the world from the implicit model of modernity of the West (and, in particular, the United States) seems ready made for relating the mechanisms of this transformation to

1 E.A. Wilson in Consilience, The Unity of Knowledge (1998) professed the desire for the social sciences to share with his sociobiology a common general theory of human knowledge; however, in that work he makes known that only economics at best has anything rigorous to offer to his synthesis.
the development of a general theory of society “as a conglomerate of mating flows that morph in time in order to flow more easily: people, goods, money, information, etc.”

I will later give a more specific delineation of “globalization”, but for the present I take globalization not as a state of the social world having permanent forms but rather as a set of flows which alters the social landscape and its environments, and in turn is altered by the changing landscape. The complex and dynamic aspects of globalization certainly make a rapprochement of sociology and physics/engineering feasible, with overlapping interests, both in seeking new fields of application for each, and in seeking the refinement of the respective theories. Thus, a basic point of this chapter is that Adrian Bejan’s constructal theory, if it seeks to widen areas of applicability from the flows in the “natural” world to the global flows in the “social” world, has an important domain to explore in globalization. Conversely, given the amorphous aspects of globalization and its multiple themes rich in empirical descriptions but lacking theoretical rigor, constructal theory might provide heuristic models for more sophisticated analyses than additional conceptual differentiation and articulation.

I approach this encounter of sociology with engineering/physics not only with keen anticipation of the fruits of dialogue but also with a cautionary stance based on my reading of earlier encounters. A model from engineering regarding societal flows may easily offer a heuristic metaphor, perhaps even for selected areas, a partial causal explanation, but on methodological grounds, I am agnostic as to whether a general causal explanation of social change can be provided.

7.1.1. Physics and Engineering in Previous Sociology

Although interaction between sociology and physics/engineering has, until Adrian Bejan’s overture, been quite limited in recent years (and this may reflect more my ignorance than actual conditions), a quick historical glimpse offers a better vista, starting right with the founder of sociology as a scientific enterprise, Auguste Comte.

Comte was trained as an engineer at the elite Polytechnic School, and the imprint of his early training shows in his aim to make the new discipline one that would not only generate empirical “positive” knowledge about society but also bring about social engineering for the reconstruction of a social order. The latter had, in the wake of the French Revolution and the skeptical “negativism” of the Enlightenment, become in what today’s terminology might be called “chaotic”—in Comte’s lifetime, the turbulence of the Revolution of 1830 and the two Revolutions of 1848 sandwiched between the despotic rules of Napoleon I and Napoleon III. The history of sociology acknowledges readily Comte’s adaptation of his early training in the formulation of his “law of three stages” and his taking the social engineer as in charge of the reconstruction of society. But we seldom get to see how this might reflect the tremendous achievements of physics and engineering in the first half of the 19th century: the reconstruction of the infrastructure of modern society (canals, bridges, railroads, highways) and