Chapter XIII

Institutional Constraints in the Initial Deployment of Cellular Telephone Service on Three Continents

Joel West
University of California, Irvine

INTRODUCTION

The influence of institutional pressures on standards and standardization are readily apparent in their most direct form. For example, in the mid-1990s, both the European Union and the United States issued new wireless communications licenses in the 1.8-2.0 GHz band: the EU countries mandated use of their decade-old communications standard, while the U.S. authorized three competing standards not yet widely used in the U.S. (Mehrotra, 1994).

However, institutional pressures can also shape standardization efforts in a less direct fashion. For example, in a regulated industry such as telecommunications, existing economic and political institutions constrain the diffusion of a new technology. Such diffusion mediates the impact of product compatibility standards upon society. If producers adopt standards for their goods and services, and if users adopt the products that incorporate such standards, only then such standards can have an economic or social effect upon society at large. Therefore, it is important to understand the impact of institutional pressures on diffusion of the innovation that incorporates a standard if we wish to explain the eventual success or failure of such a standard.

Here a particular standards-based innovation, analog cellular telephone service, provides an opportunity to contrast the effects of institutions on diffusion and thus standardization. Over a four year period, three independent design centers deployed mutually incompatible standards in three continents. While the technical solutions were similar, differences in institutional context between the regions influenced both the nature of the respective standards and their corresponding diffusion. In particular, the systems were deployed in a period of shifting...
telecommunications competition policies and priorities for radio frequency allocation.

Prior research has examined the causal links between standards and institutions, both the institutional context of standards development (e.g., Besen, 1990) and also how established standards themselves function as institutions (Kindleberger, 1983). But rarely do we have the opportunity to examine the diffusion of the same innovation in differing institutional contexts.

This paper will focus on the most complex institutional context for the deployment of cellular telephone service, the United States, which despite having invented cellular technology, was the third region to deploy cellular service due to regulatory delays. The experience of Japan and Northern Europe are offered as contrasts to highlight the importance of the institutional context in the adoption of both standards and standardized products.

**DIFFUSION OF STANDARDIZED TECHNOLOGY PRODUCTS**

**Institutional Context of Standardization**

Although sometimes viewed as merely technical in nature, product compatibility standards are tightly interwoven with economic and political institutions, as they can be both the consequence and antecedent of such institutions.

Standards normally originate in institutions, whether economic, political or a hybrid thereof. Economic standards-setting institutions can be either a single firm or a coalition of firms, while political institutions sponsoring standards may be national, regional and international governments. Other standards originate from hybrid organizations, committees of individuals or firms to whom the government delegates responsibility, such as the American National Standards Institute (Farrell & Saloner, 1988; David & Shurmer, 1996).

Many standards stem from institutions whose scope is the nation-state. Some standards — such as those for broadcasting — are implicitly dependent on governmental institutions for the arbitration of competing claims and the promulgation of uniformity within a national market. Strong national institutions may also be a prerequisite for the adoption or substitution of standards, such as the standardization of railroad gauges. Global standards may originate with such national standards, or developed by explicitly multinational institutions such as the International Telecommunications Union (Kindleberger, 1983; Besen & Farrell, 1991).

Whatever their source, standards themselves serve as economic institutions: they fit the class definition of a public good, available to all and not depleted through use. Indeed, developing such public goods often falls to government by default (Kindleberger, 1983; Cowan et al., 1991; Antonelli, 1994). These economic institutions can constrain industry structure, defining the basis for both vertical supply relationships (e.g., Intel to IBM) and horizontal competition (IBM vs. Compaq).

These two aspects of institutionalization — institutions driving standards and standards acting as institutions — are often joined in the *ad hoc* institutions that are
An Exploratory Analysis of the Relationship Between Organizational and Institutional Factors Shaping the Assimilation of Vertical Standards
[www.igi-global.com/article/exploratory-analysis-relationship-between-organizational/50573?camid=4v1a](www.igi-global.com/article/exploratory-analysis-relationship-between-organizational/50573?camid=4v1a)

What, Me, Worry? The Empowerment of Employees
Marsha Cook Woodbury (2004). *Social, Ethical and Policy Implications of Information Technology* (pp. 59-73).
[www.igi-global.com/chapter/worry-empowerment-employees/29306?camid=4v1a](www.igi-global.com/chapter/worry-empowerment-employees/29306?camid=4v1a)