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Book Reviews

Kunneke R., Ménard C., Groenewegen J. (2021). Network infrastructures: Technology meets institutions. Cambridge University Press, Cambridge (UK)

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The research presented in the book Kunneke *et al.* is part of a wider programme of inquiry that is investigating the multiple dimensions of interrelations between technology and institutions (Kunneke *et al.*, 2010; Ménard, 2014, 2017). Developing an articulated conceptualization of the relationships between technology and institutions and clarifying their role in infrastructure performance, the book represents a turning point in this research programme.

Network infrastructures are socio-technological systems characterized by strongly interdependent technological and institutional objects.

The basic theme of the book concerns the central idea that the performance of the network infrastructures depends upon the alignment between institutions and technology. This is innovative for two reasons: first, because it deepens the understanding of institutions with respect to socioeconomic life; second, because it makes clear that infrastructure services can be provided just by establishing a coherent linkage between technology and institutions, which are often addressed separately.

The analysis of network infrastructure performance is developed by moving from the awareness that *values* play a critical role in specifying which services are *essential* for a society. The Authors introduce an innovative conceptualization of network infrastructure, submitting that these services are guaranteed by the infrastructures' critical functions: *system control* (which pertains to the question of how the overall system – e.g., the flow between the various nodes and links – is being monitored and controlled and how the quality of service is safeguarded, associating technical requirements to effective institutional entities and consistent rules to allow them to perform adequately); *capacity management*, dealing with the allocation of scarce network capacity to certain users; *interconnection*, which refers to the coordination of activities and services between different segments that perform similar or complementary tasks in an infrastructure network; *interoperability*, referring to the requirements that components of infrastructure networks must satisfy in order to support the complementarity between different nodes and links that structure the network. The book argues that the

issue of the technological coordination of complementary artefacts is not addressed in the economic literature. There is instead a need to specify the features of technology that are relevant for the safeguarding of critical functions (79-80).

Based on this starting point, the core of the proposed theoretical framework includes the articulation in three layers of technology (technological architecture, technological design, technological operations) and institutions (macroinstitutions, meso-institutions, microinstitutions).

The *technological architecture* articulates the constitutive technological features of a network infrastructure needed to provide generic services, the constitutive material components, and the technological arrangements of its mutually complementing parts required to provide generic services and safeguard the critical functions (p. 84). The *technological design* of a network infrastructure differs from its architecture: it denotes the contextual framing of the generic architecture in terms of particular services, specific material components, and the technological arrangements required to provide services (p.85). *Technical operations* refer instead to the configuration of technical devices, so that expected services are provided and critical functions are monitored and controlled given the context-specific design and architecture (p. 87)

Following Ménard (2014, 2017), the institutional framework is conceptualized in three layers. The macroinstitutions correspond to the institutional environment, as defined in North's theory (1990). The microinstitutions correspond instead to the governance structures (Williamson, 1985). The organizational layer is what the agents design and adopt to organize their transactions.

The concept of meso-institutions was introduced and elaborated by Ménard (2014, 2017) and posited at the core of an innovative research agenda. Meso-institutions are devices that are in charge of implementing the general rules of the game through their translation into rules specific to sectors and/or geographic areas, thus framing and delineating the domain of activities of actors (Mènard, 2014, p. 578). Meso-institutions are necessary because laws and norms are often abstract or ambiguous (Ménard, 2017). Thus, they need to be interpreted by devices that translate the general rules into specific guidelines and mechanisms that shape their implementation, adapting the definition and allocation of decision rights and their usage to the scope, space and time in which actors evolve (Ménard, 2017; Royer *et al.*, 2016; Rouviere, Royer, 2017; Soregaroli *et al.*, 2022).

More precisely, meso-institutions carry out three functions (Ménard, 2017): a) *Translation*: which consists of providing guidelines, information about norms, formations, and in broad terms makes the constitutional rules (North, 1990; Ostrom, 2009) context-specific (at the sector or geographic level) and, thus, manageable by actors operating at the microlevel; b) *Monitoring*: monitoring/controlling the implementation of rules to be translated, establishing procedures that actors have to follow and check their actual implementation;

c) *Enforcement and feedback*: based on the power to penalize those who do not comply with the rules and on the possibility of providing feedback to regulatory authorities (Ménard *et al.*, 2022).

The key result of the book is that the availability of network services – the *expected services* – depends upon *alignment between the technology and institutions.* The Authors clarify this as such: «Our understanding of alignment is more general and concerns the compatibility of coordination along the three layers of our framework: between the technological architecture and the macroinstitutions, between the technological design and the meso-institutions and between the operational technology and the microinstitutions» (p. 39). It is the ordered alignment of technology and institutions that guarantees the achievement of the expected services. The empirical parts of the book are very rich. While it offers wide confirmation of the theoretical proposal, it also makes available a set of finely conducted case studies that can guide the development of further sectoral studies.

The book makes a robust theoretical point in the research on the relationships between technology and institutions, basically because it substantiates the relationships in terms of alignment and coordination, thus qualifying the relationships themselves. This point opens many research possibilities, not only for institutional and new-institutional theorists but also for applied economics scholars and, in particular, for agricultural economists. Transition studies are actually demanding innovative contributions (Fresco *et al.*, 2021) in which the analytical capability of developing efficient models of transformative technologies has a central role. The changes in the socioecological systems triggered by the ecological transition strongly mobilized analytical attention on the dynamics of the network infrastructures. Moreover, logistics in food chains and standard management digitalization are just some fields of inquiry that could benefit from the theoretical framework built on by the book. For all these fields of inquiry, the book provides a conceptual toolbox for agricultural economists, one based on an innovative perspective and capable of opening new perspectives of research.

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