

Dynamics of Knowledge Circulation for Sustainability Innovation

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For encouraging innovation for sustainability, it is crucial that diverse types of data, information, and knowledge be integrated effectively. Particularly in the era of knowledge-based societies, rapid creation of and easy access to knowledge bases are considered to make key contributions to innovation. Since scientific and technological progress is developing rapidly and the sources of data, information, and knowledge are widely distributed in the field of sustainability, no single individual or organization has all the necessary capacities to stay on top of all the various areas, and collaboration across disciplinary, organizational, or geographical borders has become of critical importance. Cross-border collaboration, however, is not always working effectively, because of various technical, economic, and organizational challenges, including establishment of academic approaches to inter-/trans-disciplinary research, its institutionalization, and coordination of seeds in science and needs in society. To understand the mechanisms of sustainability innovation, the social process of production, diffusion, and utilization of various types of knowledge needs to be analyzed. Case studies suggest that gaps and inconsistencies in the knowledge circulation system could pose serious challenges to the pursuit of sustainability innovation. The development of photovoltaics illustrates a significant transition in the knowledge system from one based on R&D projects supported by the public sector for basic scientific knowledge to another based on investments in production facilities by private funds for societal diffusion. The pattern of innovation through university-industry collaboration, which functioned relatively well in the past for creating scientific knowledge, may not be working in utilizing financial knowledge. For sustainable water management, various types of knowledge are required, including demand prediction, water treatment technologies, water management systems, infrastructure, and laws and regulations. The traditional innovation system focusing on specific technological development may not function effectively for utilizing various types of knowledge as a package and are actively expanding the market.