



# National institutional differences and cross-border university–industry knowledge transfer

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## ABSTRACT

Does inter-national institutional difference hamper technology transfer from the foreign university to the business enterprises? A multinational study on institutions suggests that some elements of institutions of nations positively influence international technology transfer, some other elements of institutions negatively influence the international technology transfer, and yet some other elements of institutions of nations have no influence on the international technology transfer. The empirical analysis on six institutional dimensions reveals variegated results: (i) religious distance has a positive effect on international technology transfer when listed companies are controlled; (ii) social distance has a positive effect when listed firms are not controlled; (iii) education distance has a positive effect when listed companies are not controlled; (iv) political distance has no effect on international technology transfer; and (vi) industrial distance has negative effect on international technology transfer. However, Hofstede's measures on national cultural dimensions show no significant effects. The non-significant results could be due to the measurement of national cultures, characteristics of the biopharmaceutical industry, or due to changes in the patterns of national cultures over time.

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## 1. Introduction

Inter-organizational knowledge transfer has become a critical resource for the survival and growth of high technology firms. To source external knowledge, firms are using different partners, modes of governance, and international context to acquire knowledge (Hakansson and Johanson, 1988, p. 48; Lundvall, 2002). With the increase in practice, research has also increased on the relationship between institutional differences and knowledge transfer. One stream in the literature asks why firms internationalize their technologies, and whether institutional differences affect cross-border knowledge transfer. The underlying assumption in this stream is that national institutions differ; the institutional difference matters in understanding the rate and direction of the internationalization process. Thus, institutional gap between the home and source country of the firm can hamper the internationalization of the business and its performance (Johanson and Wiedersheim-Paul, 1975).

The perceived proposition suggests that national institutions influence the flow of technology between the source and recipient organizations in a cross-national setting (Johanson and Vahlne,

1977). Institutions as systems of rules influence behaviours of individuals, organizations and nations (Hodgson, 1988; Johnson, 1992; North, 1990). These habits result in historical events that become stable over time. Stable habits regulate interactional behavioural of actors for learning and technological development (Dosi et al., 2000). The input for the development of these habits differs between nations, which leads to institutional diversity. Therefore, technological and innovation systems are likely to differ. Especially in high technology sectors, national innovation systems and technological trajectories differ because of differences in condition and incentives (Bartholomew, 1997). Accordingly, the role of diverse institutions in technological development has become a plausible proposition in the literature.

The increase in the argument on institutional diversity and its implications is rooted in the notion of path-dependence (Johnson, 1992), associated with habits of thoughts (Hodgson, 1988). Habits of thoughts develop overtime and follow a path-dependent trajectory. Since institutions follow a path shaped by their different historical events, the resulting institutional diversity is likely to increase inter-institutional asymmetries. The asymmetry affects and reflects interaction and transaction of knowledge. An increase in institutional diversity can increase barriers in the way of inter-institutional information flow. These barriers can increase the cost of transaction and transformation of information between international actors (Kogut and Singh, 1988; O'Grady and Lane, 1996).

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This view in international knowledge transfer suggests that institutional diversity can explain international business and its outcome (Norstrom and Vahlne, 1994, p. 42).

Several empirical studies support the association between institutional diversity and its implication on the internationalization process (Dow and Karunaratna, 2006; Ellis, 2008; Hakanson and Ambos, 2010). However, these studies are limited in several ways in the context of international technology transfer. First, prior literatures focus on the internationalization of established technologies. The current study explores the internationalization process of knowledge sourcing (input). Second, prior literatures focus on inter-firm technology transfer. The current study focuses on knowledge transfer from the foreign university to the firm. Third, prior literatures tend to examine the exploitation of relatively stable technologies in the downstream. The current study focuses on the biopharmaceutical sector, comprising the up- and down-stream. The biopharmaceutical sector is a science-based phenomenon. Its application is inherently uncertain. Its process and products are often patented together (Kodama, 1992; Teece, 2000). It is also a globalized industry, both in the up- and down-stream for knowledge and products respectively (Cockburn, 2008).

Fourth, prior literatures view the role of institutions as enablers or inhibitors in an international business context. The current study assumes that institutional influence on knowledge transfer is neither monotonic nor is it a one-dimensional relationship. Some institutional dimensions enable technology transfer and others hamper it. Institutions governing university–industry integration vary from country to country (Kenney, 1986; Kneller, 2003; Owen-Smith et al., 2002). For instance, the gap between the university and industry in the USA is shorter than the gap between the university and industry in Europe and Japan. It indicates a diverse nature of institutions and their implications. Therefore, the current study slightly deviates from the prior literatures in the context of knowledge transfer from the university to the firm.

The research question posed in this study is whether and how institutional distance matters in international university–industry technology transfer. Guided by this research question, the next section develops theory and hypotheses. The third section outlines the method. The fourth section presents results. The fifth section provides discussion, followed by some implications.

## 2. Theory and hypotheses

### 2.1. Definition of institutions

Douglas North defines institutions as “humanly devised constraints that structure human interaction” (North, 1990, p. 3). These institutions function as “rules of the game” (North, 1990, p. 4). In the background of this view, Hodgson (2006) elaborates that institutions are “systems of established and prevalent social rules that structure social interactions, language, money, law, systems of weights and measures, table manners, and firms (and other organizations) are thus all institutions. . . [which] both constrain and enable behaviour” (Hodgson, 2006, p. 2).<sup>1</sup> Knight holds a similar view on institutions (Knight, 1992).

According to these definitions, institutions rest on some explicit and implicit habits. Explicit habits refer to laws and administrative guidelines. Implicit habits refer to common law, every custom, moral and social norm. In other words, institutions are partially internalized and partially externally enforced. Codified knowledge tends to be externalized while tacit norms tend to be internalized (Polanyi, 1967). These habits develop from historical events; they

are sources of stability and change in the social behaviour; and they set different paths of learning. Hence, institutions can explain technological trajectories of a national innovation system (Commons, 1934; Hodgson, 2006; Knight, 1992; Nelson and Winter, 1982; North, 1995).

### 2.2. Sources and functions of institutions

Institutional sources are linked to their functions. One of the primary functions of institutions is uncertainty reduction by organizing the amount and quality of information needed for the collective understanding and action (Hodgson, 2003; Knight, 1992; North, 1990). They contain stable images for references develop over a passage of time (Johnson, 1992, p. 26). At the same time, they are sources of future direction for the collective behaviour (March and Olsen, 1989). Therefore, institutions serve purposes that vary in efficiency and efficacy.

Institutional functions can be very inefficient and sub-optimal (Johnson, 1992). Some established institutions serve some vested interest; therefore, any changes to those institutions are resisted (North, 2005, p. 48). Some inferior institutions get locked-in and survive over a long period (Harris, 2008; Niosi, 2011). Inferior institutions may support inferior technologies (Dosi, 1982), and inferior technologies get locked-in on a path (Arthur, 1989). These functions reflect the historical input. Since historical input vary, institutional set-ups are likely to vary between nations. Thus, the main role of institution is to guide interaction.

Institutions provide interaction and shape communication through information signposts. These sign posts of institutions guide information identification, evaluation, and transaction through stable images and scripts. Institutional signposts enable communication between individuals, organizations and nations. The link between institutions and communication can be described as enabling, inhibiting or indifferent. Institutions can also affect the quality and quantity of information from the person of one side or the other. Therefore, at sub-functional levels, institutions can be a source of stability and change (Johnson, 1992; North, 2005).

For the stability function, institutions reduce uncertainty; they enable cooperation and coordination between the source and recipient of technology, reducing conflicts between them. Uncertainty can occur on a technological dimension, behavioural dimension or on both dimensions. Technical uncertainty refers to the information and communication gap between parties resulting from different knowledge bases and absorptive capacities (Cohen and Levinthal, 1990). Absorptive capacity can differ in scope and scales. Therefore, communication and information exchange can be difficult under high asymmetries due to institutional differences (Kogut and Zander, 1992; Von Hippel, 1994; Winter, 1987). Thus, technological uncertainty results from knowledge gaps and not behavioural gap between actors.

Behavioural uncertainty is also related to institutions. It represents willingness rather than the ability of the actor to cooperate and coordinate. The actors in an interaction may be able to understand each other, but they may not cooperate to communicate and share information because of different motives. Institutions offer different incentives and conditions, leading to different behaviours. Institutions that support individual values, self-interest and private benefits encourage hoarding of information compared to institutions that view information in a public goods. The former type may hamper private information sharing; the later type may enable information flow for the collective betterment. These differences can vary in scope and scale, leading to asymmetries and uncertainty (Fidler and Johnson, 1984). Thus, a combination between technical and behavioural uncertainty can induce institutional inertia. Inertial forces favouring resistance to change are some of the institutions attributes (Johnson, 1992; Kaufman, 1995).

<sup>1</sup> Hodgson commented that North's 'rules of the game' come in the front; and Hodgson's 'habits of thoughts' come in the background in the theory of institutions.

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