Toward a Theory of IOIS Variance: A New Framework for Studying Inter-Organisational Information Systems

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ABSTRACT
Observing that existing models of inter-organisational information systems (IOIS) have not been developed to explain IOIS variance, in this paper the authors develop three criteria a new theoretical framework should meet: 1) It should support identification of and distinction between essential properties of IOIS; 2) it should explain the resilience of IOIS, that is, why (properties of) IOIS persist in the face of environmental change; and 3) it should offer a way of describing IOIS on organisational and collective levels, that is, the level of various types of collectives of organisations, such as networks, associations or industries. This paper then assesses four theories commonly used in IOIS studies (Transaction Cost Theory, Resource Dependence Theory, Neo-Institutionalism, and Structuration Theory) in view of these three criteria. Based on this discussion, the authors develop a new framework for studying IOIS variance which views IOIS as constellations of aligned practices.

Keywords: Comparative Studies, Descriptive Models, Information Systems Adoption, Inter-Organisational Information Systems, Practice Theory, Structuration Theory

INTRODUCTION
Why is it necessary to provide yet another ‘new’ framework for studying inter-organisational information systems (IOIS)? The literature is replete with such frameworks (Barrett & Konsynski, 1982; Johnston & Vitale; 1988; Benjamin et al., 1990; Kumar & van Dissel, 1996; Choudhury, 1997; Esbjerg, 1999; Fleisch & Österle, 2000; Riemen et al., 2001; O’Daniel, 2001; Hong, 2002; van der Vorst et al., 2002; Themistocleous et al., 2004; Qiu & Ling, 2004; O’Donell & Glassberg, 2005) and one might want to first ask why they are not sufficient for our purpose. In this article, we argue that while the extant literature has largely succeeded in explaining success and failure of IOIS initiatives, it has yet to cope with a phenomenon that has evaded academic attention, namely a substantial variation in existing IOIS which is not easily accounted for. For example, we find entirely different systems in similar industries but situ-
ated in different countries. Do country-level factors dictate or constrain the types of IOIS that emerge as stable systems in an industry? Furthermore, we find different systems in the same industry co-existing peacefully. Do these systems address different requirements of different segments in that industry? In that case, one would probably rather rely on industry-level factors for predicting which types of IOIS will emerge as a sustainable system in a given environment. Then again, we find cases in which all relevant contingencies seem to be almost identical but prevailing IOIS still differ significantly. However, looking at their evolution reveals that different types and constellations of actors have played crucial roles at early development stages or that these systems have been created at different points in time. This observation might lead one to speculate that those types of IOIS which emerge as stable systems are influenced by the particularities of their development process suggesting an explanation based on the theory of path-dependency.

An ability to explain variance of IOIS would make a significant contribution to theory development in the IS field. Scholars are still puzzled by the relationship between new information technologies and existing organisational and institutional structures. Specifically, the question in which way organisational and institutional factors influence deployment of information technology has not yet been satisfactorily answered. While the notion that institutional and organisational factors in some way constrain IT deployment is largely unchallenged, it is not clear how such constraints work. As a consequence, the opposite view, that organisational and institutional structures follow constraints inherent in technology—so-called technological determinism—has mostly been abandoned; yet it would seem to be a mistake to adopt a stance of ‘institutional determinism’ in which organisational and institutional structures determine viable forms of IT deployment (Markus, 2005). Ability to explain variance of IOIS would have to rely on a deeper understanding regarding this relationship between organisational and institutional factors on the one hand and forms of IT deployment on the other. We assume that IOIS variety would—to a large extent—follow from a variety of organisational and institutional settings while not every difference in organisational or institutional structure should be associated with a different type of IOIS.

However, thus far we lack the conceptual apparatus as well as a widely accepted list of properties to identify and describe IOIS. Consequently explaining variance of IOIS would be a rather haphazard undertaking because it would not be clear whether one would be looking at different types of IOIS or rather describing similar IOIS differently. For example different types of IOIS are sometimes identified by different types of underlying technologies (EDI over VANs, EDI over Internet, XML-based information exchange; cf. Williamson et al. 2004). Yet, these technologies may actually support the same type of IOIS. Thus, authors may emphasize different aspects of IOIS which leads them to see different types of IOIS where others would only see different underlying technologies.

The purpose of this paper is to lay the foundation for explaining IOIS variance by developing a theory-based method for identifying and describing IOIS. Existing IOIS taxonomies (Barrett & Konsynski, 1982; Swatman & Swatman, 1992; Alt & Cathomen, 1995; Meier, 1995; Klein, 1996; Kumar & van Dissel, 1996; Choudhury, 1997; Hong, 2002; Qiu & Ling, 2004; Eom, 2005; O’Donell & Glassberg, 2005) do not provide such theoretical links so that empirical research could only be based on statistical evidence but not on case study research which requires theory-based explanation (Yin, 2009). The large number of possible influence factors in combination with a relatively small total population of IOIS—as compared to the number of possibly relevant influence factors—and the difficulties of empirically separating the IOIS phenomenon from its relevant context indicate that case study research is more promising for the task at hand than statistical analysis (cf., Reimers et al., 2004).

In the next section we will first discuss the requirements that a theory used for that purpose
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