

Assimilation of Inter-Organizational Information Systems under Coercive Pressure

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Abstract

With the development of information technology and network technology, the assimilation of inter-organizational information systems (IOIS) has become more and more important in the field of supply chain management. During this IOIS assimilation stage, there is coercive pressure being exerted on non-dominant enterprises by other dominant enterprises in the supply chain. This paper devotes to research the factors affecting non-dominant enterprises' IOIS assimilation under coercive pressure. A conceptual model is developed and described to explain the combination effects of technological characteristics and organizational characteristics on the IOIS assimilation under coercive pressure, and the moderate effect of organizational learning ability.

Keywords: IOIS, Assimilation, Coercive pressure

1. Introduction

According to the economic globalization situation, any enterprise cannot perform all the activities alone throughout the entire supply chain, so the competitions between enterprises have been transformed into the competition between supply chains. Many enterprises have realized that success in the global market competition depends largely on supply chain

management, which is the integration of all activities, linking all trading partners and ensuring timely movement of materials from the raw material supplier to the final consumer effectively^[1]. With the development of information technology and network technology, the implementation of inter-organizational information systems (IOIS) has gradually become an effective way and supportive platform of supply chain management, thereby optimizing the resources configuration in the supply chain. However, the reality is that advantages of the whole supply chain tend to be appropriated by the dominant enterprises during IOIS investments. By contrast, whether non-dominant enterprises assimilate IOIS will inevitably have impact on the performance of entire supply chain. In order to maximize the benefits from IOIS investments, non-dominant enterprises should understand and manage their assimilation processes.

Therefore, this paper devotes to research the factors affecting non-dominant enterprises assimilate IOIS after being interfered by dominant enterprises to adopt the IOIS, that is what we call under coercive pressure. And we propose a conceptual model of IOIS assimilation under coercive pressure, trying to explain the reasons for different assimilation performance among different enterprises under coercive pressure.

2. Literature Review

2.1. Definition of IOIS

In 1966, Kaufman firstly suggested general managers to think beyond their own organizational boundaries and put forward the concept of “extra-corporate systems” [2]. However, until 1980s researchers did not pay much attention to IOIS. In 1982, Barret and Konsynski clearly defined “interorganizational information sharing systems” as “systems that involve resources shared between two or more organizations” [3]. Premkumar considered “interorganizational systems” [1] as extranets and revealed three levels sophistication in IOIS, including communication, coordination and cooperation. Although different scholars have different views towards inter-organizational information systems, we use the term IOIS to describe systems based on information and communication technology, linking two or more organizations in the supply chain to make information flow among them, and supporting inter-organizational transaction and cooperation.

2.2. Assimilation of IOIS

Prior to getting the full advantage from IOIS, all the enterprises in the supply chain should assimilate IOIS. However, there is a big assimilation gap [4] between adoption decision and IOIS implementation. Unlike the typical focus on adoption, we focus on assimilation stage, in which organizational members are committed to IOIS application usage in the normal activity and even make value creation to enhance the performance of entire supply chain. The research of IOIS assimilation has flourished in recent years, among which scholars mainly apply technology-organization-environment (TOE) framework [5,6] and institutional theory [7,8] to lay the groundwork to explain the mechanism of IOIS assimilation. TOE framework identifies three aspects of context for technology innovation develop-

ment: (1) technological context describes both the existing technology and the availability of a particular new technology relevant to the enterprises; (2) organizational context refers to several descriptive measures such as organizational size, the centralization, formalization, the quality of human resources and the amount of slack resources available internally; and (3) environmental context is the arena in which an enterprise conducts its business, including its industry, competitors, access to resources supplied by others [9]. While institutional theory posits that organizations face pressures-coercive pressure, mimetic pressure, and normative pressure-to conform to the shared notions of appropriate forms and behaviors: (1) coercive pressure stems from political influence and the problem of legitimacy; (2) mimetic pressure resulting from standard responses to uncertainty; and (3) normative pressure associated with professionalization [10]. Furthermore, Chatterjee found top management championship; strategic investment rational and extent of coordination positively influence web assimilation [11]. However to our knowledge, there has been no research on the predicted relationships considering both the technological and organizational characteristics of IOIS assimilation under coercive pressure, especially from the perspective of organizational learning.

3. Theoretical Framework

Since the 1980s, different theories and models were developed to analyze the factors affecting the adoption, assimilation and implementation of IOIS from different perspectives. However, prior researches examined based only on either TOE framework or institutional theory. In contrast, limited attention has been paid towards the interaction between TOE framework and institutional theory, especially ignoring both the technological and

organizational characteristics of IOIS assimilation under coercive pressure. In this paper, we try to propose a conceptual model to explain the factors affecting IOIS assimilation under coercive pressure.

3.1. Coercive Pressure on Assimilation

Coercive pressure is defined as formal or informal pressure exerted on organizations by other organizations upon which they are dependent [7]. According to the assimilation behavior patterns, we can divide non-dominant enterprises behaviors into two categories: (1) non-dominant enterprises response to the external environment initiatively so as to consensus with the social trends consciously to assimilate IOIS; (2) non-dominant enterprises are interfered by the dominant enterprises to assimilate IOIS in order to consensus with their action. The former is spontaneous assimilation while the latter is due to coercive pressure. In this paper, we focus on the assimilation of IOIS under coercive pressure. In the supply chain, dominant enterprises occupy rare resources, while other enterprises must rely on these resources to ensure their survival and development. Because of the unequal status between dominant and non-dominant enterprises in the supply chain, dominant partners often require non-dominant partners to make significant idiosyncratic investments to improve inter-organizational coordination [12]. Take automobile manufacturers and suppliers for example. To optimize the performance of the entire supply chain, automobile manufacturers always employ IOIS to improve production efficiency and reduce transaction costs. The interference from manufacturers will force the suppliers to adopt IOIS; however, in order to supply manufacturers and avoid losing large market, the suppliers have to adopt IOIS. This will make the supplier under coercive pressure to assimilate

IOIS, when the IOIS spread across the boundaries of manufacturers.

3.2. Technological Characteristics and Assimilation of IOIS

Technological characteristics play obvious roles in determining enterprise assimilation activity. The effect of technology assimilation depends largely on how the IOIS fit with enterprises' current technology. According to Tornatzky, technological characteristics contain a wide range of up to 25 factors [9], of which the most common ones are relative advantage, compatibility, complexity, experimental and observability [13]. Only relative advantage, compatibility and complexity are consistent with the empirical researches [14] among all these factors summarized in the past literature, especially in the IOIS field.

Relative Advantage Relative advantage refers to the potential benefit provided that enterprises assimilate IOIS. Potential benefit is the perception of the extent to which enterprise assimilating IOIS is better than using the current information technology. We emphasize on the subjective perceived advantage of assimilator rather than the objective actual advantage of IOIS. Most of the literatures take the relative advantage as an important positive factor affecting the assimilation of IOIS. The implementation of IOIS enables a comparative advantage in the supply chain to eliminate the heterogeneous interoperability barriers between the dominant and non-dominant enterprises, so as to shorten the communicational time, quickly access to the information, reduce cost and improve productivity [3]. This leads to the following proposition.

Proposition1: Higher levels of perceived relative advantage of IOIS will positively affect the likelihood of IOIS assimilation by the non-dominant enterprise.

Compatibility Compatibility refers to the degree of match between IOIS and current technological setting of an enterprise. Compatibility is a major factor in explaining IOIS assimilation behaviors, which reacts in the technological level, such as interfaces, communication standards, computing speed, etc. Depending on the existing practices and hardware/software currently, some organizations may require more efforts to assimilate IOIS than others. The better IOIS match with the enterprise's current hardware/software, the more likely that IOIS will be applied to a higher extent. If IOIS are hardly to perform in the enterprise's current technological infrastructure, enterprises will have low intention to assimilate them. This leads to the following proposition.

Proposition2: Higher degrees of compatibility of IOIS will positively affect the likelihood of IOIS assimilation by the non-dominant enterprise.

Complexity Complexity refers to the degree of difficulty to understand and use IOIS. This complexity dimension takes into account two aspects, including the complexity of IOIS technology itself and the complexity of IOIS implementation. For the first aspect, its mechanism is similar to the compatibility, the level of component heterogeneity is high and a wide range of hardware and software will increase the complexity of IOIS infrastructure. For the other aspect, a complex IOIS infrastructure will require enterprise to learn more about the technology for the purpose of IOIS usage. Increased complexity without attendant trainings will result in maintenance costs and errors. So it does not seem possible that greater IOIS complexity would bring about higher levels of assimilation. This leads to the following proposition.

Proposition3: Higher degrees of complexity of IOIS will negatively affect the

likelihood of IOIS assimilation by the non-dominant enterprise.

3.3. Organizational Characteristics and Assimilation of IOIS

The purpose of this study is to investigate the organizational level of assimilation, enterprise as assimilator, its attributes and characteristics will undoubtedly have impact on assimilation behavior. In the TOE framework and its derivative models, organizational factors such as economic type, organizational size, business scope and organizational structure are widely applied to analyze the assimilation of information technology, among which organizational size and organizational structure are the hotspots. While the organizational structure of an enterprise consists of organizational arrangement, such as centralization and formalization, which are created to accomplish the overall mission of that enterprise^[15].

Size An important organizational characteristic in studies of innovation is organizational size^[16]. Damanpour offered a meta-analytic review and pointed out types of innovation that do not have moderating effect on the relationship between size and innovation^[17]. Innovation was defined as the development and use of new ideas or behaviors, no matter a system or a service. This suggests that there is significant correlation between organizational size and IOIS assimilation. Therefore, numerous scholars are researching on the question of how the diversity of enterprises' scales influences the IOIS assimilation. It is stated that large enterprises have more advantages in technical knowledge, human resources, capitals and management skills than that of small enterprises so that large enterprises tend to assimilate IOIS. However, the above analyses target at spontaneous assimilation while the objects of this study are the non-dominant enterprises under coercive pressure. On one hand, in

accordance with the field study, we find the smaller the organizational size, the more intensive non-dominant enterprises attached to dominant enterprises. In order not to lose partners, the smaller enterprises have to assimilate IOIS after being required by dominant enterprises. On the other hand, small enterprises are considered to be more flexible, so they have higher ability to assimilate IOIS^[18]. This leads to the following proposition.

Proposition4: Larger organizational size will negatively affect the likelihood of IOIS assimilation by the non-dominant enterprise.

Centralization Centralization refers to the degree to which the right to make decisions and evaluate activities is concentrated; while decentralization refers to the distribution of authority among different structural components^[19]. Enterprises are likely to use IOIS due to the existence of operation distribution which requires a higher coordination among different structural components. Meanwhile, a low degree of centralization will permit constant change and continuous improvement of technology. Decentralization will increase the organizational members' level of involvement, which may encourage organizational members to apply new technology, such as IOIS. This leads to the following proposition.

Proposition5: Higher degrees of centralization will negatively affect the likelihood of IOIS assimilation by the non-dominant enterprise.

Formalization Formalization refers to the degree to which formal rules, standard policies, and procedures govern decisions and working relationship^[19]. Enterprises that currently have a formal policy are better prepared to assimilate IOIS. First, to assimilate standard compliance under coercive pressure requires setting up procedures. Enterprises already have a formal policy could conduct the implementation of IOIS. Second, a high level

of formalization implies a wider and more detail control at each assimilation procedure so that IOIS will be assimilated orderly and effectively. This leads to the following proposition.

Proposition6: Higher degrees of formalization will positively affect the likelihood of IOIS assimilation by the non-dominant enterprise.

3.4. The Impact of Organizational Learning

“The fifth discipline” written by Peter M. Senge makes the concept of organizational learning prevailing. Despite of decades of researches on the organizational learning which is scattered across different scientific fields, it appears to be extremely difficult to generalize organizational learning. Here we use the definition proposed by Lähteenmäki: organizational learning refers to adaptation to the changes in operational culture, development of new ways of doing things, norms and paradigms^[20]. Since the organizational learning conception appeared, it has been a keen discussion between the relationship of organizational learning and information technology. The essence of organizational learning is the adaptation to the changing environment. Information share, communication and understanding depend largely on organizational learning ability. The more the learning ability organizations possess, the more the innovative management can be promoted. Cooper put forward that Learning models are more appropriate to explain for the assimilation stage^[21]. Grewal pointed out the ability results from the influence of organizational learning and information technology capabilities are important in determining the nature of participation in business-to-business electronic markets^[22]. Moreover, Fichman used data by 608 US businesses to empirically study the importance of learning-related scale in explaining the assimila-

tion of object oriented programming languages (OOPLs) [23]. In a word, as a kind of the technological innovation, IOIS is likely to be assimilated when organizational learning ability is strong. Thus, the impact of technological characteristics on the IOIS is relatively weakened. This leads to the following proposition.

Proposition7: Organizational learning will positively mediate the effect of technological characteristics on the IOIS assimilation by the non-dominant enterprise.

3.5. Conceptual Model

The impact of technological characteristics, organizational characteristics and organizational learning ability on the IOIS assimilation are previously demonstrated. Based on the above discussions, we construct a conceptual model of IOIS assimilation under coercive pressure as Fig. 1 to explain the combination effects of technological characteristics and organizational characteristics on the IOIS assimilation, and the moderate effect of organizational learning ability.

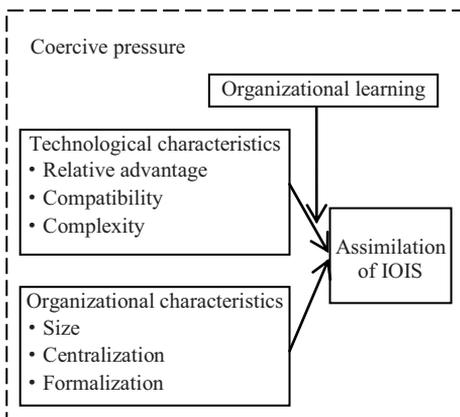


Fig. 1: A conceptual model of IOIS assimilation under coercive pressure.

4. Conclusions

In this article, a conceptual model of IOIS assimilation under coercive pressure is developed and described. By introducing previous studies and discussions, we have revealed gaps that require filling. We concentrate on IOIS assimilation stage from the perspective of non-dominant enterprise, elaborate how the technological characteristics and organizational characteristics have impact on IOIS assimilation, and try to explore the moderate affect of organizational learning. Through the analyses, relative advantage, compatibility and formalization are found positively affect IOIS assimilation while complexity, organizational size and centralization are found negatively affect IOIS assimilation. At the same time, organizational learning will positively mediate the effect of technological characteristics on the IOIS assimilation. In the future, a systematic empirical study is needed to evaluate the conceptual model. The findings will be useful to both scholars and practitioners to apply to the design of future investigations and to the management of IOIS assimilation by non-dominant enterprise under coercive pressure.

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