

CHAPTER 3: DEVELOPMENT OF THE IOS CAPABILITY FRAMEWORK

3.1 Research Framework

The past literature summarizes the key resources and capabilities that help firms gain sustained competitive advantages. Researchers have found that some of the resources are IT-related and can be allocated by firms to acquire a unique IT capability (Bharadwaj 2000, Santhanam and Hartono 2003), but no study has investigated the resources that are related with corporate capability to develop a successful IOS. Combined the RBV with the dynamic and relational view, we propose a research framework that includes twelve resources to form the IOS capability and link it to IOS usages and performance (Figure 3-1): (1)physical assets, (2)financial assets, (3)inter-relation specificity assets, (4)integration, (5)learning, (6)path dependency, (7)contracts, (8)interfirm knowledge sharing, (9)complementary resources, (10)policy, (11)market power, and (12) people skills. The first three address company’s tangible IOS resources, the following eight are related with the intangible IOS resources, and the last one are dependent on people skills. We will introduce every construct and our hypothesis in the next section.

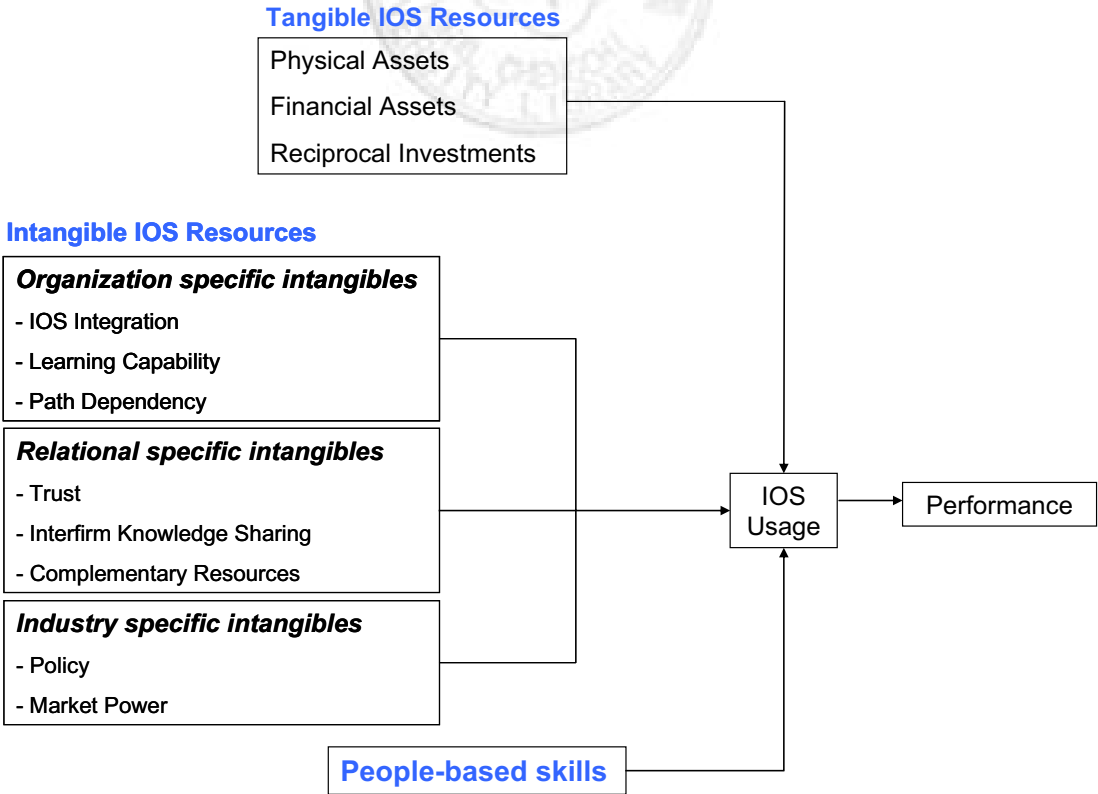


Figure 3-1. Research Framework

3.2 Hypothesis

3.2.1 Tangible IOS Resources

Physical resources like IT infrastructure are the basic resources of the IOS capability. Many IOS studies argue that firms with more flexible IT infrastructure are more able to develop successful IOS. For instance, Ramamurthy and Premkumar (1995) referred that IS sophistication would be positively related to EDI's internal and external diffusion, and it included hardware and software resources to support IOS systems. Recently, Zhu and Kraemer (2005) had asserted technology competence such as technology resource and IS capability as sources of e-business usage and value. Hence, we have the following hypothesis:

Hypothesis 1. Firms with more physical assets related to IOS technology are more likely to achieve a greater IOS usage.

Having sufficient financial assets to support IOS is also one of the significant IOS capabilities. Implementing IOS requires investment in hardware, software, system integration, and employee training. Zhu and Kraemer (2005) consider that sufficient financial resources dedicated to e-business helps companies to obtain these necessary resources and develop them into better functionalities. Besides, setting up links with multiple partners and wider sets of transactions introduces significant increases in expenditures. Take EDI diffusion for example, a sizable and continuing investment is necessary to educate and train users throughout the adopting unit as well as its trading partners to make effective use of the EDI innovation (Ramamurthy and Premkumar, 1995). Thus, firms with more financial assets investment in IOS are more likely to achieve successful IOS implementation and thus tend to achieve a greater IOS usage. Therefore, we have the hypothesis as follows:

Hypothesis 2. Firms with more financial assets invested in IOS are more likely to achieve a greater IOS usage.

Reciprocal investments refer to transaction-specific investments made by one party in an exchange relationship that the other party can consider as safeguarding its investments in transaction-specific assets (Son et al. 2005). Taking EDI as an instance, a powerful customer firm establishing an EDI network can develop reciprocal investments by supporting their EDI partners software free of charge, long term incentive, risk sharing, education seminar, and cost subsidy (Riggins and

Mukhopadhyay 1994, Wang and Seidmann 1995; Son et al. 2005). According to Son et al. (2005), these reciprocal investments in the form of EDI-related support are proven to be effective in increasing EDI volume and diversity. So, our hypothesis is:

Hypothesis 3. Firms with more reciprocal investments in IOS are more likely to achieve a greater IOS usage.

3.2.2 Intangible IOS Resources

Three different types of IOS intangibles are discussed: organizational, relational, and industrial. Details are discussed below.

3.2.2.1 Organizational-specific IOS intangibles

IOS Integration

Integration has been recognized as one important factor of EDI implementation. It means the extent to which data collected through IOS could be directly entered into internal applications without additional preprocessing. A good IOS integration can often improve the effectiveness and efficiency of operations as IOS must be integrated with internal applications, such as payment systems, payable/receivable systems, and production planning systems, for documents to be automatically sent, received, and processed by applications. As Lee and Lim (2003) stated, the customer service and inter-firm relationships can be improved when system integration level is higher. This leads to the following hypothesis.

Hypothesis 4. Firms with greater IOS integration are more likely to achieve a greater IOS usage.

Learning Capability

Absorbing a new complex technology not only requires modification and mastery of the technology, but also requires modifications in organizational practices and procedures (Stasz, Bikson, and Shapiro 1986, Johnson and Rice 1987, Attewell 1992). Therefore, Attewell (1992) argued that implementing a complex new technology needs both individual and organizational learning because the role of know-how and organizational learning are potential barriers to the adoption of innovations or technology. Given the potential impact of organizational learning on the technology adoption, we suppose that learning is also likely to enhance the IOS usage. The following hypothesis is set forth:

Hypothesis 5. Firms with greater learning capabilities are more likely to achieve a greater IOS usage.

Path Dependency

A firm's ability and incentive to adopt newer technology are largely a function of its level of related experience with period technologies (Cohen and Levinthal 1990, Zhu et al. 2006). Previous studies have found that firms with EDI experience can foster the skills for next generation IOS implementation and develop a better understanding about the economic and organizational impacts of IOS (Lyytinen and Robey 1999, Zhu et al. 2006). These firms may have a lower adoption costs because they tend to have a better understanding of true costs, and they know the difficult of process change while implementing. So we suppose path dependency about IOS technologies leads to successful IOS implementation. The following hypothesis is set forth:

Hypothesis 6. Firms with previous IOS experience are more likely to achieve a greater IOS usage.

3.2.2.2 Relational specific intangibles

Trust

A contract is a concrete form to create trust and cooperation relationship between IOS partners. Based on Dwyer, Schurr, and Oh (1987), trust is defined as "the belief that a party's word or promise is reliable and the party will fulfill his/her obligations in an exchange relationship". Therefore, trust is an important concept in understanding expectations for cooperation and planning in a relational contract. According to Hart and Saunders (1998), trust is an important factor of EDI use because it can mitigate the uncertainty related to these vulnerabilities coming from the increase in the volume of exchanges and diversity of transaction sets for an EDI partner. Hence, our hypothesis is:

Hypothesis 7. Firms with constant transaction contracts with trading partners are more likely to achieve a greater IOS usage.

Interfirm Knowledge sharing

Knowledge sharing is at the core of collaboration either within the firm or between firms (Moffat and Archer 2004). According to Moffat and Archer (2004), the

management of the exchange of task relevant information and knowledge presents a special management challenge in the context of inter-firm collaboration. Moreover, the broader the scope of the venture and the more closely integrated the business processes of the member firms, the greater the volume and frequency of the flow of information required to support collaboration. Chi and Holsapple (2005) also argued effective knowledge sharing can promote understanding, suppress opportunistic behaviors, and induce commitment and trust among trading partners, so leading to greater IOS collaboration. Given the potential impact that interfirm knowledge sharing has on the IOS adoption, we suppose that better interfirm knowledge sharing is also likely to enhance the IOS usage.

Hypothesis 8. Firms with greater interfirm knowledge sharing are more likely to achieve a greater IOS usage.

Complementary resources

In order to develop a great extent of IOS usage, previous research recognized the significance of the complementarity of technology. Dyer and Singh (1998) defined complementary resource endowments as distinctive resources of alliance partners that collectively generate greater rents than the sum of those obtained from the individual endowments of each partner. Similarly, Bensaou (1997) argued that compatibility in goals and technological capabilities reduce the uncertainty about the partner's inclination and potential intentions for opportunistic behavior and therefore invite cooperation. Over and above, firms are looking for complementary partners continuously and then developing and implementing IOS with these partners because firms expect to generate more IOS usage, which cannot be generated by either firm in isolation. Eventually, Tan and Raman (2002) argued that strong complementarity, which is meant to both the firm and the partner have adequate IT sophistication and financial resources to jointly undertake the IOS implementation, has positive impact on IOS adoption. So, the following hypothesis is set forth:

Hypothesis 9. Firms with more complementary resources are more likely to achieve a greater IOS usage.

3.2.2.3 Industry specific intangibles

Policy

Government policy is a critical environmental factor that tends to affect IOS usage. Researchers found that companies operating in an environment where

government policies are restrictive have low IT adoption (Dasgupta et al. 1999, Zhu and Kraemer 2005). Further, empirical findings which are particularly applicable to e-business found that government regulation could influence innovation diffusion as the lack of legal protection of online transactions as well as security and privacy tend to be common concerns both for companies (especially retailers) and for consumers (Williamson 1983, Straub et al. 2002, Xu et al. 2004, Zhu and Kraemer 2005). Thus, governments could encourage industrial e-business usage by establishing supportive business laws to protect e-business transactions, regulating the industry policy to make transaction platform trustworthy and widespread, and providing incentives for using B2B electronic commerce protocol in government procurements and contracts. Therefore, our hypothesis here is as follows:

Hypothesis 10. Firms facing higher regulatory support are more likely to achieve a greater IOS usage.

Market Power

Market power is another important environmental factor to impact the IOS usage. According to Hart and Saunders (1998), relative dependence in a dyadic relationship between customer and supplier is a determinant of power. Power affects EDI use because the transaction or procedures for handling data exchanges frequently required investments that an EDI partners may not want to make (Hart and Saunders 1998), and thus some large customer firms with dominant market share have often exerted their bargaining power to influence the IOS-related decision in initial stage (Son et al. 2005). Prior studies showed that power exercised by large trading partners has a positive effect on initial adoption (Chwelos et al. 2001, Iacovou 1995, Son et al. 2005) and usage (Ramamurthy et al. 1999, Son et al. 2005) of EDI in organizations. Consequently, our hypothesis here is:

Hypothesis 11. Firms with greater market power between IOS trading partners are more likely to achieve a greater IOS usage.

3.2.3 Human IT Resources

Organizational human resources generally comprise the training, experiences, relationships, and insights of its employees (Barney 1991, Grant 1995, Bharadwaj 2000). According to Bharadwaj (2000), human IT resources include: (1) technical IT skills, such as programming, system analysis and design, and (2) the managerial IT skills, which include abilities such as the management of IS functions, coordination

and interaction with user community, and leadership skills (Capon and Glazer 1987, Copeland and Mckenney 1988, Bharadwaj 2000). Firms with strong human IT resources are able to integrate the IT and business processes more effectively. In similarly, the managerial ability to coordinate the multifaceted activities associated with the successful implementation of IT systems has been found to be a key distinguishing factor of successful firms (Sambamurthy and Zmud 1992, Bharadwaj 2000). So, we suppose IOS usage can be enhanced by human IT resources. The hypothesis is listed below:

Hypothesis 12. Firms with great human IT resources are more likely to achieve a greater IOS usage.

3.2.4 IOS usage and firm performance

It has long been recognized that the high level of IOS usage can contribute the supply chain performance. For example, Bensaou and Venkatraman (1995) proposed that the greater the multiplicity of channels and the frequency of information exchanges, the greater the information processing capabilities of the dyad. Similarly, Riggins and Mukhopadhyay (1994) suggested that the great volume of business communications for which the firm uses EDI and the high degree to which the firm becomes immersed in EDI of doing business as the efficient ways to maintain partner relationship. Recently, Subramani (2004) argued that higher supply chain management systems (IOS) use leads to competitive performance of suppliers. The hypothesis is as follows:

Hypothesis 13. Firms with more IOS usage are more likely to achieve better firm performance.