

E BUSINESS SUPPLY CHAIN MODELS

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PROJECT OVERVIEW

This twelve month project funded by the Association for Standards and Practices in Electronic Trade (operating as 'e.centre'), the EPSRC Innovative Manufacturing Research Centre (IMRC) and the NHS Purchasing and Supply Agency (NHS PASA) addressed the business case for e-commerce and issues of data standardisation, within the healthcare sector.

In the retail sector, where the importance of efficient supply chain management is well recognised, electronic systems for supply management are relatively well established. In other sectors, less progress has been made, despite potentially significant benefits. In healthcare, there are many e-commerce technologies available which could offer major benefits to the effective and efficient delivery of healthcare. And yet, uptake of e-commerce is limited and fragmented.

OBJECTIVES

The aim of the project was to increase the understanding of the strategic opportunities and implications of e-enabled business processes in complex, data rich supply chains in the health sector, focusing particularly on:

- policy and strategic objectives and outcomes
- higher-system levels (e.g. sectors and networks), as well as individual organisations

- contingent approaches according to the characteristics of particular types of supply contexts
- the importance of the consistent use of global, open standards in the supply chain

Centred on four contrasting, health-specific supply chains, this project explored the use of e-commerce technologies, future plans, reasons for adoption (and non-adoption), supply process specific factors, formal business plans and rationales and informal factors influencing adoption decisions.

The project investigated e-commerce adoption/investment decisions through 4 research questions:

- *Is e-commerce strategic?*
- *What is the strategic case for e-enabled business processes in healthcare supply chains?*
- *How and why does it vary between different healthcare settings (chains, sectors, etc.)?*
- *What are the strategic implications of using global, open standards (or not) for supply management in healthcare?*

METHOD

The principal research method used in this project was a comparative analysis of four supply chains. The four chains studied were in four different product areas: cardiac stents, orthopaedic footwear, pathology blood tubes and intravenous fluids. The four health sector

supply chains that were researched comprised five NHS Trusts, a cross-section of firms supplying a 'product family', agencies such as the NHS Purchasing and Supply Agency (PASA) and appropriate trade associations.

The methods for data collection for the project as a whole included: (a) a literature review, (b) workshops and (c) conducting interviews and the use of available documentation. Based on the literature study and cumulated knowledge on e-adoption and the healthcare sector within CRiSPS, interview guides and a coding scheme were developed to enable the collection and analysis of data. Most interviews were tape-recorded, and then coded in NVivo, using a coding framework.

Data was collected using various methods and sources: interviews (face-to-face and telephone); documentation, and secondary sources. In total across the four supply chains, 45 interviews were conducted. The data was organized to develop case descriptions at two levels: supply chains and organizations within their supply chain context. Finally, the cross-case analysis was used to address the research questions.

FINDINGS

Is e-commerce strategic?

Recent media attention on Sainsbury's highlighting the problems the firm has encountered in implementing its new logistics system and questioning whether it was ever a sensible investment show how e-commerce can have a strategic impact on the reputation and financial status of a commercial company. In the context of the healthcare sector, we considered this question from two complementary perspectives.

1) Can e-commerce have an impact on the achievement of strategic objectives?

The study data shows that e-commerce can be related to the achievement of strategic objectives across three inter-related domains – health, supply and business – but the contribution of e-commerce may be an indirect effect mediated by 'sister' technologies (e.g. electronic prescribing) or via operational benefits which release resources that are then redeployed.

2) Does e-commerce feature in strategic plans?

Overall we can conclude that e-commerce is rarely included in strategic plans in trusts and suppliers but that if a plan is present, the use of e-commerce within all the different supply chains is based on financial impact or patient safety. The literature review suggests e-business strategy should be aligned with corporate strategy and supply strategy. In the case of healthcare, this study suggests the importance of linking predicted benefits and costs of e-with strategic objectives across the three main domains in terms of health, business and supply.

What is the strategic case for e-enabled business processes in healthcare supply chains?

This question was addressed in terms of 'big issues' (key and current challenges facing organizations in the chain) in the four supply chains, adoption (or non-adoption) of e-commerce technologies and perceived benefits and risks, in order to build a supply chain centred interpretation of the strategic case for e-enabled business processes.

Most perceived benefits of using e-commerce were related to costs and benefits in operational improvements, for example reduced transaction costs and reducing errors. In terms of strategic benefits from e-adoption in supply chains, the impact of e-technologies *could be* on patient safety, patient experience, clinical outcomes and health service capacity, efficiency and effectiveness. However, there does not appear to be a systematic way of linking analysis of e-enablement and strategic objectives across health management, business management and supply management. Also, strategic benefits on a supply chain level are not recognised or explicitly linked with e-commerce, as the strategic benefits on an organisational level are not yet always recognised and systematically linked with e-commerce.

There are two issues in addressing the question of making the strategic case for e- in healthcare supply chains. The first relates to risk and benefit sharing between key stakeholders. Suppliers are concerned about the consequences of using e-technology such as e-auction or e-enabled ward assembly process in the IV fluids

chain. We found that a supplier's motivation and interests could seriously affect their willingness to participate in an e-adoption project in their supply chain.

The second issue relates to the importance of buyer/supplier collaboration in the supply chain. Most supply chains we studied are quite fragmented in managing supply, the exception to this being stents. Cost and pricing were major issues for IV fluid suppliers supplying to NHS trusts, while concerns over uncertain supplier arrangements with NHS trusts was the biggest issue for footwear suppliers.

How and why does it vary between different healthcare settings (chains, sectors, etc.)?

The adoption of e-commerce solutions varies between and within the supply chains. Different trusts were found to be at very different stages in their e-business development. Contingency factors affecting adoption are: importance of the purchase (spend, innovativeness, pressure on budgets), degree of organisation of the supply market, size of suppliers (resources), the number of suppliers, absence of a common platform within the NHS influenced by the organisational structure. Differences in external pressure exist, supporting the importance of a stakeholders' perspective. Suppliers have different stakeholders' positions (different dependencies and interests in technologies) leading to different motivations to use e-.

E-adoption and the strategic recognition also showed to be partly dependent on who decides for the uptake of e- and their interest in e- and/or belief to which it could benefit their priorities, based on their own criteria (i.e. financial ones). The degree to which purchasing could influence the investment decision and e-adoption depended on (a) the extent to which others appreciated the (potential) role and contribution of the purchasing and supply function and (b) recognised how better supply management could be translated into more hospital wide benefits such as improved patient care. Also, the adoption was said to depend on the presence of certain so-called '*project champions*', influential individuals supporting and advocating e-adoption.

Overall, this shows that the strategic case for e-adoption in healthcare supply chain is a very complex process, depending on a mix of different factors, such as perceived benefits and risks, stakeholder's motivation, equitable allocation of cost and benefit, influential functions and individuals.

What are the strategic implications of using global open standards (or not) for supply management in healthcare?

A key benefit of e-commerce for buyers and sellers is improved management information. In the NHS, the value of the move towards more regional and national contracting would be undermined if Trusts cannot exchange and consolidate data to improve their negotiating position with suppliers. If several standards were in use, this would be more difficult and costly to achieve. Thus, global, open standards have strategic implications for supply.

From discussions with policy leads and workshop participants, the strategic implications of standards in health are clear – common standards are associated with reduced errors, an essential element for improving patient safety. However there was little evidence of this connection in our data.

Lack of common standards would have operational implications for transaction costs and accuracy. From a strategic perspective, it seems logical to expect that suppliers who have adopted global, open standards would be better placed to compete internationally, and to diversify into new markets. Again, however, there was not much evidence of an appreciation of these issues among those we interviewed.

IMPLICATIONS

Adoption from a supply chain perspective:

Overall, considerable benefits could be derived through better co-ordination between Trusts and suppliers, but the necessary quality (granularity and timeliness) of data would not be possible without e-enabled business processes. A protocol, which could be used in many different health contexts and across organizational boundaries, for examining costs and benefits of potential e-technologies, to enable negotiations

between interested parties and encourage innovation and learning would be valuable.

Adoption from a policy/ leadership perspective:

The study shows 'levers for change' can enable the adoption of e-commerce technologies. Whilst Trusts are expected to comply with certain healthcare service standards, they are not obliged to follow the policies of the two national supply bodies, NHS PASA and NHS Logistics. Their contracting and distribution services are not necessarily lowest cost but they are relatively quick and easy to implement, and therefore could be regarded as agents for change despite the lack of mandate. In this arena, leadership seems to be more about co-ordination (e.g. improving interoperability), framing (e.g. producing a limited set of options from which to choose) and knowledge transfer (e.g. identifying similar cases in different contexts and promoting learning), than mandate.

Leadership and co-ordination need to accommodate the vast range of existing e-enablement from entirely paper-based systems to advanced, integrated systems. Two factors may have an important impact on timing here: first, supply management confederations may lead to more rapid uptake; second, take up of NHS Logistics' (or its competitors') services could lead to rapid adoption of systems and standards for consumables at least.

Adoption as a social process within actors in supply chains

The analysis shows that whether e- is adopted or not in Trusts is subject to a social process of negotiation. Certain individuals and departments can be highly influential in the adoption decision, both in Trusts and suppliers and purchasing's influence depends on its social position. People do not relate to costs and benefits in an abstract sense but link them to their particular context and priorities. The study suggests the need to customise arguments in favour of e-commerce for different audiences, such as finance versus clinical experts. Also, those seeking to promote the adoption of e- and standards could benefit from mapping out for the relevant actors (individuals, functions, organizations etc) their views of electronic technologies, standards, supply, health and

business, recognising that these views are nested and mutually influencing. Selecting so-called 'project champions' can further benefit adoption and diffusion of e-.

The strategic case for e-commerce in supply chains

The strategic benefits of e-commerce lie in the relationships between the parties in the chain. Increased cooperation between Trusts and suppliers and between Trusts and PaSA/NHS Logistics can lead to improved benefits of e-solutions. This can then lead to e-commerce having more of a strategic role in the chain as a whole.

However, the adoption of e-commerce solutions and the recognition of its strategic role is foremost also an internal matter, as before it can play a role on chain level, it needs to be recognised on an actor level as strategic. Links between the use of e-commerce and strategic priorities seem to exist but they are often not recognised by those who influence e-adoption decisions. As long as this is so, e-solutions will not be seen as a tool that can help achieve organisational strategic objectives. For benefits to be recognised, they need to be matched with the priorities of the people in charge.

The adoption of global, open standards

The data on standards suggest that, if there is a problem at all, it is the lack of knowledge about standards, rather than resistance to the adoption of a common, open standard. People value reduced transaction costs, reduced errors, improved safety and improved data exchange, but they are not aware of the ways in which these benefits are reliant on standards. Whilst detailed knowledge seems unnecessary a general increase in awareness of the impact of not adopting global, open standards would be beneficial.

FURTHER READING

Zheng, J., Bakker, E.F., Knight, L.A., Gilhespy, H., Harland, C.M. and Walker, H.L. (2005) A strategic case for e-adoption in healthcare supply chains, In: Proceedings of 14th Annual IPSERA Conference, Archamps, France, March pp.1105-1117