

The Strategic Importance of XML Applications

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Abstract

The economic environment in which businesses find themselves today is perhaps the most turbulent in history. It is dominated by three powerful influences, globalisation, a knowledge and information revolution, and structural change. Above average performance with regard to profitability and return on capital invested can be achieved by the application of information technology to the concepts of the value chain and the value system. In the past, leveraging competitive advantage, via the value system, was an option only available to large organisations using EDI. However, the Internet, with the development of concomitant technologies such as XML, can unleash an e-business revolution. E-business involves re-engineering business processes to utilise Internet technology in order to maximise efficiency throughout the whole value system by creating strategic alliances. The implementation of e-business requires a fundamental change in the way businesses organise and manage, and will provide further impetus to the development of flat or networked organisational structures. This paper argues that companies, in striving to achieve competitive advantage by utilising Internet technologies, will accelerate the growth of networked organisations. These organisations are likely to enhance their position at the expense of businesses maintaining traditional hierarchical structures.

1. Introduction

Extensible Markup Language (XML) is the World Wide Web Consortium recommendation for the exchange of structured information over the Internet. It is an open, non-proprietary, human and machine-readable metalanguage. XML was designed to enable businesses to create and exploit opportunities presented by the Internet as a medium for financial and information transactions.

Competition is the essence of businesses. In today's turbulent economic environment companies striving to attain competitive advantage must consider all of the factors influencing the environment in order to implement a viable strategy. It is into this arena that XML is introduced and it is the purpose of this paper to consider the impact that it will have on business strategy.

The application of information technology to the value chain in order to derive competitive advantage is not a new concept. However it has been constrained by the lack of a common language to facilitate interoperability between disparate computer systems and only organisations that have been able to afford to implement EDI have been able to achieve an advantage. It is argued that the development of the Internet and subsequently associated technologies, such as XML, is on the verge of overcoming the limitations of EDI and unleashing an e-business revolution. It is proposed that this revolution will accelerate the development of flat or networked organisational structures, which confer significant competitive advantages and will threaten the existence of businesses that maintain a traditional hierarchical structure.

2. Competitiveness and the Role of Information Technology

"Competition is at the core of the success or failure of firms"

[1]

In order to appreciate the strategic importance of XML as an integral part of an overall IT strategy it is necessary to examine the factors that propel business. These business drivers are derived from the forces acting upon an organisation, which threaten to undermine its competitive position. It is the role of management to develop appropriate strategies to deal with changes within the business environment and to deploy the resources necessary to implement strategy successfully.

2.1 The Business Environment

The economic and business environment has been, and will continue to be, dominated by three powerful influences, globalisation, a knowledge and information revolution and structural change [2].

2.1.1 Globalisation

The expansion of business into global markets since 1945 has been accompanied by an 84% increase in the Gross Domestic Product (GDP) of the world to \$30 trillion. It is estimated that within the next 50 years the global GDP will increase to \$80 trillion due to new opportunities for trade and investment. This can be attributed to deregulation, privatisation, the opening up of the Eastern Block and the industrialisation of the remaining and extensive underdeveloped economies [3].

2.1.2 The Knowledge and Information Revolution

The developed economies are undergoing a fundamental change that Laudon describes as a knowledge and information revolution. This has been characterised by an increase in the recruitment of technologists and specialists whilst there has been a reduction in the demand for semi-skilled and unskilled workers [2]. This revolution has also resulted in the emergence of knowledge and information based businesses in which information technology and systems become critical strategic assets [4].

2.1.3 Structural Change

The traditional model of a business is epitomised by centralised, hierarchical, inflexible bureaucracies that are dependent upon standard operating procedures to achieve organisational goals. Management relies upon formal planning, rigid division of labour and a barrage of motivational techniques to ensure that organisational functions are performed appropriately. However, information technology is facilitating the development of business models that are less hierarchical (i.e. flatter), and more decentralised and flexible. These models focus on the co-ordination and allocation of scarce resources by engendering a customer orientated culture within the business aimed at satisfying the demands of the market [2].

The forces of globalisation, the knowledge and information revolution and structural change interact in dynamically generating a turbulent and unstable economic environment. It is this chaotic competitive situation that Peters addressed when he wrote:

"The winners of tomorrow will deal proactively with chaos per se as a source of market advantage, not as a problem to get around".

[5]

Peters went on to predict that in such a volatile environment companies would no longer be able to achieve sustainable competitive advantage over their competitors. Success in this new environment would require a strategy based on *"world class quality, service and enhanced responsiveness achieved through increased [organisational] flexibility [characterised by flatter structures, i.e. fewer layers of management] combined with continuous short cycle innovation and improvement"* [5]. Managing competitive advantage was to become the fundamental precept of strategic management [6].

2.2 Competitive Advantage

In an increasingly turbulent environment competitive advantage differentiates those businesses that demonstrate the *"ability to achieve market superiority"* over their competitors. This means above average performance with regard to profitability and return on capital invested [7].

Dean and Evans [7] observe that the literature is supportive of Michael Porter's [1] contention that competitive advantage can be derived from two main sources; product differentiation and cost leadership. However, in the event of competing businesses achieving competitive parity in relation to these sources they will then attempt to establish at least one further source of advantage. This has led to a third source being suggested by Miller, which he calls quick response [8]. The concepts of differentiation and cost leadership are well known and will not be discussed here, however it is worth noting their impact on financial performance before reviewing quick response.

2.2.1 The Impact of Differentiation and Cost Leadership on Financial Performance

The assertion that competitive advantage results in above average financial performance is borne out by the analysis carried out by Miller [8], which indicated:

- 1) Businesses that achieve neither product differentiation or cost leadership produced an average Return on Investment (ROI) of 9.5%.
- 2) Those with a cost advantage achieved an average ROI of 26.2%.
- 3) Businesses with highly differentiated products achieved a 22.0% ROI.
- 4) Companies that achieve both forms of competitive advantage enjoyed an average ROI of 34.7%.

However there is no performance analysis available for quick response, which is described below.

2.2.2 Quick Response

Miller introduced a further dimension involving those organisations who have achieved competitive parity within an industry. He suggested that these organisations would undertake to compete on speed of response. This form of competitive advantage concentrates on providing the *"quality and cost customers want faster than the competition."* [8]. Miller also argues that quick response refers to a company's ability to bring new or improved products to market and the speed at which it makes management decisions that impact the customer. It is a measure of a firm's flexibility [8].

The business community was quick to realise the tremendous potential rewards offered by the application of information technology to these sources of competitive advantage. It was also recognised that it was the pervasive character of information within the value chain that offered significant opportunities.

2.3 Applying Information Technology to Achieve Competitive Advantage

Laudon points out that firms use IT at three levels of strategy, namely the business, firm and industrial levels [2]. The firm and industrial levels are more complex in that they comprise of multiple businesses or business units and it is perhaps appropriate that the argument should be focused at the business level for the purposes of generality.

2.3.1 Value Chain Model

Michael Porter describes a technique for the identification of areas within a company where competitive strategies may be employed. The value chain model views the firm as a series of strategic activities that offer margin to a company's product and therefore have the potential to be performed more efficiently than a firm's competitors by the innovative use of IT. These activities can be categorised as primary activities, relating to production and distribution and secondary activities, which support the delivery of the primary activities. Secondary activities are for example administration, management, accounting and human resource functions. In essence the value chain disaggregates a firm into its strategically relevant activities in order to understand the behaviour of costs and the existing and potential sources of differentiation [1].

2.3.2 Value System

Porter extends his argument to conceptualise a value system. The view is taken that a business's value chain is an integral part of a larger value chain made up of its suppliers. Since suppliers create the inputs to a business it can be argued that suppliers can influence in a substantial way the performance of that business. Therefore a source of competitive advantage can be derived not only from maximising the efficiency of the internal value chain,

but also from the overall value system that ultimately represents the customers value chain [1].

Figure 1 represents the interaction of the various business level strategies in a value system. A Company can only achieve maximum competitive advantage by optimising the value that all links in the value system contribute to the final product or service.

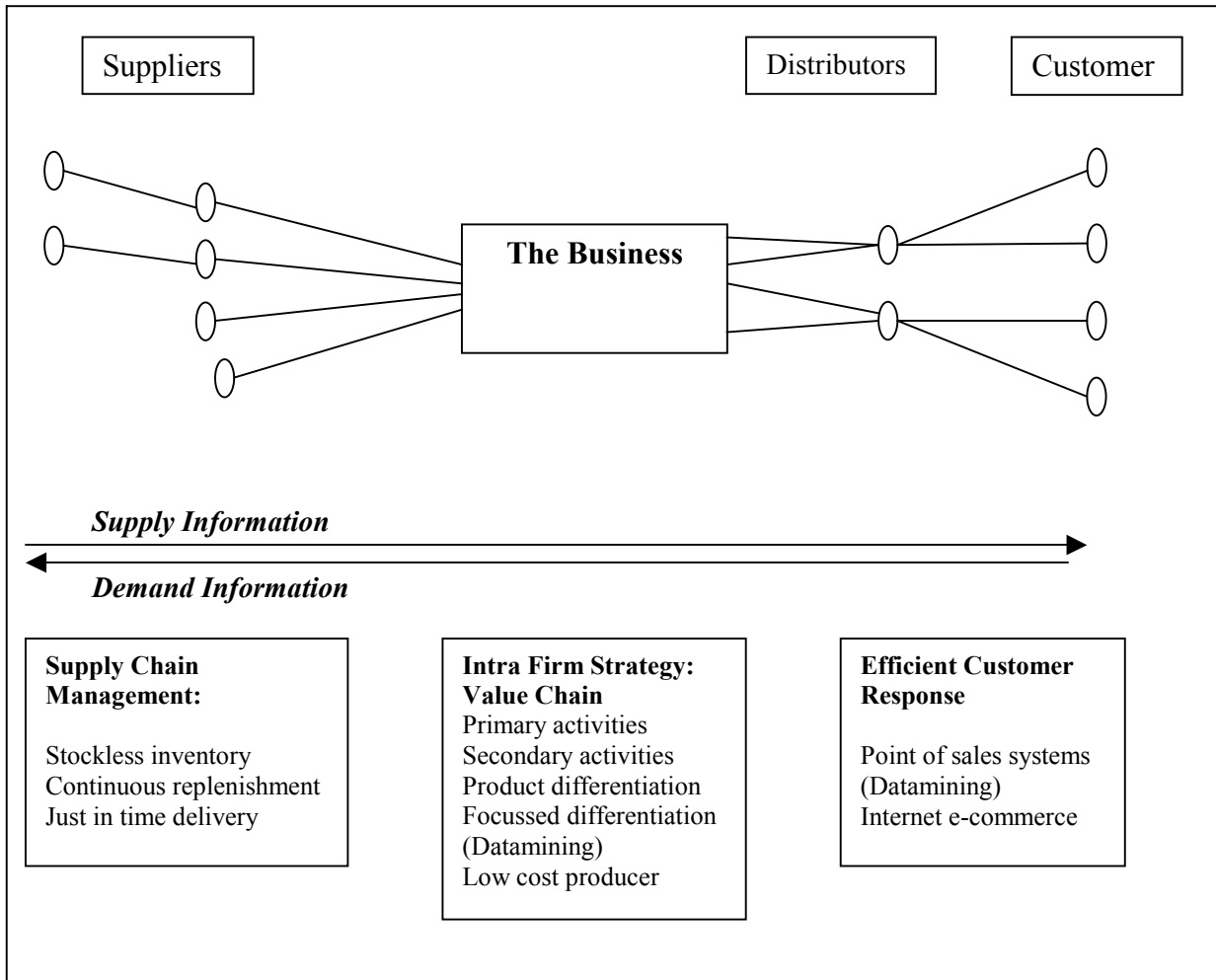


Figure 1 A Simple Representation of the Value System
Based on a model in [2]

The application of IT to the value chain has the effect of changing the structure of a business, and the nature of managerial activities performed within it, as more primary and secondary activities are automated. Francis Fukuyama argues that the high growth performance of the US economy in the last decade is due to changes in the way organisations organise and manage. The improved productivity achieved by the economy has been accredited to the application of sophisticated information technology. However he observes from technological revolutions of the past that *"growth occurs only when technology is applied in the proper organisational context."* [9]. Therefore he argues that perhaps the most important factor has been the development of the flat or networked organisation [9].

Structural change is enabled by the implementation of information technology but it is also constrained by it. Currently the vast majority of businesses to business transactions are not conducted electronically. The lack of appropriate software and standards for exchanging

information has been instrumental in perpetuating this situation. However, XML as a technology provides the opportunity to overcome these limitations.

3. From EDI to E-Business via XML

The application of IT to leveraging advantage from the value system occurred about twenty five years ago in the form of Electronic Data Interchange (EDI). This may have represented the beginning of the knowledge and information revolution and it is from this perspective that recent developments are examined and a projection is made for the future.

3.1 EDI

The economic justification for EDI was that transmitting standard business transaction documents, such as purchase orders and invoices, directly from one information system to another could result in substantial savings [2]. In order to achieve this, customers and suppliers have to custom-design their value chains thus raising the switching costs of changing to a new supplier or suppliers servicing other competitors [1]. Therefore EDI has the added strategic advantage of helping to lock suppliers and customers into more stable relationships.

EDI however, is not readily extensible as it relies on a dedicated communication medium, and custom-design to suit particular application requirements. Laplante reports that only 100,000 companies world-wide employ EDI despite having been in use for 25 years. This has been due to the prohibitive cost, particularly for medium sized and small companies, associated with overcoming interoperability problems between the transacting companies, the cost of application development, and other technical issues.

EDI is a comparatively old technology, which was not specifically designed to take advantage of the Internet [10].

3.2 The Internet

Advances in computer technology, network technology and telecommunications coincided with a reduction in the cost of hardware and software. These factors combined with the development of the WWW and HTML have led to the popularisation of the Internet. The Internet has developed into an entertainment and general-purpose medium for the public at large. In June 1996 approximately 400,000 businesses world-wide had domain addresses [11]. The Gartner Group estimated that at the end of 1998, 88% of companies in the USA had web sites compared to 70% in the Nordic Countries, 55% in the UK, and 52% in Germany with the rest of Europe further behind. Perhaps this reflects the fact that in 1998 there were 147 million Internet users world-wide of which 52% were living in the USA and 20% in Western Europe of which 5.5% live in the UK [12]. These statistics may also reflect that businesses in Europe are aware of the potential the Internet presents and are positioning themselves for European e-commerce growth to come in line with that of the USA.

The Internet being such a pervasive communications medium, presents organisations with the opportunity of overcoming the shortfalls characteristic of EDI and to release the potential of e-commerce and e-business. One way in which this will be facilitated will be with XML, which has emerged as a standard for information exchange over the Internet. The ability of XML to be parsed, interpreted and processed automatically combined with XML applications that facilitate interoperability between heterogeneous databases [13] place it in a strong position to be instrumental in the advent of e-business.

3.3 E-Commerce and E-Business

There is an ongoing debate regarding what actually constitutes e-commerce and in order to understand the potential it has to offer it is necessary to explore its constituents. In section 2.3.2 a simple view of the strategic linkages that exist at business level was explored. It was noted that there are three main elements within the value system; supply chain management, intra firm strategy and efficient customer response. These elements coincide with three categories of e-commerce which are business to business (primarily associated with EDI), inter-organisational and customer to business [14].

The main focus for the commercial development of the Internet has been for the marketing and sale of goods and services directly to the customer. Forrester Research estimated that in 1998 the value of e-commerce transactions in the USA was in the region of \$8 billion and is expected to rise to \$108 billion in 2003 [15]. However these figures are almost insignificant compared to those produced for business to business transactions via extranets that have been estimated at \$43 billion in 1998 rising to \$1.3 trillion by 2003 [15]. This growth is accounted for by the fact that the number and value of transactions between businesses far exceeds those of consumers, and businesses have the motivation and the capability of utilising the Internet. Forrester Research also believes that the USA is about to launch into "*e-business hyper-growth*" and that the UK and Germany will follow within two years [15].

From a strategic perspective the view has been taken here that e-commerce is only a part of the much larger concept termed e-business. E-business involves re-engineering business processes to utilise Internet technology in order to maximise efficiency throughout the whole value system by streamlining business processes, and integrating suppliers and partners in a strategic alliance [16]. In essence e-business is the means by which competitive advantage can be achieved via:

1. Attracting and retaining customers, building stable relationships with them.
2. Automating corporate business processes to reduce costs and enhance the organisations quick response.
3. Streamlining supply chains to deliver the correct quality of product in the fastest possible time.
4. Capturing, analysing and sharing business intelligence about customers with suppliers in order to identify potential product differentiation tactics.

[17]

Each of these elements can have a significant effect on the financial performance of an organisation as discussed previously (section 2.2).

3.4 The Impact of E-business

Symonds reported in the Economist that organisations that have already embraced the concept of e-business have achieved significant efficiencies and first wave advantage. Cisco Systems may be taken as an example of an organisation that began by employing the web to provide customer support and to address an ongoing problem with the accuracy of customer orders. It was estimated that over one-third of all orders received suffered from errors. The problem was resolved by automating the processes of ordering, contract manufacturing, fulfilment and payment. Approximately 55% of orders pass through the Cisco system without the need for manual intervention and it is estimated that savings in the order of \$500 million per year are being achieved. It is also reported that the quarterly accounts now only take two days to prepare instead of the traditional ten days, whilst halving the cost of finance. As a result 600 employees can be utilised in proactive activities such as datamining rather than in reactive transaction tracking [15].

Despite the mounting evidence that the e-business revolution is building momentum there seems to be a reticence amongst many organisations to address the issue. Research carried out by MORI indicated that none of 119 Chief Executive Officers and board directors of global corporations surveyed regarded e-business as an important problem facing their businesses. The top three concerns were reported as threats from competition, cost control, and identifying new opportunities [16]. These are the same strategic concerns that are addressed by the application of e-business solutions. An impression of how this situation will be resolved can be gained by taking into consideration transaction cost theory.

Transaction cost theory asserts that the price of a product is comprised of three elements: production costs, co-ordination costs and profit margin. Co-ordination costs include the transaction costs of all the information processing necessary to co-ordinate the application of the resources employed in primary activities (i.e. the production and distribution of goods and services). Economic theory contends that firms will select transactions which will minimise co-ordination costs. This will result in a move to automate the business processes associated with co-ordination costs and therefore maximise profit margin [18]. Wigand states that actual market behaviour supports this assertion and predicts that *"as information technology continues its rapid cost performance improvement firms will continue to find incentives to co-ordinate their activities electronically."* [18]. Business organisations will therefore be subjected to tremendous economic and strategic pressure to adopt e-business and its concomitant technologies, of which XML is well placed to play a significant role.

E-business will facilitate easy access to information and an efficient means of disseminating decisions resulting in many of the functions that were traditionally thought of as essential being re-engineered to extinction. A de-layering of middle managers and staff throughout the secondary activities of business will ensue. This will result in the development of flatter networked organisations characterised by enhanced responsiveness, flexibility, agility and superior financial performance [19]. Organisations with traditional hierarchical structures will ultimately face a bleak future as they fail to remain competitive in an expanding virtual economy.

4. Conclusion

The forces of globalisation, the knowledge and information revolution and structural change interact in a dynamic relationship generating a turbulent economic environment. The ability of businesses to flourish in such conditions is dependent upon their ability to harness at least one source of competitive advantage. The sources of differentiation, cost leadership and quick response can be developed by the application of information technology to the value system. This, however, effects the organisational structure of business facilitating flatter, networked organisations, which in turn stimulates economic growth. Until recently these changes have been constrained by the lack of an economically viable technology. Only larger organisations that could finance EDI have been able to achieve a competitive advantage.

The popularisation of the Internet and the development of associated technologies including XML applications have overcome the limitations of EDI and laid the foundations of an e-business revolution. It is expected that two years after the USA launches into e-business *hyper-growth* Europe will follow. Business processes will have to be re-engineered to integrate suppliers and partners into strategic alliances within automated value systems (networks). Significant improvement in financial performance will accrue to "first-mover" businesses adopting e-business and as a result of de-layering the trend towards flat organisational structures will accelerate. These companies will achieve enhanced responsiveness, flexibility and agility and will threaten the survival of competitors maintaining traditional hierarchical structures. Generally organisations with traditional structures will be unable to remain competitive in an expanding virtual economy.

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