Making the ASP model work: using SD to explore trade-offs in IT service product design

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Making the ASP model work: using SD to explore leveraging in software access options

Abstract

The value-added potential of e-business is the driver behind many firms engaging with new information technology products and processes. However, promise has not always been fulfilled. An apparent mismatch between customer expectations and vendor offerings also suggests a lack of appropriate methods and techniques for evaluating strategic benefits from e-business, and some have argued that IT in many respects is now merely a commodity infrastructure. This paper draws from a longitudinal research study on application service provisioning (ASP), an e-business model targeted mainly at small and medium businesses (SMBs). By addressing the inherent complexity of the ASP model, the paper demonstrates how a series of critical inter-relationships between key performance indicators (KPIs) will impact the business value for customers. The paper offers insights into critical factors that could make the ASP model work, and, if it could, then how clients could still obtain competitive advantage from engaging their services.

Introduction

In a recent Harvard Business Review article, Nicholas Carr (2003) argues that IT is now effectively a commodity, and he draws comparisons between IT and other infrastructure services like electricity and the railways. He suggests that when in their early days and such infrastructures services were relatively rare, firms could gain strategic advantage from exploiting them, for example by locating along railway routes or electricity generating sites or by wiring factories to provide power at the point of use rather than via complex mechanical belt systems driven by a central source like a water-wheel or steam engine. His further argument is that firms can no longer gain *strategic* advantage from IT, anymore than they can from the railways or use of electricity, though access to these infrastructure commodities at minimum cost can still provide some competitive advantage. Also, like

transportation and electricity, IT may now be low cost and largely undifferentiated but companies are very vulnerable to their security of supply – a power outage or email system fall-over can wreak havoc on operations and communications. Carr's 'New Rules for IT Management' (Carr, 2003, p. 48) emphasise three new priorities:

- Spend less it is now harder to gain strategic advantage and easier to put a business at a cost disadvantage now
- Follow, do not lead opportunities for strategic advantage from cutting edge use of IT is now much rarer, but buying something that is flawed or doomed to rapid obsolescence more common
- Focus on vulnerability, not opportunities the scope for major IT-induced calamity is greater than for IT-lead advantages.

In the late 1990s, Application Service Providers (ASPs) emerged in various guises to offer hosted software applications, mainly to small and medium businesses (SMBs) (Dean and Jackson, 2000; SCN Education, 2000). These offered a lower cost and more convenient access to software applications through a rental-type arrangement with an external provider instead of individual software purchase, and in some respects could be seen as a further reflection of the commodity nature of IT applications. Many of the ASP firms were start-ups, where their ability to differentiate their product and service offerings depended upon forming business relationships with other technology firms (i.e. independent software vendors, hardware manufacturers, and telecommunications firms) (Kern et al, 2002). Between 1999 and 2001, over 750 ASP firms joined the newly formed ASP Industry Consortium (Currie, 2002). Yet by the end of 2001, many of these firms had ceased to exist (Hagel, 2002). Many explanations have been offered on the demise of ASPs: the failure of ASPs to enhance customer satisfaction and offer integration (Susarla, et al, 2003); the flawed nature of the ASP business model resulting in poor customer adoption (Hagel, 2002); the lack of maturity in the IT infrastructure, where customers were offered unsuitable software applications on a remote basis which had been developed using customer server technology (Wainewright, 2002); an apparent mismatch between vendor offerings and customer requirements, especially where large ASP vendors failed to understand the business and technical needs of small firms (Currie et al, 2004; Clancy, 2001); and poor methods and techniques for evaluating different ASP vendor offerings (Currie, 2003a).

Research by Currie (2003a) into value creation from the ASP business model utilised a risk assessment framework comprising five key performance areas (KPAs): delivery and enablement; integration; management and operations; business transformation; and customer/vendor relationships. Each KPA comprises a number of key performance indicators (KPIs) for evaluating ASP vendor offerings. This paper uses maps system structures using causal loop diagrams from system dynamics to examine the leverage points in managing aspects of delivery of ASP service extending that original work. The process of defining the structure of the model in this way might highlight additional 'factors and variables, or relationships amongst them, that previously have not been addressed'. McCray et al., (1999, p. 350). The paper specifically considers how factors influencing service performance that are linked with Carr's new perspective on IT access interact. Specifically the paper looks at the balance between the level of service that is being offered and achieved in terms of 24 X 7 delivery and the trade-off between a service offering that is configured to clients' individual needs. Of course, if IT functionality is viewed as a commodity and cost containment a key priority, it has to be borne in mind that both the assurance of continuous service and any move more towards a tailored rather than a one-fits-all service product requires resources and hence ups delivery costs and the price of the offering to clients. A clearer picture of the inter-relatedness and trade-offs in this provision highlights some of the factors that must be got right to make the ASP model work.

The Rise and Fall of the Application Service Provider

Conceptualising a model for an electronically-based business offering as a unit of analysis (Amit and Zott, 2001) enables researchers to focus upon how firms develop and implement ebusiness initiatives at the organisational level to better understand how specific managerial strategies, policies and practices may differentiate business performance (Mahadevan, 2000). However, other writers prefer to focus upon the societal and industrial level of analysis (Porter, 2001) and are sceptical of the e-business concept. In this paper, we accept that both levels of analysis are relevant. Clearly, the focus upon the micro (organisational/managerial) level without an understanding of how industry factors influence the success or failure of firm performance results in a distorted analysis. Equally, a macro (industry) level focus, without an understanding of how business and technical strategies may differentiate firm performance is also of limited value (Magretta, 2001). Other writers take the e-business model concept further by decomposing it into a number of 'atomic' e-business models (Weill and Vitale, 2001). recognising that each type requires different IT infrastructure capabilities (Weill and Vitale, 2002). These atomic models have been extended by Joyce and Winch (2003) with more detailed process representations that bridge across e-business strategy, process configuration and ICT infrastructure specification, reflecting that the way in which firms develop and manage their IT resources will influence the outcome of their e-business initiatives (see also, Ross et al, 2001).

The rise and decline of the ASP business model offers some interesting insights into the 'irrational exuberance' of the dot.com era (Cassidy, 2002). It also casts serious doubt on frequent suggestions that firms invest in Internet-based technologies, even before the evaluation tools to demonstrate how business value are available. Entering the market in the mid-1990s, ASPs were intended to offer SMBs a fast and efficient way of remotely accessing their data (Kern and Willcocks, 2002). ASPs emerged in many guises, from those offering enterprise resource planning (ERP) and customer relationship management (CRM) packages on a subscription basis, to others offering simple commodity-based software applications (email, calendaring, etc). Research work undertaken in conjunction with the ASP Industry Consortium identified five KPAs: Delivery and Enablement; Integration; Management and Operations; Business Transformation; Customer/Vendor Relationships. A total of over thirty KPIs are spread across the categories, about six in each. (Currie, 2003a; Currie et al, 2004). These are listed in Appendix 1, and a summary of the leading KPIs in each category is presented in Figure 1.

The five KPAs identified as important attributes of the ASP business model were tested using a survey instrument in five vertical sectors (Currie et al, 2004). The results showed that, respondents attached different priorities to specific KPIs. For example, within the KPA category of 'delivery and enablement', the two most important KPIs for potential and existing customers (using a five-point scale) were 'data security and integrity' and 'disaster recovery and back-up'.



Figure 1. Key Performance Indicators in ASP delivery within each category

However, interviews with ASP vendors and customers suggested a mis-match between their different priorities and perceptions of the ASP solution (Currie et al, 2004). ASP vendors tended to emphasise the importance of attributes such as 24 x 7 access to remote delivery of software applications; whereas customers were more concerned about data security. Whilst this research offers some interesting insights into how existing and potential ASP customers rank each KPI, it does not elaborate on the inter-dependence of the KPIs, particularly insofar as vendor attention on improving performance in one area (i.e. data security and integrity) may result in a more expensive service.

Analysing complexity and identifying success leverage points.

The ASP model is an attempt to move away from the traditional approach of selling software (i.e., licence and maintenance contract) direct to end-users towards the provision of a software-as-a-service concept. In providing the software in this manner there is no longer a clear distinction of software as a product versus a service provision. Indeed, the service industry of software provision now allows an avenue for ASP companies and software vendors to "net-enable" their applications and deliver core applications over the Internet to their customers (Kern et al, 2002). The assumed benefits to businesses are, clearly, a reduction from the full cost of ownership ranging from multiple sites and platforms, the

ability to keep up to date with the latest ICT, better manageability, and the integration of ICT with the their core business.

Currie's research suggested that ASPs consider that 24x7 provision is likely to be a key element of the value proposition, though they do not always consider exactly what this means in actual system up-time (Currie, 2002). For example, the cost difference between offering a service guarantee of 99.9% and 99.999%, may be considerable. Further, the research also suggests that for the customer, an important question will be whether they actually need 24x7 service, and even if they do, what are the consequences of periods of service downtime? This analysis emphasises the critical importance to the ASP of segmenting the marketplace in terms of the importance of 24x7 service. Offering and costing a service that gives high levels to all may initially seem an attractive strategy.

However, if the levels of service actually offered fall short, customers who value this KPI will be negatively affected by this impact. Their response will initially be frequent and demanding calls to customer support, next will be intervention of senior managers diverting them from core activities, and possible rapid decline in confidence in the ASP. A targeted offering which aims to deliver top-level 24x7 service to customers for whom it is critical backed up by separate, dedicated and customer-knowledgeable service is more likely to meet their demands. A more 'vanilla' level of services at lower cost levels can be delivered to customers for whom this service is not critical. An interesting observation from the first phase of the ASP research was that all ASPs tended to market their services on the strength of a 24 x 7 (anytime, anyplace, anywhere) remote delivery (Currie and Seltsikas, 2001). Yet interviews with existing and potential customers found that 24 x 7 was not their most pressing concern (Currie et al, 2004). More important concerns were data security and disaster and recovery, and it was these issues, which precluded many firms from deploying an ASP solution in the first place.

In analysing the structural relationships in this system and how they are likely to impact on system behaviour, and ultimately company performance, two loops within the structure are likely to be key, and it is the impact of these that determines the important system issues highlighted above. Reinforcing feedback is a loop structure that is behind the growth ambitions of most firms. The principle is that their actions lead to success, which provides resources to invest in further actions and developments leading to further growth, and Oliva

et al. (2003) have also investigated the 'get big fast' mentality within the e-commerce sector. Two key loops of this sort are present in the structure in Figure 4. Sales of the services offered generate the firm's revenues and these are used to deliver service to the customer as contracted and to fund the staff employed to provide service support and make further quality enhancements. Both of these are important elements of the proposition in terms of 24x7 delivery. The two loops are isolated in Figure 2.



Figure 2. Reinforcing feedback in the 24x7 service proposition

As with all reinforcing loops, their presence can be a double-edged sword. Provided that the revenue streams are effectively invested then the necessary levels of service will be achieved and quality of service is maintained and improved, the proposition remains attractive and leads to further sales and accelerating revenue growth. However, if one or other of these effects does not happen – the ASP is unable (for whatever reason) to deliver service or quality declines - then the attractiveness of the position reduces, sales do not increase and may decline, leading to reductions in investment and the service levels, with quality spiralling downwards. This dynamic explains why many firms can have initial success as a product or service is launched and is initially well received, but quickly optimism declines as sales fall off. This typically occurs when firms are capitalised to provide good levels of service initially, but under-pricing or price-reducing to defend against entering competitors means they are unable to maintain a revenue stream sufficient for these needs. The proposition begins to look unattractive with sales declining further, leading to the ASP vendor going into morbid decline.

This analysis suggests that caution must be exercised by companies in terms of the levels at which they set their charges to be competitive but at the same time prices generate sustainable revenue streams. Further, they must use the revenues by investing in resources that support quality service delivery, and be patient and not take resources out of the system by early profit taking. The danger of these loops going into morbid decline are real, and maintaining a rigorous monitoring system to give early warning if expected sales growth flattens, so that remedial action can be taken before unsustainable revenues force drastic action. If companies, for example, are panicked into price-cutting to compensate for poor quality delivery, they may well drive themselves into an unrecoverable system. This has been observed in other studies relating to internet-based sales efforts (Winch, 2001).

A further internal danger is highlighted where another effect in conjunction with the reinforcing feedback structures in Figure 2. This involves a mechanism whereby a goal or target of providing a 24x7 service influences the behaviour of the system. The effect is that the system will tend to be balanced or controlled towards the achievement of that goal. This balancing feedback' is an important mechanism where management control of aspects of the system are sought, but can also frustrate ambition by negating the impacts of desirable reinforcing structures.



Figure 3. Over-emphasis on present delivery limits future growth

In this situation, if an ASP believes that its customers value the 24x7 service above all other factors, it may commit the maximum available support staff to supporting current delivery. For example, it may channel resources to the 24 hour help-desk (possibly creating over-

capacity in this area). In the short-term this has a positive effect in that it will maintain the quality of service delivery and the attractiveness of the proposition. But a negative result may be that resources are diverted away from developing future quality enhancing initiatives. Over time the quality aspect of the proposition may therefore be eroded which in turn limits future growth potential (Figure 3).

This analysis emphasises just how important it is that ASPs understand customer priorities. Devoting disproportionate resources to providing a 24x7 delivery system to customers who do not require it, will divert resources away from future developments that other, if not all, their customers do value.

Tailoring Solutions by Configuration and Integration of Package Solutions

The ASP model is an attempt to move away from the traditional approach of selling software (i.e., licence and maintenance contract) towards the provision of software-as-a-service. In providing the software in this manner there is no longer a clear distinction of software as a product versus a service provision. Indeed, the service industry of software provision now allows an avenue for ASP companies and software vendors to "net-enable" their applications and deliver core applications over the Internet to their customers (Kern et al, 2002). The assumed benefits to businesses are, clearly, a reduction from the full cost of ownership ranging from multiple sites and platforms, the ability to keep up to date with the latest ICT, better manageability, and the integration of ICT with the their core businesse.

A diagram mapping the interlinkages in the configuration and integration of package solutions for an ASP is presented in Figure 4 in familiar casual loop diagram format. A key structure is that the ASP's ability to recruit and retain high quality staff depends on the continued provision of quality services at a sustainable revenue level. The attractiveness of the proposition increases sales, and revenues increase accordingly, allowing the ASP vendor to attract and retain a higher level and quality of staff. The level of configuration and integration is important and may relate to configuring and integrating software packages either developed by the customer, developed by an independent service provider on behalf of the customer, or developed by the ASP.

From Figure 4, it can be seen that there are two major loops of interest: the ASP package integration and configuration loops. Both of these are balancing loops, and can be envisaged as exerting a constraining effect on the growth ambitions of the provider. The ASP's ability to provide software solutions to its customers depends on the skills profile of its IT staff and the portfolio of packages comprising its offer. These add together to define its ability to manage, maintain, configure and integrate packages they have developed as either proprietary systems and/or through the use of third party applications to support their customer's needs and expectations.



Figure 4. Balancing pressures in tailoring solutions versus containing costs

Various types of software packages can be offered by an ASP. The offering might consist of access to a general-purpose proprietary package that is configured for the individual circumstances of the customer. In this case, if it is to be able to cost the service at a price the customer is able and willing to pay, it is essential that the ASP possesses skills in the effective configuration of the software, and it must obtain the package at a reasonable level of licence fee from the third party vendor. Historically, third-party software vendors used a typical pricing policy that set the fees equal to the cost had each customer who accesses the software purchased it outright. Obviously the more the ASP has to pay for the licence fee for the base software, the less scope there is for it to add value in the offering to enable it to recover its costs for providing integration and configuration services to the customers.

A major constraint on an ASP's ability to offer software services configured to meet individual customer needs is the converse economic pressure to deliver 'same-for-all' solutions (Wainewright, 2002). Whilst this would enable the ASP to offer economically a viable delivery access solution to the customer, the ASP will still want to achieve economies of scale, by developing as large as possible customer-base, to establish a profitable business (Currie, 2003b). It will then need to consider how it can develop a unique or distinctive image in relation to its competitors when its offerings are largely undifferentiated.

One strategy to enhance revenues from ASP was full service provisioning (FSP), where an ASPs aggregated a number of different software packages to deliver to a single customer. This proposition points up a number of licensing issues and even if the ASP provides an inhouse solution, the ability effectively to support the customer base in scalable numbers will require considerable levels of skill from the ASP's IT staff. An example of a provider offering FSP was the subsidiary of Cable & Wireless, Cable & Wireless a-Services[™], which encountered numerous problems with software partners relating to software licenses and the challenge of integrating software applications for customers. Although SMEs were interested in exploring the opportunities of remote delivery access and integration, the cost of providing this service was perceived as prohibitive to both the ASP and customer. Eventually, in 2001, Cable & Wireless a-Services [™] was forced to close down, recognising that the ASP model needed to mature (Currie et al, 2003b).

As Figure 4 demonstrates, the feedback loops have considerable balancing power as both package licensing fees and a one-to-many configuration policy can remove the attractiveness of the proposition and consequently the ability to retain good quality staff.

Conclusions

This paper has built upon a programme of research work which developed a risk assessment framework for evaluating ASPs (Currie, 2003a; Currie et al, 2004), but here uses system dynamics methodology to relate specific key performance indicators in ASP performance. It recognises that the field of IT access and provision is evolving with new models like the ASP emerging, and that in some senses IT is now more of a commodity infrastructure service with limited scope for firms to develop sustainable competitive advantage from IT alone.

Focusing specifically upon 24 x 7 service delivery and the provision of customised versus commodity-based software applications, the paper demonstrates how ASP vendors need to take into consideration a complex array of factors and variables if they are to create business value for themselves and their customers. The original Currie research pointed to critical factors in the delivery of an ASP service, but the presentation and analysis of her data in the form of causal loop diagrams further enables us to develop a rich picture of the relationships between phenomena, and how ASPs need to prioritise the resources and efforts they invest in specific activities and tasks.

The paper has echoed some of the points that Carr puts forward in arguing IT is now more of a commodity. The ASP model can potentially support prudent IT users by enabling them to gain access to software only on an as-needed basis, and to keep up-to-date with applications without having to continually purchase software upgrades. The ASP model also gives clients access to troubleshooting, up-grade and adaptation capability on a shared-cost basis, and through an external vendor who takes a large portion of the risk in early adoption of new software. The paper has also considered issues concerning the access to 24 x7 service and risks of systems falling over – the vulnerability that Carr highlights in commodity infrastructure services.

However, whilst this paper can only provide a an insight into some of the of the complexities of ASP, it offers some guidelines for firms in the pursuit of developing e-business models which generate business value for both the vendor and customer. This was a dimension notably absent in the first phase of the e-business era, but as the analysis here suggests, if the model is made to work, critical performance factors delivered, and especially if the right balance between one-for-many and tailored applications can be achieved, then there is still scope for the ASP to offer its clients the opportunity to derive competitive advantage from their service model.

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Appendix	1. ASE	' Key	Performance	Indicators
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ASP Key Performance Indicators				
Delivery and Enablement				
24x7 software applications availability				
Delivery of end-to-end solution				
Ability to scale (to reasonable numbers)				
Ability to migrate existing data				
Data security and integrity				
Disaster recovery, back-up and restore procedures				
Speed to market				
Integration				
Integration of s/w applications across multiple platforms, sites, and environments				
Business process re-design through s/w applications integration				
Integration of billing information into auditing and reporting systems				
To create an IT infrastructure for better manageability				
To achieve faster software application implementation				
Resultant synergy from combination of applications				
Management and Operations				
To allow management to concentrate on 'core' activities				
To reduce total cost of ownership (TCO) through s/w application outsourcing				
To eliminate the problem of managing IT				
To gain access to scarce IT skills				
To achieve greater 'visibility' of IT costs				
To pursue e-business strategy				
Improvements in customer service				
External (hosted) s/w applications infrastructure more cost-effective than traditional outsourcing (where customer owns the s/w licence and pays for maintenance)				
Greater flexibility of outsourcing as opposed to in-house mgt of software applications				
Business Transformation				
To keep pace with the latest information and communications technologies (ICTs)				
To integrate ICT with the core business				
To treat ICT as a service to the core business only				
Strategic plan to increase ICT outsourcing				
To gain senior management support for ICT				
Customer/Vendor Relationship				
Desire to develop strategic partnerships with vendors				
Outsourcing success depends on good service level agreement (SLA)				
Financial stability of vendor critical to outsourcing decision				
Single point of contact (with Vendor)				
Responsiveness of vendor to ICT changes				
The strength of the strategic partnerships between vendors				
Mergers/acquisitions/takeovers between vendors				
Market turbulence and uncertainty				