Modeling, Information Flows, Performance, Strategy and Competitiveness across the Service Value Chain

by John Hamilton, School of Business, James Cook University

Modeling, information flows, performance (measures and benchmarking), strategy and competitiveness are all interrelated within the service value chain. The 'service value chain' is defined as the flexible, dynamic, delivery of a service, and/or product, by a business and its coordinated value chains (supply chains and demand chains working in networked harmony), such that an intelligent, value-adding (external or peripheral partners), specific (internal partners), service and/or product solution (intelligent customer targeted) is effectively, and efficiently, delivered to the individual customer in a timely, physical or virtual manner.

The physical and virtual framework from which service value chains may be evaluated is developed, and specifically extended into the virtual service value chain model. Critical components of this model are explained. A strategic competitive positioning approach is outlined and the constructs and their relationship in the development of information flows, measures, benchmarking, performance, strategy and competitiveness are explained.

This virtual service value chain model, combined with a targeted industry approach and virtual balanced scorecard approach, offers a mechanism whereby a business (or a large multinational enterprise (MNE)) may enhance the competitive strategic positioning and strategic alignment.

Sampson (2000) demonstrates that service supply chains are bi-directional, and that communication between customers and suppliers, and vice versa, must occur, resulting in a partnering between these participants (Vokurka, 1998). Sampson also indicates bi-directional supply chains are typically short lived, but have ‘just in time’ implications with inherent value-added expectations. New metrics tools are incorporated throughout the demand-supply chain to record, understand and interpret value adding solutions. These tools help to:

1) convert and distribute information, products and services;
2) manage knowledge, quality and connectivity;
3) work with virtual partners and customers; and
4) deliver strategic information to management.

Another extension of the value chain is the services value chain. Definitions vary, but in general they refer to optimizing after-sales service situations – right across the service supply chain. The service supply chain is one that, over time, delivers the fully collaborative state of low inventories, efficient planning, and high customer-service levels. This may include all planning, movement and repair of materials activities to enable after sales support of products (de Waart & Kemper, 2004; de Waart, 2003; Poole, 2003).

Services Industry
The services industry provides services not goods (Hughes, Mitchell & Ramson, 1993). This industry is moving towards globalization (Kathawala & Abdou, 2003). In 1870 the service sector employed slightly more than 20% of the U.S. workforce, whilst by 2002 it employed in approximately 82% of the U.S. workforce, and 81% of the private sector.
GDP (US Bureau of Labor Statistics, 2002; 2004). Services Management is a ‘transfunctional’ research area (Kamarkar, 2002). It covers areas including service quality (Chase, 1996), services encounters (Cook, Goh & Chung, 1999), and service execution (Nie & Kellog, 1999). Services operations management (Chase 1996) and services marketing (Berry & Parasuraman, 1993; Swartz & Iacobucci, 2000) provide still other perspectives to services.

Definitions of what constitutes a service vary across the service sector. Definitions of service (and what constitutes a service) range from the narrow to the broad. In 1960 the Definitions Committee of the American Marketing Association (1960) defined services as: ‘Activities, benefits, or satisfactions which are offered for sale, or are provided, in connection with the sale of goods.’ Examples include: amusements, hotel service, electric service, transportation, the services of barber shops and beauty shops, repair and maintenance service, and the work of credit rating bureaus.

Rathmell (1966; 1974) promoted the service sector of the economy, and the true nature of services. (Quinn, Baruch & Paquette, 1987; Murdick, Render, & Russell, 1990) broadened services definitions to include all economic activities where output was not a physical product or construction, was usually consumed when produced, and delivered intangible, added value to the customer - for example, travel comfort. Again services were redefined.

‘Services are deeds, processes, and performances’ (Zeithaml & Bitner, 1996), but they may also be tangible – for example healthcare. Czinkota, Ronkainen and Moffett (2005) split services into tangible areas involving: 1) people (fitness centres); or 2) possession processing (like freight transportation), and intangible areas involving; 3) mental stimulus like (education and religion); and 4) information processing (like banking, data processing). Often services are integrally enmeshed with manufactured goods, or to the delivering (or enabling) of goods. Thus the distinction between goods and services is imprecise, and no clear boundary between manufacturing and service firms exists (Berry & Parasuraman, 1991). Levitt (1972) proposes that ‘there is no such thing as a service industry,’ and that ‘there are only industries whose service components are greater or less than those of other industries.’ He further indicates that ‘everybody is in service.’ Thus one may conclude that all manufacturing is indeed a service, as it delivers something!

Value Chain
Definitions of value vary (Zeithaml, 1988; Anderson & Chintauanta, 1993; Monroe, 1990; Gale, 1994; Woodruff, 1997), but common themes indicate customer value is:

1) linked to the use of a product or service, thereby removing it from personal ‘values’;
2) perceived by the customers rather than objectively determined by the seller;
3) often traded between what the customer wants (e.g. quality, benefits, worth), and what the customer gives up to acquire, and then use a product or service (e.g. price, sacrifices).

Porter (1985) promoted the notion of the value chain as a key activity by which a business could manage and deliver added value to the customer. Both internal and external value chains exist. The internal value chain works within the business itself, whilst the external value chain involves activities performed or linked through by business partners. The value chain approach seeks to deliver improved efficiencies and/or greater business effectiveness. Value may be added to each customer by reducing cost (and/or adding value) to the customer:

1) within each element of the value chain; and
2) at the interface between value chain components (for example, the business sales – customer interface). Value may be defined via Equation 1.
Equation 1:

Value = (Benefit of each VC activity minus its cost) + (Benefits of each interface between VC activities minus its cost)

Other early value creation measures arise from the supply chain (Houlihan, 1987), and the customer chain (Schonberger, 1990). Both involved a series of integrated, dependent processes whereby chosen specifications were transformed to finished deliverables. Emphasis was placed on the integration of activities, whilst also considering increasing customer value.

Rayport & Sviokla (1996) propose the internet enables value creation by gathering, organizing, selecting, synthesizing and distributing information. They define two value chains – the virtual value chain and the physical value chain. The virtual value chain is information technology based, and involves the value chain delivering e-business (e-business to e-business and e-commerce (e-business to consumer) solutions. In some cases human decision making/ control steps are maintained within the virtual environment, but the intelligent software is reaching a stage where these control points are being replaced by artificial intelligence software.

The value chain targets the real-time environment. On-line promotions by leading e-tailers can be monitored on an hourly basis to test customer response and review the competitor’s offers, thereby allowing the business to adjust its targeting priorities, offerings and the like. Thus delivery processes speed up, alignment of products and services is enhanced, and the efficiency of value chain activities with the e-customer improves. The value chain may be deliver efficiencies, and e-sales that may controlled from internal or external value chain constituents or partners.

Kalakota & Robinson (2001) discuss disaggregation of the value chain to streamline efficiencies. For example, logistics outsourcing and subsequent re-aggregation of a supplier mix may deliver new value chain components. Timmers (1999) points out that the value chain may no longer be acceptable as a series of discrete steps, and that technology is offering more possibilities to integrated solutions. For example, Dell uses on-line customized ordering systems to reduce its time to market, improved customer tracking and monitoring, decrease its customer response times, and reduce its delivery times. It uses considerable alliance partner involvement, and its partners have instantaneous data concerning customer purchasing and special requests.

Within the e-business environment, Kalakota & Robinson (2001) developed an early e-business model, potentially capable of delivering business value chain solutions. Business intelligence, knowledge management and database driven websites were incorporated. This integrated framework linked intelligent, innovative actions, and knowledge management, via communications networks across the business service value chain. This integrated system encapsulated:

1) data;
2) learning (or programmed knowledge);
3) the creation of new insights;
4) external sources of information, allowing the analyzed knowledge to deliver customer expectations; and
5) business strategy.

This model may incorporate various, business-specific, intelligence tools that may provide pathways to measure, classify, benchmark, and analyze information against performance criteria. Purpose built artificial intelligence software, and fuzzy logic approximation techniques may be added to enhance the
competitive foci of the available knowledge management systems. Vermijmeren (2003) suggests flexible, intelligent supply chain ‘engines’ drive these dynamic supply chains, delivering value, in an efficient manner. Incorporating high level logistics solutions offers yet another new strategic (and potential competitive advantage) solution, for the on-line business.

Chaffey et al. (2004) and Diese (2000) suggest the modern value chain network may involve upstream value chain partners (suppliers and buy-side intermediaries) working directly to deliver the core value chain activities to the downstream value chain partners or sell-side intermediaries. They suggest the strategic and non-strategic business partners may also contribute to this value chain.

The modern value chain combines the integrated impacts of supply chain and the demand chain, yet retains a customer focus. Value chain modeling (Bagchi, et al., 2003) has shown how changes in speed, responsiveness, and variability affect operational performance, and may enable the business to perform solutions scenario like financial impact assessment, cost-benefit analysis, and sensitivity analysis.

**Service Value Chain**

The service value chain views the delivery of a service, or product, as a service to the customer. Beck (2002.) suggests the ‘services value chain’, supported by consolidation and advances in the information technology upstream supply-side sector, will drive change during the next five years. Beck’s model displayed in Figure 1 suggests groups of equal business partners will share their specific, market-leading competencies, identify a group of similar buyers, and will deliver the required vertical solution repeatedly, reliably and cost-effectively. Beck suggests these consortiums of partners could specifically target the individual customer, deliver high client satisfaction, drive new levels of profitability, and achieve competitive advantage.

![Figure 1. The Service Value Chain Aggregator, from Gartner Dataquest (April 2002)](image)

The services value chain, offers a new business model, and service delivery mechanism. It reconciles two conflicting, but concurrent, requirements of customers - to leverage economies of scale (from a diverse block of data storages), and to be able to deliver highly specific customized solutions (Brown & Vashistha, 2002). This services value chain pathway is being driven by:
1) businesses – now requiring ‘easy-to-implement’, and ‘value-proven’ vertical or process-specific solutions, instead of generic ‘capability-based’, technical support;
2) the drive towards core competency and competitive advantage; and
3) the requirements for holistic solutions – driving cooperation throughout the services value chains, and aiming to satisfy client demands.

France, Da Rold & Young (2003) predict the services value chain will be one of the most important models for the global maturation of the services industry.

The service value chain may emerge from supply chain aggregators (Beck, 2002; Zrimsek, 2002), working with other back-end providers to deliver partial, sophisticated solutions. These aggregators may combine with sophisticated 4th party logistics providers (Gunesh & Hamilton, 2003), working in complex business markets (Selen & Soliman, 2002) to deliver cheaper alternatives (to costly custom-built solutions), whilst delivering value across the service value chain. Aggregators link the business processes (operations, supply chain, customer relationship management, service activities, finances, and others with the business applications infrastructure backbone. These business units are also linked vertically in line with the business strategy. The business architecture offers unique solutions to integrate and optimize components, their environments, movements, and hosting systems. New modes of service delivery are also delivered. Hence, the business aggregator solution delivers the ‘optimized’ internal systems. It ‘optimizes’ the relationships between the internal business and its external customer - strategic partners associates.

Businesses today are both change agents, delivering new products and services that change the lives of consumers (Czinkota, Ronkainen & Moffett, 2005), and change responders. For example, a firm has great difficulty in predicting when, and where, a useful, additional service value chain will emerge, and if it is the ‘optimal’ solution (one that ‘best’ meets the contingent trends of its service value chains; and of its buyers). In this unclear, non linear environment of incomplete understanding the firm and its service value chains should develop high agility (Kassim & Zain, 2004) in their ability to respond to change. Some trends have the potential to accelerate or inhibit the adoption of emerging service value chains. For example, intelligent database driven websites have great advantage over webpage solutions because they are capable of delivering specifically sourced data direct to a standard template page structure.

**Service Value Chain Encounter Model**

The ‘service value chain encounter model’ offers the framework for a new research model. This model is displayed in Figure 2. The operational, services and customer strategies of the business are drawn together as interconnected data sharing models delivering unique customer services encounters – ones aiming to exceed customer expectations! This business system learns from its customer encounters, and improves its services database offerings ready for additional, or more specific, customer encounters.

This model fits cohesively across:

2) commercial services business solutions providers including Gartner (www.Gartner.com); Comergent (comergent.com); UPS (ups.com);
3) value chain modeling including Diese (2000); Chafey et al., 2004;
4) software developers including Microsoft and IBM.
The ‘Service Value Chain Encounter Model’ component delivers the business’s latest service value chain networked information systems, data storage and retrieval systems. It incorporates latest web metrics (Rayport & Jaworski, 2001; Sterne, 2002), fuzzy logic and artificial intelligence (Chen, 1996; Li, 2000; Kenney et al., 2002; Chen & Huang, 2003) tools, to:

1) determine customer needs, wants and options;
2) interrogate its internal and external databases;
3) source, sort and interpret available information;
4) deliver customized (or personalized) solutions capable of targeting perceived physical or virtual customer expectations.

This learning networked system is very different to the normal ‘rigid core component’ experienced in normal website service offerings (Leonard-Barton, 1995). It also incorporate issues related to failures and recovery (Miller, Craighead & Karwan, 2000). In short, the ‘operations concept’ component delivers the ‘how’ to the service value encounter.

The ‘customer targeted’ component establishes a relationship to the service being offered in terms of its efficiency, relevance, scope and performance (Kalakota & Robinson, 2001; Sterne, 2002). This requires the cognition to recognize, and then target, the specific customer group. In some cases it allows for degrees of customization (and possibly one-on-one ‘customerization’), of the customer service product. The understanding of the target market(s) remains an important consideration as it enables a viewpoint for new service development (Heskett el al, 1990). In short, the ‘customer targeted model’ component delivers the ‘what’ appropriately targeted to the ‘whom’.

These three components of the model, and their downstream areas, house much of the business’s intellectual property. They remain integrally linked downstream via a
modern ‘service value chain’. Downstream business supply chain partners, logistics support, peripheral partners and other external data sources are interconnected and interrogated across the business integrated IT networks. Here internal and external data, logistics, and the like are pooled, shared, cross-model, and then applied to provide new business systems learning, and new, improved, upstream customer solutions. The customer and the business network come together at the service encounter ‘touch-point’ Thus, the business aims to deliver the ‘best’, customer demand chain driven, customer value chain response, possible from the available value adding set of databases at its disposal.

The ‘upstream customer service encounter’ has two components –
1) a ‘physical’ (tangible) encounter between the customer and a business contact person or persons;
2) a ‘virtual’ (intangible) encounter with an IT based website structure, which is often visually connected via its internal or external business website. In both cases, information flows from customer to business and business responds sourcing relevant, allowable (non-sensitive), correct information.

Business then delivers customer requested, value chain sourced information (in a timely flow), across the service encounter interface and through to the customer. Chinese University of Hong Kong and National Sun Yat-sen University research (Liang, 2003) indicates customers in the US buy using multiple channels – including stores, catalogues, and on-line activities. The service value chain operates across both physical and information pathways and networks. It is a key part of the operations management equation (Heizer & Render, 2005). Such viewpoints support the physical and virtual service value encounter model. Sterne (2002) supports the notion that businesses offering both the physical and virtual encounter options tend, in the current market to be more successful, but that both models may also operate independently.

Businesses today are increasingly developing extensively networked on-line offerings, combined with high levels of interconnectivity between partners, alliances, and associated value adding organizations. In addition, they are moving their supply chains into high-tech, networked, intelligent solutions – termed service value chains (Barlow-Hills & Sarin, 2003).

Service Value Chain Defined
As the distinction between goods and services remains imprecise (Berry & Parasuraman, 1991), and Levitt (1972) suggests all industries are involved in services, it could be suggested that all manufacturing is indeed a service, as it delivers something! Van Looy, Gemel & Dierdonck, (2003) consider the value chain as a ‘value constellation’. They take a more ‘holistic view of the way in which the innovation process creates value for the final customer.’ They believe the value chain constellation inspires ‘innovation managers to fully understand and articulate how the products and services are developed by the organization, in interaction with other (complementary) products and services, creating value for the customer,’ …’leading to integration of activities across the value chains (rather than along the value chain) into new product and service offerings.’ It is often difficult to fully isolate services from products and vice-versa. However, to deliver greater customer value a pure services business, like financial services, may focus its traditional activities along its value chain, and may also focus on the integration of its complementary activities.

Drawing on the above, and the views expressed in the literature to date, the author defines the ‘service value chain’ as the flexible, dynamic, delivery of a service, and/or product, by a business and its coordinated value chains (supply chains and demand chains working in networked harmony), such that an intelligent, value-adding (external or peripheral partners), specific (internal partners), service and/or product solution (intelligent customer targeted) is effectively, and efficiently,
delivered to the individual customer in a timely, physical or virtual manner.

**The Virtual Service Value Encounter Model**

In 2003, Australia’s ‘business to business’ and ‘business to consumer’ e-commerce was valued at $11.3B, and it was growing rapidly. It ranked 5th in the world regarding its potential to use the internet economy! At this time, thirty five percent of Australian businesses purchased on-line and eighty nine percent of Australian businesses were on-line. Australian businesses (with more than ten employees) recorded near ubiquitous Internet adoption (Di Gregorio & De Montis, 2003). Australia is but one example of how the Internet has transformed key businesses and agency functions including services delivery, customer relationship management, organizational administration, supply chain management and knowledge (or data) management. In addition, the world is highly interconnected via the Internet. In January 2004 over forty six million web servers worldwide were globally connected to the Internet (H’obbesZakon, 2004), with three percent connecting with the browser Netscape and ninety six percent connecting with the browser Internet Explorer (Congressional Internet Caucus Advisory Committee, 2004). Thus, for many countries like Australia there remains considerable scope for growing the business’s virtual service value chain encounters with customers.

The business website presents one form of the ‘customer service value chain encounter model’ – the ‘virtual service encounter model’, and it is displayed in Figure 3.

![Virtual Service Value Encounter Model](image)

**Figure 3. The Virtual Service Value Encounter Model © Hamilton (2004)**

This e-service encounter environment presents several potential virtual customer services related weaknesses and several points of research including:

1) amplification and bottleneck effects;
2) e-services;
3) the web interface;
4) customer targeting;
5) information communication technologies;
6) virtual finance metrics effects;
7) environmental business effects;
8) operational performance effects;
9) customer effects; and
10) competitive positioning and strategic alignment effects.

These factors are elaborated below.
Amplification and Bottleneck Effects
The bullwhip effect is defined as the "phenomenon where orders to the suppliers tend to have larger variances than sales to the buyer (demand distortion), and the distortion moves upstream in a amplified form (variance amplification)" (Forrester, 1961; Disney & Towill, 2003). Akkermans & Vos (2003) investigated amplification (or bullwhip-like) effects in service supply chains. They also investigated countermeasures to reduce upstream amplification effects, with quality improvement being determined as the most powerful countermeasure, in particular process quality. Lee et al. (1997) consider customer ordering as a lumpy occurrence to which the supplier responds. Many reasons may drive such decisions, such as block salesman order submissions, discounting, timing, chance, demand trends, and the like. Finch (2003) states: 'a key to eliminating the bullwhip effect and a key to any supply chain management effort is an increase in 'information' supplied by business to their suppliers'. Hence, measures aimed at website quality improvement (from the customer's perspective) may enhance the internal service supply chains. This indicates that upstream amplification (or bullwhip) effects may be reduced when a website delivers more efficient, more direct, targeted, and more uniform information access pathways between the service value chain and the customer. In this context, improved information flows - delivering manageable amounts of filtered, most relevant, information to the customer - may deliver one solution.

Bottlenecks occur when a limiting resource affects the output level of the entire system, and therefore are considered as system constraints. In the services industry, the business website may become an information bottleneck. Multiple customers search multiple supply chain data sources for their individual needs. Inefficiencies arise, such as some customers finding wrong information, making non-intuitive decisions, and/or using excessive 'clicks-to-purchase'. For example, a vast array of users may intersect a certain web page at the same time, and may even choose to download items at the same time. Such customer related activities may slow access to everyone, and may place additional strain on the upstream supply chain, or they may exacerbate bullwhip effects by not allowing the timely transformation of quality information among value chain partners. The resultant bottleneck is normally overcome (or prevented to a degree) by designing excess capacity within the information system network. The extra cost involved may be in the form of additional excessively fast processors, more neural networks, over-designed database systems, and the like. Furthermore, efficient design of the website (with the use of appropriate technologies), may reduce customer cycle-time (customer website access time to source, retrieve and absorb desired information) (Malinski, Dominick & Hartrick, 2001; Cutler & Sterne, 2002), thereby reducing bottlenecks, and possibly improve website effectiveness. The resulting 'touch-point' information trade-rates between the customer and the business service value chain are therefore subject to continuous improvement.

E-Service Effects
Many market forces influence the development of the service value chains. There is an ever-present economic imperative to reduce IT costs, whilst increasing both the business value, and impact of this IT suite (Kaplan and Norton, 1996). Many businesses cannot afford high degrees of IT customization, and indeed this may not always be necessary – consider a mass user situation like on-line airline bookings. Hence size and capital remain limiting factors.

The type of customer market is another factor. For example, Schmenner, 1986; Fitzsimmons & Fitzsimmons (2004) suggest that when services are considered there is range of labour, interaction and customization. They offer a four quadrant model 1) service factory (low labour, low interaction and customization); 2) mass service (high labour, low interaction and customization); 3) service shop (low
labour, high interaction and customization); and 4) professional service (high labour and high interaction and customer service). Numerous other ways to classify services include the degree of: intangibility, customer contact; simultaneity; heterogeneity; perishability; demand fluctuation; service customization; labour intensity; service direction towards people or equipment (Van Looy, Gemel & Dierdonck, 2003) Thus making general statements about services remains difficult.

Timelines to move to on-line service value chain solutions will also vary. A service value chain is achievable where durable alliances between technologies companies, services companies and other relevant participants continue to deliver and to maintain appropriate solutions. Complete service value chain partnering across, and within, the multi-provider network remains a vital ingredient. The Australian real estate industry's premier website operator 'realestate.com.au' offers a degree of partnering. However their approach to added value partnering is merely to offer partner links within their portal – this is not a true service value chain. It is at best a systems aggregator. Dell.com offers a partial service value chain solution, with degrees of customization, again not a true one-on-one customerization model, and one with scope for improvement!

A true service value chain integrates all aspects of its business's service supply chain – internal and external in an intelligent, coordinate manner. It then interrogates the relevant data and delivers business-specific intelligence that matches the demands of the customer, again reducing inefficiencies. This area remains one with great scope for further research and development. Various third party logistics solutions have been developed to integrate these areas with those of other businesses, delivering new strategies, solutions and competitive advantage.

Website Effects

Many business's website solutions deliver a virtual global presence, but do not attempt to add value (Evans, 2002; Al-Mudimigh, Zairi & Ahmed, 2004), nor do they recognise customer or customer group requirements (McQueeny, 2003). The modern business website, in contrast, is a database supported customer interface, offering a wide range of business products and selected corporate information for external (customer) use. By incorporating software programs that query the available database information, apparently 'intelligent' solutions to customer requests may be offered. Such intelligent website acts similarly to an intelligent, inquisitive, reasoned, language sensitive search engine, capable of taking in customer requests by voice, email, image, 'search-for ...'; and the like. Artificial intelligence, knowledge management, and fuzzy logic principles can then be applied to determine efficient, appropriate business-specific solutions.

The resulting 'intelligent' website processes may reduce the need to revisit and reinterrogate databases, and may reduce the non-productive, time consuming, information seeking workload demands on the service supply chains, thereby yielding potential tangible and intangible cost reductions. Furthermore, fewer demands per initiative, per customer, may reduce the information transmission strain across the global communications networks, and hence reduce negative customer sentiment.

The development of intelligent websites remains inherently expensive, and is not needed in all situations. Evans (2002a) suggests the world is moving into the realm of killer applications, built on combinations of other killer applications, and that in the future computers will begin serving, rather than command, the customer. Situations can be envisioned where information will move seamlessly across location, device, physical and virtual boundaries. This type of solution may be visualized as a brokerage house where the customer may receive direct information, or be offered added-value solutions, via the brokerage house's external sourcing tools. If required, the customer may then be offered even more
specific, targeted details. Such an ‘intelligent’ website offers great opportunities. It could tap into customer senses, conveying its filtered information on request, using visual, audio, text and other queues.

To develop such solutions the flat website encounter must be converted to a new three dimensional approach. Microsoft.com is developing such solutions. Imagine standing in a room, and reaching with your mouse to extract desired files from this surrounding 3D space. Firstly, being 3-dimensional instead of 2-dimensional, a much wider array of relevant customer information may be readily accessed via this means. Secondly, such a system may result in improved information flows, as fewer pages may need to be accessed to get to the information of interest. Thirdly, information may be prioritized in terms of depth or importance, with most important information closest to the front of the “3D-room”, and least important information near the back of the room. Fourthly, greater volumes of sorted and specific information are instantly accessible. Such a three dimensional site requires customer education, since a degree of homepage clutter must be fathomed (or sifted) through, prior to information access. This newly emerging web-interface will offer great opportunities for more effective information flows in future service value chains.

Customer Targeting Effects
When a customer encounters any aspect of a business a ‘moment of truth’ arises, and positive or negative impressions can be generated (Albrecht & Zemke, 1985). In highly customer responsive business systems, customer contact time may be lessened and sales opportunities may be enhanced (Davis, Aquilano & Chase, 2003). The customer may be an internal customer (working for the business, a participant in the upstream service value chain, or and internal services participant in an area such as data processing, engineering, maintenance, accounting, after sales service (Davis, Aquilano & Chase, 2003), or an external customer (a consumer or one who interacts with and adds value to the business service value chain (Tenner & De Toro, 1992). To service the virtual customer strategic, responsive, flexible, adaptive, service value chains often offer desirable options. Parasuraman, Zeithaml & Berry (1985); Finch (2003) and others suggest that delivering quality services may involve both assurance and empathy. The delivery of sound website service quality should encapsulate service and product dimensions. Thus, when considering websites, key dimensions of quality to be addressed include:

1) performance;
2) features;
3) durability;
4) serviceability;
5) reliability;
6) responsiveness;
7) reputation;
8) tangibles;
9) aesthetics;
10) assurance;
11) empathy
(Gavin, 1984; Parasuraman, Zeithaml & Berry, 1985; Pisek, 1987; Fitzsimmons & Fitzsimmons, 2001; Sterne, 2002).

Thus the website becomes a complex system, with the customer service value chain ‘touch-point’ providing a vital cog to deliver customer quality of service. Marketing and advertising based studies (Briggs & Hollis, 1997; Chen & Wells, 1999, 2000, 2001) expand this concept adding satisfaction and effectiveness. Davis, Aquilano & Chase (2003), report that customer satisfaction arises if the service meets or exceeds the customer’s expectations, and they derive the equation (Equation 2):

**Equation 2:**

\[
\text{Customer Satisfaction} = \text{fn(Performance Perception)} - \text{fn(Expectation)}
\]

HAMILTON 39
Hence raising the customer’s perception of performance, or lowering the customer’s expectations, may improve the customer’s level of satisfaction. To date, the consideration of the website as a service value chain enabler has not been investigated.

Rohm & Sultan (2004) explain that strategies to increase customer engagement (time) with a brand, strengthens the customer relationship. Some businesses, like Saturn Corporation (Cohen, Cull & Willen, 2000) in conjunction with their channel partners, match the urgency or criticality of their customers’ varying needs. They aim to develop buyer life-cycle ownership value, and deliver intensively loyal groups of customers. Still others like AB Dick adopt geographically focused permission-based email ‘blasts’ to target promotions at specific customer segments. McCullough Johnston (2001) emphasizes the increasing importance of corporate interaction as companies ‘virtualize’ and adopt less physical approaches. They recognize that website purchasing is moving towards customer empowered, on-line, self paced, exploration of product variations, prior to purchase. Gates (1999) refers to the required business responsiveness to match customer product variation desires as ‘business at the speed of thought’ – where a one-on-one dialogue is established across the website ‘touch-point’. These diverse opinions leave scope for investigation.

Another consideration to website development is the customer’s readiness to adopt new service value chain approaches (Rohm & Sultan, 2004). New levels of required segmentation (Forrester Research, 1996), interactivity, skill and knowledge may also arise as such solutions sets develop. Virtual customers change with the click of a mouse, and traditional, stable analyses often no longer apply (Foss & Stone, 2001). Today customers generally seek value, interest, ease of inter action, simple and quality outcomes in return for their interaction time (Hoffman and Novak, 1996, 2000).

Incorporating ‘value-adding’ solutions (Sterne, 2002; Lawrence et al, 2002) may deliver mechanisms that delight the customer (Lovelock & Wirtz, 2004). Thus the customer exhibits a multidimensional impact on the business website. Hence, the business must maximizing its virtual ‘touch-point’ appeal, and must develop its virtual management tools (and metrics) set.

**Information Communication Technology Effects**

The Internet protocol version 6 (IPv6) software (Comer, 1995) has been encapsulated into the operating systems platforms of major software developers since 1998. However, it still lacks the necessary global adoption permissions that would allow it to be new standard throughout the Internet. IPv6 offers a more extensive, stable uniform address system as compared to the previous IPv4 global standard. It offers several permanent IP addresses per household, and a common secure communication channel for transactions. Although a better system, global resistance to change, combined with privacy concerns, have delayed its implementation. IPv6 will allow marketers to segment a business’s website customers, using postcodes, geographical location, and phone numbers. Mobile devices, watches, and clothing are now capable of housing customized information solutions for business.

Third party software operating on common platforms like Microsoft’s ‘.Net’, or IBM’s WebSphere platforms may further enhance the virtual environment delivering savings for business measured as per initiative - lower ‘human’, and ‘capital resource requirements’. In addition, new ways to interpret, interrogate and deliver customer requirements are unfolding, and highly intelligent, responsive websites are emerging. New business strategies, and the nuances of customer wants and needs, are developing, and will be incorporated into solutions. Working relationships - like ‘e-customer relationship management’
(Deitel, Deitel & Steinbuhler, 2001), trust (Mohammed et al., 2004), loyalty (Zeithaml, Berry & Parasuraman, 1988), satisfaction (Chen & Wells, 1999, 2000, 2001), addressing the dynamics of the industry structure (Canzer, 2003), and cultural fit will become just as important to the customer as the provider's portfolio (Van Slyke, 2003). To date, these latest computer application tools deliver low level solutions (not high levels of customization), and are best utilized for standard product type applications. Hence the development (and implementation) of highly customized software to deliver operational 'service value chains' is not yet a reality.

Virtual Finance Metrics Effects
From a financial perspective, the business must determine tangibles like how much it should invest; how it may optimize its financial benefits and minimize its costs; how it measures /values its information and its customer servicing; what standard payment mechanisms it will accept, and under what standardized system (Deitel, Deitel & Steinbuhler, 2001). Other intangible measures must also be determined, including how customer satisfaction, importance, success, speed of sourcing, trends and best practice are measured (Sterne, 2002).

Environmental Business Effects
Davis suggests there are three key sources of environmental uncertainty that affect supply chains – supplier uncertainty (lateness, inconsistency), manufacturing uncertainty (process performance, breakdowns, supply chain performance) and demand uncertainty (forecasting errors, irregular orders). In addition world class operators and technological innovation (Hahn et al., 1990) have pushed this area into a highly competitive area. Thus, supply, demand and technology uncertainty impinge on the virtual service value chain. Another effect is the Bandwagon effect. Here the business tends to adopt innovations because other organizations have already adopted it (Tolbert & Zucker, 1983), and this is often seen as an easy way forward (March & Olsen, 1976).

Operational Performance Effects
Operational performance is related to many factors. Quality focused businesses maintain a few reliable competent and cooperative suppliers over a long-term basis (Guinipero & Brewer, 1993). The business as a supplier may have its performance is measured in terms of reliability, competence and cooperation (Ahire et al., 1996). Other performance measures that affect the final product (or service) quality include supplier quality, flexibility delivery, cost performance, and promptness of response.

The customer responsiveness also constitutes part of the operational performance measure (Hendrick, 1994). Here, time-based performances predominate (Handfield & Pannesi, 1992), including new product/service development time (Vickery et al., 1995); delivery and dependability (Roth & Miller, 1990); new product introduction time (Safizadeh et al., 1996).

Financial measures including return on investment, profit, sales, present value and net income (Vickery et al., 1995; Beamon, 1999; Neely 1999; Kathuria, 2000; Medori & Steele, 2000) also contribute to operational performance. The degree of customer targeting (Frohlich & Westbrook, 2002), competitive priorities (Porter, 2001; Chen & Paulraj, 2004), the affect of inter-organizational IT systems (Greis & Kasarda, 1997) and the affect of the Internet (Porter, 2001) are other important business performance measures.

Customer Effects
Customer may be segmented in many ways but often the business has two prime customer groups – the e-business to e-business (or B2B) group and the individual external information seeker or discrete buyer (or B2C). These two customer groups respond differently to the virtual service encounter. The B2B customer tends to be an experienced searcher, with considerable knowledge of the website, whereas the B2C customer demonstrates lower overall skills. The B2C
customer displays dynamic expectations (Shepetuk, 1991), and accepts short lead times when waiting for a particular product (Drjaijer, 1992). It is important to satisfy the customer’s needs (Dibb et al., 1994) by identifying them (Carlson et al., 1998), and to target delivering quality, customization and responsiveness (Ahire, et al, 1996; Carlson et al., 1998; Tan et al., 1999).

**Competitive Positioning and Strategic Alignment Effects**

Businesses organising themselves along a virtual service value chain paradigm must be able to compete successfully in the market place, thereby being able to position themselves strategically among competitors, and being aligned internally among value chain partners in terms of a common strategic goal. Porter (2001) evaluated the impact of the Internet as an enabling technology for establishing a distinctive competitive strategic positioning. Porter’s model is modified below to include negative (-) or positive (+) effects inherent to a service value chain approach. The bracketed signs indicate whether the relevant factor has a negative, or positive, effect on the competitiveness and profitability of the business. It should be noted that each specific service industry may exhibit different effects (and to different degrees). The modified Porter-model is given in Figure 4.

![Figure 4. The Virtual Service Value Chain and its Influences on Business, Adapted from Porter, 2001](image)

The supply chain side of the physical and virtual service value encounter model becomes a cohesive partnership of integrated players working collaboratively as a block, in order to maximize the net benefit of their systems. Immediate competitors either mimic the service value chain approach, or develop their own solutions, and hence, points of difference, and learning curve advantages and strategies; which in turn results in different competitive positioning(s).

The development of semi-intelligent websites in service value chains includes four generic dimensions:
1) technical operations factors – including communication channels, software and hardware, artificial intelligence; fuzzy logic methodologies; natural language interpretations; web metrics; website flows and information integration; presentation modes (‘telepresence’ (Hoffman and Novak, 1996) and 3D screens);

2) business factors – including externals (supply chain partners/peripheral partners; logistics); and internals (business, management);

3) customer targeting factors – grouped initially in technographic segments (Forrester, 1996; Stein, 2004), and then cyber-segmented further to allow targeting;

4) revenue generating factors including - sales, charges, advertising, partnerships, franchises, and fees.

These four areas for intelligent websites may be captured using a balanced scorecard approach, similar to one devised by Davig, Elbert & Brown (2004), and based on works by Kaplan and Norton (1992, 1996). A Balanced Scorecard approach may assist in aligning service value chain partners to a common strategic goal, along a balanced set of performance measures. This proposed model is displayed in Figure 5.

Figure 5. The Balanced Scorecard Website Model, adapted from Kaplan and Norton, 1996

The balanced scorecard retains traditional financial measures that utilize past financial records. Modern multi-national enterprises (MNE’s) now investigate how they create future value through investment in customers, suppliers, employees, processes, technology, and innovation. This web-based balanced scorecard approach delivers a four-component, metrics-related strategy. Financially related data is collected and continuously analyzed relative to each of the four perspectives. Astute on-line MNE’S factor into their balanced scorecard additional measures, including:
1) non-financial information (eg. defect rate, churn rate, wrong path, download completion);
2) forward-looking information (eg. future ability to generate cash);
3) the needs of customers.

The balanced scorecard model focuses on competitive areas – to be customer oriented, to shorten response time, to improve quality, to emphasise teamwork, to reducing new product launch times, and to managing over time. It reveals where one area achieves and another fails. Competitive positioning of the MNE’s website using techniques including quality functional deployment (Hamilton & Selen, 2004) (building targeted websites), strategic positioning (Hamilton & Selen, 2003) (gearing website size and functionality to the target market), and incorporating relevant sets of metrics (Sterne, 2002; muchinfo.com, 2004; giga.com, 2004; webcredibility.org, 2004) is also important.

**Virtual Service Encounter Model Constructs**

There are seven key sources of construct development that apply to the virtual service encounters. These are displayed in Figure 6. Each of the seven construct blocks contributes to the service value chain. These construct blocks capture the customer and the business service value chain perspective with regard to performance, and strategy. They may be used to determine if the service value chain is outperforming other less complex models such as the service demand chain, the service supply chain, or the low service integration models. In addition they may be used to determine the business’s virtual service encounter strategies, or even the physical service value chain encounter strategies. They also provide the framework from which to test and compare various business performance and strategy components, construct blocks and measures and even to match these against various customer (internal e-business and or external e-business customer) blocks.

![Virtual Service Value chain Encounter Constructs Model](image)

*Figure 6. The Virtual Service Value chain Encounter Constructs Model © Hamilton, 2004*
These seven construct areas provide a pathway to move forward and to develop measurable service value chains. For example the external e-business customer constructs include requests for assistance, purchases, time per action, customer pain (or error rate), customer anger (or early departure), buyer behaviour (or activity sequence) and the like, and each affects the output of the service value chain. They may be drawn together, and can deliver measurable targeted customer touch-point effects for the business. They can be combined with measurable tangible and intangible financial outcomes, and a new on-line strategic balanced scorecard business model for the business may be developed.

This research is currently being undertaken by the author. It encapsulates the wide definition of the services industry (including manufacturing). Downstream business supply chain partners, logistics support/peripheral partners and other external data sources which are interconnected across the business through integrated IT networks, are being tested to determine how they work within a service value chain paradigm.

The business aims to deliver the 'best' possible value chain-customer response so that it may compete with its capabilities (Stalk, Evans & Shulman, 1992). Hence, the customers, the virtual service encounter options, and the business service value chains are evaluated across the service encounter ‘touch-point’. The performance and strategies of internal and external data, logistics, and the like, when shared, and modeled, against business’s customer data remains the key focus. New, improved, upstream customer solutions are being evaluated.

The virtual service value chain links the on-line customer, the business, the business’s upstream service supply chain, and the business’s peripheral value adding partners across the customer ‘touch-point’ or (intelligent) website. The service value encounter framework within the service value chain will offer an important management dimensions to enable the leveraging of value added solutions through a virtual service value chain business model, and also through the non-virtual service value chain. The balanced scorecard and strategic positioning will further enhance the measurability, performance and strategic alignment of service value chains.

The research model is utilizing seven key construct blocks:
1) The external customer’s virtual service value chain constructs;
2) The internal e-business customer’s virtual service value chain constructs;
3) The operational IT performance constructs;
4) The virtual service performance constructs;
5) The customer targeting constructs;
6) The virtual service financing constructs;
7) The external environmental business pressures.

These seven construct blocks are being tested initially across the virtual service value chain, and later across the physical service value chain. The competitive advantage of the service value chain is thus being quantified.

The customer ‘touch-point’ is complex. The development of reliable measures for the above constructs delivers a strategic mechanism to analyze, and enhance a services business’s performance and competitiveness.

Conclusion

The ‘physical and virtual service value encounter model’ delivers a service value chain view of areas where a business may attempt to close the gap that exists between 'business issues’ in the client side and ‘technology capabilities’ in the provider side. The virtual customer ‘touch-point’ is complex, and many areas of research, development and idea creation may be applied to enhance the business’s website competitiveness (Porter, 2001).

From the ‘virtual service value encounter model’, the bottleneck of the website is exposed. Such bottlenecks potentially
create upstream bullwhip effects and other inefficiencies. The website is the virtual service value chain ‘touch-point’ with the virtual customer, and the above effects all impinge to some degree on the service value chain.

Strategies that deliver service value chains and peripheral value chain components, optimized websites, customer targeting, outstanding information communication technologies, artificial intelligence, and enhanced models are all awaiting research, and offer real value to services businesses.

The virtual customer ‘touch-point’ with the business website (its pages and screen interfaces) should operate as an ‘optimal’ solution for the customer and the business. One partial solution may be to minimize the passage time for the customer to obtain information, and to maximize the efficient delivery of, and quality of, requested (and possibly added value) information flows between the business and the customer. The resulting process should offer more efficient procedures, and can be measured by the reduction of customer revisits and re-interrogations of databases. Such a system should also enhance customer satisfaction, and reduce churn rate (loss of customer). Thus significant tangible and intangible savings may arise.

The disruptive, virtual service value chain links the on-line customer, the business, the business’s upstream service supply chain, and the business’s peripheral value adding partners across the customer ‘touch-point’ or website. The entire business service value chain set working in harmony, using combined skills, know-how, and vision, can reengineer a business scenario, or request into a new dynamic solution. As new technologies, intelligence, knowledge and techniques develop, they to, will be modelled and incorporated.

The task remains to deliver competitive, flexible, agile, dynamic, intelligent receptacles, and to deliver responsive, value adding treatments to customer requests. Such responses aim to deliver materials that meet customer needs, enhance customer knowledge, reduce customer time to decision, and deliver highly satisfying, total quality management customer focused solutions aligned to strategic business objectives.

Hence the realm of business, its virtual service values chain, and its virtual customer base remains an exciting area of investigation. This paper delivers many related opportunities for research and business development and scholars are encouraged to join in developing this emerging field of research and disruptive technologies. In addition, the physical customer may be similarly treated, and the enmeshed with the virtual service value chain network. This research is currently being explored by the author.

References


Brown & Vashistha, 2002


Canzer, B. 2003, E-Business Strategic Thinking and Practice, Houghton Mifflin, Boston, MA.


Dell. Accessed: June 12 2004 at, Dell.com


Evans, N. 2002, ‘Dissecting the Web Services Value Chain: Discover how current Web services offerings are layering the foundation for higher value business services to come,’ Financial Times Prentice-Hall, New York, NY. pp. 1-5.


Hendrick, T. 1994, ‘Purchasing’s contributions to time based strategies,’ Centre for Advanced Purchasing Studies, Tempe, AZ.


Murdick, R., Render, B. & Russell, R. 1990, Service Operations Management, Allyn and Bacon, Boston, MA.


Poole, K. 2003, ‘Seizing the Potential of the Service Supply Chain,’ Supply Chain Management Review, July/August, pp. 54-61.


Tenner, A. & De Toro, I, 1992, Total Quality Management, Addison-Wesley, Reading, MA.


