

The Virtual Service Value-Chain: Disruptive Technology Delivering Competitive Advantage for the Services Industry

John Hamilton

Director of E-Business, James Cook University, Cairns, Australia 4870

John.Hamilton@jcu.edu.au

ABSTRACT

Services have been investigated from a diverse range of approaches. Services encapsulate over 65% of global business, yet there are many gaps in the services knowledge base – particularly from an operations management perspective. This research investigates an emerging and truly disruptive business scenario – the service value-chain, from both a marketing and an operations approach. The service value-chain is defined as the flexible, dynamic, delivery of a service, or product, by a business's coordinated value chains (supply chains and demand chains working in harmony), such that a value-adding, specific, service solution is effectively, and efficiently, delivered to the individual customer.

The 'virtual service value-chain customer –business encounter model' is developed. Impediments to the development of a service value-chain are investigated to delineate future areas of business research. The virtual, information aspect of the services value chain customer 'touch-point' across the web interface offers a raft of new research possibilities and possible new pathways to competitive advantage. Eight key areas related to websites are offered as investigation areas. Business response mechanisms to the customer 'touch-point' must be focus on the competitive mix of strategic features.

Key Words: Services, Logistics, Service value chain, Strategic intelligence, Website, Customer

1. INTRODUCTION

The services industry provides services not goods[1]. This industry is moving towards globalization[2]. In 1870 the service sector employed slightly more than 20% of the U.S. workforce, whilst by 2002 it employed in approximately of 82% of the U.S. workforce, and 81% of the private sector GDP[3]. Services Management is a 'transfunctional' research area[4]. It covers areas including service quality[5], services encounters[6], and service execution[7]. Services operations management and services marketing provide other perspectives to services.

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 of a service 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.

Judd[8] and Rathmell[9] promoted the service sector of the economy, and the true nature of services. Murdick, et al.[10] and Quinn, et al.[11] broadened services definitions to include all economic activities where output was not a physical product or construction, and was usually consumed when produced, and delivered as an intangible, added value to the customer - for example, travel comfort. Again services were redefined.

'Services are deeds, processes, and performances' [12], but they may also be tangible. Czinkota, et al.[13] 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[14]. According to Levitt[15], 'There is no such thing as a service industry. There are only industries whose service components are greater or less than those of other industries. Everybody is in service.' Taken to its logical conclusion, it could be suggested that all manufacturing is indeed a service, as it delivers something!

Encyclopedias including Britannica, Encarta, Columbia; and dictionaries including Oxford and Macquarie, offer a range of definitions of service. To meet these diversities we follow Rust & Metters[16] 'topologies' approach to group some of the complexities of services down onto models.

2. SERVICE TYPOLOGIES

From an operations and marketing perspective topology schemes for services have generally lacked empirically tested works. Empirical works [17],[18],[19], offer some key exceptions, but overall empirical services related research is in its infancy. A topologies approach, based on recent service industry models identifies key

knowledge gaps, and establishes possible empirical research areas.

3. SERVICE MODELS

Figure 1 presents Rust & Metters view of services. They grouped service models as customer models (external) or service provider models (internal).

Each model was then segregated, as shown in Figure 1, into two of the three models:

- 1) 'customer behaviour models' - dynamic models of customer retention (like loyalty) and stochastic models of customer behaviour (like satisfaction), and of customer behaviour (like churn rate or loss of a specific customer during a single service encounter);
- 2) 'service quality impact models' – aggregate models (like customer satisfaction effects) and disaggregated models (like financial impacts of a service component);
- 3) 'normative service models' – organizationally focused marketing models (like incentive schemes and trade-offs between satisfaction and productivity), and operations models (like queuing).

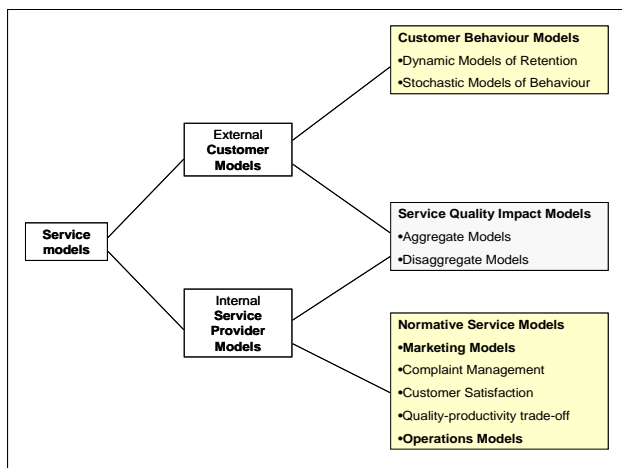


Figure 1. Mathematical Models of Service, from Rust & Metters (1996)

In 1999, Cook Goh & Chung[20] developed the 'integrated schematic representation of services' matrix. Figure 2 displays this integrated services schematic.

They recognized that services could be split into marketing (product) or operations (process) orientations. They believed that in delivering a final 'customized' solution their remained a need to integrate and interact with both orientations. They suggested research in the 'interaction and integration' area may articulate strategies and tactics for improving services.

Roth & Menor[21] delivered a further addition to the services topologies. Their 'service strategy triad' (displayed in Figure 3) separated the 'what', the 'how', and the 'who' of service encounters. It offered a new

perspective to advance an understanding of services operations management. The 'who' was the right customers (and not just a customer segment). These targeted customers could be defined by techniques like Forrester's 'technographics', 'psychographics', and psychographic profiling groups of customers. The interpretation of such target markets provided a means to enhance both service and performance standards, and to allow the business to competitively align its chosen degree of customer targeting with its offered service products and delivery systems.

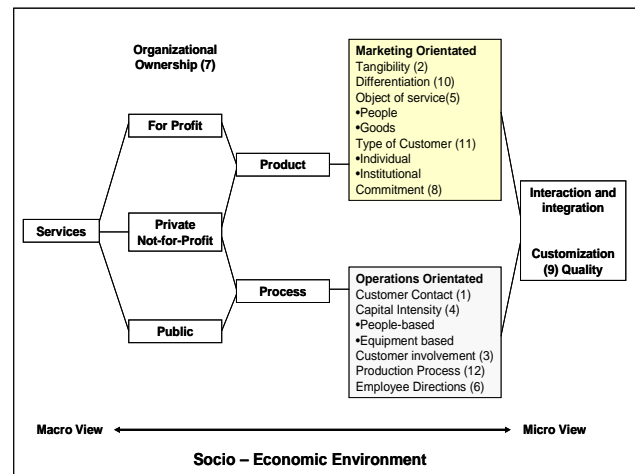


Figure 2. Integrated Schematic Representation of Services, from Cook, Goh & Chung (1999)

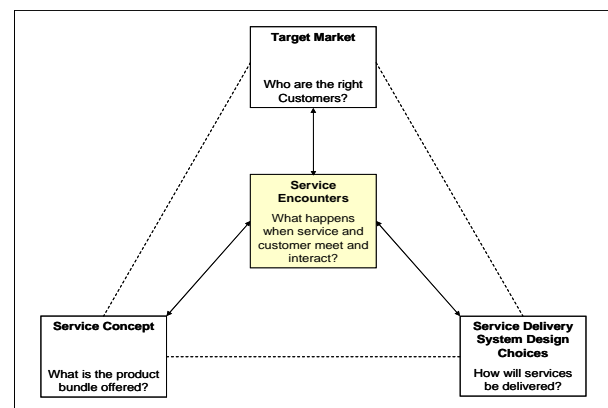


Figure 3. The Service Strategy Triad, from Roth & Menor (2003)

Roth & Menor operationally defined their 'service strategy triad' into 5 elements:

- 1) the supporting facilities (physical and structural resources);
- 2) the facilitating goods (materials and supplies that are consumed);
- 3) the facilitating information (supporting the explicit services);
- 4) the explicit services (customer experiential and sensual benefits);
- 5) the implicit services (psychological benefits).

They realized the total service concept by the customer, may differ from the service offered by the service provider. To overcome this, a feedback loop (execution, assessment of gaps, renewal) was proposed.

Roth & Menor's 'service delivery systems architecture' model, displayed in Figure 4, allows a framework to investigate three interrelated and dynamic components of service delivery systems:

- 1) the strategic service design (portrayed as structural, infrastructural and integration, and based on choices between time-phased content portfolios of major supply
- 2) the service delivery execution system (exemplified by programs, policies and behavioural aspects deliver complimentary areas of customer focus], possibly using balanced scorecard approaches;
- 3) the customer perceived value of the total service concept (intangibles and other effectiveness aspects of the service).

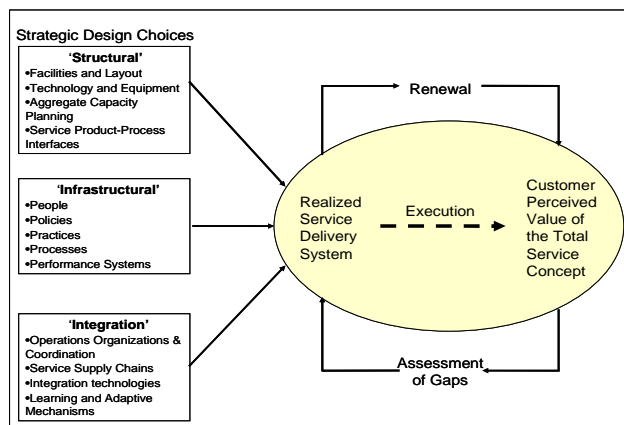


Figure 4. The Service Delivery Systems Architecture, from Roth & Menor (2003)

These features, delivered upstream by the external integration of the service supply chain, combined with the linked internal integration of the operational functional areas, and the adaptive mechanisms available to the intellectual capabilities provide new avenues to perceived customer value. Here the artificial learning and intelligence capabilities of the system, the fuzzy logic approaches to approximate answers, and the rapid absorption of skilled human capital talents may deliver targeted boundaries which offer enhanced potential to the service encounter. The assessment execution and renewal factors encountered define the potential effectiveness of the realized service encounter. These choices are the basis for forming competitive capabilities, in such strategic arenas as the internet, the manufacturing arena, internet marketing, and the services area.

The degree of service competitive capabilities such as consistent quality, supply chain management, convenience, accessibility to channels, customization, one-on-one customerization, operational efficiency and low costs are used by customers to make choices among competitors.

The above models, when considered with other factors like customer demand-driven supply chains, the effect of the internet, business solutions, virtual service organizations and technology options, along with their interrelated, and interconnected links, can be drawn into a new topology model termed the 'service value-chain encounter model'.

4. SERVICE VALUE ENCOUNTER MODEL

The 'service value-chain encounter model' offers the framework for a new research model. This model is displayed in Figure 5. 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.

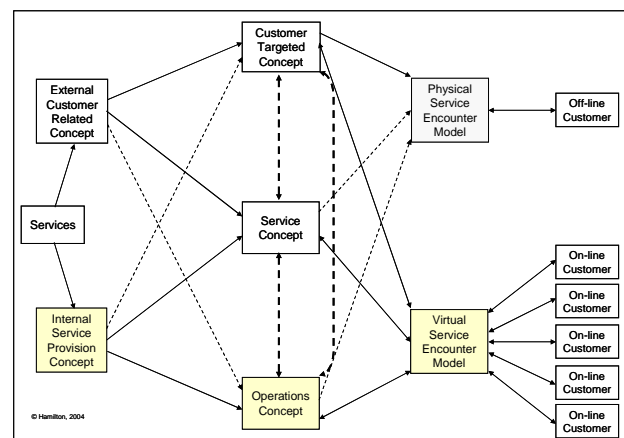


Figure 5. The Physical & Virtual Service Value Encounter Model © Hamilton (2004)

This model meshes with:

- 1) earlier works above;
- 2) other works[22],[23],[24];
- 3) commercial services business solutions providers [25],[26];
- 4) software developers including Microsoft & IBM.

The 'operations concept model' component delivers the business's latest service value-chain networked information systems, data storage and retrieval systems. It incorporates latest web metrics[27], fuzzy logic[28] and artificial intelligence[29] tools, to:

- 1) interrogate its internal and external databases;
- 2) sort and interpret available information;
- 3) deliver customized (or personalized) solutions capable of targeting perceived physical or virtual customer expectations.

This 'renewal' and learning networked system is very different to the normal 'rigid core component'

experienced in normal website service offerings[30]. It also incorporate issues related to failures and recovery [31]. In short, the 'operations concept model' component delivers the 'how' to the service value encounter.

The 'services concept model' component is integrated with both the operations concept model and the customer targeted model and delivers multi-dimensional information from the business and its value adding partners, in a quality manner, such that the greater the depth of information sought, the greater the quality, and the more realized[32] is the customer's experience. In short, the 'services concept model' component delivers the 'what' to the service value encounter

The 'customer targeted model' component establishes a relationship to the service being offered in terms of its efficiency, relevance, scope and performance[33]. This requires the cognition to recognize, and then target, the specific customer group. In some cases it allows for degrees of customization (or even 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 [34]. In short, the 'customer targeted model' component delivers the 'what' appropriately targeted to the 'whom'.

These three component models 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 '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 and electronic based 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 [35] 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. Such viewpoints support the physical and virtual service value encounter model. Sterne [36], a world authority on web metrics, 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 [37]. The 'service value-chain' may be defined as the flexible, dynamic, delivery of a service, or product, by a business's coordinated value chains (supply chains and demand chains working in harmony), such that a value-adding, specific, service solution is effectively, and efficiently, delivered to the individual customer in a physical or virtual manner.

In 2003, Australia's 'business to business' and 'business to consumer' e-commerce was valued at \$11.3B [38], 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 [38]. The internet has transformed many of Australia's key business and agency functions including services delivery, customer relationship management, organizational administration, supply chain management and knowledge (or data) management. In January 2004 over forty six million web servers worldwide were globally connected to the internet, with

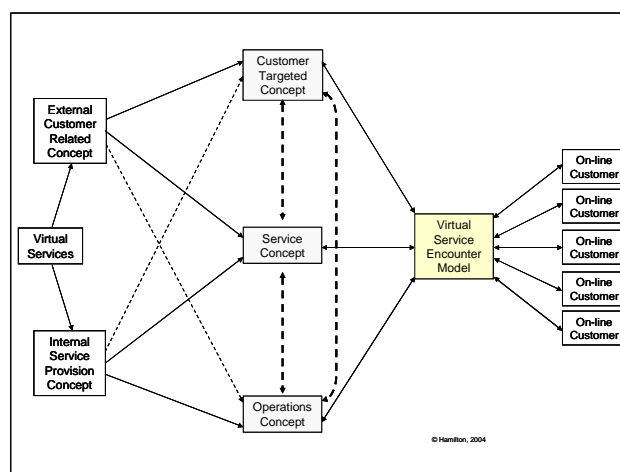


Figure 6. The Virtual Service Encounter Model © Hamilton (2004)

ninety six percent connecting with the browser Internet Explorer. Thus, for many countries like Australia the opportunity remains to deliver high-value service offerings to virtual business 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 6. This e-service encounter environment presents several potential virtual customer services related weaknesses and several points of research including:

- 1) amplification effects;
- 2) e-services;
- 3) the web interface;
- 4) value chain modelling;
- 5) customer targeting;
- 6) information communication technologies;
- 7) bottleneck effects;
- 8) business strategies.

These factors are elaborated below.

4.1 Amplification 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)[39]. Lee, et al.[40] consider customer ordering as a lumpy occurrence to which the supplier responds. Schmenner[41] theorized that fast, even-flow could explain productivity gains in manufacturing settings, and that even flows were achievable when the variability in supply chain was reduced. He also noted that tight quality control reduced negative amplification effects. Finch[42] 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'. Thus the upstream amplification (or bullwhip) effects may be reduced where a website delivers more efficient, more direct, targeted, more uniform, information access pathways between the service value-chain and the customer. Improved information flows - delivering manageable amounts of filtered most relevant information to the customer may deliver one solution.

4.2 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. 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. Timelines to move to on-line service value-chain solutions also vary.

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.

4.3 Website Effects:

Incorporating software programs that query the available database information apparently 'intelligent' solutions to customer requests may be offered.

The 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 are then 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 requirements on the service supply chains. Significant, tangible and intangible cost reductions (less non productive website activities) may be achievable. Less demands, per initiative, per customer, may reduce the information transmission strain across the global communications networks, and may reduce negative customer sentiment.

Such solutions may require the flat website encounter to move to a new three dimensional approaches[43].

4.4 Value Chain Modelling Effects:

Value chain modelling[44] 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.

Vermijmeren[45] suggests flexible, intelligent supply chain 'engines' may drive these dynamic supply chains, delivering value, in an efficient manner. Various third / fourth party logistics additions offer additional new strategic solutions, scope for competitive advantage, and scope for business development.

The incorporation of peripheral added value options may improve these offerings.

4.5 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[46]. In highly customer responsive business systems, customer contact time may be lessened and sales opportunities may be enhanced. The customer may be an internal customer (working for the business, a participant in the upstream service value-chain, or an internal services participant in an area such as data processing, engineering, maintenance, accounting, after sales service[47], or an external customer (a consumer or one who interacts with and adds value to the business service value-chain. To service the virtual customer complete, responsive, flexible, adaptive, service value-chains often offer most desirable options. Finch argues that delivering quality services involves assurance and empathy. However to deliver service quality across a website requires a broadening of the quality dimensions to encapsulate product and service and product dimensions. Thus the customer exhibits a multidimensional impact on the business website. Hence, the business must maximize its virtual 'touch-point' appeal, and must develop its virtual management tools (and strategic metrics) set.

4.6 Information Communication Technology Effects:

In 2001, the five largest software providers: HP, IBM, Microsoft, Oracle, and Sun, along with a few new entrants, began promoting new standards, new web services platforms, and new activities environments. Since 1998 internet protocol version 6 (IPv6) software has been encapsulated into operating systems platforms[48]. If adopted, 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', trust, loyalty, satisfaction, addressing the dynamics of the industry structure, and cultural fit will become just as important to the customer as the provider's portfolio. Currently 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 customerized, and fully operational, 'service value-chains' is not yet a reality.

4.7 Bottleneck Effects:

Bottlenecks occur when a limiting resource affects the output level of the entire system. The business-customer website encounter as shown in Figure 6, is one such bottleneck. Here, multiple customers search multiple supply chain data sources, for their individual needs, and business inefficiencies arise. Finch suggests bottlenecks may be considered as business constraints.

In the services industry, information is the key ingredient that moves. Some information may be physical in nature - like paperwork, whereas in the manufactured product situation, both information, and product move. In both cases information bottlenecks occur.

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) [49],[50], reduce bottlenecks, and possibly improve website effectiveness. Thus 'touch-point' information trade-rates between the customer and the business service value-chain remain dependent variable areas that may be improved.

4.8 Business Strategies Effects:

Businesses faced with tough competition are devoting greater resources to support their e-business initiatives [51]. Using tools defined by IBM and others these businesses can prioritize their financial and operational performances, and closely define their e-business and management strategies in multiple-customer environments. These strategies involve the development of semi-intelligent websites, and target delivering in four key areas related to the 'physical and virtual service encounter model' - these are the: 1) technical (operations model) factors - including communication channels; software and hardware; artificial intelligence; fuzzy logic methodologies; natural language interpretations; web metrics; website flows and information integration; presentation modes (3D screens); and telepresence. 2) business (service operations model) factors - including externals - supply chain partners; peripheral partners; logistics; and internals - business, management; marketing; operations; and strategies. 3) customers (customer targeting model) factors - grouped initially in technographic segments, then cyber-segmented further to eventually allow individual targeting. 4) revenue generator factors - including - sales, fees, charges, advertising, partnerships, and franchises.

5. BUSINESS RAMIFICATIONS

An understanding of the 'virtual service encounter model', and its 'effectors' provides the business strategist with a new disruptive business model. This model facilitates the development of inter-service-model concept measurements, and relevant integration processes.

Each business has a unique mix of effectors and further research in this area is currently being pursued by the author. Investigation is continuing on 5 fronts – customer targeted constructs, on-line customer constructs, serviced concept constructs, operations constructs and financial constructs. The aim of this research is to deliver a new customer touch-point model, one that delivers greater satisfaction to the virtual customer and does so in a more efficient, manner, by better developing and utilizing the service value-chains. This will ultimately deliver a highly agile, flexible service value network, and do so at reduced financial commitment per virtual customer.

6. CONCLUSION

The ‘physical and virtual service encounter model’ provides 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 [52].

Hence the realm of business, its virtual service value-chains, and its virtual customer 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.

7. REFERENCES

- [1] Hughes, J. Mitchell, P. & Ramson, W. (eds), 1993, *Australian Concise Oxford Dictionary*, Oxford University Press, New York, NY.
- [2] Kathawala, Y. & Abdou, K. 2003, ‘Supply chain evaluation in the services industry: A framework development compared to manufacturing,’ *Managerial Accounting Journal*, vol. 18, no. 1/2, pp. 140-149.
- [3] US Bureau of Labor Statistics, 2002; 2004.
- [4] Kamarkar, U. 2002, ‘Integrative Research in Marketing and Operations Management,’ *Journal of Marketing Research*, vol. 33, no. 2, pp. 125-133.
- [5] Chase, R., Aquilano, N. & Jacobs, R. 1996, *Operations Management for Competitive Advantage*, McGraw-Hill/Irwin, Boston, MA.
- [6] Cook, D., Goh, C. & Chung, C. 1999, ‘Service topologies: A state of the art survey,’ *Production and Operations Management*, vol. 8, no. 3, pp. 318-338.
- [7] Nie, W. & Kellog. D. 1999, ‘How Professors of Operations Management View Service Operations,’ *Production and Operations Management*, vol. 8, no. 3, pp. 339-355.
- [8] Judd R. 1964, ‘The case for redefining services,’ *Journal of Marketing*, vol. 28, no. 1, pp. 58-59.
- [9] Rathmell, J. 1974, *Marketing in the Service Sector*, Winthrop Publishing, Cambridge, MA.
- [10] Quinn, J., Baruch, J. & Paquette, P. 1987, ‘Technology in Services,’ *Scientific American*, vol. 257, no. 6, pp. 50-58.
- [11] Quinn, J., Baruch, J. & Paquette, P. 1987, ‘Technology in Services,’ *Scientific American*, vol. 257, no. 6, pp. 50-58.
- [12] Zeithaml, V., Berry, L. & Parasuraman, A. 1988, ‘Communication and Control Processes in the Delivery of service Quality,’ *Journal of Marketing*, vol. 52, no. 2, pp. 35-48.
- [13] Czinkota, M., Ronkainen, I. & Moffett, M. 2005, *International Business*, (7th ed.), Thompson/South-Western, Mason, Ohio.
- [14] Berry, L. & Parasuraman, A. 1991, *Marketing Services: Competing through Quality*, The Free Press, New York, NY.
- [15] Levitt, T. 1972, ‘Production line approach to service,’ *Harvard Business Review*, vol. 50, no. 5, pp. 41-52.
- [16] Rust, R. & Metters, R. 1996, ‘Mathematical Models of Service,’ *European Journal of Operations Research*, vol. 91, no. 3, pp. 427-439.
- [17] Verma, R. & Boyer, K. 2000, ‘Service Classification and Management Challenges,’ *Journal of Business Strategies*, vol. 17, no. 1, pp. 5-24.
- [18] Akkermans, H. & Vos, B. 2003, ‘Amplification In Service Supply Chains: An Exploratory Case Study From The Telecom Industry,’ *Production and Operations Management*, vol. 12 no. 2, pp. 204 -223.
- [19] Chen , I. & Paulraj, A. 2004, ‘Towards a theory of supply chain management: the constructs and measurements,’ *Journal of Operations Management*, vol. 22, pp. 119-150.
- [20] Cook, D., Goh, C. & Chung, C. 1999, ‘Service topologies: A state of the art survey,’ *Production and Operations Management*, vol. 8, no. 3, pp. 318-338.
- [21] Roth, A. & Menor, L. 2003, ‘Insights into Service Operations Management: A Research Agenda,’ *Journal of Operations Management*, vol. 12, no. 2, pp. 145-164.
- [22] Hoffman, D. & Novak, T. 2000a, ‘Advertising Pricing Models for the World Wide Web,’ in D., Hurley, B., Kahin, & H., Varian, (eds.) *Internet Publishing and Beyond: the Economics of Digital Information and Intellectual Property*, MIT Press, Cambridge, UK.
- [23] Chen, Q. & Wells, W. 1999, ‘Attitude toward the site,’ *Journal of Advertising Research*, vol. 39, no. 5, pp. 27-38.
- [24] Biocca, F., Li, H. & Daugherty, T. 2002, ‘The Role of Virtual Experience in Consumer Learning,’ *Journal of Consumer Psychology*, vol. , no. , pp. 1-39.
- [25] Gartner (www.Gartner.com) Gartner Dataquest (April 2002).
- [26] Comergent.com. Retrieved: April 10, 2004, from <http://www.comergent.com/products/valuepropositions.cfm>.
- [27] Sterne, J. 2002, *Web Metrics*, John Wiley & Sons, New York, NY.

- [28] Louvieris, P. & Driver, J. 2001, 'New frontiers in cybersegmentation: Marketing success in cyberspace depends on IP address,' *Qualitative Market Research: An International Journal*, vol. 4, no. 3, pp. 169-181.
- [29] Kemp, R., Schot, J. & Hoogma, R. 1998, 'Regime shifts to sustainability through processes of niche formation: the approach of Strategic Niche Management,' *Technology Analysis and Strategic Management*, vol. 10, no. 2, pp. 175-195.
- [30] Leonard-Barton, D. 1995, *Wellsprings of Knowledge*, Harvard Business School Press, Boston, MA.
- [31] Miller, J., Craighead, C. & Karwan, K. 2000, 'Service Recovery: a framework and Empirical Investigation,' *Journal of Operations Management*, vol. 18, pp. 387-400.
- [32] Mintzberg, H. 1978, 'Patterns in Strategy Formation,' *Management Science*, vol. 24, no. 9, pp. 934-948.
- [33] Srinivasan, J., Jagannathan, S. & Kalman, J. 2002, *Internet Commerce Metrics*, Prentice Hall, Upper Saddle River, NJ.
- [34] Heskett, J., Sasser, W. & Hart, C. 1990, *Service Breakthroughs – Changing the Rules of the Game*, The Free Press, New York, NY.
- [35] Liang, T. 2003, 'The Second Wave of e-Commerce: Successful Transformation and Business Models,' Keynote Address, 3rd *International Conference on Electronic Business*, Singapore.
- [36] Sterne, J. 2002, *Web Metrics*, John Wiley & Sons, New York, NY.
- [37] Barlow-Hills, S. & Sarin, S., 2003, 'From Market Driven to Market Driving: An Alternative Paradigm for Marketing In High Technology Industries,' *Journal of Marketing Theory and Practice*, vol. 11, no. 3, pp. 13-24.
- [38] Di Gregorio, J. & De Montis, F. 2003, 'NOIE Information Economy Index 2003,' *National Office for the Information Economy*, pp. 1-50. Retrieved: March 12, 2004, from http://www2.dcita.gov.au/__data/assets/file/12294/NOIE_Index.pdf.
- [39] Forrester, J. 1961, *Industrial Dynamics*, MIT Press, Cambridge, MA. & Akkermans, H. & Vos, B. 2003, 'Amplification In Service Supply Chains: An Exploratory Case Study From The Telecom Industry,' *Production and Operations Management*, vol. 12 no. 2, pp. 204 -223.
- [40] Lee H., Padmanabhan & Whang, S. 1997, 'The Bullwhip Effect in supply Chains,' *Sloan Management Review*, Spring, pp. 93-102.
- [41] Schmenner, R. 1995, 'How Can Services Businesses Survive and Prosper?,' *Sloan Management Review*, vol. 27, no. 3, pp. 21-32.
- [42] Finch, B. 2003, *OperationsNow.com*, McGraw-Hill/Irwin, New York, NY.
- [43] Microsoft at Microsoft.com.
- [44] Bagchi, S., Gallego, G., Grey, W., Katircioglu, K., Seybold, D., Shi, D. & Stefanis, S. 2003, 'An analytical approach for quantifying the value of e-business initiatives,' *IBM Systems Journal*, vol. 42, no. 3, pp. 484-497.
- [45] Vermijmeren, M. 2003, 'Software architecture in supply chain management,' *Computers in Industry*, vol. 53, pp. 165-178.
- [46] Albrecht, K. & Zemke, R. 1985, *Service America! Doing Business in the New Economy*, Dow Jones-Irwin, Homewood, H.
- [47] Davis, M, Aquilano, N. & Chase, R. 2003, *Fundamentals of Operations Management*, (4th ed.), McGraw-Hill/Irwin, New York, NY.
- [48] Comer, D. 1995, *Internetworking with TCP/IP* volume 1: Principles, protocols, and architecture, Prentice-Hall, Englewood Cliffs, NJ.
- [49] Malcinski, A., Dominick, S. & Hartrick, T. 2001, 'Getting to know your audience is the key to online success – making the numbers work for you,' *IBM white paper*, pp. 1-11. Retrieved: May 1, 2004, from www-106.ibm.com/developerworks/web/library/wa-mwtl/.
- [50] Cutler, M. & Sterne, J. 2002, *E-Metrics*, NetGenesis, pp. 1-62.
- [51] Bowman, R. 2001, 'Fast deployment - quick return help sell IT in a slow economy,' *Global logistics and Supply Chain Strategies*, Oct.
- [52] Porter, M. 2001, 'Strategy and the Internet,' *Harvard Business Review*, Vol. 79, No. 3, pp. 63-78.

This paper is further developed in the JSSSE 2005