

Unbundling Processes in On line Trading: Economic and Technical Drivers

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Abstract - The Internet creates opportunities for micro-level unbundling in stockbroking and other information-intensive industries. This research proposes a framework to capture the unbundling effects on value chains and illustrates the opportunities for the case of the Australian securities market. Inter-organisational work and data-flow models are employed to describe the phases of on-line trading and investigate current and future models that leverage the unbundling arrangement. Finally, the paper identifies key socio-economic and technical drivers for the adoption of unbundling arrangements within electronic markets.

I. INTRODUCTION

The development of on-line trading models presents the stockbroking industry with yet to be realised opportunities and threats. The traditional trading model in the stock broking industry focuses upon a single entity performing the entire process (information provision, investment decision and order, trade execution, settlement and record keeping). On-line discount brokers are able to offer trading processes, in particular trade execution and settlement, through electronic marketplaces at a lower rate than under traditional brokering arrangements. These market forces require brokers to address the issue of unbundling services with separate revenue models applied to each unbundled service. For example, traditional brokers would regard the provision of stock market information as 'free' customer service, while on-line traders are usually unable to provide such individualised assistance. On the demand side, on-line customers expect the flexibility of choosing separate service providers for separate phases of electronic market transactions to minimise charges. Pressure from supply- and demand-side will lead to new business models, and the event of new competitors from within and without the traditional industry presents serious threats to current market leaders.

These 'unbundling' trends are not restricted to the brokerage or financial services industries. Hagel and Singer [1] predict similar scenarios as described above for all industries:

'As more business interactions move onto electronic networks like the Internet, basic assumptions about corporate organization will be overturned. Activities that companies have always believed to be central to their business will suddenly be offered by new, specialized competitors that can do them better, faster, and more efficiently'.

Financial services show early and illustrative examples of these unbundling processes. The (partly) separation of

information provision from the transactional activities of brokering was one of the first applications of the commercialisation of the Internet. Historical and real-time stock market information became available on the World Wide Web soon after its wide-spread adoption. Generally the 'freedom of information' and the scope of free, global services available on the Internet provided investors, and in particular smaller investors, with better market knowledge. The broker and specialised stock market analysts were no longer the single source of financial market information for investors. Today, the information provision function of stockbrokers has to add value on top of the knowledge available on the global networks or it will become redundant. Such de-coupling of processes (= unbundling) will not be restricted to the early, information phases of a trading process. However, these phases are the parts of the value chain where unbundling has already become obvious in the current market situation. This research will lay out an explanatory framework for other, later phases of electronic market transactions.

II. RESEARCH METHODOLOGY

The aim of this research is to examine the organisational and economic aspects of unbundling opportunities at the micro-process level as exemplified by the Australian securities market. The research methodology is descriptive/interpretive using qualitative methods and according to Galliers categorisation, is based in an interpretivist paradigm [2]. The interpretivist paradigm provides consideration to the environment, i.e. the market itself and its associated operations [3]. In fact, the multiple 'pictures' of the trading process call for an interpretivist paradigm that allows the existence of multiple realities from as many perspectives [4]. An extension to this issue is the modelling of data interfaces for each component-process/new business model that may arise from the unbundling.

The research is holistic by gaining insight into the trading processes from the investor's perspective as well as the perspectives of other market entities [5]. From the interpretation and description of the trading processes, a layer of abstraction is built by establishing a model that maps the trading processes, the owners of each component-process and the flow of data between the component processes. This layer of abstraction provides the necessary detail from which theories regarding the potential for high level and micro-process unbundling can be established.

III. UNBUNDLING IN THE ON-LINE TRADING CONTEXT

The general approach for non-quantitative process analysis has been to break down, or disaggregate the operations and their associated business processes [compare 6] and review each component level individually. This approach has facilitated analysis of distribution channel impacts (supply chain) as well as potential areas for process improvement (business process re-engineering). This systematic disaggregation is analogous to the unbundling of the investor trading process that is occurring now in securities markets around the globe. The Internet distribution channel is facilitating this unbundling while market forces develop new business models for the provision of each of the unbundled processes. The trading process is no longer the exclusive domain of particular service providers that have often been protected by legal regulation. The dynamics of electronic marketplaces becomes apparent with portal sites like Gomez.com (<http://www.gomez.com>) offering comparison 'shopping' with detailed product analysis of nearly 50 Internet brokers. In the following sections, the trading transaction is disaggregated within the context of Schmid's established electronic market reference model [8, 9] with application to the Australian securities market.

A. *The Relationship between Unbundling and Business Processes*

When analysing the unbundling of business processes for separate provision by different market entities, the granularity of disaggregation where unbundling occurs, is difficult to define. At a certain level, operations dictate that these processes must be performed by the same market entity. The close interaction and interwovenness of processes can make the separation economically unjustifiable or even technically infeasible. In such situations, the transaction costs associated with coordinating each low-level process between different providers are too great and these processes remain provided within the hierarchy of a single market entity [1]. The occurrence of electronic markets (as opposed to electronic hierarchies) favours the coordination through market mechanisms (as opposed to internalised, hierarchical coordination mechanisms) [17]. However, government regulation may require certain processes to be performed exclusively by specific entities. The unbundling of business processes will be broken down to such a level where each component can (theoretically) be provided by a single market entity, regardless of whether that entity actually provides other adjacent processes.

B. *An (On-line Trading) Extension to the Electronic Markets Reference Model*

Considerable work has been completed on the concept of electronic market reference models (EM-RM) [compare 7, 8, 10, 11]. Two major advantages are achieved by disaggregating the investor's trading processes within the context of an established generic market transaction model:

1. The investor's disaggregated processes inherit a certain degree of context from the established model (that in turn should facilitate easier understanding), and
2. The adaptability of the disaggregated processes to other international securities markets becomes easier through a

generic model. This adaptability is aided by the high degree of homogeneity in operations among international securities markets around the globe.

Schmid puts forward an electronic market reference model by disaggregating the market transaction process and applying different organisational views. In their model, three pertinent market transaction phases were sequentially identified: the information phase, the agreement phase and the settlement phase. Accompanying these disaggregated phases are four separate views of the market transaction: the business view, the transaction view, the services view and the infrastructure view. Rather than providing a more detailed description of this concept, we refer the reader to Schmid and Lindemann [7].

C. *A phase model of investor trading in the Australian securities market*

Schmid's electronic market reference model closely parallels the trading processes in the Australian securities market making it an appropriate model to use as a contextual framework for this research. Using the three market transaction phases of the Schmid and Lindemann model, the trading process in the Australian securities market has been disaggregated into its component process level. Under the original electronic market reference model the settlement phase encompasses the complete fulfillment of the contract including the maintenance and warranty obligations of the vendor. However for the Australian securities market, this does not represent a close enough description of the investor's trading process. To include the on-going nature of maintenance functions we divide the settlement phase from the original electronic markets reference model in order to accommodate this market: *settlement* and *record and account keeping*. The new settlement phase does not include any maintenance of share registry holdings; this describes the operation of the records and account keeping phase. Consequently, the extended model as represented by Figure 1, adds this fourth phase of records and account keeping where the component process of the same title resides. Figure 1 aligns the disaggregated component processes with an adapted electronic markets reference models and shows that each component process is in fact comprised of lower level processes.

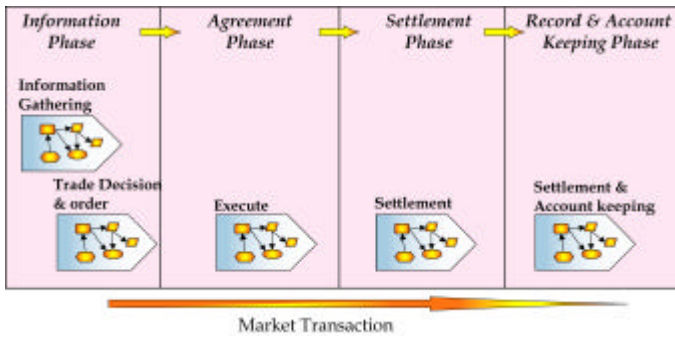


Figure 1: Adaptation of Schmid's electronic market reference model for on-line trading

IV. ANALYSING UNBUNDLING STRATEGIES WITH BUSINESS PROCESS MODELS

This research aims to disaggregate and analyse the trading processes qualitatively. Traditional methods of systems analysis and design for process (interaction) analysis typically include work-flow and data-flow diagrams (DFDs). However, the purpose of this research is not the detailed description of process activities, but the identification of process owners and their interactions. Therefore, a simpler modelling method that incorporates the following elements appears sufficient:

1. Specification of actual processes;

2. Identification of the entity performing the process (the process owner); and
3. Definition of the data-flows between these processes.

In this paper a simple diagrammatic syntax is adopted, which does not adhere to either strict data-flow diagrams (DFDs) or work-flow syntax. The syntax is illustrated in Figure 2, and comprises only process, process owner and data-flow elements. External entities and mandatory inputs or outputs are not defined and deemed unnecessary.



Figure 2: Modelling entities and diagram syntax

A. An Illustrative Example: The Settlement Processes

Once the order has been placed and executed, the ensuing settlement processes, as depicted in Figure 3, are provided almost exclusively by the stockbroker. Figure 3 is a diagram of the settlement micro-processes in the Australian securities market.

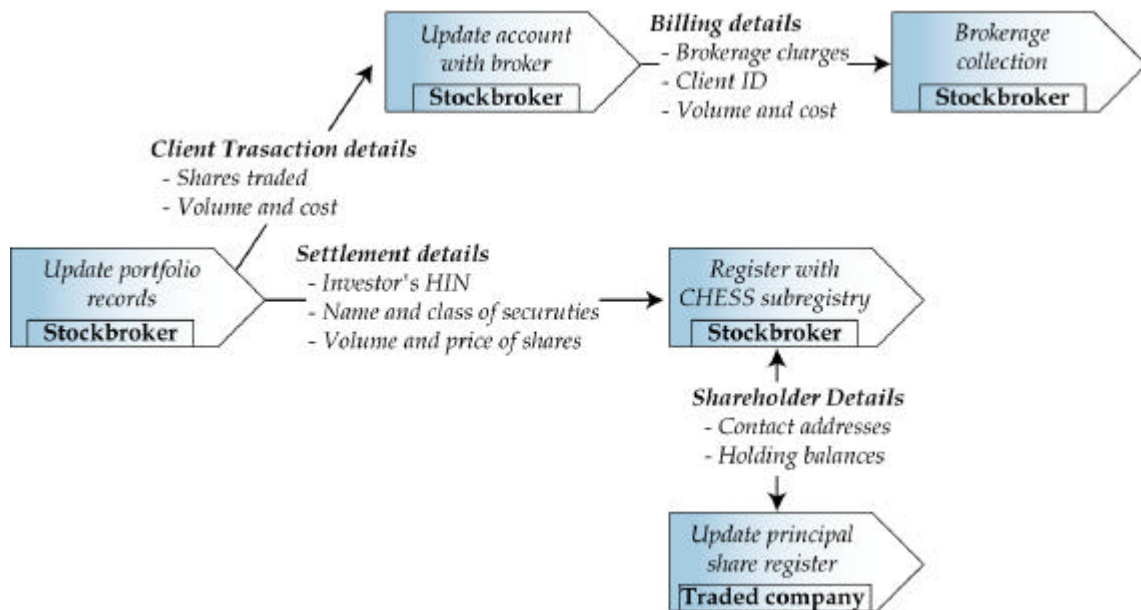


Figure 3: The settlement processes in traditional trading

Stockbrokers must update their portfolio records to reflect the acquisition, or relinquishment, of share holdings and the associated monetary flows with the trade. Data-flows include the volume of shares traded, the securities transaction type and the value of the trade. This trade data must then be attributed to an account that is held by a client (investor) with the stockbroker. The subsequent process is for the stockbroker to update these accounts for the relevant clients and process the associated advice of brokerage owed for trading services provided. Here, the relevant data-flows are net and gross values of the trade and the associated brokerage to be forwarded. The stockbroker is also responsible for entering trade and investor details into the Australian stock exchange's settlement system, CHES (Clearing House Electronic Sub-register System). CHES is responsible for the clearing and settlement of transactions in CHES approved securities including shares and financial derivatives [12]. The major dataflow is a unique and confidential HIN (Holder Identification Number) that identifies the investor and the stockbroker to CHES for the transfer of funds and shares between the appropriate parties to the trade. The other major flow is the trade specifications. While CHES is in fact a *sub-register*, the *primary register* that provides the market with full disclosure of share ownership and company equity is maintained by the company whose securities are being traded. There is a bi-directional dataflow between primary and sub-registers with the major flows including contact details and share holding balances of each shareholder.

The unbundling of services supports the creation of entities that specialise in the provision of certain services. This specialisation leads to lower costs or qualitative differentiation. Figure 4 illustrates the potential for unbundling the micro-processes of settlement by having them provided through different market entities. Notice the new process owners at the base of each micro-process in Figure 4. One area of on-line trading models where this may have a significant impact is in the back-office functions traditionally performed at a stockbroking firm with respect to the keeping of accounts and share registration. Traditionally, the settlement process (see Figure 3) has been conducted by stockbrokers through interaction with CHES. There is no particular *market-based* reason why this process arrangement should exist. If a number of service providers are involved in the trading process then each service provider will seek payment for the performance of their service.

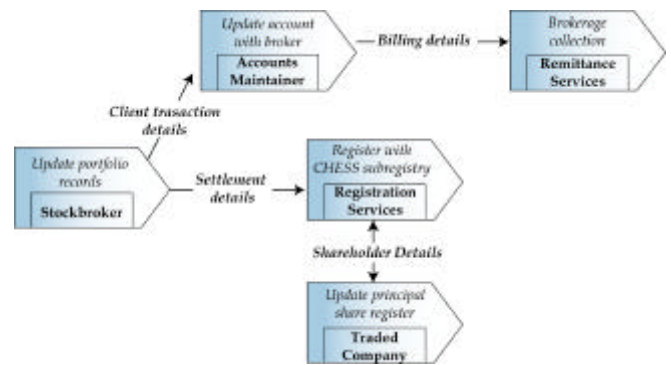


Figure 4: The settlement processes in an unbundled trading environment with different process owners

In the context of Figure 4, investors could choose to have their trade executed with a certain *stockbroker* and have that stockbroker forward the details of the transaction to a particular *account manager* for management of their transaction accounts. The monetary transaction may be funneled through another separate entity that provides *remittance services* in the form of secure EFT (Electronic Funds Transfer); e.g. a reputable financial institution. Furthermore, the investor may then elect to use separate *registration services* for the documentation of share holding in the CHES sub-registry. Different service providers will be competing in markets for the exclusive provision of a particular trading micro-process.

B. The revolution of stockbroking models

The modelling of the macro and micro-processes of investor trading with the application of unbundling these processes, illustrates the current revolution in on-line trading processes and establishing theories pertaining to possible future scenarios for the concept. Figure 5 shows four distinct stages of the trading transaction with a clear separation by technology support and unbundling.

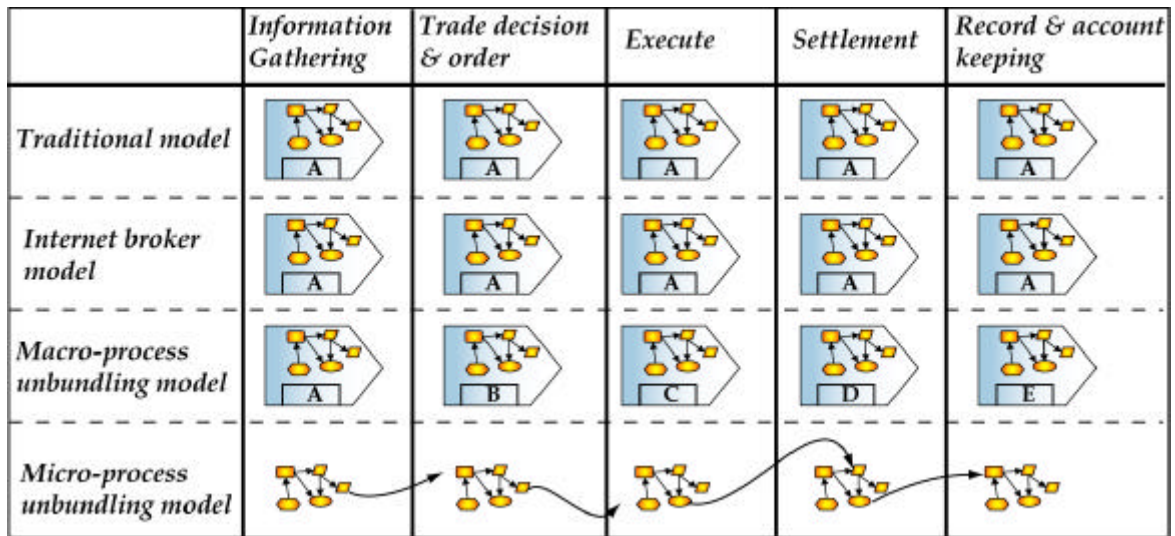


Figure 5: Stages of unbundling in the broking industry

1. *Traditional Model:* In the traditional model each macro-process is owned and performed by the stockbroker acting on behalf of the investor. This model is still persistent in current market operations.
2. *Internet broker model:* This model is consistent with current market trends whereby existing and new stockbrokers are offering Internet trading through transactional web sites. These new Internet brokers are merely traditional stockbrokers that have added a new distribution channel via the Internet to their avenues of trade placement for clients (investors). Similar to the traditional model, (almost) all broking macro- and micro-processes are still owned by the same legal entity. There is very little in the way of innovative operations whereby dis-intermediation, re-intermediation or other such phenomena of transitional electronic markets occurs.
3. *Macro-process unbundling model:* With this stage the macro-processes become independent from the process owner. In theory, each (macro-)process can be performed by a different process owner. In such instances, a client may go to different markets from around the globe to source a particular trading (macro-)process. In practice, regulations and the lack of market maturation will only lead to the unbundling of singular (macro-)processes.
4. *Micro-process unbundling model:* This is the final stage of unbundling. The trading processes are broken down into micro-processes, which can be assigned to different process owners. The same conceptual model underpins this stage and the former stage, only the process level is at a sufficiently more granular level. This added granularity is only feasible through technical innovations, but also requires innovative business models that are distinctly different from traditional trading and current Internet stock broking. The theory behind this model is explicated in the following sections.

V. DRIVERS FOR UNBUNDLING STRATEGIES

Modelling methods as illustrated in section IV and electronic market theories describe the most considerable drivers behind the unbundling trends in on-line trading. Particular consideration needs to be given to the underlying effects of the shift to Internet transactions and services as the enabling technologies for these business phenomena. The drivers introduced in this section are mainly generic and equally applicable to other industries.

The automation of information (and data) flows between entities, the decrease of transaction costs of (electronic) market transactions, the availability of micro-pricing arrangements and the obsolescence of legislative regulation are the major characteristics of on-line services working in favour of unbundled business models. These drivers differentiate on-line from traditional trading through the technical feasibility of new solutions and/or the economic change of market structures and powers. The following sections A to D explain each of these drivers in greater detail.

A. Automated Data-Flows

The inter-organisational exchange of information is a time-consuming and costly process with non-electronic means. Even electronically, inter-organisational data communication processes can be difficult and indeed economically prohibiting in the absence of a global information infrastructure and common data interface standards. The Internet as a globally accessible electronic network established affordable and geographically independent physical access to communication infrastructures. In the short term, global standards for the syntactic and semantic definition of data-flows will be achieved through XML (Extensible Markup Language). The DTDs (Document Type Definition) in XML enable the exact specification of the data-flows between business entities. The automation of sending, receiving and processing of data becomes manageable for

multi-national corporations, small- and medium-sized enterprises and consumers alike.

The open specification of DTDs ensures the interoperability of the data flows and the global availability of information specifications. Such DTDs have already been implemented and are in widespread use in the financial services industry and on-line trading. The on-line retail banking transactions standard OFX (Open Financial Exchange - <http://www.ofx.net>) offers support for investment operations, share trading and portfolio maintenance. Personal Financial Management software, for example Intuit's Quicken or Microsoft's Money, are already supporting OFX. Financial institutions, however, are currently supporting the 'pure' banking transactions to a much larger extent than the investment operations. This bias is due to greater technical challenges in the implementation and to business strategies, which see on-line transactions mainly as a vehicle for cost savings.

Maturation of technology and market pressure will remove these barriers and force financial institutions into offering the services that clients demand. The technical feasibility of exactly specifying the information exchanged in the process chain allows to cross organisational borders without incurring high interaction cost and management risk. The Internet technology therefore becomes the major driver behind the unbundling of on-line trading. Obviously, these organisational structures are infeasible without global electronic networks. In the case of the stock broking industry it is the very nature of automated data-flows on the Internet that allow to split up one process further, to be handled by several organisational entities.

B. Reduced Transaction Cost in Electronic Markets

Transaction cost theory [compare 13, 14] attempts to explain the superiority of coordination mechanisms on the continuum between markets and hierarchies by minimising transaction costs. The effect of electronic networks and inter-organisational systems on transaction costs is reduction, which favours electronic market coordination over electronic hierarchies [15]. While transaction cost economics have been criticised as an analysis tool on the micro- (firm-) level [16], the theory can be utilised to predict the competitive environment and the general trends of electronic markets. In fact, the theory has been applied frequently in support of electronic market models ever since their occurrence [17]. Transaction cost theory provides an analytical framework to explain the emergence of business models with electronic markets for each of the micro-processes. The electronic coordination mechanisms described in the previous section A make such micro-markets economically sound.

The technical requirements for a widely interoperable electronic financials markets as outlined in the previous section A, also sets a precedent for low marginal costs of additional information transfers between different process owners. In line with Bakos and Brynjolfsson's extensive research on aggregation and disaggregation of information goods [18, 19], as process owners obtain such interoperable technology, the marginal costs of transactions are diminished to almost zero. Such low marginal costs are a major incentive

for unbundling at the micro-process level where process owners can realise low operational costs.

C. Micro-Prices and Micro-Processes as New Revenue Models

Micro-pricing arrangement allow clients to source several 'micro-processes' for a very small charge from various vendors. Again, Internet technology becomes instrumental as an enabler, providing the infrastructure for micro-payment mechanisms and automating the communication processing and account maintenance. The emergence of business models to fit such arrangements will also be driven by client demand. On top of better bargaining power, the option to select the most attractive providers for specific activities and combine their strength according to the client's demand offers an added incentive for such arrangements from the investor perspective. In the longer term electronic market systems with advanced search and comparison facilities and (intelligent) agent systems will reduce the transaction costs (most notably search cost) for organisation of such arrangements prior to trade.

D. Weaknesses of Regulatory Environments

Currently legislative regulation of the stockbroking industry is still a major barrier to unbundling trends. However, only a limited number of processes or data-flows can be regulated through legal requirements. The further disaggregation of the processes into 'micro-processes' and the creation of global electronic marketplaces for the sourcing of those activities may provide a vehicle to circumvent local jurisdictions. The crucial 'regulated' micro-processes can still remain under a certain jurisdiction, while other micro-processes are performed under different jurisdiction. Such arrangements assure legal compliance with the regulatory environment and opens up the buying power of global (electronic) marketplaces to achieve more effective sourcing. Naturally, the shift of a large portion of the process activities to other jurisdiction while the regulatory jurisdictional control remains intact, will make regulatory environments more difficult to sustain.

VI. CONCLUSION AND FURTHER RESEARCH

The extent and direction of the changes the Internet brings about the economic landscape are difficult to predict ex-ante. In this paper, one of the aspects that is leading towards new business models, the unbundling of corporate services and more particular on-line share trading, has been analysed. The close scrutiny of the macro- and micro-processes unveils the potential of disaggregation and recombination of business processes for existing market players and new entrants. The simple modelling method employed here can be adapted for the analysis and prognosis of other industries and marketplaces. The results of the illustrative business processes included into this paper show the usefulness of this method for the prognosis of future roles. The paper also identifies the socio-economic and technological drivers behind the unbundling of micro-processes.

There are inherent interdependencies between these micro-process that are a major obstacle to a frictionless financials market. Today and in the foreseeable future, a trader would necessarily be required to prescribe the complete path her

trade would follow from the *trade order* process to *record & account keeping* process, prior to the placement of the trade. In an environment where comparison and search facilities as described above are available, such decisions will be made dynamically at the point where each process owner has finished with the individual trade and is ready to pass it on to the next process owner. Today's freer market environment encourages an unbundling of processes, but the inefficiencies also encourage the bundling of these unbundled processes through re-intermediaries [20], that can provide bundled processes as one-stop trading to Internet traders for a small premium. Such a business model is yet to evolve however is a likely intermediate step to a more frictionless market.

However, this research stops short of empirical validation. While the models are backed through anecdotal evidence and market knowledge, the link to empirical evidence is not sufficient to validate the models theoretically. Another task left for further research is the generalisation of the hypotheses posited in this paper to fit other industries or generic (industry-independent) unbundling theories.

REFERENCES

- [1] J. I. Hagel and M. Singer, 'Unbundling the Corporation,' *Harvard Business Review*, pp. 133-141, 1999.
- [2] R. D. Galliers, 'Choosing appropriate information research approaches: A revised taxonomy,' presented at Proceedings of the IFIP TC8 WG8.2 Conference, Copenhagen, Denmark, 1990.
- [3] J. W. Creswell, *Research design: Qualitative & quantitative approaches*. California: Sage Publications, 1988.
- [4] R. N. Rapoport, 'Three Dilemmas in action research,' *Human Relations*, vol. 23, pp. 499-513, 1970.
- [5] P. B. Checkland, 'From framework through experience to learning: The essential nature of action research in Information systems,' in *Information Systems research contemporary approaches and emergent traditions*, N. H.E., H. K. Klein, and R. Hirschheim, Eds. Amsterdam, 1991.
- [6] M. Porter, *Competitive Advantage. Creating and Sustaining Superior Performance*. New York: The Free Press, 1985.
- [7] B. Schmid and M. Lindemann, 'Elements of a Reference Model for Electronic Markets,' presented at Proceedings of the 31st Hawai'ian International Conference on Systems Sciences (HICSS-31), Los Alamitos, 1998.
- [8] B. Schmid, R. Dratva, C. Kuhn, P. Mausberg, H. Meli, and H.-D. Zimmermann, *Electronic Mall: Banking und Shopping in globalen Netzen*. Stuttgart, Germany: B.G. Teubner, 1995.
- [9] B. Schmid, 'Electronische Märkte,' *Wirtschaftsinformatik*, vol. 35, pp. 465 - 480, 1993.
- [10] B. Schmid, 'Requirements for Electronic Markets Architecture,' *EM - Electronic Markets*, vol. 7, pp. 3 - 6, 1997.
- [11] B. Suter, 'VEGA: A Software System for Virtual Enterprises,' presented at Proceedings of the Twelfth International Electronic Commerce Conference, Bled, Slovenia, 1999.
- [12] Australian Stock Exchange, 'Your CHESSE Statement Explained,' vol. 1999: ASX, 1998.
- [13] R. H. Coase, 'The nature of the firm,' *Economica N.S.*, pp. 386-405, 1937.
- [14] O. E. Williamson, 'The modern corporation: Origins, evolution, attributes,' *Journal of Economic Literature*, vol. XIX, pp. 1537-1568, 1981.
- [15] T. W. Malone, J. Yates, and R. I. Benjamin, 'The logic of electronic markets,' *Harvard Business Review*, vol. May-June, pp. 166-170, 1989.
- [16] S. Ghoshal and P. M. Insead, 'Bad for practice: A critique of the transaction cost theory,' *The Academy of Management Review*, 1996.
- [17] T. W. Malone, J. Yates, and R. I. Benjamin, 'Electronic markets and electronic hierarchies,' *Communication of the ACM*, vol. 30, pp. 484-497, 1987.
- [18] Y. Bakos, E. Brynjolfsson, "Aggregation and Disaggregation of Information Goods: Implications for Bundling, Site Licensing and Micropayment Systems," in Proceedings of Internet Publishing and Beyond: The Economics of Digital Information and Intellectual Property. D. Hurley, B. Kahin, and H. Varian, eds. 1997.
- [19] Y. Bakos, E. Brynjolfsson, "Bundling and Competition on the Internet: Aggregation Strategies for Information Goods," Working Paper 1999.
- [20] J. P. Bailey, J. Y. Bakos, "An Exploratory Study of the Emerging Role of Electronic Intermediaries." *International Journal of Electronic Commerce*, vol. 1, no. 3, Spring 1997.