

# Broker Models For Mass Customization Based Electronic Commerce

Frank T. Piller, Dept. of General and Industrial Management,  
Technische Universität München, piller@ws.tum.de  
Ralf Reichwald, Dept. of General and Industrial Management,  
Technische Universität München, reichwald@ws.tum.de  
Kathrin Möslein, Dept. of General and Industrial Management,  
Technische Universität München, moeslein@ws.tum.de  
Christoph Lohse, Dept. of General and Industrial Management,  
Technische Universität München, lohse@ws.tum.de

## Abstract

While the competitive advantage of mass customization has been widely substantiated in management theory since more than a decade, its implementation in business can be observed just within the last years. In this paper we demonstrate how modern Internet technologies and possibilities of e-business work as success factors for mass customization. Especially, we deploy how intermediaries can add new value to mass customization based business models in electronic commerce.

## Mass Customization and Electronic Commerce

The objective of mass customization is to deliver goods and services for a (relatively) large market which exactly meet the needs of every individual customer with regard to certain product characteristics at costs roughly corresponding to those of standard mass produced goods. Mass customization shall give an answer to "smart customers" (Glazer, 1999) demanding more and more individualized and personalized products. Explanations may be found in the tendency towards an experience economy, the growing number of single households, an orientation towards design and, most importantly, a new awareness of quality and functionality which demands durable and reliable products corresponding exactly to the specific needs of the purchaser.

Until today, mass customization is connected closely to the potential offered by new manufacturing technologies (CIM, flexible manufacturing systems) reducing the trade-off between variety and productivity (Ahlström/Westbrook, 1999; Anderson, 1997; Kotha, 1995; Pine, 1993; Victor/Boynton, 1998). But while the concept has already been discussed in the literature for more than a decade (e.g. Davis, 1987; Kotler, 1989; Pine, 1993; already Toffler, 1970 described the basic idea), increased practical implementation of this strategy can be found in business only in the last few years. This time lag may be explained by the fact that only within the last years sufficient technologies exist to handle the information flows connected with mass customization. Customer-related value added of mass customization is produced on

the information level. Especially as mass customization enters more and more consumer markets, new Internet technologies can be seen as its main enabler.

Thus, from a conceptional point of view mass customization can be categorized as an *application* of electronic commerce. Electronic commerce is understood as the integrated execution of all informational constituents of economic processes via digital channels (Wigand/Picot/Reichwald, 1997). In the simplest of cases, this can mean the exchanging of messages by e-mail. More advanced forms are the extensively automatized exchange of data between applications (electronic data interchange/EDI) or the up-and-coming area of electronic commerce based on the Internet or World Wide Web (WWW).

Web-based electronic commerce greatly assists in reducing information costs, chiefly by considerably simplifying and increasing the effectiveness of communication relations between customers and producers (Choi/Stahl/Whinston, 1997; Peterson/Balasubramanian, 1997). Furthermore, electronic commerce facilitates the collection and employment of numerous data concerning the individual customer thanks to its characteristic feature of permitting interaction between economic units connected via networks. A characteristic feature of mass customization is that the goods and services are produced only after the order of a particular customer is placed, based on the customer's wishes and needs. These needs are transferred into a product specification during the configuration process. While in business-to-business markets personal sale and configuration is common, in consumer markets Web-based electronic commerce has to take this part. A personalized chocolate bar like *Cyber-Chocky* ([www.caliebe.de](http://www.caliebe.de)) with a retail value of 5 € can not be sold in traditional channels. The same is true for many other mass customized products with a relatively small margin. Therefore, mass customization can be seen closely related to e-business and new possibilities connected with the Internet economy. The use of the Internet as a communication medium facilitates the efficient production of customized goods as well as the individualization of customer relationships.

Literature often mentions the market entry of new intermediaries as a significant characteristic of the

Internet economy (Beam/Segev, 1997; Elofson/Robinson, 1998; Robinson, 1997; Shapiro/Varian, 1998; Wigand/Picot/Reichwald, 1997; Zerdick/Picot/Schrape 2000). But while mass customization is seen by more and more scholars as an innovative e-business strategy, there is almost no research of the function of brokers and other intermediaries for mass customization (some remarks can be found in Turowski, 1999; Elofson/Robinson, 1998). However, within the last months new and heavily funded players entered the mass customization market regarding themselves as brokers for mass customization (the most prominent examples are *getcustom.com*, *custome.com*, and *digichoice.com*).

Therefore, we will examine in this exploratory paper which new business models can be created by including brokers in the mass customization value chain. Our discussion will show that intermediaries bring new value added services into a mass customization concept – in contradiction to traditional economic theory that in specific and individual purchasing processes the direct interaction between the supplier and customer is preferable. In Section 2 we will discuss briefly different channel strategies for mass customization as transaction cost theory suggests on the first view that only direct sales are efficient. Section 3 examines the advantages and capabilities of brokers for mass customization from the customer's and the manufacturer's ("mass customizer") point of view. In Section 4 we will introduce a systematization of different business models for brokers in mass customization concepts. Four particular business approaches can be presented, each with different demands to e-business. Section 5 gives a brief conclusion.

## **Retail and Configuration Channels for Mass Customization**

The integration of the customer into the production process is a distinctive feature of customized production. One can look at the relation between the customer and supplier as a cooperation providing benefits for both sides, but demanding inputs of both participants, too. In mass customization processes, this integration of the customer is required primarily during configuration. Configuration can be seen as the most important task of the sales process. It substitutes the traditional retail tasks of arranging and distributing a competitive product range according to the characteristics and needs of the target customers (bundling of demand and supply).

For complex, specific goods that are purchased individually transaction cost theory recommends on the first view a direct interaction between manufacturer and buyer to fulfill the configuration and purchasing process without any intermediaries (Williamson, 1981; Williamson, 1985). A retailer would do nothing else than transferring the product specification to the manufacturer where each order has to be proofed, planned and fulfilled separately. Thus, a retail channel would just add an

additional cost-generating level to the transaction chain, especially as today electronic commerce allows manufacturers to communicate and trade with large groups of consumers directly and efficiently (Alba et al., 1997; Peterson/Balasubramanian, 1997). Therefore, most of the prominent examples of mass customization are based on direct sale strategies. Large consumer good companies like Mattel, Levi Strauss, P&G or Nike, normally using multi-level retail channels, sell their mass customized products efficiently via the Internet in direct interaction with their consumers.

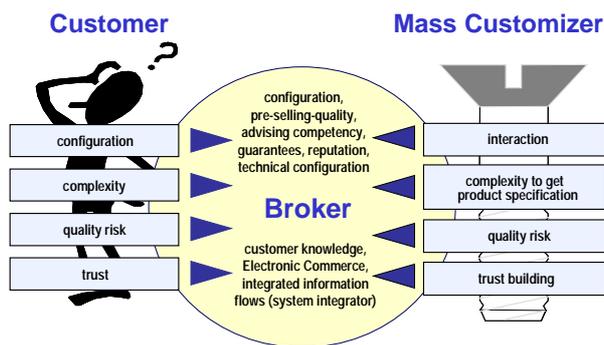
However, one of the major obstacles of mass customization are the uncertainties and risks from the customer's point of view during the configuration process (Huffman/Kahn, 1998; Pine, 1993; Gilmore/Pine, 2000). Especially in consumer markets customers often do not have sufficient knowledge for the definition of the product specification which corresponds to their needs. As a result the configuration process may last pretty long, and customers may experience an increasing uncertainty during the transaction process. Comparison processes are more difficult because of smaller transparency of supply compared to standardized goods or services. Uncertainty about the behavior of the manufacturer exists, too. The newer and more complex individualization possibilities are, the more information gaps are increasing. Configuration process for mass customization are characterized by an asymmetrical distribution of information – a typical principal agent constellation (Ross, 1973; Jensen/Meckling, 1976): The customer (principal) orders (and pays!) a product he has never seen at a manufacturer he often doesn't know and has to wait some days or even weeks to get the product. Without a clear reference point for the definition of an optimal performance it is also difficult to judge whether a case of warranty arises compared to purchasing standard mass produced goods.. Additionally, online buyers of mass customized goods are facing the additional risks of online shopping (see for a discussion Kollock, 1999).

The customer's uncertainties can be interpreted as additional transaction costs of the customer in mass customization processes. One of the most important tasks of the mass customizer it to ensure that the customer's expenditure is kept as small as possible, while the benefit she experiences has to be clearly perceptible. Leading mass customizers have implemented strong instruments to build trust and reliability in order to reduce the risk seen by prospective customers in mass customization processes. Examples are the participation in certified trust agent networks or an "trustful" screen design (Mandel/Johnson, 1999). Other instruments minimizing the purchaser's risk are strong warranties ("no questions ask exchange policy") or the use of an established brand name (transfer of reputation).

## Intermediaries in Mass Customization Concepts

Although mass customization offers plenty of new opportunities, there are numerous hazards faced by customers and suppliers alike. Attracted by the huge market potential of customized goods (Cox/Alm, 1998), new third party services established themselves to manage these risks. Economic players like *getcustom.com*, *custome.com* or *digichoice* have the objective to improve mass customization specific transaction processes between customers and manufacturers. While the use of third party services has been compiled by a number of scholars in regard to secure online transactions in general (Barret, 1996; Kollock, 1999), the specific benefits of brokers and similar intermediaries for mass customization have not yet been discussed in academic research. We will start our discussion from the customer's point of view before we will examine the perspective of the manufacturer. As an overview, Figure 1 shows some important tasks of a broker in mass customization environments.

Figure 1. Functions of a Broker for Mass Customization



### Benefits of MC brokers for the customer

Many customers do not have the necessary know-how to find a configuration corresponding to their desires. Often they are even not able to express their particular needs. While, for example, more and more users nowadays have learnt to configure a PC online, only few Americans may be able to configure a car or their new suit on their own. Therefore, an important task of brokers is their assistance in the configuration process. Interacting and serving each customer separately is a totally new task for traditional mass producers connected with deep changes of established business processes. A broker may establish the required knowledge faster and more efficiently than a single manufacturer as he fulfills this processes for several suppliers and product groups (*economies of learning*).

An important enabler for efficient configuration are software tools like recommendation engines. They

simplify the identification of preferences by recording, comparing, and aggregating former sales, page views or click rates. Recommendation engines enable the direct presentation of individualized content and offer a first suggestion of a configuration by comparing user profiles and indexes of content – even if a user cannot explicitly express her preferences and wishes (Elofson/Robinson, 1998; Shardanand/Maes, 1995). As the quality of the results of these recommendation engines is connected positively to the quantity of user profiles saved, the cooperation of several manufactures within one network, operated by a broker, is of central importance. Here, the main difference to traditional intermediaries on the Internet can be found. Traditional intermediaries are connected mainly with mass produced, standardized goods and services. The customization of goods creates new tasks.

Empirical research has shown that successful mass customizers establish strong customer relationship management (CRM) programs based on the knowledge from the first configuration and purchase process of a particular customer (Reichwald/Piller/Moeslein, 2000). In order to support customer loyalty, the interaction process has to differentiate between old and new customers. For new customers, a general profile of their desires and wishes has to be built up using the technologies mentioned above. For existing customers the old configuration and additional information gathered during former transactions have to be used to make all following sales as easy (time- and money-saving) as possible. For example, the last configuration may be presented and customers just asked for variations. Here, a broker based cooperation between different manufactures enables new possibilities as similar data can be shared. Even if a customer is new for one particular manufacturer, she may already be an existing customer within the network allowing to serve her better, faster and more efficiently. In this context, an additional benefit of a broker is to act as an organizer for an on-line community for customers interested in specific topics related to the product assortment. While providing value-added content like chats, newsletters and personal webspace he might also find new ways to aggregate buying power. For instance, members could be asked to engage in reverse auctions.

Another task of brokers may be to rank and assess new mass customizers in order to create shared reputation backgrounds of different suppliers. Customers don't have to rely only on direct personal experiences which is both inefficient and perilous because one will discover untrustworthy partners only through own hard experience (Kollock, 1999). Reputation can reduce uncertainty and guide the decision of whether to trust the supplier. Great gains are possible if information about past interactions is shared and aggregated within a group. Here a mass customization broker may add new value. Theoretical work (e.g. Raub/Weesie, 1990; Rapoport/Diekmann/Franzen, 1994; Yamagishi, 1994) has demonstrated the

beneficial effects of shared reputation. By bundling a selected group of providers under “one roof” the broker assists a prospective customer to find his particular supplier. If the broker offers his own guarantees for order fulfillment, he will cooperate only with providers having high quality standards – decreasing the uncertainty for the customer. Finally, the implementation of brokers may reduce the prices of mass customized goods. Reasons are:

- *Economies of specialization:* Brokers like *get-custom.com* aim to establish themselves as a leading “mass customization brand name” with the core competencies in configuration, selection and assisting the customers in finding the product that really fits their particular desires. Here they are superior to traditional mass producers as they specialize on the mass customization specific tasks of the customer interface.
- *Economies of scale:* Brokers may re-use one configuration system for several manufactures. Only one large scale web site has to be established, the same is true with other overhead functions (billing, fulfillment planning, customer service etc.). The result may be a strong decrease of transaction costs.
- *Enhanced efficiency:* Brokers may bring additional competitive pressure to the whole value chain forcing manufacturers to design their value process more efficiently (for example by choosing only the best mass customizer from one product category).

### *Benefits of MC brokers for manufacturers (mass customizers)*

Other advantages of brokers can be found from the manufacturer’s point of view. First of all, brokers support the market entry of new mass customizers heavily. They offer the possibility to reach heterogeneous customer groups fast and efficiently. New mass customizers may start on a higher level of reputation if they use an established market name of a broker. Combined with the use of established technologies, configuration engines, and higher levels of attention of the web site, this allows significant *economies of speed* in the introduction phase of a mass customization program. Cooperating with brokers can also prevent image conflicts or negative reputation in the starting phase of a mass customization concept if manufacturers still market their traditional mass produced brand names.

One of the largest obstacles for mass customization programs of established consumer good manufacturers are channel conflicts. Large retail groups are often afraid of loosing their profits when a manufacturer starts to interact directly with the consumers. Therefore, they often prevent any further action (e.g., Nike was forced to limit its mass customization program to 400 personalized shoes per day). Here the inclusion of an intermediary may avoid channel conflicts if the broker acts as the visible market player. The same is true for internal conflicts between the

new mass customization processes and the old sales force or between business units. Manufacturers are typically not set up for close customer contact. The inner structure of such an organization often impedes a seamless and comfortable interaction process since customer-orientation is not anchored in the company’s culture. Compared to direct online sales of mass produced goods mass customization demands an even stronger customer relationship. It took mass customization pioneer *Levi Strauss* four years to establish a relationship management program in order to lock-in first-time customers into their system. Here a specialized broker understanding the relationship processes of mass customization could have speed-up this practice rapidly.

Brokers can also reduce market uncertainty on the supplier-side. Despite the fact that mass customizers aim to increase the operational flexibility regarding differing customer preferences they still face the risk of missing fundamental market developments altogether. By accumulating in-depth knowledge on targeted customer segments, a broker can provide valuable insight for the mass customizer to adjust the strategic direction of its product range. Of course, this requires a close, trusted relationship between the producer and the intermediary, a constellation not found very often today. Many mass customizer probably will choose to do market research on their own, at least in the beginning. But with further increasing market dynamics and fragmentation, manufacturers lacking a strong marketing muscle will face the necessity to engage in long term partnerships with intermediaries. Moreover, as the rule with traditional intermediaries such as retailers, the broker might also take over the risk of insolvency and default by pre-financing orders and billing the customer later. Additionally, manufacturer can profit from decreasing costs by using broker services:

- *Outsourcing of information processing:* Collection and storage of customer data, system security and administration etc. are basic activities connected to mass customization which require very specific knowledge but do not represent core competencies of the manufacturer. On the other side, brokers may realize substantial economies of scale and scope by providing this service for multiple suppliers, therefore reducing the costs of these activities. Brokers may even take over the software development of configurators specific to the needs of the targeted customers.
- *Outsourcing of on-line competency:* Cost savings result not only from economies of scale and scope by using the same information processing system, but also from using special skills and knowledge connected to the conduct of electronic commerce. Contracting, payment, privacy policies (one of the major obstacles of mass customization) are fields which are subject to continual shifts in regulation and therefore hard to capture by non-specialists. With

potentially huge sums at stake in case of legal action, a specialized third party can provide valuable service for the mass customizer.

- *Outsourcing of customer interaction:* As already mentioned, the closeness of the intermediary to the targeted customers can provide substantial value in terms of more accurate and timely information about needs and market trends. This better understanding of the customer on the other side also leads to a more efficient handling of the configuration process on behalf of the mass customizer. Another advantage is simply the ability to bundle customer interaction, therefore reducing internal complexity for the mass customizer and allowing him to reach more customers.

## Business Models for Mass Customization

### Brokers

Based on the degree of the interaction between the customer and the broker on the one side and the extent of the fulfillment of mass customization specific process steps of the other, a four-field matrix can be derived, distinguishing different strategic logics for brokers in mass customization based electronic commerce (see Figure 2 for an overview). These broker models shall not be seen as clusters based on empirical research (there are far too less players in the market to conduct empirically valid research in the moment of writing). The objective is to give ideas for new business models based on a particular set of core competences needed for successful mass customization.

Figure 2. Broker Strategies for Mass Customization

degree of interaction between customer and broker	3	4
	<i>configuration specialist</i>	<i>mass customization specialist</i>
number of tasks fulfilled by broker	1	2
	<i>contact specialist</i>	<i>back office integrator</i>

*Contact specialists* (field 1) are focused on establishing the contact between a prospective customer and a mass customizer. Brokers like *Digichoice.com* list

more than 1000 different manufacturers offering affordable customizable goods and services. By categorizing this large amount of mass customizers, contact specialists help – like a portal site – the customer to find a supplier fitting to her customization needs. Additional services may be search engines, rankings (cheapest supplier, fastest supplier, best online configurator, ranking of reliability). Furthermore, contact specialists may add community services for the buyers of customized goods of specific manufactures (an example may be a community of enthusiastic personalized *Barbie* doll lovers). However, configuration and all following processes are fulfilled by the mass customizer. Profit is generated mainly by listing fees, “click through rates” and online advertising space.

The core competency of *back office integrators* (field 2) is to connect and integrate heterogeneous existing information systems in retail, production planning or production control with the various customer data. Good examples can be found in the apparel industry. Here system integrators like German *TecMath* or US *TC2* provide fully integrated process chains for the manufacturing of customized apparel. These systems connect three dimensional scanning devices in retail outlets, construction systems for pattern charts, modern cutting devices and the production planning and control systems of apparel manufactures. An other example are companies specializing in generating and storing customer profiles to be used in recommendation engines like *Firefly Network*.

*Configuration specialists* (field 3) concentrate on the product or service configuration, one of the major success factors of mass customization. A future example may be scanning services just offering 3-dimensional scanning shops on High Street (or in convenient stores, post offices, railway stations, airports ...). The body data are then supplied to co-operating online and brick-and-mortar stores (either owned by the manufacturers or independent retail groups) helping these retailers to sell made-to-measure clothes without the time (and costs) for measurement services (modern 3D-scanners still have prices of 100 000 € and more). An additional task of such an intermediary may be to transfer the generic scanned body data to the specific data format required by the construction devices of the manufacturers. The profit model of these brokers (field 2 and 3) is based on a transaction fee paid by the manufacturer.

*Mass customization specialists* (field 4) finally integrate the different tasks mentioned above. They are the driving force behind a mass customization concept and may be the only actor from the customer’s point of view. A good example provides *getcustom.com*. On its Internet site about 50 different customizable goods are offered, all under the same brand name (that of *getcustom.com*), with the same “look-and-feel” during the configuration process, with the same billing system, the same distribution fees, the same exchange guarantees and

so on. These brokers aim to become the one-and-only starting point for customers looking for affordable customized goods and services. Their profits rely on heavy provisions for each sale. Additional profit can be generated by consulting services for new prospective mass customizers as mass customization specialists will generate a broad knowledge base about efficient configuration and customization very fast.

## Conclusion

This paper has discussed the role of intermediaries in mass customization based electronic commerce concepts. While the field of mass customization in combination with e-business is already quite a new field of research, we moved a step further to examine if and how brokers bring additional value to mass customization. However, the broker models presented here must not be understood as generic strategic patterns but rather as starting points for new innovative business models. The most important task of a successful broker in mass customization concepts is to communicate its additional value and benefits to the customers and manufacturers as on the first view intermediaries just add a new cost and time consuming level to the value chain.

Future research shall focus on success factors of brokers for mass customization when more market players enter the field with their own innovative business models. Another important field is the discussion of broker based community networks for mass customization. From a technological point of view, information technologies have to be identified and developed that support the functions described in this paper. Finally, the paper has concentrated on the potentials of intermediaries for mass customization. Though, the implementation of brokers creates some new problems, too: Who shall own the customer knowledge created from the mass customization process that is the foundation of long lasting customer relationships? How are profits shared if the second buy is fulfilled directly between supplier and customer without the broker? How effects the introduction of new customization brands by brokers like "getcustom" or "custoMe" the brand position of established manufacturers? Which instruments protect customer data and secures privacy as mass customizers get much deeper and more personal information about their customers compared to traditional online sellers of mass produced goods? As the concept of mass customization grows rapidly in the old and new economy alike, future research will have the chance to answer these and other questions based on a broader empirical base as it exists today. An empirical validation of the broker models described above is another important field for future research.

## References

- Ahlström, P. and Westbrook, R. "Implications of mass customization for operations management: an exploratory survey," *International Journal of Operations & Production Management* (19:3), 1999, pp. 262-274.
- Alba, J. et al. "Interactive Home Shopping: Consumer, Retailer, and Manufacturer Incentives to Participate in Electronic Marketplace," *Journal of Marketing* (61), 1997, pp. 38-53.
- Anderson, D.M. *Agile product development for mass customization*, Chicago: Irwin, 1997.
- Beam, C. and Segev, A. "Automated negotiations: a survey of the state of the art," *Wirtschaftsinformatik* (39:3), 1997, pp. 263-268.
- Choi, S.-Y., Stahl, D.O. and Whinston, A.B. *The Economics of Electronic Commerce*, Indianapolis: Macmillan Publ., 1997.
- Cox, M. and Alm, R. "The right stuff: America's move to mass customization," Federal Reserve Bank of Dallas, *1998 Annual Report*, 1998, pp. 3-26.
- Davis, S., *Future Perfect*, Reading: Addison-Wesley, 1987.
- Elofson, G. and Robinson, W.N. "Creating a custom mass-production channel on the Internet," *Communications of the ACM* (41:3), 1998, pp. 56-62.
- Gilmore, J.H. and Pine, B.J. *Markets of one*, Boston: Harvard Business School Press, 2000.
- Glazer, R. "Winning in smart markets," *Sloan Management Review* (40:2), 1999, pp. 59-69.
- Huffman, C. and Kahn, B. "Variety for sale: mass customization or mass confusion," *Journal of Retailing* (74:4), 1998, pp. 491-513.
- Jensen, M.C. and Meckling, W.H. "Theory of the firm: managerial behavior, agency costs and ownership structure," *Journal of Financial Economics* (3), 1976, pp. 305-360.
- Kollock, P. "The production of trust in online markets", Working Paper, UCLA, 1999.
- Kotha, S. "Mass customization: implementing the emerging paradigm for competitive advantage," *Strategic Management Journal* (16, special issue 'Technological transformation and the new competitive landscape'), 1995, pp. 21-42.
- Kotler, P. "From mass marketing to mass customization," *Planning Review* (18:5), 1989, pp. 10-13, 47.
- Mandel, N. and Johnson, E.J. "Constructing preferences online", Working Paper, Wharton School of Business, 1999.
- Peterson, R.A. and Balasubramanian, S. "Exploring the implications of the Internet for consumer marketing,"

*Journal of the Academy of Marketing Science* (25 :4), 1997, pp. 329-346.

Pine, B.J. *Mass Customization*, Boston: Harvard Business School Press, 1993.

Rapoport, A., Diekmann, A. and Franzen A. "Experiments with Social Traps IV: Reputations Effects in the Evolution of Cooperation," *Rationality and Society* (7:4), 1994, pp. 431-441.

Raub, W. and Weesie, J. "Reputation and efficiency in social interactions: an example of network effects," *American Journal of Sociology*, 1996, pp. 626-654.

Reichwald, R., Piller, F. and Moeslein, K. "Information as a critical success factor for mass customization," *Proceedings of the ASAC-IFSAM 2000 Conference*, Montreal, 2000.

Robinson, W.N. "Electronic brokering or assisted contacting of software applets," *Proceedings of the 30th Annual Hawaii International Conference on Systems Sciences*, Hawaii, 1997, pp. 449-458.

Ross, Stephen A. "The Economic Theory of Agency: The Principal's Problem," *American Economic Review* (63:2), 1993, pp. 134-139.

Shapiro, C. and Varian, H. *Information rules*, Boston: Harvard Business School Press, 1998.

Shardanand, U. and Maes, P. "Social information filtering: algorithms for automating word of mouth," *Proceedings of the CHI 1995*, ACM, 1995.

Toffler, A. *Future shock*, Cologny, Geneva; Orbit Publ., 1970.

Turowski, K. "A virtual electronic call center solution for mass customization," *Proceedings of the 32nd Annual Hawaii International Conference On System Sciences*, Hawaii, 1999.

Victor, B. and Boynton, A.C. *Invented here*, Boston: Harvard Business School Press, 1998.

Wigand, R., Picot, A. and Reichwald, R. *Information, organization and management*, Chichester, New York: Wiley, 1997.

Williamson, O.E. "The Modern Corporation: Origin, Evolution, Attributes," *Journal of Economic Literature* (19), 1981, pp. 1537-1568.

Williamson, O.E. *The Economic Institutions of Capitalism*, New York: The Free Press 1985.

Yamagishi, T. et al. "Prisoner's Dilemma Networks: Selection Strategy Versus Action Strategy," *Social Dilemmas and Cooperation*, edited by U. Schulz et al., New York: Springer, 1994, pp. 233-250.

Zerdick, A., Picot, A. and Schrape, K. *E-conomics*, New York: Springer, 2000.



LEHRSTUHL  
FÜR ALLGEMEINE UND INDUSTRIELLE  
BETRIEBSWIRTSCHAFTSLEHRE

Prof. Dr. Dr. h. c. Ralf Reichwald

Leopoldstrasse 139  
80804 Munich  
Germany

Tel: +49 / 89 / 36078 - 216  
Fax: +49 / 89 / 36078 - 222

Paper presented at the

2000 Americas Conference on Information Systems (AMCIS 2000),  
Long Beach (CA), USA, August 9-13, 2000.

Published in the conference proceedings: AMCIS 2000, Vol. II, edited by Mike Goul / Paul Gray / H. Michael Chung, published by the Association for Information Systems (AIS), p. 750-756.

© Copyright 2000 by Frank Piller, Ralf Reichwald, Kathrin Möslein and Christoph Lohse, TUM.

Contact information: piller@ws.tum.de; www.mass-customization.de