Automating Customer Complaints Management Through Trust Accounts

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ABSTRACT

The automation of business processes by the use of paper-free EDI transmissions between business partners can be an incentive to advance the exchange of orders, invoices, and customer complaints without human interruptions by integrating and embedding trust mechanisms. This paper analyzes the applicability of automatically updated trust accounts for customer relationship management for the handling of customer complaints. The model introduced in this paper can help to reduce handling and shipping costs significantly and thereby improves customer benefits, resulting in higher customer loyalty.

1. INTRODUCTION

A promising application area to realize yet unexploited automation benefits in the area of customer relationship management is the handling of customer complaints. While empirical research and therefore data are very limited in this area, two figures might provide an idea of how much money possibly can be saved by an improved complaints handling process: Eastman Chemicals was able to save $2 million after improving its business processes associated with investigating and responding to complaints. They were able to cut expenses for waste removal and rework caused by off-quality products or incorrect paperwork (Hallen and Latino 2003). According to Schilling and Sobotta (1999), a medium-sized enterprise with approx. €5 million annual revenue, calculated the average processing costs with € 837.47 for each complaint handling process in 1997.

A major impediment to increasing the degree of automation in this area is the need for human interaction and decision, e.g., to check complaints or to prevent opportunistic customer behavior. Since the handling of complaints is costly not only for suppliers but also for customers, only 5-10% of all dissatisfied customers decide to complain at all (Tax and Brown 1998). But dissatisfied customers very likely switch their provider with consequential revenue losses higher than the costs caused by complaints in the first place (Fornell and Wernerfelt 1987). Therefore, suppliers have to cope with two dilemmas: Firstly, to date the suppliers they cannot automate or standardize the complaint-handling since opportunistically acting customers may benefit from this and, secondly, they might never get notice from a dissatisfied customer who has switched to another supplier because the manual complaint-handling is too expensive in comparison to the value of the defective or missing delivery. The remainder of the paper is organized as follows: an overview of relevant related research in trust and reputation is provided in section 2, followed by a modified customer complaints handling system in section 3. We discuss and conclude the paper in section 4.

2. REPUTATION AND CUSTOMER RELATIONSHIP MANAGEMENT AUTOMATION

Automation-Oriented Business Process Reengineering

Apart from the standardized exchange of electronic order or invoice messages there are further customer-related business processes which are so far not fully standardized and utilized. Most of those processes are related to trust or reputation aspects, i.e. are the data submitted up-to-date, is the sender or receiver reliable and solvent, or is a partner's claim justified? Costly human interaction is necessary to fix occurring problems, especially when it comes to irregularities in the value chain not covered by standardized processes. A common problem in every day product delivery is the handling of customer complaints of missing or broken items from an ordered lot. The customer complaints management process itself might be more expensive than the replacement value of the product, especially where missing or broken low-value products such as office supplies are concerned,. The customer has to decide whether to claim or not. If she does not, she has to pay for the incomplete delivery and the supplier cannot adjust its distribution because its quality management never gets the information that products have reached customers in an unsatisfactory condition.

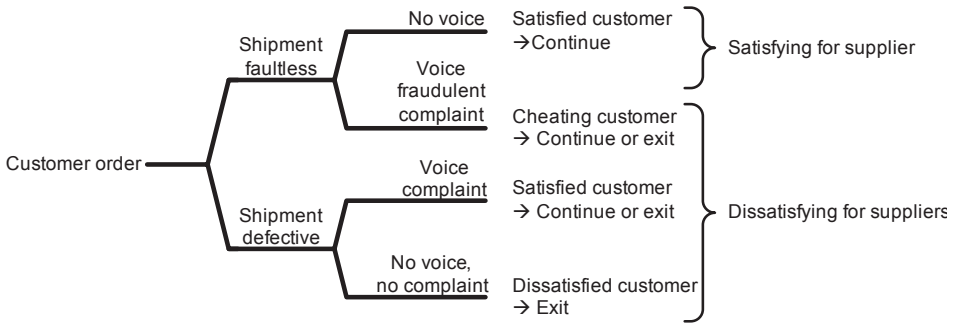
Reputation and Trust

Reputation reflects an aggregated ratio incorporating multiple factors: quality of merchandise, reliability of financial transactions, and/or level of customer service. It is often observed that reputation and trust acquire fundamental importance in long-term business relations. According to Mui et al. (2002b),, reputation is a "perception that an agent creates through past actions about its intentions and norms" and trust is a "subjective expectation an agent has about another's future behavior based on the history of their encounters". It can be shown that reputation reduces the complexity of the decision process through a better estimation of the likelihood of failed orders and through a reduction in the number of quality tests needed for a product (Marsh 1992). A broad overview of approaches to the use of reputation, e.g., in multi-agent systems, is provided by Mui et al. (2002a). Sabater and Sierra (2001) introduce a reputation model that takes the individual and social dimension of reputation into account. Carter, Bitting, and Ghorbani (2002) propose a formalization of reputation for multi-agent systems, applying the sociological concept of role fulfillment for establishing a positive reputation and for examining the link between reputation and trust. The role of trust in supply relationships and the underlying implications are addressed in an empirical study of business relationships in Germany and Britain (Lane and Bachmann 1996). As they point out, trust relations are highly dependent on stable social, institutional, and legal structures. Moorman et al. (1992) investigate the specific relationship between providers and users of market research reports and provide a good introduction to the role of trust in relationships. Das and Teng (1998) argue that trust and control are the two pivotal sources of confidence in the cooperative behavior of business partners in strategic alliances. Both sources of confidence are highly interdependent. A high level of control reflects a low level of trust and vice versa. Without any control, the trusting party takes the whole risk of the trustee's opportunistic behavior. As they point out, trust or control are two completely different kinds of approaches to business relationships.

Customer Complaint Alternatives and Implications

In order to discuss the complaint process both on the customer and supplier sides in more detail, the alternatives and relevant business cases are depicted in the following. Drawing from the "exit, voice, and loyalty" model provided by Hirschman (1970), and the customers "problem impact tree" framework of Rust, Subramanian, and Wells (1992), a problem tree of voice a complaint or exit without making a complaint is utilized. According to Hirschman, customers have two potential feedback options: (1) to voice complaints and thereby express the dissatisfaction directly to the supplier or (2) to stop buying and exit the relation. Both options have different, but always unfavorable impacts on suppliers: After submitting an order, the incoming orders are checked by the customer's receiving department. In the case of a faultless shipment, one expects that customers have no reason to complain (upper branch of Figure 1). This is true in nearly all cases: customers receiving correct deliveries will be satisfied, continue with the supplier, and will not place any complaints. The situation is different if complaints are not too costly and the supplier does not ask for the defective items to be sent back in order to validate the complaint. If customers do not perceive the recall of defec-

Figure 1. Customer action alternatives



tive items as a credible threat, then they might be tempted to cheat and complain about faultless shipments. Avoiding such an incentive is a pivotal element when designing an automated customer complaint-handling solution.

In the case of defective or partially missing items in the shipment (lower branch of Figure 1), the supplier must be contacted and/or the broken parts sent back. Afterward, the supplier sends the defective parts again and the customer tracks the complaint until all replacement parts are received. If the supplier handles the complaint satisfactorily, the customer will buy again. If this is not the case and the customer is dissatisfied with the process management, then the exit strategy might be chosen. In the latter case, the supplier has no chance to contact the dissatisfied customer if a defective shipment is delivered and the customer decides not to complain. This can be the case if the complaint process is more costly then the value of the defective products. Dissatisfied with the delivered quality, it is likely that such a customer will discontinue the business relationship.

3. CUSTOMER COMPLAINT ALTERNATIVES AND IMPLICATIONS

A Simplified Customer Complaint Process

In this section, a simplified customer complaint process is described to reduce the handling costs for suppliers and customers. It will be shown that from a game-theoretical point of view the simplified customer complaint-handling process dominates the conventional process if customers are always truthful. If customers cannot be assumed to be acting truthfully, a trust mechanism is introduced to inhibit cheating behavior by customers.

Our model is based on the following assumptions:

- Neither supplier nor customer knows the exact value of the defectiveness ratio "*d*". The exact quality of the products is not known (e.g., due to unknown conditions during the shipment).
- There is a long-term recurring business relationship between supplier and customer. Products are exchanged frequently between both of them.
- The value of a single order is relatively low, as can be observed for raw materials or office supplies.
- The customer complaint-handling costs of the new simplified process can be ignored. In the simplified process, the customer only has to send a notification to the supplier; the supplier does not have to perform a check if the products are indeed defective.

We will use a game-theoretical approach to analyze the trade situation for the conventional and the simplified complaints handling process. In a conventional complaint-handling process, the customer checks the shipment and if there are defects, the defective parts of the shipment are sent back to the supplier. The supplier has to check whether the complaint is justified or not. Both partners have expenses due to the manual processing and shipment of products. Table 1 depicts the cost matrix in a game with a conventional customer complaint process. If the shipment is indeed defective and the customer decides to reclaim, both customer and supplier have to pay for the cost-intensive manual handling of the customer complaints (c_C^C and c_S^C), respectively. Additionally, the supplier will not get paid for her defective products and the value "*v*" (ranging from 0 to the total value of the shipment if all parts are defective) of these parts is lost for her. When the customer decides not to reclaim the defective products, her loss equals the value of the defective shipped products *v*. If the shipped products have only minor defects, the consumer may be able to use the products partly, thereby reducing her loss to a fraction of *v* indicating the shipments remaining utility. Nonetheless, compared to flawless products, the consumer encounters loss costs ranging from 0 for minor defects to the value of the shipment *v* for major defects.

Table 1. Conventional customer complaint process cost matrix

Shipment defective?	Customer complaints ? Yes	Customer complaints ? No
Yes (d)	Customer: complaint costs (c_C^C) Supplier: {0; fraction of defective shipment (*v*)+} complaint costs (c_S^C)	Customer: {0; fraction of defective shipment (*v*)} Supplier: 0
No (1-d)	Customer: complaint costs (c_C^C) Supplier: complaint costs (c_S^C)	Customer: 0 Supplier: 0

Table 2. Simplified customer complaint process cost matrix

Shipment defective?	Customer complaints ? Yes	Customer complaints ? No
Yes (d)	Customer: 0 Supplier: fraction of defective shipment (*v*)	Customer: {0; fraction of defective shipment (*v*)} Supplier: 0
No (1-d)	Customer: - fraction of defective shipment (-*v*) Supplier: fraction of defective shipment (*v*)	Customer: 0 Supplier: 0

If the shipment is not defective and the customer decides to issue a complaint, both partners will have to pay complaint costs (c_C^C and c_S^C). After the order is sent back, the supplier checks the products and finds them non-defective, so she may re-ship them or sell them to another customer, so there are no further costs despite the complaint processing costs. In regular cases when the shipment is not defective and the customer does not decide to reclaim, the transaction is completed as originally intended.

Now a simplified customer complaint-handling process is implemented, significantly reducing complaint costs for both partners. In cases where the customer decides to complain about a shipment, the supplier trusts her customer, assuming the products are indeed defective without testing. The customer subtracts the invoice accordingly or a new shipment is immediately scheduled and the supplier does not audit the complaint any further. This new setting is described in Table 2.

If the shipment is not defective and the customer decides not to reclaim, the situation is unchanged. In cases where the products are defective the situation is unchanged despite the lack of complaint costs. The critical case is a cheating customer who pretends to complain for a shipment which is not defective at all. In this case, the customer does not have to pay for the products although she receives faultless products. She immediately earns the value of the products ("negative loss costs (-v)"). On the other hand, the supplier loses the value of the products shipped. Comparing both situations reveals that for defective product shipments, the second scenario with a simplified customer complaint process is advantageous in all situations. If supplier-side complaint costs are less than the value of the shipments, only the lower left quadrant of the cost-matrix is disadvantageous. This outcome, which implies a cheating customer, must therefore be avoided. Despite the savings by skipping reclaim checks, it can be rational for the supplier to ask the consumer to return the defective goods in order to be able to determine the source of the defects and improve quality by taking appropriate counter measures. Even if consumers are always acting truthfully or a reputation mechanism is applied, a random sample of claimed shipments should be returned to the supplier to analyze the source of defects. The costs of shipping and handling complaints in a specific market are also important for the applicability of the simplified customer complaints process. In the case of low or negligible shipping and complaint-handling costs, it might be rational to always return defective shipments. It depends on the relationship of total complaint costs to the individual value of a shipment whether the simplified complaint process is applicable or not. If total complaint costs are high in relation to the shipment's value, the simplified complaint process can realize substantial cost savings.

A Reputation Mechanism to Inhibit Fraudulent Behavior

In the case of accurate shipments, there is a significant difference between the conventional and simplified scenario. If the customer decides to complain for faultless shipment, then she will not have to pay for the faultless products and immediately gains their value. On the other hand, the supplier loses the equivalent value because she trusts her customer and does not perform a quality check on the reclaimed products. If there is no additional monitoring or control structure, the customer will always reclaim the delivered shipments, independent of the actual status of the shipment (whether it is indeed defective or not). It is the best strategy for the customer to complain always. The supplier therefore always loses the equivalent value of the shipment if no mechanism to counter cheating behavior is applied.

In an idealized world, a truthful acting customer would be the optimum to reduce transaction costs. Both partners could improve their respective position in all cases, because only the upper left and lower right sections in Table 2 would be relevant. If one can assume that a customer is always telling the truth, then the conventional complaint-handling mechanism is dominated by the simplified automated complaint handling. Both parties benefit from the reduction of transaction costs when processing complaints automatically. Nevertheless, the customer might be tempted always to complain about defective products even if this is not justified. The pivotal question is how to assure that the customer has no interest in cheating the supplier by applying an inexpensive mechanism at the same time. At this point, an automated complaint-handling mechanism might be suitable. Reputation in this context is based on business transactions with a certain customer in the past. The more orders successfully processed in the past, the higher the reputation account. Contrariwise, the customer withdraws from her reputation account on the supplier side if transactions failed in the past. For example, in the simplest case the supplier could estimate the defectiveness ratio d of his/her products r and adjust the customer's reputation account if her complaints rate significantly differs from the estimated quality, e.g., by applying a χ^2 test. The supplier's plausible threat is to switch back to the conventional customer complaints handling mechanism, inducing complaints processing costs on future transactions. This threat only works for infinitely repeated games as assumed for this model. Nevertheless, this assumption seems to be appropriate for our setting, since B2B-relationships can often be characterized as long-term, frequently recurring relations. The supplier can implement several strategies to ensure that the customer is truthful. The following strategies can be applied, if the supplier knows the defectiveness ratio d with high accuracy:

- The supplier can randomly select reclaimed shipments and request the customer to return the products for an intensive test. If the products are faultless, the customer cannot be trusted and she is removed from the simplified customer complaints handling process. The process is immediately switched back to the traditional handling process. This trigger-strategy is misleading if the customer accidentally complains about products that are not defective.
- The supplier can switch back to the conventional complaints handling process if the ratio of complained products significantly exceeds the defectiveness ratio d. This mechanism only works, if the supplier knows d with high accuracy.
- Each customer receives a reputation account for a given period, calculated as the product of the mean ordered value and the defectiveness ratio d. If a customer reclaims a shipment, the shipment's value is subtracted from this account and if the account is exhausted, the customer has to justify her behavior. This mechanism also relies strongly on the accuracy of the parameter d.

The threshold for identifying cheating behavior on the part of a customer should be chosen according to the accuracy with which d is known. If d is not exactly known and is subject to changes, this threshold should be increased or decreased accordingly. If the supplier herself does not know the defectiveness ratio d, she can improve the reputation mechanism by taking the responses of all other customers for each product into account. Each customer has individual reputation accounts for each product. If a customer reclaims a shipment, the value of this shipment is subtracted from her account, which refers to the affected products. Afterwards, the reputation accounts of all customers receive a bonus. This bonus for product r and customer i is calculated as an adjusted ratio of the mean quantity ordered by the customer. This value can be regularly recalculated for all orders of a given period (e.g., monthly). The following equation calculates the reputation bonus for each customer i and product r.

$$bonus_r^i = \frac{q_r^i}{\sum_{j=1}^{n} q_r^j} * p_r q_r^d$$

p_r : price of product r

q_r^i : aggregated quantity of product r ordered by customer i in a given period

q_r^j : aggregated quantity of product r ordered by customer j in a given period

n: number of customers with reputation accounts

q_r^d : quantity of defective product r that is reclaimed

If all customers are acting truthfully, the individual reputation accounts for every product will be zero on average. A brief example should illustrate the mechanism: a defectiveness ratio of 10%, a price of 1 for a given product r and three customers are assumed. The first customer regularly orders 1000 units, customer 2 orders 50 units and customer 3 orders 200 units. Each customer reclaims truthfully 10% of the shipments. When the first customer reclaims in total 100 units, her reputation account is immediately reduced by 100, equivalent to the total value of the complaint. Afterwards, all customers' reputation accounts are given a bonus (including the customer initiating the claim), resulting in 80 bonus points for customer 1, 4 bonus points for customer 2 and 16 bonus points for customer 3. This process is also applied for the complaints of the other customers, leading to neutral reputation accounts at the end of the selected period. If one of the customers decides to cheat and complains with a higher ratio, e.g., 15%, then her reputation account will be negative while the accounts of the other customers will be positive. If the first customer complains 15% of her shipments and the other customers complain about

10%, their respective reputation accounts for the illustrative example will be -10, +2 and +7.2. Customers with a higher complaint ratio than other customers can be identified by their negative reputation accounts. The first cheating customer will put herself into an inferior position compared to truthful customers. This system can only be cheated on if all customers together increase their complaints ratio. Furthermore, it does not work with a small number of customers. If there were only one customer, then this reputation account would always be neutral. From a macroeconomic and individual perspective, both partners can reduce their costs when the simplified mechanism is applied and supported by reputation accounts to foster truthful behavior of customers.

4. SUMMARY AND CONCLUSIONS

The combination of information systems and game-theory inspired trust accounts in a customer relationship management system establishes new solutions to automate business transactions where human decisions were formerly necessary. Through the reduction of manual handling and shipping costs, quality of the complaint-handling process may be increased both for customers and suppliers, resulting in higher customer retention.

A game-theoretic analysis of the order and customer complaint process has yielded insights into undesired outcomes of the interaction of suppliers and customers. While faulty deliveries will always remain a problem, costs associated with customer complaint-handling can be reduced significantly if substituting human decision competence with an automated information system. Thus, we believe that an economic interpretation of existing information systems may help to uncover as-yet unrealized potential for computer-mediated customer relationship management approaches. The system allows firms to deploy a simplified customer complaint-handling process while preventing customers from acting opportunistically.

In general, applying trust and reputation mechanisms can guard against otherwise unfavorable situations and create outcomes where all participants can benefit. The use of information systems mitigates the threat of opportunistic behavior in business transactions that could not be achieved previously.

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