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Discussion Paper WI-344

Complaint Management and Repurchase Behavior: A Decision Support Approach Using System Dynamics

by

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in: Proceedings of the 15th Americas Conference on Information Sytems, San Francisco, August 2009, p. 1-14.

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Complaint Management and Repurchase Behavior: A Decision Support Approach Using System Dynamics

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ABSTRACT

Today there is no doubt about the relevance of complaint management for customer retention, which, among other things, results in improved repurchase behavior. However, what happens when organizations are not aware of which customers are satisfied and dissatisfied? What happens when complaint management cannot assess the repurchase behavior of their customers? Which consequences in terms of sales revenue must decision-makers then take into account? To address these questions, we present a decision support approach—based on findings from evidence controlling—to find out what influence repurchase behavior of customers has on the achievement of distribution goals. For this purpose, we develop a system dynamics model for complaint management to analyze the effects of repurchase behavior of satisfied and dissatisfied customers. The research findings suggest that the application of system dynamics supports identifying relevant feedback loops in complaint management and furthermore provides information to what extent repurchase behavior influences distribution goals.

Keywords

Decision support, system dynamics, complaint management, repurchase behavior.

MOTIVATION AND OBJECT OF RESEARCH

As a critical part of an organizational culture, customer orientation focuses on fulfilling customers' needs. To provide superior value, organizations need to understand their customers' expectations in order to satisfy them (Conduit and Mavondo, 2001). Most likely, satisfied customers remain loyal customers of the organization. However, customers can become dissatisfied when their expectations differ from their perceptions (Churchill and Surprenant, 1982; Oliver, 1980). This happens, for example, through defect products, insufficient services, or inadequate organizational behavior. If so, this will cause critical consequences for organizations: dissatisfied customers tend to reduce their customer loyalty, damage the corporate image by negative word-of-mouth, and change their repurchase behavior dramatically (Fornell and Wernerfelt, 1987).

Although decision-makers set up complaint management in organizations—being responsible for transforming dissatisfied back into satisfied customers—they often cannot see the red light: Many dissatisfied customers express their displeasure only indirectly to third parties (e.g. consumer protection organizations) or do not articulate their complaint at all (Homburg and Fürst, 2007). Thus, besides successful handling of incoming complaints, organizations need to identify all their dissatisfied customers to be able to transform them back into satisfied ones and motivate them to repurchase their products and services.

Therefore, for decision-makers it is not enough to minimize the complaint rate (i.e. the quotient of the total number of complainants and the total number of customers) but also to maximize the rate of dissatisfied customers complaining to the organization in order to minimize the rate of dissatisfied customers of the organization in the end. On this account, Stauss and Seidel introduced the term "evidence controlling" to raise organizations' awareness of identifying "unvoiced complaints of dissatisfied customers [and determining] the extent of those complaints that are articulated, but not registered in the firm" (Stauss and Seidel, 2008). For decision-makers it is particularly difficult to incorporate the effects of these so-called hidden complaints and their consequences on changing repurchase behavior that could endanger the existence of their organization in the worst case.

This contribution targets at developing a dynamic model for complaint management in order to analyze the effects of repurchase behavior of satisfied and dissatisfied customers to sales revenue in future. Exemplarily, we propose recommendations for decision-makers in complaint management.

Therefore, the research question is: *To what extent shall complaint management attain measures of repurchase behavior of satisfied and dissatisfied customers in order to achieve given distribution goals?*

To answer this research question, we apply the system dynamics approach striving for the goal of qualitative description and analysis as well as quantitative simulation of complex systems.

The remainder of the paper is organized as follows: Section 2 proposes the existing findings in complaint management, repurchase behavior, and system dynamics. Section 3 presents the application of the system dynamics approach to complaint management in terms of repurchase behavior and simulates four sensitivity analyses subject to varying repurchase behavior and their effects on sales revenue. Section 4 summarizes the results and points out future research.

RELATED WORK

Complaint Management

In general, being responsible for dissatisfied customers of organizations, complaint management targets at transforming them back into satisfied customers in order to stabilize these endangered customer relationships and increase their customer loyalty at last.

According to Fornell and Wernerfelt, complaint management is defined as defensive marketing strategy: It strives for the goal "to minimize customer turnover (or, equivalently, to maximize customer retention) by protecting products and markets from competitive inroads" (Fornell and Wernerfelt, 1987). In contrast, Johnston proposes a more service-oriented perspective. He argues that complaint management includes service recovery and involves the receipt, investigation, settlement and prevention of customer complaints, and recovery of the customer (Johnston, 2001). Taking an information perspective, Gilly et al. focus on the flow of information from "dissatisfied customers through the organization to relevant decision makers" (Gilly, Stevenson, Yale, 1991). Finally, Stauss and Seidel state the main goal of complaint management as "increasing the profitability and competitiveness of the organization by restoring customer satisfaction, minimizing the negative effects of customer dissatisfaction on the organization, and using the indications of operational weaknesses and of market opportunities that are contained in complaints" (Stauss and Seidel, 2004).

This definition implies three sub goals: First, the customer-related sub goal aims at improving the repurchase behavior of customers by enhancing the repurchase frequency and intenseness as well as promoting cross- and up-buying behavior (Mittal and Kamakura , 2001).Second, striving for the image-related sub goal, organizations seek to create promotional effects via positive impacts of word-of-mouth (Davidow, 2003). Third, the quality-related sub goal involves the improvement of product and service quality by analyzing and using complaint information (Fornell and Wernerfelt, 1988).For this paper, we concentrate on the customer-related subgoal investigating the repurchase behavior in more detail.

Repurchase Behavior

In his exit-voice theory, Hirschman states possible post purchase options for dissatisfied customers (Hirschman, 1970): Besides the alternative to express a complaint (voice), dissatisfied customers can cancel the customer relationship (exit) or remain loyal customers, though, changing their repurchase behavior disadvantageously (e.g. reducing their repurchase frequency).

Focusing on the repurchase behavior, organizations should strive for the goal of sustainable repurchase behavior of their customers, i.e. the "objectively observed level of repurchase activity" (Seiders, Voss, Grewal, Godfrey, 2005). Research literature confirms that organizations have to spend more money to attract a new customer compared to retain an existing customer, which makes existing customers more profitable (Peppard, 2000). Mittal and Kamakura state that the likelihood of satisfied customers to repurchase products and services in following periods is much higher compared to dissatisfied customers (Mittal and Kamakura , 2001).

Additionally, the repurchase benefit can be considered as the key measurement of the success of complaint management. Organizations can attain this effect when "customers who would have switched to the competition and been lost indefinitely due to their negative experiences continue their association" with the organization (Stauss and Seidel, 2004).

System Dynamics

Although organizations enhanced complaint management in recent years, they failed to integrate dynamic considerations in these considerations: Effects on repurchase behavior, word-of-mouth, and product and service quality demonstrate the relevance of integrating internal and external changes. However, these effects have not been addressed sufficiently in the past.

System dynamics shall counteract this deficit. This approach can identify, analyze, and simulate the complex causal structures of complaint management comprehensively. In many cases, the application of system dynamics models results in revisions and adaptations of decision rules and learning effects in terms of future decision-making (Morecroft and Forrester, 1994). Based on system theory, Forrester originally developed the system dynamics approach and defined it as "the investigation of the information-feedback characteristics of a [managed] system and the use of models for the design of improved organizational form and guiding policy" (Forrester, 1961). According to Coyle, system dynamics is "a method of analyzing problems in which time is an important factor, and which involves the study how the system can be defended against, or made to benefit from, the shocks which fall upon it from the outside world" (Coyle, 1979). Finally, Wolstenholme notes that system dynamics is "a rigorous method for qualitative description, exploration, and analysis of complex systems in terms of their processes, information, organizational boundaries, and strategies which facilitates quantitative simulation modeling and analysis for the design of system structure and behavior" (Wolstenholme, 2003).

In conclusion, system dynamics as methodical approach strives for the goal of qualitative description and analysis as well as quantitative simulation of complex systems. Therefore, this approach is suited for investigating complaint management in terms of repurchase behavior and thus will be introduced systematically in the following.

MODEL DEVELOPMENT

Having defined the main elements of this paper, in this section we develop the system dynamics model: We generate it by means of the process model of Randers (Randers, 1980) consisting of the process steps system definition, qualitative modeling, and quantitative modeling. Finally, we simulate the model under different conditions based on adequate system parameters and educe decision guidelines from these findings.

Step 1: System Definition

The first step of the modeling process determines the nucleus of the system (in our case the complaint management with the focus on repurchase behavior): It should contain all system variables being important for the following investigation. Since complaint management is a comprehensive process, we concentrate on the indirect complaint management process and, in particular, on complaint management controlling for further analysis (see Figure 1).

Figure 1. Indirect complaint management process (based on (Stauss and Seidel, 2004))

The fundamental task in complaint management controlling is the so-called *evidence controlling.* It determines to what extent "complaint management is in a position to make the degree of dissatisfaction of the firm's customers evident to management" (Stauss and Seidel, 2004). According to the customer annoyance iceberg (Stauss and Seidel, 2008) we classify satisfied and dissatisfied customers subject to their current state and deduce specific rates from these states for organizations:

1. In general, all customers are characterized as customers who purchase a product in a period (C_p). This could be either existing customers (i.e. customers who already bought this product in the last period) or new customers, (i.e. customers who buy this product for the first time). For reducing complexity of the model, we neglect that new customers could have bought this product more than one period before. Furthermore, we assume the number of new customers constant since complaint management—integrated in marketing and sales and distribution—can figure on to obtain a largely constant number of new customers. Future research will include the effects of word-of-mouth on customer acquisition in more detail.

2. Customers can purchase an intact (C_{ip}) or defect (C_{dp}) product. Under defect products (measured by the total defect rate (TDR), i.e. the fraction of defect products produced in a period) we subsume products that already are damaged before the act of purchase, i.e. that the organization is accountable for the defect in any form. However, the customers could not detect this defect directly during the act of purchase, so that they cannot react, by immediate replacement or return of the defect product, for example.

3. If customers purchase a defect product, they will be dissatisfied and thus will decide whether to complain (C_{dpc}) or not (C_{dpn}). On this account, we define the rate of complaining customers as the total articulation rate (TAR). If the TAR is near 0, only few customers will express their complaints making it extremely difficult for organization to identify the reasons for their dissatisfaction.

4. Having decided to complain, dissatisfied customers need to determine whether to articulate their complaint to the organization (C_{dpco}) or third parties (C_{dpct}). We assume this decision can only be made exclusively. Customers articulating their complaints to third parties cannot be registered and, similar to the non-articulated complaints, represent an inherent danger for the organization.

5. In contrast, complaint management will handle complaints being articulated directly to the organization. (In this paper we neglect the case that complaints are expressed towards customer-contact personnel being unprepared for complaint situations or are afraid of negative consequences and thus record only a fraction of the complaints (Stauss and Seidel, 2008)). Customers who complain directly to the organization can be measured by the registered articulation rate (RAR). Depending on the complaint handling and the complaint solution, customers will be satisfied (C_{dpcos}) or dissatisfied (C_{dpcod}), which is illustrated by the total satisfaction rate (TSR).

Table 1 summarizes the classification of customers. We assume this classification is complete which means that customers have no other options for action (e.g. customers being neither satisfied nor dissatisfied after the complaint process). Based on this classification, the question arises to what extent a customer will repurchase the product in the next period and thus will contribute to sales revenue. We measure this customer repurchase behavior by the repurchase rate (RR).

<table>
<tr><th colspan="5">All customers who purchased a product in a period C_p</th></tr>
<tr><td rowspan="4">Customers who purchased an intact product C_{ip}
(if TDR = 0)</td><td colspan="4">Customers who purchased a defect product C_{dp} (if TDR > 0)</td></tr>
<tr><td rowspan="3">Customers who do not articulate their complaint C_{dpn}
(if TAR = 0)</td><td colspan="3">Customers who articulate their complaint C_{dpc} (if TAR > 0)</td></tr>
<tr><td rowspan="2">Customers who do not complain to the organization C_{dpct}
(if RAR = 0)</td><td colspan="2">Customers who complain to the organization C_{dpco}
(if RAR > 0)</td></tr>
<tr><td>Customers who are dissatisfied after the complaint process C_{dpcod}
(if TSR = 0)</td><td>Customers who are satisfied after the complaint process C_{dpcos}
(if TSR > 0)</td></tr>
</table>

Table 1. Classification of customers

Step 2: Qualitative Modeling

Having defined the system nucleus, we determine qualitative causal relationships between the system variables that researchers in practice often establish by consulting experts and conducting interviews (Luna-Reyes and Andersen, 2003). Goal of this qualitative process step is to identify and analyze closed cause-and-effect chains. These so-called feedback loops can be distinguished into positive and negative loops (Sterman, 2000). In contrast to positive feedback loops—being characterized by exponential growth behavior and indicated by a + sign—a feedback loop is called negative when its behavior converges towards a target value. Since in practice, most likely, numerous feedback loops overlap, intenseness, temporal delays, and nonlinearities of the individual loops decide about the behavior of the entire system.

The presented causal loop diagram aims at identifying the implications of repurchasing behavior of satisfied and dissatisfied customers. Other consequences (e.g. word-of-mouth, product and service quality) will be included in future research.

The following assumptions characterize the model:

1. We investigate the repurchase behavior for a specific commodity.
2. Customers need to purchase this commodity every period, i.e. there are no temporal delays in repurchase behavior.
3. If customers purchase an intact product, they will be satisfied. In contrast, if customers purchase a defect product, they will be dissatisfied.
4. Having purchased a product in a period, customers will decide whether to repurchase the product in the following period from the organization (illustrated as “repurchasers” 1–5 depending on the classification of the customers) or from competitors. Their repurchase behavior is demonstrated by the RR_1 - RR_5.
5. The number of new customers is constant over time.

The causal loop diagram is illustrated in Figure 2.

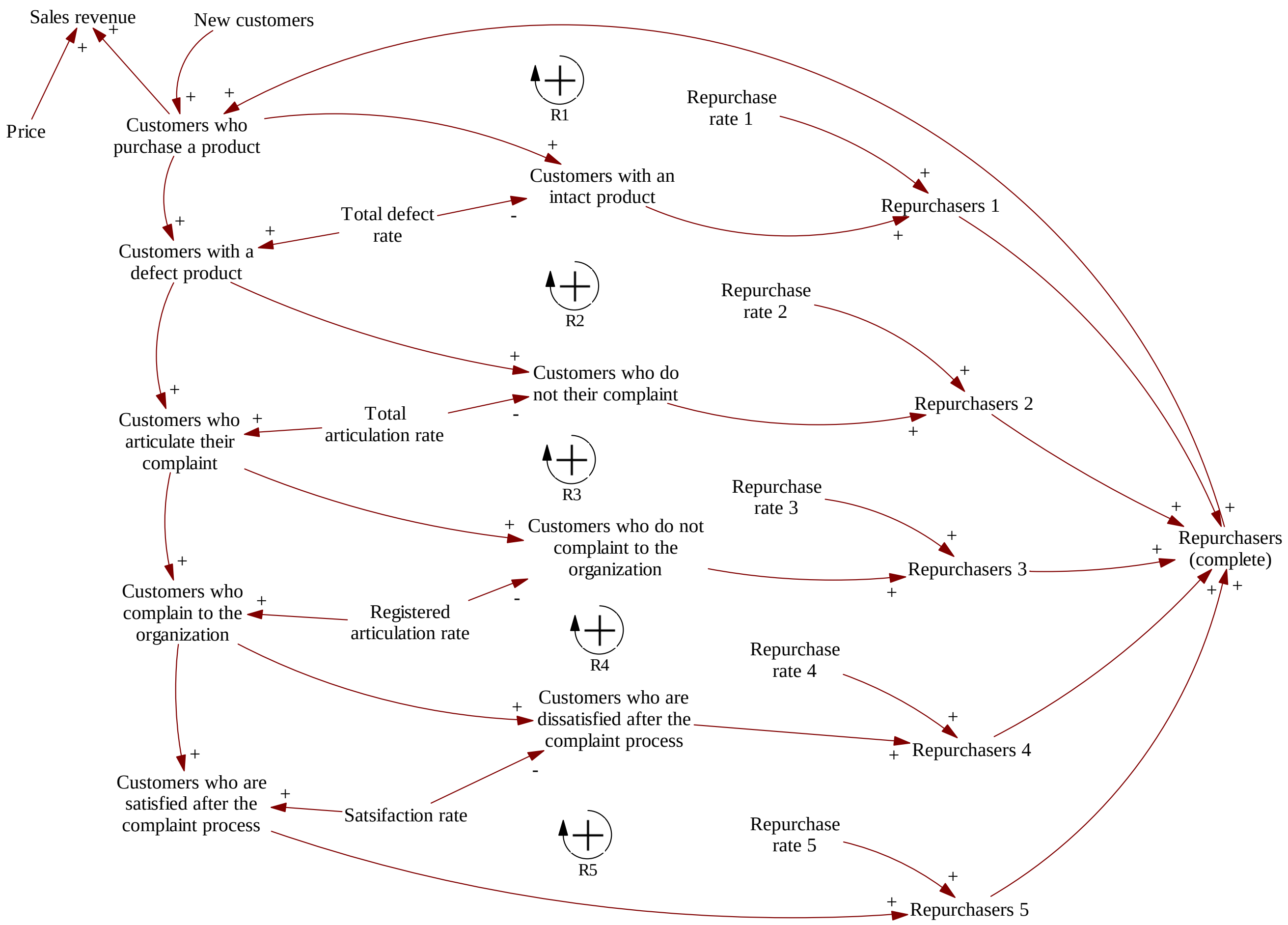

Figure 2. Causal loop diagram

Analyzing the causal loop diagram, we identified the following feedback loops (see Table 2):

Loop	Polarity	Description
R1	positive	Customers who purchase a product ➔ Customers with an intact product ➔ Repurchasers 1 ➔ Repurchasers (complete)
R2	positive	Customers who purchase a product ➔ Customers with a defect product ➔ Customers who do not their complaint ➔ Repurchasers 2 ➔ Repurchasers (complete)
R3	positive	Customers who purchase a product ➔ Customers with a defect product ➔ Customers who articulate their complaint ➔ Customers who do not complaint to the organization ➔ Repurchasers 3 ➔ Repurchasers (complete)
R4	positive	Customers who purchase a product ➔ Customers with a defect product ➔ Customers who articulate their complaint ➔ Customers who complain to the organization ➔ Customers who are satisfied after the complaint process ➔ Repurchasers 5 ➔ Repurchasers (complete)
R5	positive	Customers who purchase a product ➔ Customers with a defect product ➔ Customers who articulate their complaint ➔ Customers who complain to the organization ➔ Customers who are dissatisfied after the complaint process ➔ Repurchasers 4 ➔ Repurchasers (complete)

Table 2. Feedback loops

Due to the exclusive appearance of positive feedback loops, the reader could suppose that the system behavior grows exponentially. However, the system has an upper limit by defining the range of the RR_1 - RR_5 between 0 and 1. Thus, neglecting the number of new customers, the number of “repurchasers” remains constant in the best case.

Step 3: Quantitative Modeling

In the third step, we transfer the qualitative causal loop diagram into a quantitative model—the so-called stock and flow diagram. This diagram enhances the causal loop diagram with further information for a deeper understanding: Stocks, flows, and auxiliary variables illustrate the existing, partly nonlinear and therefore non-intuitive, causal loops (Sterman, 2000). Moreover, the stock and flow diagram is enhanced by model equations in order to represent the causal relationships formally for quantitative analysis (Forrester, 1961).

Model Equations

First, we present exemplarily the most important model equations that contribute to a better understanding of the stock and flow diagram.

Equation (1) and (2) illustrate the inflow rates for the stocks C_{ip} and C_{dp} depending on the TDR and C_p. If the TDR = 0 (i.e. the organization produces a defect-free commodity), all customers would be satisfied and have no reason to complain. The number of repurchases in the next period would only reduce if RR_1 (i.e. the number of existing customers who purchased the product in the last period) is less than the rate of new customers in the current period. Equation (2) denotes that the organization unconsciously sells a defect product being perceived as defect commodity after the act of purchase (i.e. if the TDR > 0).

$$C_{ip}\_rate = (1-TDR) * C_p \quad (1)$$

$$C_{dp}\_rate = TDR * C_p \quad (2)$$

The rate for customers who purchased a defect product but do not complain—neither to the organization nor to third parties—is demonstrated by equation (3). In contrast, if the TAR > 0, dissatisfied customers will become complainants (see equation (4)). A TAR = 1 means that all dissatisfied customers will complain about the defect product. At this point, we do not distinguish to whom the complaints are articulated.

$$C_{dpn}\_rate = (1-TAR) * C_{dp} \quad (3)$$

$$C_{dpc}\_rate = TAR * C_{dp} \quad (4)$$

Equation (5) and (6) analyze to whom customers address their complaint. A RAR = 0 means that dissatisfied customers complain about the defect product to third parties exclusively. In this case, the organization actually has no possibilities to become attentive to the reasons for their customers’ complaints. A more beneficial situation demonstrates a RAR near 1 implying that dissatisfied customers complain directly to the organization and thus provide information about their experienced deficits.

$$C_{dpct}\_rate = (1-RAR) * C_{dpc} \quad (5)$$

$$C_{dpco}\_rate = RAR * C_{dpc} \quad (6)$$

If complaints have been articulated to the organization (i.e. the RAR > 0), the complaint management needs to transform the dissatisfied back into satisfied customers through adequate complaint processing and complaint solutions. If they fail, the TSR will converge to 0. The goal of the complaint management should be to achieve a TSR near 1.

$$C_{dpcod}\_rate = (1-TSR) * C_{dpco} \quad (7)$$

$$C_{dpcos}\_rate = TSR * C_{dpco} \quad (8)$$

Stock and Flow Diagram

Having defined the model equations, we need to determine the input parameters for the stock and flow diagram. The following input parameters have been used:

1. As explained above, we determine the number of new customers constantly 100 per period.
2. For the commodity, we assume a constant product price of 10 monetary units and a TDR of 5%.
3. According to Goodman et al., we conclude that, regardless of the industry, approximately only 20-50% of the dissatisfied customers express their annoyance to the organization (Goodman, O'Brien, Segal, 2000). Hence, we define an average TAR of 30%.
4. Depending on the industry and the extent of the problem, studies show that only about 10-60% of the articulated complaints are registered and thus known to the complaint management (Goodman et al., 2000). Therefore, we assess a RAR of 40%.
5. Finally, practical experience shows that complaint management cannot transform all dissatisfied back into satisfied customers. As a rule of thumb, Goodman et al. define 40% as average value for the TSR (Goodman et al., 2000).

Hint: Decision-makers who want to get a more realistic view of the problems should not only consider the average rates but also need to integrate the specific information of the organization in terms of complaint management rates. Only on this basis, they can guarantee the validity of the data and make sure that the right measures are used for simulation. Based on the parameters, we generate the stock and flow diagram (see Figure 3).

As simulation software, we apply Vensim© PLE Version 5.8c by Ventana Systems, Inc. Time unit used in the simulation is month because we assume a monthly RR of the commodity. We run the simulation for 100 months and use Euler integration method with fixed time steps of 0.5 months.

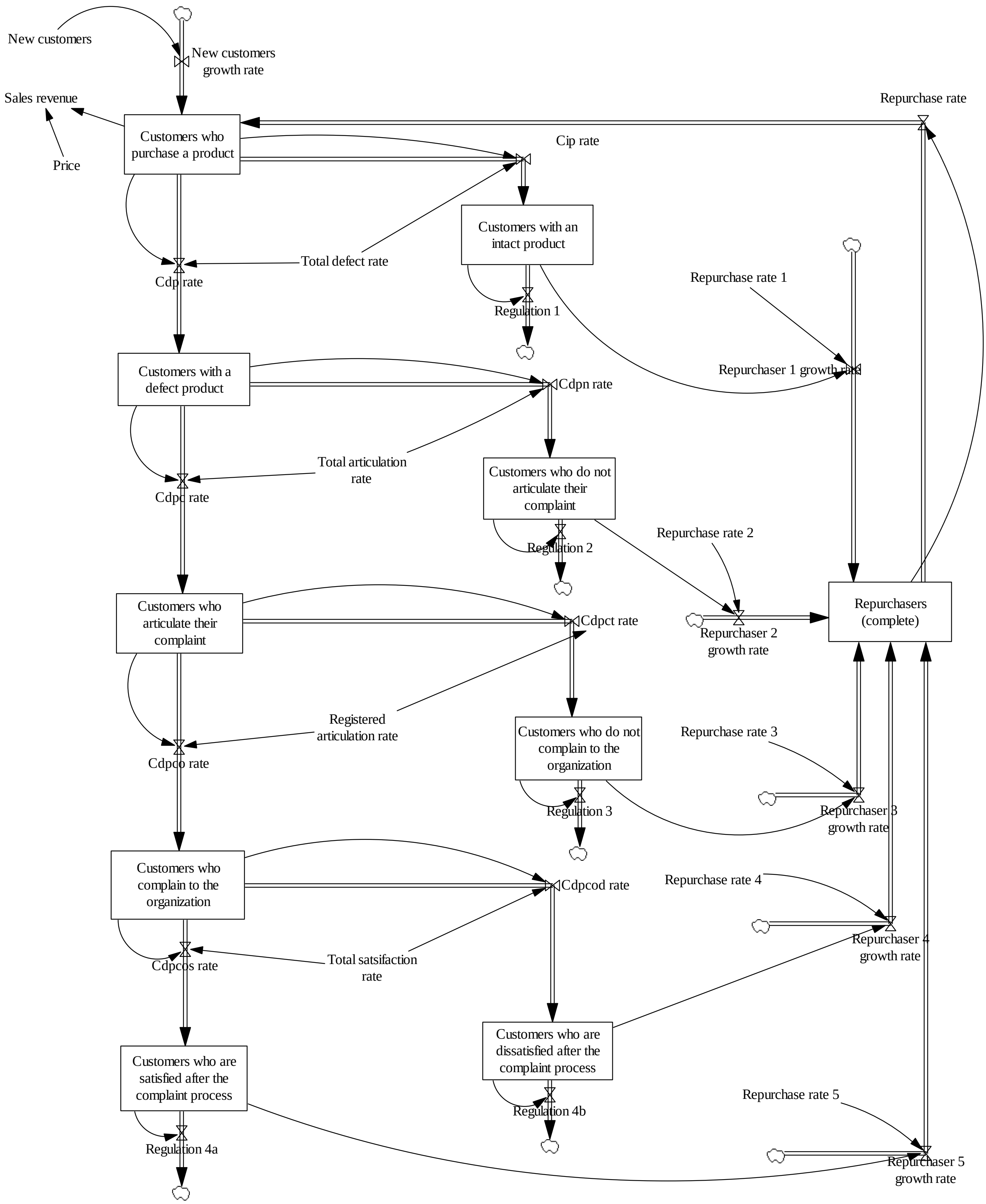

Figure 3. Stock and flow diagram

Step 4: Simulation

The last step builds upon the stock and flow diagram and establishes different “scenarios” to examine the system under changed conditions. This supports learning effects for decision-making and helps to understand the system behavior over time (Senge and Sterman, 1992). In conclusion, simulation represents the particular benefit of the system dynamics approach.

For this purpose, we conduct four sensitivity analyses by altering the RR_1 - RR_5. These sensitivity analyses demonstrate how small changes in the different RR influence the sales revenue in the following periods. From these insights, decision-makers can recognize the need of action depending on different repurchase behaviors of their satisfied and dissatisfied customers.

Sensitivity Analysis 1

In sensitivity analysis 1, we show the importance of a high RR_1 of satisfied customers in terms of sales revenue. The satisfied customers represent one of the most important customer groups because they purchased an intact product and therefore can be motivated differently to repurchase the product compared to dissatisfied customers. Changing RR_1 from 94% to 90% (or 96% respectively) will result in a long-term collapse (or an upswing respectively), which implies that decision-makers should be aware of a high RR_1 to guarantee enduring success (see Figure 4).

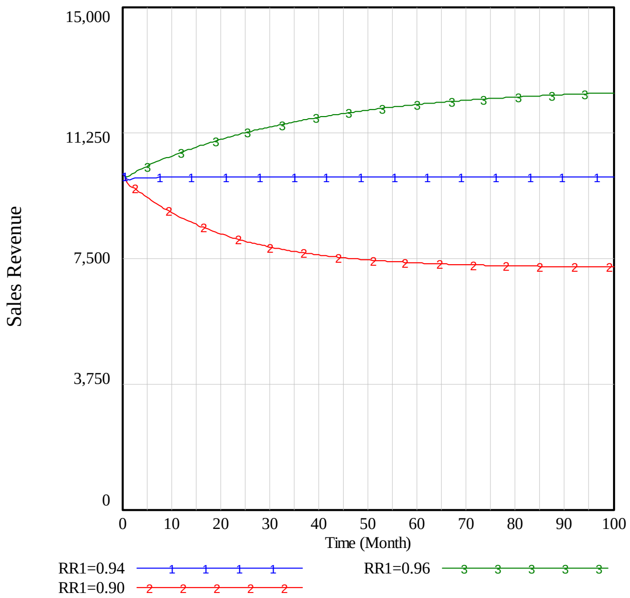

Figure 4. Sensitivity analysis 1 (TDR = 0.05, RR_1 = 0.94 (curve 1), RR_1 = 0.90 (curve 2), RR_1 = 0.96 (curve 3))

Sensitivity Analysis 2

The second sensitivity analysis illustrates how sales revenue will develop, if RR_2 (i.e. the RR of dissatisfied customers who do not articulate their complaint at all) increases from 10% to 20% (see Figure 5). Decision-makers should aim at high switching costs, for example, to attain this repurchase behavior in the following periods. .

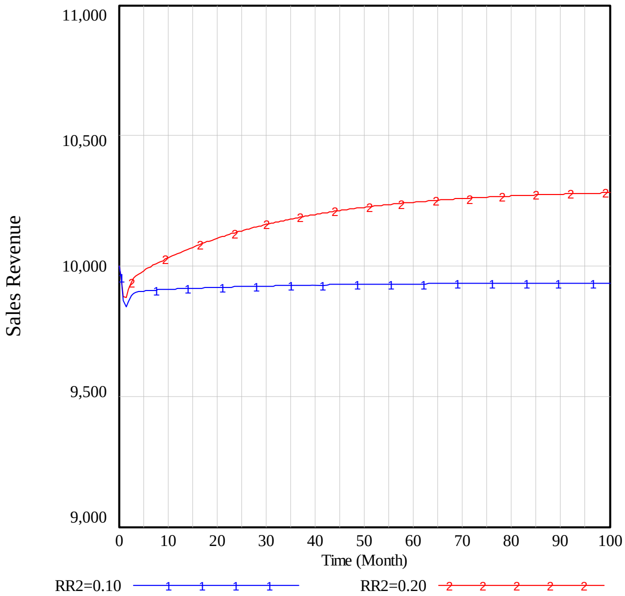

Figure 5. Sensitivity analysis 2 (TDR = 0.05, RR_1 = 0.94, TAR = 0.30, RR_2 = 0.10 (curve 1), RR_2 = 0.20 (curve 2))

Sensitivity Analysis 3

The third sensitivity analysis presents less clear results altering RR_3 regarding to the RAR. Customers who decide to express their annoyance to third parties can only be motivated moderately in terms of a higher RR_3. Although the RAR indicates that 60% do not complain directly to the organization, a higher RR_3 will only contribute little to improve sales revenue (see Figure 6).

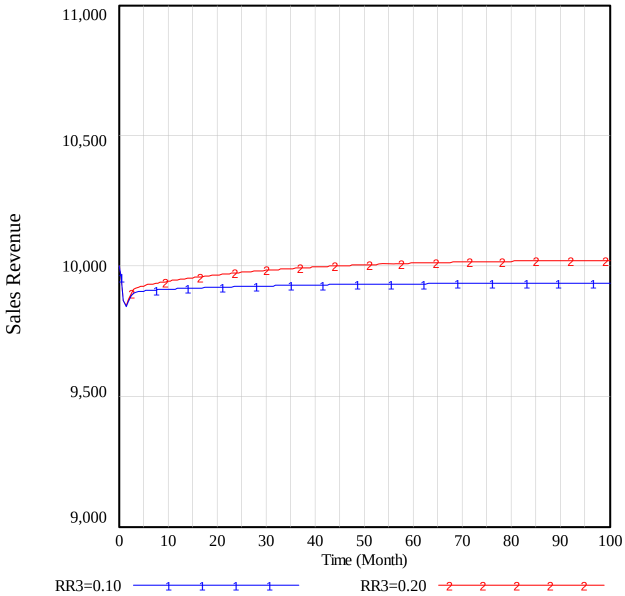

Figure 6. Sensitivity analysis 3 (TDR = 0.05, RR_1 = 0.94, TAR = 0.30, RR_2 = 0.10, RAR = 0.40, RR_3 = 0.10 (curve 1), RR_3 = 0.20 (curve 2))

Sensitivity Analysis 4

Finally, sensitivity analysis 4 examines the effects of complaint management by complaint processing. As mentioned above, we assume a TSR of 40%, i.e. that 40% of customers who complained to the organization could not be satisfied through the complaint solution. In this case, only 5% of the still dissatisfied customers (i.e. RR_4) repurchase the commodity in the next period. A marginal effect has the reduction of RR_4 to 1%. For the rate of customers who could be satisfied through the complaint solution, we determine a RR_5 of 60%. Reducing RR_5 form 60% to 40%, the reader can recognize a constant development involving the danger of decrease when other rates change (see Figure 7).

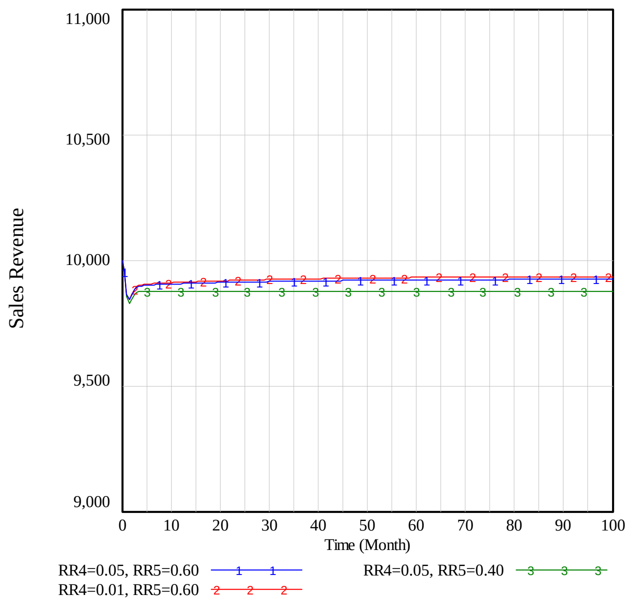

Figure 7. Sensitivity analysis 4 (TDR = 0.05, RR_1 = 0.94, TAR = 0.30, RR_2 = 0.10, RAR = 0.40, RR_3 = 0.10, TSR = 0.40, RR_4 = 0.05, RR_5 = 0.60 (curve 1), RR_4 = 0.01, RR_5 = 0.60 (curve 2), RR_4 = 0.05, RR_5 = 0.40 (curve 3))

SUMMARY AND FUTURE RESEARCH

This system dynamics model clearly shows the power to design and illustrate a decision support approach for a complex system as complaint management. We established the relevant system variables by system definition and created a causal loop diagram based on findings in evidence controlling of complaint management. In the next step, we set up model equations and transferred the qualitative causal loop diagram into the stock and flow diagram that allows the quantitative investigation of the repurchase behavior of satisfied and dissatisfied customers. By altering the input parameters, we simulated different conditions in order to gain deeper insights into the system behavior for decision-making.

Since this model focuses exclusively on the investigation of the repurchase behavior of customers, future research needs to enhance this consideration:

1. First, in terms of the customer perspective, we will enhance the model's ability to consider repurchase frequency, repurchase intenseness, and cross- and up-buying behavior.
2. Second, we need to incorporate acquisition effects of new customers via positive impacts of word-of-mouth.
3. Third, we integrate the quality perspective: Currently, the model assumes that the TDR remains constant over time. However, complaint information can provide useful hints for quality management of the organization to improve the product for following periods. This could reduce the TDR and increase the number of existing as well as new customers.
4. Finally, applying system dynamics, a complaint management balanced scorecard could be developed to get a deeper insight into the different perspectives of complaint management. Since this contribution concentrates on the customer perspective (i.e. the repurchase behavior), for future research it is necessary to incorporate the financial (e.g. in terms of return on complaint management), the process (e.g. in terms of the total time of complaint processing), and the employee perspectives (e.g. in terms of employee satisfaction and development).

Overall, this decision support approach presents a promising fundament to visualize and simulate the causal relationships within the complaint management in terms of repurchase behavior. Future research could build on the findings where this contribution only presents the first component for the goal of a comprehensive insight and provides hints for realization by means of system dynamics.

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