Perceptual dynamics of 'good' and 'poor' service quality

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ABSTRACT

Service researchers support the necessity of integrating policy and design dimensions with service front-line variables in modeling service systems. Current research unveils multiple causes of *good* and *poor* service quality as well as the goal that service designs for quality should attain. The goal is neither to narrow nor to close, but to reverse the gaps among customer expectations and perceptions of service quality. Grounded on the contributions of conceptual and empirical research, a small three-sector system dynamics model describes the interactions of policy and service front-line variables in a typical quasi-manufacturing service. The firm treats customer defections as measurable scrap and, in a company-wide effort to ferret out weaknesses against potential loss, its top management is committed to soliciting feedback from defecting customers. Computed decision scenarios trace the patterns experienced with performance to the inauspicious effects of pulling on internal policy levers too hard. The resulting dysfunctional behavior shocks the entire service system, including customers, defectors and profit per customer. A radical change in the firm's average customer life (avgLife) target triggers a cycle-doubling pattern in the calls soliciting feedback from defecting customers. This chaotic pattern forces the entire system to respond accordingly. System dynamics can provide the integrated-process view required for understanding self-inflicted problems in services. Along with its policy analysis and service design implications, the simulation output indicates the morphology of the topology possibly underlying customer perceptions of service quality.

INTRODUCTION

In their service-system design matrix, Chase & Acquilano (1989) incorporate both policy analysis and design variables, such as innovation, operational focus and worker requirements. The strategic dimensions of this well-known matrix both propel and curb service front-line variables. Filtered down into service front-line behaviors, policy dimensions determine the sales opportunity of a service. The matrix allows grouping services into *pure*, *mixed* and *quasi-manufacturing*, along the customer contact dimension. Pure services, such as legal and medical services require direct, face-to-face contact, with loose specifications between the customer and the service provider. Quasi-manufacturing involves little or no contact among customers and workers. The use of on-site technology and the mail contact between a firm's headquarters and the local government agency are examples of quasi-manufacturing services. Mixed services have two components: the first requires little labor, but the second is labor intensive. Examples are television broadcasting, with its transmission and production components, and research and development (R&D), which requires both expensive equipment and human thought. Like pure services, mixed services require intense customer contact, but within tight specifications. Customer contact can be active or passive (Mersha, 1990), with its intensity varying across industries. Generally, producers of tangible goods, such as soap and beer, limit customer contact to the retail end. Customer preferences are very important for manufacturing production, but actual customer presence is not (Buffa & Sarin, 1987: 38). Conversely, customer contact intensity is high both in pure and in mixed services (Fitzsimmons & Sullivan, 1982). Quasi-manufacturing services offer a high innovation potential. Their explosive growth matches that of associated technological advances, with service customers reaping the benefits of great variety at a declining cost (Chase & Tansik, 1983).

Intense customer contact blurs functional boundaries and makes measuring service quality and productivity difficult. Service employees who interact with customers perform production and marketing functions as well. Bitran & Hoech (1990) urge firms to train front-line employees for handling diverse customer requests and temperaments. Customer perceptions of service quality depend on interpersonal skills, such as courtesy, friendliness, tolerance and pleasantness (Hobson, Hobson, & Hobson, 1984). Service quality involves both the processes and the outcomes of service production, delivery and consumption (Parasuraman, Berry, & Zeithaml, 1991). Also, it depends on the differences among customer expectations and perceptions of quality (Lewis & Booms, 1983). Service promotions raise customer expectations of quality; if not met, they cause a gap between customer expectations and perceptions of quality (Hore, 1986). Psychological theories, such as the adaptation level, assimilation contrast, prospect theory and the Weber-Fechner law complement each other in explaining the formation of such gaps (Laitamäki, 1990).

In their ongoing survey, Parasuraman et al. (1991) focus on accessibility, reliability, responsiveness, competence, courtesy, communication, credibility, security and understanding and knowing the customer. Also, they stress tangibles, such as physical facilities, appearance of personnel and the sophistication of the tools used to provide a service. Miller-Duffy & Fitzsimmons (1988) assess service quality along similar dimensions, but find complaint data highly suspect for measuring service quality. Yet, the case by Bitran & Hoech (1990) and the data of Mersha, Adlakha & O'Brien (1988) verify the importance of these variables. Specifically, knowledge of the 'product,' attention to customers and courtesy rank as the top causes of good quality. Rudeness, indifference or "I don't care" attitude and reluctance to correct errors rank as the top causes of poor quality. Price correlates negatively with perceived quality. If customers feel that the price of a service is unfairly high, then their perceptions of service quality will be low.

This brief survey includes both case and empirical studies converging on salient causes of service quality. The empirical studies contribute to theory building through hypothesis testing, but the cases provide an equally important, indeed necessary contribution. Some of them suggest linking service front-line variables, such as customer expectations and perceptions of service quality, with promises that firms make to customers. Others call for integrated models to help service managers and researchers consider quality at the service design phase (Bitran & Hoech, 1990; Lyth & Johnston, 1988). Similarly, Reichheld & Sasser (1990) suggest combining statistical process control (SPC) with customer defection analysis to measure and to improve service quality.

System dynamics provides a structure for modeling real systems. This internally coherent structure offers the integrated perspective required for understanding services. Grounded on the contributions of current research, the model presented here describes the interactions among policy and service front-line variables in a typical quasi-manufacturing service. Besides its direct implications for practice, the simulation output reveals the morphology of the topology possibly underlying customer perceptions of good and poor service quality.

MODEL STRUCTURE

With customer defections identified as measurable scrap, the top management of a quasi-manufacturing service is committed to soliciting feedback from defecting customers. In a company-wide effort to improve quality against potential loss, defection analysis guides the firm's continuous improvement. The variables of the STELLA® (Richmond & Peterson, 1992) diagram in Figure 1, both propel and curb customer buying decisions. These variables depict customer expectations of attention, courtesy and knowledge as well as their perceptions of quality.

In Fig. 1(a), potential users consider the service at the prevailing industry rate. If they use the service, according to the industry's use norm, they become customers; some respectfully decline. Customers stay with the firm until the industry's defect norm or a gap in the perceived over expected quality turns them into defectors. Defecting is not necessarily permanent, but a state of

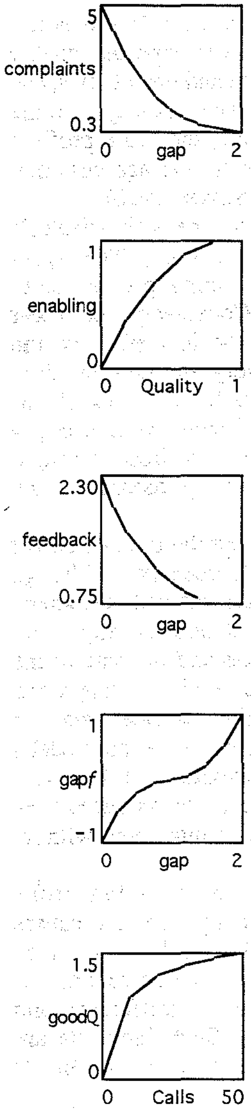
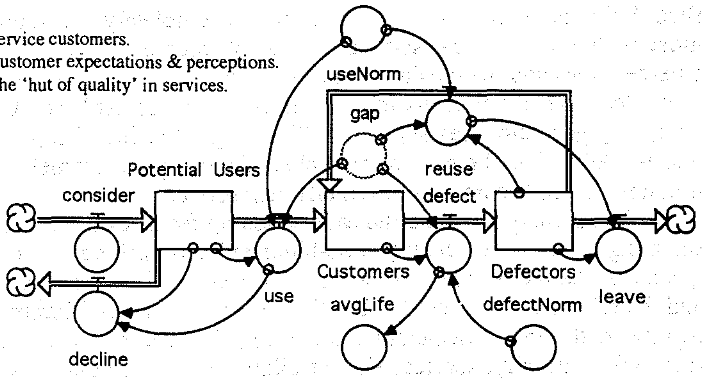
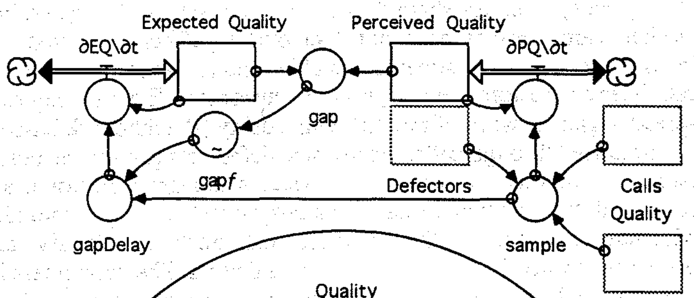


Fig. 1
(a) Service customers.
(b) Customer expectations & perceptions.
(c) The 'hut of quality' in services.

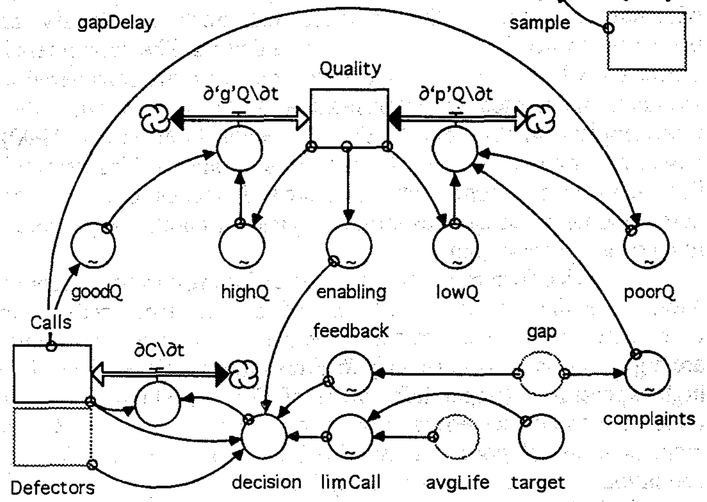
(a)

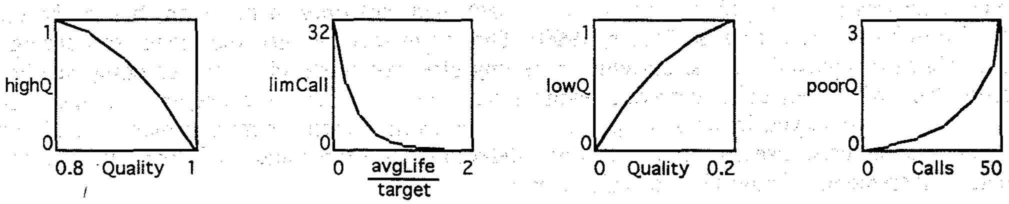


(b)



(c)





flux. A few defectors stop using the service completely. Depending on the industry's use norm, most of them reuse the service unless, of course, a gap of perceived over expected quality emerges. This gap, which determines sales opportunity through the use, reuse and defect rates, can move defectors permanently into a competitor's customer base. As long as customers stay with the firm, they generate sales and profit. The longer the firm keeps its customers, the more profit it makes. Defined as the net present value of profit per customer stream over the average customer life, this pattern is common across different service industries (Reichheld & Sasser, 1990).

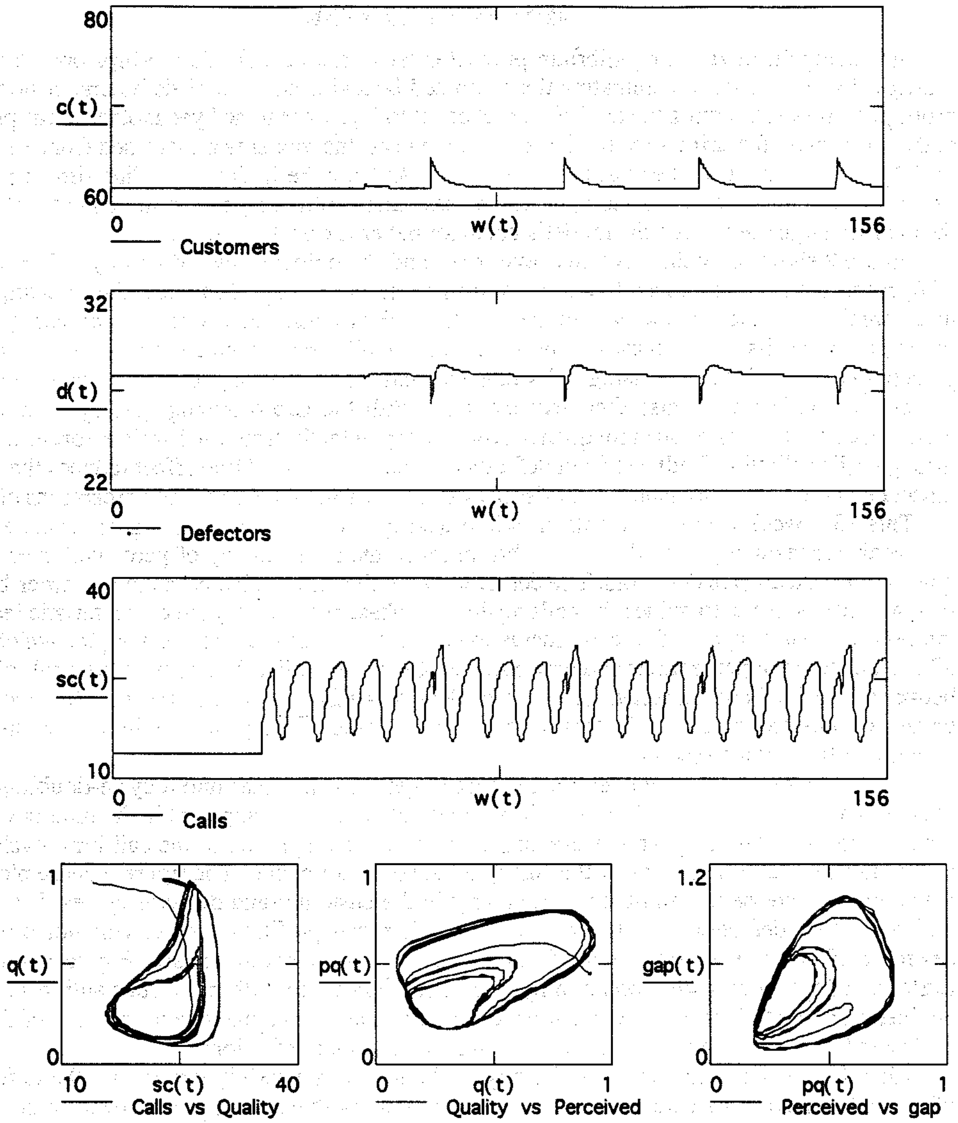
In Fig. 2(b), quality and the calls soliciting feedback from defectors determine each defector's sampling opportunity. Quality is enabling with diminishing returns (Samuelson, 1980). The higher quality is, the more permeable each call contact, the higher each defector's sampling opportunity and the effective feedback that the firm turns into material improvements. Conversely, the lower quality is, the less transparent the contact, the less effective the sample, the less effective the feedback. Naturally, services do not allow inspecting quality before delivery and consumption. During calls, defectors share the cost of appraisal, verifying and inspecting quality in ad-hoc client-worker teams. Errors need not 'get out' to affect perceived quality. Defectors witness costly investigations and adjustments, penalties and lost accounts right there on the 'shop floor' during a call. Many defectors are disappointed customers. Even if they defect temporarily, assuredly they spread negative 'word of mouth' with a delay (Reichheld & Sasser, 1990).

Modified through calls, the average defector's gap affects reuse directly, but the use and defect rates also embody word-of-mouth weights though conditional statements (Appendix). Although reciprocal, the defect and reuse rates carry weights of equal magnitude because retained customers, who have experienced the defectors' call treatment already, are sensitized and thereby more perceptive to word of mouth than potential users. The parameters in these rates and in some of the model's auxiliary graphical functions stem from the considered judgment of service manages and workers, manifested in interviews and discussions with them. Objective service data are increasingly available, but the data of Reichheld & Sasser (1990) helped to calibrate the model's baseline parameters. Most helpful was Homer's "impressionistic" contribution (1985: 46), illustrating a fundamental tenet of system dynamics. Carefully testing the behavior produced by a potent model's endogenous structure yields accurate insight and applicable results, even without numerically precise data.

The service firm monitors and calls defecting customers from its 'hut of quality' in Fig. 1(c).[1] Along with the effective feedback, which the firm needs to improve quality, the gap causes unsolicited complaints. Typically, complaint data do not constitute effective feedback because they are highly suspect (Miller-Duffy & Fitzsimmons, 1988). Yet, they result from low perceptions or high expectations (upper left corner of Fig. 1), which can stimulate rudeness, indifference and reluctance to correct errors in a caller's response (Bitran & Hoech, 1990). Such incidents are manifestations of poor quality (∂'p'Q|∂t), and thereby affect it independently from the firm's continuous effort to improve it (∂'g'Q|∂t).

Call decisions depend on quality's enabling effect, on feedback effectiveness and on the call limit (limCall). The firm's managers control this limit through the avgLife target. The legitimacy of increasing this internal policy lever is well established, not only in this firm, but in the entire service industry (Reichheld & Sasser, 1990). The target lever is also the means to curbing the enthusiasm of enabled callers, currently receiving effective feedback from defecting customers. After the 3rd or 5th call, however, legitimately, some defectors may reperceive attention as rudeness or, worse yet, invasion of privacy. This concern, which the management shared, led to several model tests, assessing how the firm's defectors, customers and profit per customer might react to incremental changes in the avgLife target.

[1] As opposed to the 'house of quality' used in manufacturing (Hauser & Clausing, 1988).



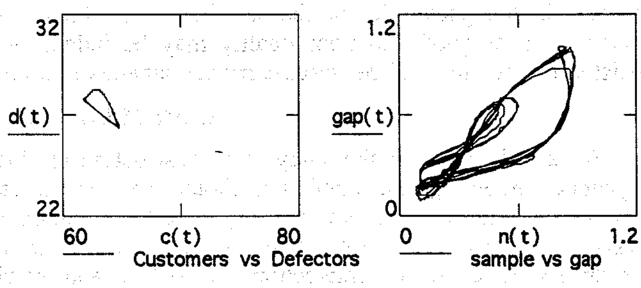


Fig. 2
Performance resulting from a 20% increase in the average customer life (avgLife) target, 30 weeks from the initial time t=0. The calls cause defectors to reuse the service and thereby increase the customer base, but only temporarily.

MODEL BEHAVIOR

Initializing the model in equilibrium prevented latent artifacts of relationships operating within individual sectors from contaminating the computed behavior patterns of defectors, customers and profit per customer. Setting the avgLife target equal to 3 years matched yet another norm prevailing at the quasi-manufacturing service. To conduct the tests, the model was disturbed from equilibrium by 1% step increments in the avgLife target, 30 weeks from the initial time. This simple procedure examined how the firm's defectors, customer base and profits respond to incremental changes in the avgLife target, and made the model's behavior patterns easy to interpret.

Figure 2 shows how the customer level rises and the defector level drops by 0.50% (1/2 of a 1%), respectively, in response to a 20% step increase in the avgLife target. These changes show up 21 weeks from the step increase in the target, at t=30 weeks. The resulting discrepancy between the avgLife and its target causes calls to increase, while the defector expectations exceed their perceptions of quality. The rising calls convey increased attention, so the defector sample and perceptions rise only to raise their expectations. With the gap dropping quickly after its initial increase, complaints rise, pushing quality down, independently from the firm's effort to improve it through calls soliciting feedback from defectors. Quality's low enabling effect reduces the calls and associated complaints, so quality start rising again, increasing the defectors' perceptions of it.

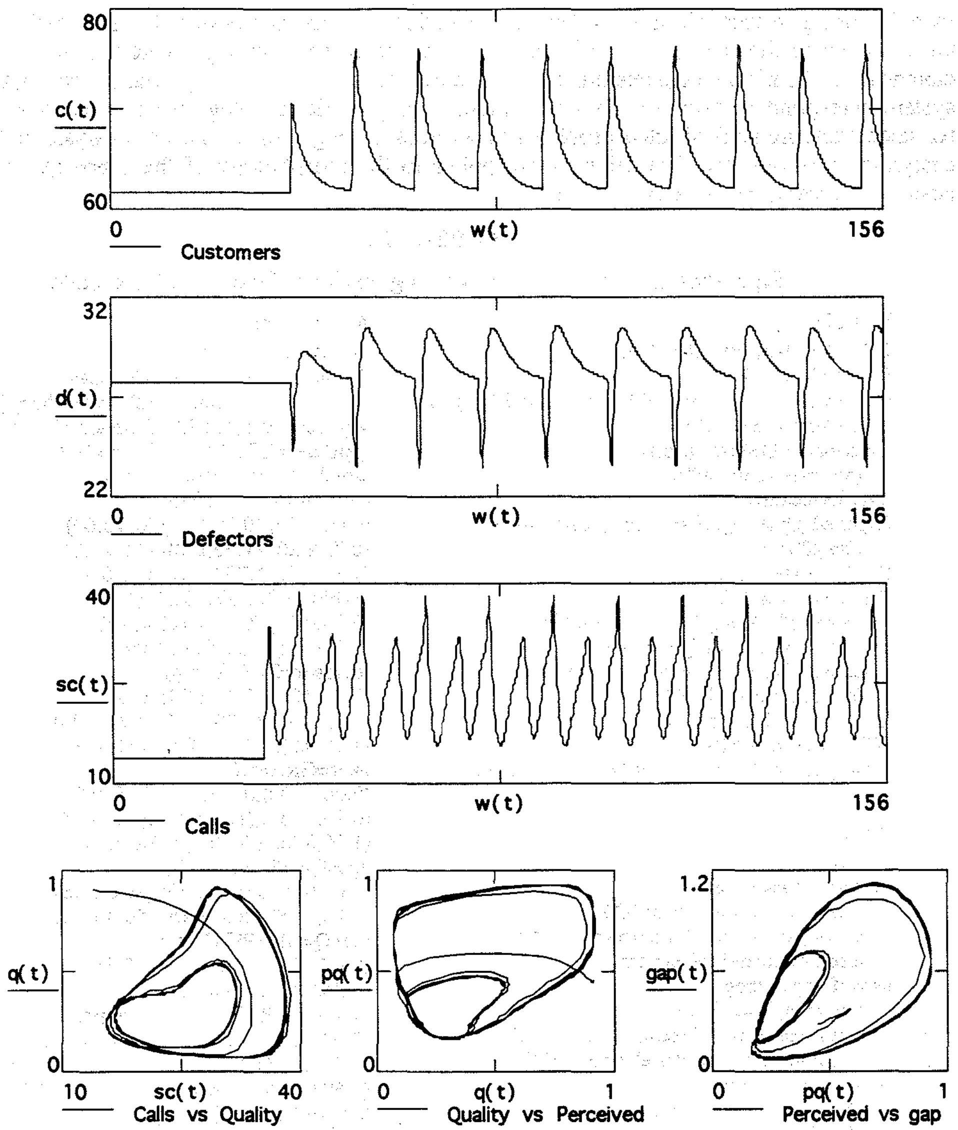
This 13.5-week cycle repeats itself, while quality and the gap reach higher levels each time they peak. Once quality exceeds its equilibrium level, the reversed gap of perceived over expected quality causes a drop in defectors. The defectors reuse the service, increase the customer base, and their avgLife goes up, to reduce the calls again. The phase plots clarify the characteristic features of the service quality cycle. The call fluctuations affect the each defector's sample, which in turn affects the defector perceptions and expectations of service quality. It is only at the peak of the gap between perceived and expected quality that defectors respond, setting the simultaneous plotted values of customers and defectors into a small cycle during the evolution of the quasi-manufacturing service system.

Under pressure from an unyielding avgLife target the calls enter into a cycle-doubling pattern, unable to return to their equilibrium position. This pattern is more apparent in the time development plots of Figure 3. The 10-year avgLife target increases the amplitude of the call limit cycle as well as the amplitude and frequency of the customer and defector cycles. The figure's phase plots verify the dramatic increase in amplitude, particularly in the customer and defector cycles. By itself, the policy of "zero defections" — keeping every the firm can profitably serve, will not produce the desired performance the quasi-manufacturing service managers anticipate. Figure 4 shows how futile the adoption of such a policy might be, if not combined with more substantive process re-engineering efforts. The average profit per customer pattern, computed from the data of Reichheld & Sasser (1990: 109), mirrors the vicious-circle of customer defections.

Also, Figure 4 presents the morphology of the topology possibly underlying the defector gap of perceptions over expectations of service quality. Pulling the internal policy lever, avgLife target, on too hard can shift attention from good to poor quality perceptions. This perceptual cross-over is evident in the phase plot of the simultaneous defector sample and gap values. Temporarily, perceptions of good and poor quality may be independent dimensions, but their medium of existence customers and defectors carry permanently between their ears.

CONCLUSION

System dynamics is the study of how structure produces behavior in real systems. System dynamics modeling and simulation should be used to describe service systems, before more service managers adopt more company-wide 'zero solutions' to self-inflicted problems that treat customers, defecting or not, as measurable scrap. Even a small system dynamics model can accurately describe the interactions of policy and service front-line variables in a quasi-



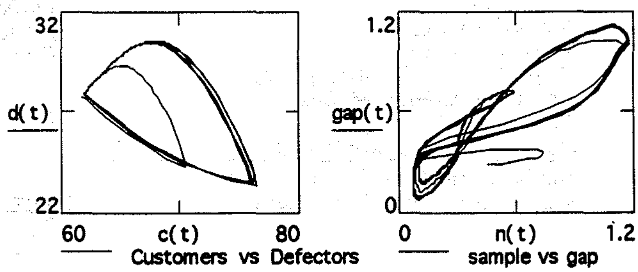


Fig. 3
Increasing the average customer life (avgLife) target from 3 to 10 years, 30 weeks from the initial time, totally shocks the service system. The calls enter a cycle-doubling pattern, leaving customers & defectors no choice but to respond accordingly.

manufacturing service. Computed decision scenarios trace the behavior patterns experienced with performance to the inauspicious effects of pulling on internal policy levers too hard. A radical change in the firm's average customer life norm triggers a cycle-doubling pattern, forcing the entire system to respond accordingly. System dynamics can provide the integrated-process view required for understanding self-inflicted problems in services. Along with its policy analysis and service design implications, the simulation output points to the morphology of the topology underlying customer perceptions of service quality.

APPENDIX

Equations of the quasi-manufacturing service defection analysis model

Levels

Calls(t)=Calls(t-dt)+(∂C|∂t)*dt
INIT Calls=13.89
Customers(t)=Customers(t-dt)+(reuse+use-defect)*dt
INIT Customers=61.73
Defectors(t)=Defectors(t-dt)+
  (defect-leave-reuse)*dt
INIT Defectors=27.78
Expected_Quality(t)=Expected_Quality(t-dt)+
  (∂EQ|∂t)*dt
INIT Expected_Quality=1.57
Perceived_Quality(t)=
  Perceived_Quality(t-dt)+(∂PQ|∂t)*dt
INIT Perceived_Quality=sample
Potential_Users(t)=Potential_Users(t-dt)+
  (consider-use-decline)*dt
INIT Potential_Users=100
∂C|∂t=decision-Calls
Quality(t)=Quality(t-dt)+(∂'g'Q|∂t-∂'p'Q|∂t)*dt
INIT Quality=0.91

Rates

consider=100
defect= if gap<1 then
  Customers*defectNorm*1.25
  else if gap=1 then Customers*defectNorm
  else Customers*defectNorm/1.25
use= if gap<1 then
  Potential_Users*useNorm/1.125
  else if gap=1 then Potential_Users*useNorm
  else Potential_Users*useNorm*1.125
reuse= if gap<1 then
  Defectors*useNorm/1.25
  else if gap=1 then Defectors*useNorm
  else Defectors*useNorm*1.25
decline=Potential_Users-use
leave=Defectors-reuse
∂EQ|∂t=Expected_Quality*gapDelay
∂PQ|∂t=sample-Perceived_Quality
∂'g'Q|∂t=goodQ*highQ
∂'p'Q|∂t=complaints*lowQ*poorQ

Simulation length: 0-156 weeks, dt = 0.1
& integration method: Runge-Kutta 4.

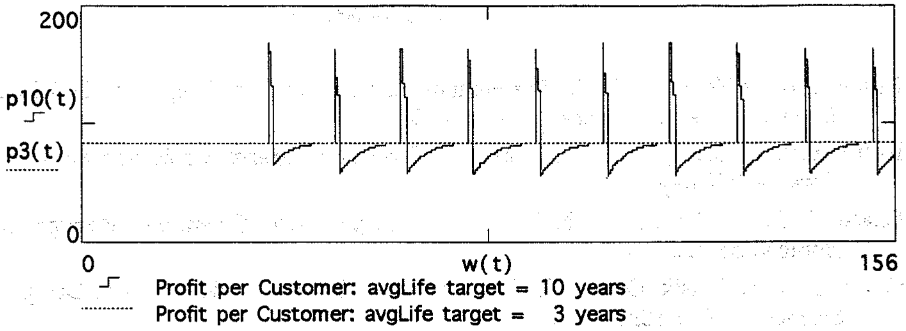
Auxiliaries

avgLife=100/defect
decision=min (Defectors*limCall,
  Calls*feedback*enabling)
gap=Perceived_Quality/Expected_Quality
gapDelay=DELAY(gap*f*+sample,8*DT)
sample=Calls*Quality/Defectors
complaints=GRAPH(gap)
(0.00,5.00),(0.25,4.00),(0.5,3.00),
(0.75,2.20),(1.00,1.60),(1.25,1.12),
(1.50,0.8),(1.75,0.55),(2.00,0.3)
enabling=GRAPH(Quality)
(0.00,0.01),(0.2,0.4),(0.4,0.7),
(0.6,0.9),(0.8,1.00),(1,1.00)
feedback=GRAPH(gap)
(0.00,2.30),(0.25,1.90),(0.5,1.60),
(0.75,1.35),(1.00,1.15),(1.25,1.00),
(1.50,0.9),(1.75,0.8),(2.00,0.75)
gap*f*=GRAPH(gap)
(0.00,-1.00),(0.25,-0.5),(0.5,-0.2),
(0.75,-0.07),(1.00,0.00),(1.25,0.07),
(1.50,0.2),(1.75,0.5),(2.00,1.00)
goodQ=GRAPH(Calls)
(0.00,0.01),(10.0,1.00),(20.0,1.25),
(30.0,1.35),(40.0,1.45),(50.0,1.50)
highQ=GRAPH(Quality)
(0.8,1.00),(0.85,0.9),(0.9,0.7),
(0.95,0.4),(1.00,0.01)
limCall=GRAPH(avgLife/target)
(0.00,32.0),(0.2,16.0),(0.4,8.00),(0.6,4.00),
(0.8,2.00),(1,1.00),(1.20,0.5),(1.40,0.25),
(1.60,0.125),(1.80,0.0625),(2.00,0.00)
lowQ=GRAPH(Quality)
(0.00,0.01),(0.05,0.4),(0.1,0.7),
(0.15,0.9),(0.2,1.00)
poorQ=GRAPH(Calls)
(0.00,0.01),(10.0,0.12),(20.0,0.3),
(30.0,0.6),(40.0,1.20),(50.0,3.00)

Constants

defectNorm=0.36 {grand USA mean} [2]
useNorm=0.25
target=3+STEP(7,30)

[2] Reichheld & Sasser (1990).



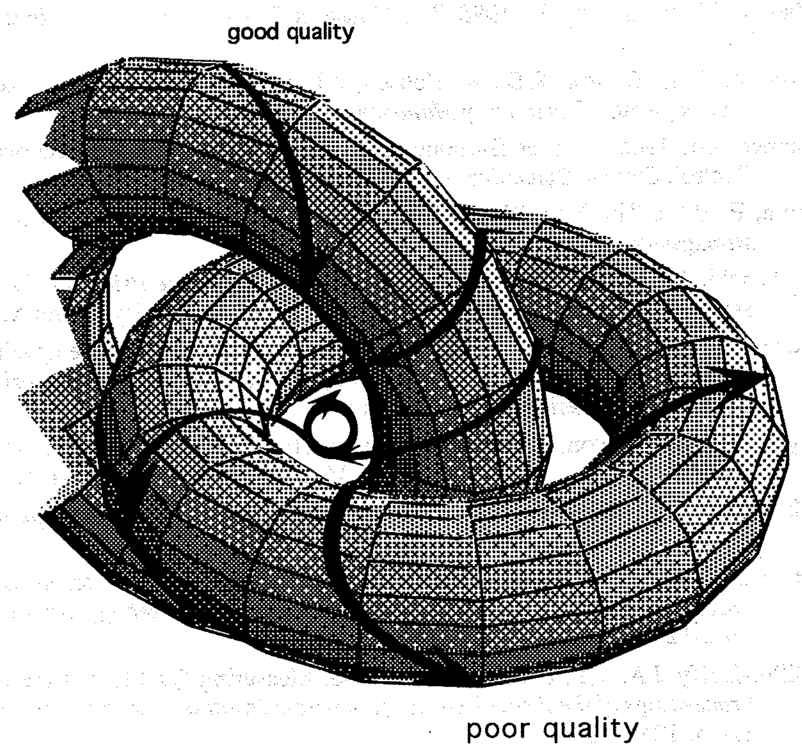
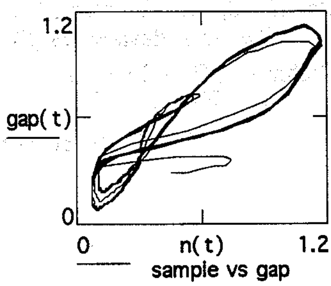


Fig. 4
It may well be that
perceptions of good
& poor quality resemble
non-homotopic paths on
tori surfaces. On each torus,
there are infinite closed paths
which do not touch at any point.
Also, there are closed paths which
cannot deform one into another continuously.



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