

Virtuous cycles of service quality: an empirical test

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Abstract

Purpose – Research on the service–profit chain (SPC) provides important insights regarding how organizations attain service excellence. However, this research stream does not shed light on the mechanisms by which service organizations sustain such excellence, despite the struggles of many organizations to do so. Thus, the purpose of this paper is to develop the SPC as a more dynamic system characterized by feedback loops, accumulation processes, and time delays based on the service operations, human resources, and marketing literatures.

Design/methodology/approach – The authors posit the feedback loops operate as virtuous cycles, such that increases in customer perceptions of service quality and in profit margins lead to subsequent increases in the quality of the internal working environment, which ultimately reimpacts performance in a positive way, and so on. The authors test the hypotheses using five years of archival data on 417 full-service US hotels. The unique data set combines longitudinal data from multiple functions, including employee assessments regarding their tools, practices, and abilities to serve customers, customer perceptions of service quality, and objective measures of financial performance.

Findings – The authors find support for the idea that some organizations provide customers with high-quality service over time by reinvesting in the inputs responsible for generating the initial success, i.e., in various aspects of the internal working environment.

Research limitations/implications – The analysis of 417 hotels from a single firm may influence the extent to which the findings can be generalized.

Originality/value – By expanding the boundaries of previous conceptual and empirical models investigating SPCs, the authors offer a deeper understanding of the cross-functional character of modern operational systems and the complex dynamics that these systems generate.

Keywords Service operations, Service quality, High-contact service systems, Self-reinforcing feedback loops

Paper type Research paper

1. Introduction

The service–profit chain (SPC) framework suggests that when employees have the tools, practices, and abilities to effectively serve customers (hereafter “internal service quality”), they tend to be more satisfied and committed to the organization, which ultimately impacts customer perceptions of service quality (hereafter “external service quality”) and financial performance (Heskett *et al.*, 1994). Studies of this well-established framework offer key insights, and correspondingly ample empirical evidence, regarding the ways in which service organizations attain excellent external service quality (and profitability) (e.g. Goldstein, 2003; Hogreve *et al.*, 2017; Loveman, 1998).

In contrast, much less is known about how organizations sustain such service excellence over time, in part because papers with cross-sectional (rather than longitudinal)



research designs dominate the SPC literature (see meta-analyses by Hong *et al.*, 2013; Hogreve *et al.*, 2017). Thus, in this paper, we investigate the following research question:

RQ1. How do some service organizations consistently achieve excellent external service quality?

Notably, a figure (titled “The links in the service–profit chain”) in Heskett *et al.*’s (1994) seminal article on the SPC includes feedback loops, but that article does not delineate the effects of such loops. At the same time, there have been multiple calls by researchers for longitudinal studies that empirically examine how the relationships between various SPC variables might evolve over time (Evanschitzky *et al.*, 2012; Hogreve *et al.*, 2017; Hong *et al.*, 2013; Loveman, 1998; Pritchard and Silvestro, 2005).

Accordingly, in this paper we articulate the SPC as a dynamic system of interrelationships characterized by feedback loops, accumulation processes, and time delays related to organizational reporting and capability development (Berry and Parasuraman, 1992; Oliva and Stermann, 2001; Stermann *et al.*, 2015). We note that a cross-sectional research design cannot be theoretically justified in this context because such an approach suggests that simultaneous causality is at play.

Specifically, we develop and test the idea that an organization’s service capabilities are not only a pre-condition for, but also an outcome of customer perceptions of service quality. That is, we posit a self-reinforcing loop (Groessler *et al.*, 2008; Repping and Stermann, 2002) such that, on average, increases in external service quality and in profit margins (made possible through improved external service quality) lead to subsequent increases in internal service quality, which ultimately reimpacts performance, and so on.

We draw broadly on the service operations, human resources, and marketing literatures to further develop our theoretical arguments and hypotheses regarding these self-reinforcing loops. Taking such a cross-disciplinary perspective is valuable in light of recent calls for scholars to develop and test theories that examine the cross-functional and dynamic nature of modern operational systems (see Stermann *et al.*, 2015).

In testing our hypotheses, we use path analysis to analyze five years of archival data from 417 full-service US properties of a leading hotelier, all of which pursue a differentiation strategy that emphasizes customized, personal service and commands premium prices (Bowen and Lawler, 1992; Silvestro *et al.*, 1992; Talbott, 2006). Such a setting, i.e., the study of more customized high-contact services, where service employees (see Walsh *et al.*, 2008) play an important role in delivering customer value, is an appropriate context for applying the SPC framework (Silvestro, 2002; Yee *et al.*, 2011).

Our data set, which is unique, combines archival data from multiple functions, including comprehensive employee assessments regarding their capabilities to serve customers, customer perceptions of service quality, and objective measures of financial performance. At the same time, the longitudinal nature of the data enables us to examine the ways in which an organization’s accumulated operations-related actions and corresponding outcomes can influence the future development of the system, and how this process is affected by time delays (Groessler *et al.*, 2008; Rahmandad, 2008). We know of no other data set in this research space that is as rich and diverse as the one we have used in our model.

By modeling the SPC in this way, we go beyond the existing body of SPC literature. Yee *et al.* (2008), for example, uncover a reciprocal relationship between employee satisfaction and firm profitability during a *post hoc* analysis of their hypothesized model, but do so using cross-sectional data, which does not allow the authors to shed light on how these relationships might evolve over time. Notably, Evanschitzky *et al.* (2012) incorporate both a feedback loop and time lags into their SPC model, and test it using three years of data. However, their study, as well as the one by Yee *et al.* (2008), does not examine the wide range of employee capabilities for serving customers that we do in this paper, nor does it

model self-reinforcing time-lagged feedback loops from external service quality to such service capabilities.

We also note that several related empirical studies model time-lagged relationships between two variables (in isolation of others) in order to examine their causal ordering, such as between various service capabilities and a measure of external service quality (e.g. De Jong *et al.*, 2006; Frey *et al.*, 2013; Ryan *et al.*, 1996; Schneider *et al.*, 1998; Winkler *et al.*, 2012) or financial performance (e.g. Schneider *et al.*, 2003; Wright *et al.*, 2005; Zablah *et al.*, 2016). While valuable contributions to the literature, these studies do not simultaneously take into account the effects of other SPC variables, and thus do not capture the complex set of interrelationships in this framework.

By comparison, we evaluate many of the SPC variables simultaneously, as a complex system, and in the process of doing so, provide empirical evidence that feedback loops, accumulation processes, and time delays are all an integral part of the SPC framework. Overall, our results suggest that organizations with a differentiation strategy in the high-contact service sector can provide customers with high-quality service over time by reinvesting in the inputs responsible for generating the initial success, i.e., in internal service quality.

2. Conceptual development

According to Groessler *et al.* (2008), taking a system dynamics perspective is particularly useful in operations management studies that examine actions that directly impact a firm's competitive position over time, which is a key theme of our research. Feedback loops are an essential part of system dynamics models (Forrester, 1968).

Feedback loops occur when outputs of a system are fed back into the inputs, which can lead to changes in future outputs (Forrester, 1958). Self-reinforcing feedback loops, our research frame, tend to reinforce whatever outcomes currently dominate, and they often involve time delays (Repenning and Sterman, 2002; Sterman *et al.*, 2015).

We draw upon this concept of self-reinforcing loops to help explain how some organizations with a differentiation strategy in the high-contact service sector are able to consistently achieve excellent external service quality. Our main premise is that such organizations are more likely to have accumulated the resources (e.g. information, funds) to devote to operational improvements, which reimpacts performance positively, which leads in turn to additional operational improvements, and so on (Deming, 1986; Evanschitzky *et al.*, 2012; Schneider *et al.*, 1998). In this way, the self-reinforcing loops can operate as virtuous cycles (Rahmandad, 2008; Repenning and Sterman, 2001, 2002).

In developing our hypotheses, we first relate increases in external service quality to subsequent increases in the eight dimensions of internal service quality (Figure 1), and do so based on the idea that service organizations that listen to customer feedback can translate this information into better management practices (Ryan *et al.*, 1996; Schneider *et al.*, 1998).

Hallowell *et al.* (1996) define internal service quality as the degree to which employees are satisfied with the service received from internal providers along eight key dimensions: policies and procedures, tools, rewards and recognition, training, management support, communication, goal alignment, and teamwork. We adopt this conceptualization of internal service quality and provide additional detail regarding these dimensions in Table I.

As illustrated in Figure 1, we propose time-lagged relationships in *H1–H8* because of the time delays in the system, namely, it takes time to interpret customer perceptions and to, in turn, make the desired operational changes (Groessler *et al.*, 2008; Oliva and Sterman, 2001; Rahmandad, 2008).

Importantly, external service quality may also indirectly influence some of the internal service quality dimensions through improved profit margins. As a result, we also present hypotheses that examine the time-lagged effect of profit margins (Figure 1).

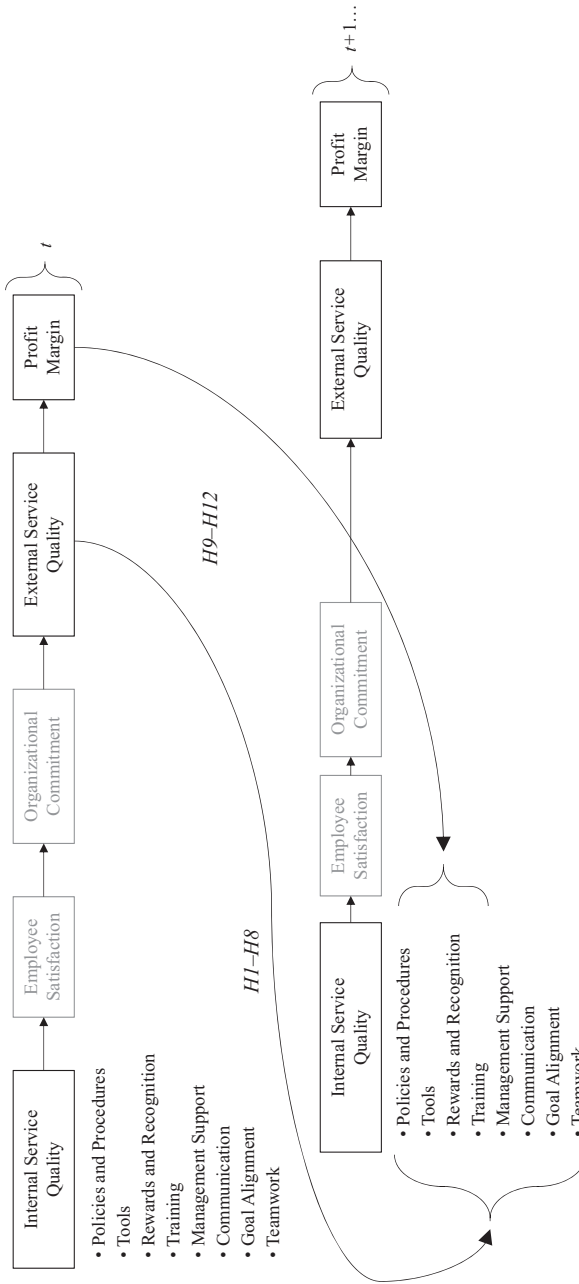


Figure 1.
Overview of
conceptual model

Notes: The Employee Satisfaction and Organizational Commitment constructs are a part of the SPC model, but because we do not specify hypotheses involving these constructs, we present them in gray text. For the purposes of parsimony, our conceptual model includes one arrow for *H1-H8*, and one for *H9-H12*. However, we develop hypotheses for twelve self-reinforcing loops, which link external service quality and profit margins (individually) with the dimensions of internal service quality specified in the figure. Our analysis includes five time points (because we have five years of data): time t , $t+1$, $t+2$, $t+3$, and $t+4$

Source: Adapted from Heskett *et al.* (1994)

ISQ Dimension	Definition (the extent to which ...) ^a	Example measures
Policies & procedures	policies and procedures enable employees to serve customers	In my department/function, policies allow me to serve my customer well. (Becker and Huselid, 1998; Hallowell <i>et al.</i> , 1996) Employees have the authority to serve the customer. (Schlesinger and Zornitsky, 1991)
Tools	employees have the tools they need to serve customers	I have access to information I need to serve my customer well. (Hallowell <i>et al.</i> , 1996) Employees are provided with tools, technology, and other resources to support the delivery of quality work and service. (Salanova <i>et al.</i> , 2005)
Rewards & recognition	employees are rewarded and recognized for a job well done	The incentive system at this plant is fair at rewarding people who accomplish plant objectives. (Ahmad and Schroeder, 2003) Employees receive recognition and rewards for the delivery of superior work and service. (Hallowell <i>et al.</i> , 1996; Salanova <i>et al.</i> , 2005)
Training	training prepares employees for job growth	We use training to build the capabilities of our staff. (Ahmad and Schroeder, 2003; Becker and Huselid, 1998; Flynn and Saladin, 2006; Goldstein, 2003)
Management support	management aids an employee's ability to serve customers	My supervisor is available to me when needed. (Hallowell <i>et al.</i> , 1996) To what extent does your firm effectively elicit and act on suggestions and feedback provided by employees? (Becker and Huselid, 1998; Flynn and Saladin, 2006) My manager is responsive to requests for help or guidance. (Schneider <i>et al.</i> , 1998) How often do you receive feedback about the work you do? (Postmes <i>et al.</i> , 2001)
Communication	necessary communication from management occurs	To what extent does your firm effectively communicate important organizational information to employees? (Ahmad and Schroeder, 2003; Becker and Huselid, 1998) My manager says exactly what he or she means. (Walumbwa <i>et al.</i> , 2008)
Goal alignment	frontline employees have goals that align with those of senior management	My work is important to my firm. (Hallowell <i>et al.</i> , 1996) I have a personal interest in seeing that my firm does well. (Hallowell <i>et al.</i> , 1996)
Teamwork	teamwork occurs among individuals and departments when necessary	How satisfied with teamwork are you within your department or function? (Hallowell <i>et al.</i> , 1996) How satisfied are you with the teamwork between your department/function and other departments/functions? (Hallowell <i>et al.</i> , 1996)

Note: ^aThese definitions are adapted from Hallowell *et al.* (1996)

Table I.
Dimensions of internal service quality (ISQ)

With regards to the specific feedback loop hypotheses that we develop involving profit margins, *H9-H12*, we note that improvements in policies and procedures, tools, rewards and recognition, and training likely require moderate funding (Ordanini and Parasuraman, 2011; Wright *et al.*, 2005), and the availability of such funds is affected, in part, by an organization's profit margins. The other four dimensions (communication, goal alignment, management support, and teamwork) do not necessarily require funds to improve, and we, therefore, expect prior-period profit margins to play a lesser role in their improvement.

2.1 Feedback loop hypotheses involving external and internal service quality

Employees who are friendly, skilled, and responsive to customer needs play a central role in positive customer perceptions about services, especially for more customized high-contact

ones (Parasuraman *et al.*, 1991; Parasuraman *et al.*, 1988; Silvestro, 2002; Walsh *et al.*, 2008). Employee care and attention to detail in the upkeep of supporting equipment and facilities are likewise hallmarks of excellent external service quality in this kind of environment (Johnson, 1991; Miles *et al.*, 2012).

Many organizations routinely and systematically capture such customer perceptions about service quality (Berry *et al.*, 2006; Caemmerer and Wilson, 2010). We argue that these assessments of external service quality can be used to home in on what matters to its customers, and to correspondingly modify policies and procedures, tools, and so on in such a way as to continue the positive momentum.

To begin, we hypothesize that as managers observe positive customer reactions to service (in the form of high external service quality ratings), they will adopt improved means for employees to continue to provide customers with good service. In fact, Schneider *et al.* (1998) suggest that customer evaluations of quality can result in first sharing customer evaluations and then in “new service-oriented policies and procedures” (p. 159).

Because employees in our research context must often exert real-time judgment to please customers, managers tend to have leeway to enact policies that empower these employees to creatively solve problems (Bhattacharjee *et al.*, 2016; Heskett *et al.*, 1997; Kusluvan *et al.*, 2010). Such solutions can then be incorporated into workplace policies and procedures. For example, a hotel employee may decide to deliver coffee to a guest’s room when the guest failed to answer her wakeup call. Management at that particular hotel might choose to incorporate this solution into its regular service offerings.

In short, organizations that seek ongoing external service quality excellence will continue to renew the service delivery system (Roth and Menor, 2003) by incorporating well-received, memorable actions into standard policies and procedures. This leads us to our first hypothesis:

H1. High external service quality leads to future strength on policies and procedures.

Being able to deliver more customized, personal service experiences is based, in part, on employees having ready access to the right information at the right time, and managers often explore tools to help with this effort (Barton and Court, 2012; Tynan *et al.*, 2010). Because of the evolving nature of tools to better understand, interact with, and/or engage customers (Bhattacharjee *et al.*, 2016; Thakran and Verma, 2013), organizations working to continue to provide customers with excellent service quality must continue to explore, using insights gleaned from customer feedback, how to effectively use these new tools. Thus, we propose the following hypothesis:

H2. High external service quality leads to future strength on tools.

By drawing upon social exchange theory, which holds that behavior that leads to positive outcomes is likely to be repeated (Homans, 1958), we relate high external service quality to subsequent increases in rewards and recognition. Prior research suggests that when employees have opportunities to earn rewards and recognition, they tend to be more satisfied and committed to the organization, which increases external service quality (Heskett *et al.*, 1997; Huselid, 1995). We expect that, in an attempt to reinforce such outcomes, as new reports of positive customer feedback become available, managers will further reward and recognize workers involved in delivering excellent service, which increases employee satisfaction, which further improves service, etc. (Bhattacharjee *et al.*, 2016; Salanova *et al.*, 2005). Thus, in line with social exchange theory, we hypothesize:

H3. High external service quality leads to future rewards and recognition strength.

According to the quality management literature, increases in an organization’s external service quality ratings correspond to decreases in “defects” in the form of customer

difficulties (Anderson and Rungtusanatham, 1994; Deming, 1986). As customer difficulties decrease, so too, typically, does the total amount of time required to resolve them (Berry *et al.*, 1990; Crosby, 1979).

As Repenning and Sterman (2002) show in a system dynamics model, organizations with fewer defects are better able to make employees available for improvement work, and in particular, for additional training. We note that service employees typically receive basic training to complete current workplace tasks. However, managers can also provide these employees with broader learning and development opportunities that are of value in our research context (identified, in part, from customer feedback), such as acting lessons to better understand customers' body language (DeLollis, 2006).

What the above means is that employees at organizations with high external service quality will likely have more time to pursue training opportunities beyond their current job duties relative to those at organizations with low external service quality (Chuang and Oliva, 2015; Repenning and Sterman, 2001, 2002). We thus hypothesize:

H4. High external service quality increases future training opportunities.

Having to spend less time to resolve customer difficulties (on account of higher external service quality ratings as described above) also means that managers have more time to devote to their other duties, such as supporting employees (Bhattacharjee *et al.*, 2016; Chuang and Oliva, 2015; Morrison, 2015). Manager support-related activities include being available to answer employee questions as they arise, listening to and acting upon employee suggestions, and providing employees with feedback on a regular basis (Becker and Huselid, 1998; Flynn and Saladin, 2006; Hallowell *et al.*, 1996; Schneider *et al.*, 1998). Consistent with the logic, we use to develop *H4*, we propose the following:

H5. High external service quality increases future management support opportunities.

H6 focuses on communication, and specifically, the extent to which service employees perceive that senior management is open and honest in communication, including about performance. Within the sociology and anthropology literatures, scholars agree that communication and culture are closely tied together (Fine, 1979; Hall, 1973), and in fact, some contend that communication creates culture (Cushman, 1977; Schall, 1983). What this suggests is that as organizational messages are communicated to employees, employees within that organization establish a culture, or, "develop a sense of collective 'we'" (Harris and Cronen, 1979; Schall, 1983). Once the organization has formed a culture, further communication reinforces that culture (Barrett *et al.*, 1995).

In keeping with this logic, we expect senior managers at organizations with high external service quality to willingly communicate such performance (in a way that suits their own distinctive style and that of their employees) in order to reinforce the importance that serving customers plays in the organization's culture. However, it takes time to disseminate results throughout the organization, so we posit a time-lagged relationship:

H6. High external service quality is associated with future positive perceptions about communication.

According to the line of sight literature, as tangible evidence of an organization's marketplace success becomes available, employees typically perceive alignment within the organization (Boswell and Boudreau, 2001). That is, employees, in interpreting such performance, often conclude members of the organization have a clear and accurate understanding of the organization's objectives and of their specific roles in contributing to those objectives.

Recall that our research focuses on organizations in high-contact service industries with a differentiation strategy. Naturally, an overarching objective of many such organizations

is to provide customers with the best possible service (Talbot, 2006; Walsh *et al.*, 2008). The external service quality metric, which captures customer perceptions of service quality, is a widely deployed means by which to assess such service excellence (Bolton and Drew, 1991; Rust *et al.*, 1995).

What the above arguments suggest is that when external service quality ratings are high, service workers are likely to perceive, in turn, that their role-specific actions and corresponding goals (as well as those of their colleagues) are aligned with the broader overall objective of service excellence. Accordingly, we expect high external service quality scores to lead to future positive perceptions about the extent to which goals are aligned across the organization:

H7. High external service quality is associated with future positive perceptions about goal alignment.

Service delivery often occurs through the actions of individuals working together. Developing effective teamwork in an organization is a complex and dynamic process that takes time. For example, research on teams identifies current performance as an important input to future team functioning (see Mathieu *et al.*, 2008 for literature review). More specifically, this literature argues that sharing positive feedback about team-related performance tends to improve members' confidence levels and motivation to work together, which, over time, increases team cohesiveness (Marks *et al.*, 2001). In the context of our research, this suggests the following hypothesis:

H8. High external service quality improves future teamwork.

2.2 Feedback loop hypotheses involving profit margin and internal service quality

Consistent with the SPC, we expect service organizations that achieve excellent external service quality to achieve greater profitability relative to those that do not (Buzzell and Gale, 1987; Rust *et al.*, 1995). These high profit margins can drive positive cash flow (Lamont, 1997), thus providing an organization with slack financial resources. Slack resources in turn allow managers to more easily invest in areas where they see a potential for improved performance (Bourgeois, 1981).

Based on this line of reasoning, we expect a service organization with high profit margins to be more likely to reinvest in its operations relative to one with low profit margins (Evanschitzky *et al.*, 2012). Because it typically takes time for the benefits of such investments to come to fruition (Rahmandad, 2008; Repenning and Sterman, 2002; Roth and Menor, 2003), we specify time-lagged relationships in the hypotheses that follow.

Clearly, revamped policies and procedures and new tools can cost an organization money. For example, changes in policies and procedures often mean changes in the service delivery process (Ordanini and Parasuraman, 2011). Organizations typically incur expenses not only to develop these new processes, but also to deploy them to service employees (Gawande, 2012; Ordanini and Parasuraman, 2011). Naturally, new supplies, technology, and equipment to improve service delivery likewise costs money.

Slack financial resources provide management with more freedom to invest in these and other means to better serve customers. This slack is made available in part by higher profits, and we thus posit the following:

H9. High profit margins lead to future strength on policies and procedures.

H10. High profit margins lead to future strength on tools.

We also expect service organizations to increase employee rewards and recognition with increases in prior-period profit margins. The human resources literature suggests that firms

with high profit margins often share such profits with employees in a number of ways, including through bonus pay (Wright *et al.*, 2005). Hence, we propose the following:

H11. High profit margins lead to future strength on rewards and recognition.

Finally, providing service workers with learning and development opportunities beyond basic skills training can be costly. In addition to the cost of instructors and training materials, many service organizations' 24/7 operations may require them to pay others to work while employees attend training.

We hypothesize that an organization's profit margins impact the extent to which broader training opportunities are funded. In fact, prior research indicates that firms with financial difficulties often reduce the number of hours that they train employees (Harter *et al.*, 2010; Wright *et al.*, 2005). It follows, then, that:

H12. High profit margins increase future training opportunities.

3. Research design and methodology

3.1 Research setting

Our research partner (hereafter "HotelCo") is a leading hotelier with over 2,500 properties worldwide, the bulk of which are located in the USA. HotelCo is a member of the Fortune 500 and has over 100,000 employees and \$8 bn in annual revenues. HotelCo operates multiple hotel brands, but primarily targets more upscale segments of the market that emphasize service and command premium prices.

Our analysis focuses on three key full-service brands at HotelCo, all of which compete using a differentiation strategy (Walsh *et al.*, 2008). According to Smith Travel Research (hereafter STR; STR is the leading data provider in the hotel industry) and J.D. Power & Associates, full-service hotels, such as the ones in our sample, distinguish themselves by offering numerous services and amenities (e.g. on-site restaurants, lounges, banquet facilities, spas, concierges, valet parking, and doormen) rather than by low price.

HotelCo focuses its efforts on operating managed and franchised properties. By managed properties, we mean those hotels owned by another firm that HotelCo operates on a day-to-day basis under the HotelCo name (Contractor and Kundu, 1998). HotelCo's franchised properties are similarly owned by another firm and operated under HotelCo's name, but in this case the franchisees are primarily responsible for the daily management of the hotel, not HotelCo.

Accordingly, HotelCo has less direct control over the day-to-day running of its franchised properties. In addition, these properties represent a small percentage of our sample (~15 percent). For these reasons, we exclude from our analysis HotelCo's properties that are franchised.

Our unit of analysis is a hotel, i.e., at the hotel level. HotelCo breaks out profit margins at this unit of analysis. At the same time, while its operations are, to the extent possible, standardized across the managed properties within a hotel brand, HotelCo managers do have a fair amount of latitude in running their properties (e.g. leeway to invest in additional tools, offer employees different rewards and recognition, provide supplemental training opportunities, etc.).

3.2 Data

We obtained archival longitudinal data that spans five years (2008–2012) from three different functional areas within HotelCo. The first is the employee survey (response rate = 95 percent) that HotelCo administers on an annual basis to assess the quality of the internal working environment and the degree to which employees are satisfied with and committed to the organization. HotelCo granted us access to their non-management

employee-level data. We average the responses from these service employees for a given property into annual hotel-level composite values.

Our second data source is the (primarily web-based) guest satisfaction survey (response rate = 24 percent) that HotelCo uses to assess the degree to which guests are satisfied with the quality of various aspects of their stay. Email invitations containing a link to the survey are sent out on a daily basis to a random sample of guests who have recently stayed at a HotelCo property. HotelCo's corporate headquarters tracks the survey responses and reports them back to each property monthly, with guest responses aggregated into monthly hotel-level composite values for each survey item.

Our third source of data is from HotelCo's finance department. This department provided us with quarterly hotel-level data on profit margins and guest room revenues, the latter in the form of the revenue per available room (RevPAR) index. HotelCo's hotel-level profit margins are calculated internally by the finance department, while the RevPAR index scores, which we control for in the analysis (see Section 3.3.2), are calculated externally by STR (www.str.com/about).

We combine the above longitudinal data with data based on fixed characteristics of the hotels that do not change during the period of analysis. Specifically, we include star ratings from Expedia and property size information from HotelCo's development group in our analysis (see section 3.3.2 Control variables).

3.3 Construct operationalization

3.3.1 SPC variables. We operationalize internal service quality, employee satisfaction, and organizational commitment using data collected from HotelCo's annual employee survey. The survey items are evaluated on a Likert scale ranging from 1 ("strongly disagree") to 6 ("strongly agree").

To measure the eight dimensions of internal service quality, we first identified HotelCo employee survey items consistent with the construct definitions and associated example measures provided in Table I. We then averaged the relevant survey items to create measures for each dimension of internal service quality (policies and procedures; tools; rewards and recognition; training; management support; communication; goal alignment; and teamwork), which we calculate by property for each year.

We operationalize employee satisfaction using a single item (Wanous *et al.*, 1997) from the HotelCo employee survey because it is a direct measure of the construct of interest. Specifically, the annual hotel-level measure of employee satisfaction captures the extent to which service employees, overall, enjoy their day-to-day work (Hackman and Oldham, 1975; Hallowell *et al.*, 1996).

Organizational commitment is characterized by "an individual's identification with and involvement in a particular organization" (Mowday *et al.*, 1979, p. 226). HotelCo includes items in its annual employee survey that map to those in the established Organizational Commitment Questionnaire (OCQ) (Mowday *et al.*, 1979; Porter *et al.*, 1974). Specifically, these OCQ items measure the extent to which employees are willing to exert extra effort to help the organization; tell friends that the organization is a great place to work; feel pride in the organization; feel the organization inspires their best work; feel it would take a lot to get them to leave the organization; feel they could stay with the organization long term; and feel this is the best place for them to work. We calculated the organizational commitment measure by averaging the seven relevant employee survey items by property and year.

We operationalize external service quality using a property's relevant "top box" scores, which are generated by HotelCo and widely used in practice (Morgan and Rego, 2006). In calculating these scores, HotelCo asks guests (via the guest satisfaction survey) to rate

various aspects of their stay at a particular property on a scale ranging from 1 (“poor”) to 10 (“excellent”) and designates response choices 8, 9, and 10 as “top box.” The monthly top box score for each survey item reflects the percentage of responding guests who rate the property as top box on that item. Our composite measure for external service quality, which we compute by property and year, represents the average of the monthly top box scores associated with perceptions of the overall quality of the guest room and of the staff’s skills and responsiveness to guest needs (Parasuraman *et al.*, 1991; Parasuraman *et al.*, 1988).

HotelCo computes a property’s profit margin by dividing its gross operating profit by total revenues for a particular quarter. We use an annual measure of *profit margin* in our analysis, calculated by averaging the reported quarterly profit margins for a property within a given year.

3.3.2 Control variables. Individual hotels typically differ in terms of the services and amenities provided to guests, even among hotels that share the same brand. Naturally, properties with a greater number of services and amenities tend to be more complex and expensive to manage (Brandt, 2012). We control for the level of services and amenities using the hotel’s star rating.

Star ratings, assigned by a third party, indicate what services and amenities a property generally offers its guests (Jeong and Jeon, 2008). We use publicly available online data from Expedia to operationalize our star rating variable, which assigns properties a star rating based on a five-star scale (www.expedia.com/Hotel-Star-Rating-Information), with “half-stars awarded for in-between hotels” (Consumer Reports, 2011, p. 11).

We utilize data from HotelCo’s development group to control for hotel size because larger hotels tend to benefit from economies of scale (Brown and Dev, 1999). Consistent with Baum and Mezias (1992), we measure a property’s size by taking the natural logarithm of the number of guest rooms (rooms).

Finally, we use the RevPAR index to control for many local factors (e.g. degree of competition or special events in the area) and global factors (e.g. economic downturn) that are outside the direct control of a particular hotel, but which might nonetheless affect profit margins. The RevPAR index is commonly used in the hotel industry to determine whether a hotel is earning its “fair share” of available guest room revenue relative to main competitors within a given market (Kimes and Anderson, 2011).

We compute an annual measure of *RevPAR index* for our analysis. Specifically, we average the STR quarterly RevPAR index scores for a property within a given year, then take the natural logarithm of that calculation in order to reduce skewness.

Descriptive statistics and a correlation matrix of all of our variables can be found in Table II. In Table III, we establish the reliability and validity of our composite measures.

3.4 Analysis

We use path analysis to analyze our statistical model. We implement the model using maximum likelihood estimation in Mplus and make the widely used assumption of data missing at random (Singer and Willett, 2003). This assumption means that conditional on the variables included in the analysis, the data do not depend on unobserved variables. This is not as restrictive, of course, as an assumption of data missing completely at random given the variables included in the model. As is necessary in maximum likelihood estimation and other typically used estimation methods, hotels with missing exogenous variables (e.g. controls) are necessarily deleted from the analysis.

The model is (first-order) autoregressive for each variable, meaning that we model variables at time $t+1$ from the same variable at time t in order to control for the previous year’s effects. We also include cross-sectional effects (e.g. *employee satisfaction_t → organizational commitment_t*) for the relationships that are well-established in the SPC literature. Additionally,

Table II.
Descriptive statistics
and correlation matrix
for the observed
variables in 2012

Variable	Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Star rating	3.20	0.36	1.00						
(2) Rooms	5.34	0.52	0.70***	1.00					
(3) RevPAR index	4.74	0.19	-0.10*	-0.07	1.00				
(4) Policies and procedures	5.02	0.34	0.01	0.07	0.01	1.00			
(5) Tools	5.03	0.36	-0.06	-0.01	0.01	0.90***	1.00		
(6) Rewards and recognition	4.60	0.43	0.15**	0.18***	-0.02	0.82***	0.80***	1.00	
(7) Training	4.99	0.38	0.16***	0.18***	0.05	0.82***	0.80***	0.76***	1.00
(8) Management support	4.93	0.39	-0.00	0.06	0.02	0.90***	0.88***	0.84***	0.83***
(9) Communication	4.97	0.39	-0.01	0.07	0.00	0.89***	0.87***	0.79***	0.82***
(10) Goal alignment	5.07	0.35	-0.01	0.07	0.02	0.89***	0.86***	0.78***	0.82***
(11) Teamwork	4.80	0.39	-0.03	0.04	0.03	0.83***	0.81***	0.74***	0.73***
(12) Employee satisfaction	5.16	0.32	0.05	0.09	-0.04	0.87***	0.84***	0.78***	0.72***
(13) Organizational commitment	5.02	0.32	0.09	0.14**	-0.02	0.90***	0.86***	0.86***	0.78***
(14) External service quality	0.83	0.04	0.02	0.04	0.20***	0.12*	0.16***	0.04	0.17***
(15) Profit margin	0.42	0.09	-0.37***	-0.27***	0.18***	0.02	0.04	-0.05	-0.05
(8) Management support	1.00	(8)	(10)	(11)	(12)	(13)	(14)	(15)	
(9) Communication	0.89***	(9)							
(10) Goal alignment	0.88***	1.00							
(11) Teamwork	0.82***	0.92***	1.00						
(12) Employee satisfaction	0.81***	0.80***	0.87***	1.00					
(13) Organizational commitment	0.85***	0.79***	0.80***	0.73***	1.00				
(14) External service quality	0.12*	0.86***	0.87***	0.79***	0.89***	1.00			
(15) Profit margin	-0.01	0.14**	0.18***	0.16***	0.07	0.10*	1.00		
		0.000	-0.01	0.01	0.00	-0.01	0.04	1.00	

Notes: The descriptive statistics and correlations reported in this table are based on a sample size of 417. We present the descriptive statistics and correlation matrix for the observed variables in 2012, which is the last year of our data; the descriptive statistics and correlation matrices associated with the years 2008–2011 are substantively the same. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table III.
Composite measure
summary: number of
items in each measure,
Cronbach's α , and
average variance
extracted

Construct	Total number of items	Cronbach's α	Average variance extracted (AVE) ^a
Policies and procedures	2	0.91	0.84
Tools	2	0.89	0.81
Rewards and recognition	2	0.70	0.54
Management support	4	0.96	0.87
Communication	2	0.88	0.78
Goal alignment	2	0.83	0.72
Teamwork	2	0.92	0.84
Organizational commitment	7	0.96	0.79
External service quality	3	0.78	0.74

Notes: We do not provide values for *training* or *employee satisfaction* in this table, as they are single-item scales. We note that *profit margin* and the three control variables (*star rating*, *rooms*, and *RevPAR index*) are all objective measures. By definition, then, their validity is already established. ^aThe average variance extracted (AVE) for the constructs all exceed 0.50, which offers evidence of convergent validity

in this model, we allow within year correlations for the exogenous variables (all 2008 variables, plus the control variables) and for the eight dimensions of internal service quality.

To test *H1–H8*, we include in our model self-reinforcing time-lagged feedback loops from *external service quality* at time *t* to each of the eight dimensions of internal service quality at time *t+1*. For *H9–H12*, we model feedback loops from *profit margin* at time *t* to the four respective internal service quality dimensions (policies and procedures, tools, rewards and recognition, and training) at time *t+1*.

We include several constraints for parsimony, as is often suggested in the longitudinal literature. First, our model assumes time-invariant relationships in the structural model, in that we constrain the corresponding paths over time to the same value. For example, the estimated effect of *external service quality*₀₉ on *tools*₁₀ will be the same value as for the effect of *external service quality*₁₀ on *tools*₁₁, etc. Second, we assume homogeneity of error variance across time (e.g. the error variances of external service quality in 2009 and in 2010 are the same).

Note, however, that we do allow the means/intercepts of the variables to vary over time due to potential fluctuations in level. Note also that the means/intercepts do not affect our theoretical arguments or structural model interpretations or the overall evaluation of fit of the model.

Third, we constrain the autoregressive paths over time for each variable to the same value, so that the path coefficient for (*tools*₀₉→*tools*₁₀) is the same as for (*tools*₁₀→*tools*₁₁). Finally, we constrain the analogous correlations over time to the same value.

We believe our constraints to be reasonable because theoretically the values of the parameters (e.g. path coefficients, variances, autoregressive effects, or correlations) should not differ systematically over time. Nonetheless, we test for robustness by analyzing alternative less constrained models to our hypothesized model. Specifically, we free the error variances, autoregressive effects, and correlations described above. Our hypothesized model is robust to these model modifications, as the results are substantively the same across all models.

4. Results

In Table IV, we provide the full path analysis results for the hypothesized model. Overall, our hypothesized model fits the data well. The root mean square error of approximation (RMSEA) is 0.070 with a 90% confidence interval of 0.068–0.072, which indicates moderately good fit per Browne and Cudeck (1993). We note that even the upper bound of the confidence interval for RMSEA excludes the population values of RMSEA that are illustrative of a poor fit (e.g. 0.08 is excluded from the confidence interval).

We now present the hypotheses test results, which we cull from Table IV. For ease of interpretation, we also illustrate these results in Figure 2. To begin, *H1* and *H2* were

Table IV.
Complete
path analysis
results for the
hypothesized model

Outcome	Predictor	Estimate (<i>p</i> -value)	95% CI ^a	Hypothesis ^b
<i>Policies and procedures</i> _{t+1}	<i>Policies and procedures</i> _t	0.391 (0.000)	[0.368, 0.413]	
	<i>Star rating</i>	-0.048 (0.087)	[-0.104, 0.007]	
	<i>Rooms</i>	0.045 (0.022)	[0.007, 0.083]	
<i>External service quality</i> _t	<i>External service quality</i> _t	0.409 (0.015)	[0.099, ∞]	H1*
	<i>Profit margin</i> _t	0.063 (0.033)	[0.007, ∞]	H9*
	<i>Tools</i> _t	0.408 (0.000)	[0.385, 0.432]	
<i>Tools</i> _{t+1}	<i>Star rating</i>	-0.073 (0.009)	[-0.128, -0.019]	
	<i>Rooms</i>	0.032 (0.093)	[-0.005, 0.069]	
	<i>External service quality</i> _t	0.619 (0.001)	[0.314, ∞]	H2*
<i>Rewards and recognition</i> _{t+1}	<i>External service quality</i> _t	0.069 (0.035)	[0.006, ∞]	H10*
	<i>Profit margin</i> _t	0.479 (0.000)	[0.456, 0.502]	
	<i>Rewards and recognition</i> _t	0.022 (0.509)	[-0.044, 0.088]	
<i>External service quality</i> _t	<i>Star rating</i>	0.082 (0.000)	[0.037, 0.127]	
	<i>Rooms</i>	-0.013 (0.477)	[-0.378, ∞]	H3
	<i>External service quality</i> _t	0.030 (0.267)	[-0.050, ∞]	H11
<i>Training</i> _{t+1}	<i>Profit margin</i> _t	0.388 (0.000)	[0.362, 0.414]	
	<i>Training</i> _t	0.015 (0.623)	[-0.046, 0.077]	
	<i>Star rating</i>	0.073 (0.001)	[0.031, 0.115]	
<i>Management support</i> _{t+1}	<i>External service quality</i> _t	0.745 (0.000)	[0.403, ∞]	H4*
	<i>Profit margin</i> _t	0.031 (0.268)	[-0.051, ∞]	H12
	<i>Management support</i> _t	0.397 (0.000)	[0.375, 0.419]	
<i>Communication</i> _{t+1}	<i>Star rating</i>	-0.078 (0.014)	[-0.140, -0.016]	
	<i>Rooms</i>	0.052 (0.017)	[0.009, 0.096]	
	<i>External service quality</i> _t	0.430 (0.022)	[0.079, ∞]	H5*
<i>Goal alignment</i> _{t+1}	<i>Communication</i> _t	0.359 (0.000)	[0.336, 0.382]	
	<i>Star rating</i>	-0.091 (0.006)	[-0.155, -0.026]	
	<i>Rooms</i>	0.075 (0.001)	[0.030, 0.120]	
<i>Teamwork</i> _{t+1}	<i>External service quality</i> _t	0.751 (0.001)	[0.385, ∞]	H6*
	<i>Goal alignment</i> _t	0.394 (0.000)	[0.373, 0.415]	
	<i>Star rating</i>	-0.081 (0.005)	[-0.136, -0.025]	
<i>Teamwork</i> _{t+1}	<i>Rooms</i>	0.064 (0.001)	[0.025, 0.103]	
	<i>External service quality</i> _t	0.711 (0.000)	[0.395, ∞]	H7*
	<i>Teamwork</i> _t	0.443 (0.000)	[0.418, 0.468]	
	<i>Star rating</i>	-0.088 (0.007)	[-0.152, -0.024]	

(continued)

Outcome	Predictor	Estimate (<i>p</i> -value)	95% CI ^a	Hypothesis ^b
<i>Employee satisfaction</i> _{<i>t</i>+1}	Rooms	0.062 (0.006)	[0.018, 0.107]	H8*
	External service quality _{<i>t</i>}	0.472 (0.016)	[0.109, ∞]	
	Employee satisfaction _{<i>t</i>}	0.063 (0.000)	[0.037, 0.090]	
	Star rating	0.019 (0.151)	[-0.007, 0.044]	
	Rooms	0.009 (0.326)	[-0.009, 0.026]	
	Polites and procedures _{<i>t</i>}	0.581 (0.000)	[0.526, 0.636]	
	Tools _{<i>t</i>}	0.052(0.028)	[0.006, 0.099]	
	Rewards and recognition _{<i>t</i>}	0.092 (0.000)	[0.062, 0.122]	
	Training _{<i>t</i>}	0.015 (0.396)	[-0.020, 0.051]	
	Management support _{<i>t</i>}	-0.075 (0.002)	[-0.124, -0.027]	
	Communication _{<i>t</i>}	-0.005 (0.827)	[-0.053, 0.043]	
	Goal alignment _{<i>t</i>}	0.174 (0.000)	[0.115, 0.233]	
	Teamwork _{<i>t</i>}	-0.048 (0.004)	[-0.082, -0.015]	
	Organizational commitment _{<i>t</i>}	0.124 (0.000)	[0.101, 0.147]	
	Star rating	0.012 (0.327)	[-0.012, 0.035]	
Rooms	0.009 (0.261)	[-0.007, 0.026]		
Employee satisfaction _{<i>t</i>}	0.880 (0.000)	[0.858, 0.903]		
External service quality _{<i>t</i>}	0.752 (0.000)	[0.718, 0.786]		
Star rating	0.000 (0.975)	[-0.005, 0.005]		
Rooms	0.002 (0.314)	[-0.002, 0.005]		
Profit margin _{<i>t</i>}	0.006 (0.003)	[0.002, 0.010]		
Organizational commitment _{<i>t</i>}	0.843 (0.000)	[0.819, 0.867]		
Star rating	-0.009 (0.048)	[-0.017, 0.000]		
Rooms	0.004 (0.208)	[-0.002, 0.009]		
RevPAR index	0.033 (0.000)	[0.021, 0.045]		
External service quality _{<i>t</i>}	0.133 (0.000)	[0.081, 0.185]		
<i>Model fit statistics</i>				
Root mean square error of approximation (RMSEA)	0.070 with a 90% CI of 0.068–0.072			
Tucker–Lewis index (TLI)	0.883			
Comparative fit index (CFI)	0.882			
χ^2	$\chi^2 = 38,407.353, 2,106 \text{ df}, p = 0.000$			

Notes: Our path model assumes structural invariance over time. Thus, we do not report the parameter estimates at a particular point in time. Instead, we use *t*+1 and *t* subscripts to designate whether a relationship of interest incorporates a time lag. An asterisk in this column indicates that the path analysis results provide support for the hypothesis at $\alpha = 0.05$. ^aWe report a 95% confidence interval for the parameter estimates; ^bwe use a one-tailed test of significance for our hypotheses

Table IV.

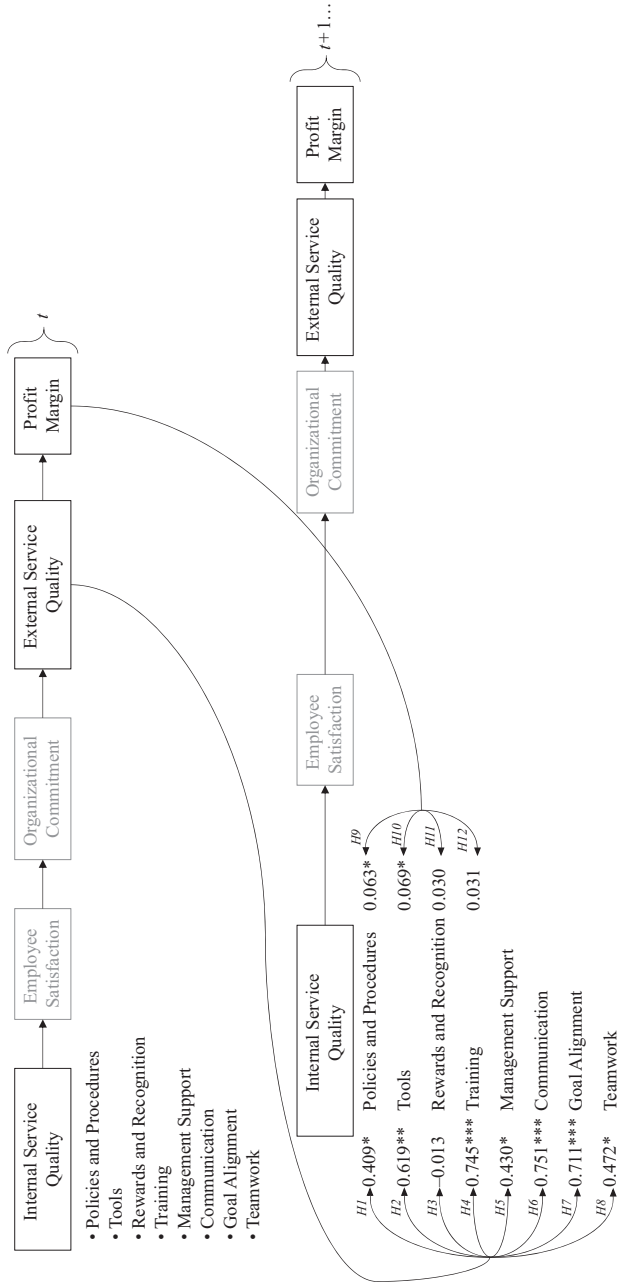


Figure 2.
Hypotheses
test results

Notes: The Employee Satisfaction and Organizational Commitment constructs are a part of the SPC model (and path analysis), but because we do not specify hypotheses involving these constructs, we present them in gray text. We tested our model using five years of data (2008–2012). For the purposes of parsimony, we only illustrate the path analysis results from Table IV that involve our hypotheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

supported by the data: we observed a positive, time-lagged relationship between external service quality and both policies and procedures (0.409; $p = 0.015$) and tools (0.619; $p = 0.001$), respectively. Our results do not support *H3*, which relates increases in external service quality to subsequent increases in rewards and recognition (-0.013 ; $p = 0.477$).

In support of *H4* and *H5*, we found that high external service quality predicts future opportunities for training (0.745; $p = 0.000$) and management support (0.430; $p = 0.022$), respectively. Our results also support *H6* and *H7*, which relate increases in external service quality to future positive perceptions of communication (0.751; $p = 0.001$) and goal alignment (0.711; $p = 0.000$), respectively. *H8* posits high external service quality improves future teamwork, and the data support this hypothesis as well (0.472; $p = 0.016$).

H9 proposes a relationship between high profit margin and future strength on policies and procedures. The path analysis results associated with this parameter estimate (0.063; $p = 0.033$) support this hypothesis. Additionally, we find a positive effect between profit margin and future tools (0.069; $p = 0.035$), so *H10* is likewise supported.

Our path analysis results do not provide support for *H11* or *H12*, as we do not observe a statistically significant relationship between profit margin and either rewards & recognition (0.030; $p = 0.267$) or training (0.031; $p = 0.268$), respectively. We provide a discussion of the meaning and implications of our key results below.

5. Discussion

According to Groessler *et al.* (2008), while feedback loops, accumulation processes, and time delays are all widespread in operations management, such phenomena are often ignored or not considered appropriately. In light of this observation, and because the majority of the findings in the SPC literature are based on cross-sectional (rather than longitudinal) research designs (Hong *et al.*, 2013; Hogreve *et al.*, 2017), it is not surprising that we know little about the specific mechanisms by which some service organizations are able to consistently deliver high-quality results for customers over time.

Our study addresses this gap in the SPC literature in two related ways. First, we offer a deeper understanding of the ways in which various self-reinforcing time-lagged feedback loops can impact the relationships in the SPC. Second, with our unique data set of 417 full-service hotels, which includes archival longitudinal data from multiple functions, we are able to evaluate many of the SPC variables simultaneously, as a complex system, over time. Importantly, this data set allows us to examine feedback loops that involve a wider range of employee capabilities for serving customers relative to prior longitudinal studies of the SPC (that similarly take a multivariate analysis approach).

The results of our path analysis demonstrate that the feedback loops are central to understanding how some organizations with a differentiation strategy in the high-contact service sector consistently achieve excellent external service quality. That is, we find that many of the feedback loops we analyze operate as virtuous cycles in that increases in performance generate additional improvements in the quality of the internal working environment, which ultimately reimpacts performance positively, and so on.

In line with the idea that service organizations can translate information from customer feedback into better management practices, which we developed in Section 2, we found strong support for seven of the eight hypotheses that relate increases in external service quality to subsequent improvements in internal service quality. *H3* is the exception; we did not observe a statistically significant relationship between prior-period external service quality ratings and rewards and recognition in our sample.

A plausible reason for the *H3* result is that some hotels may be rewarding and recognizing employees despite guest perceptions that service quality is low. This kind of relationship was observed by Repenning and Sterman (2001), who found that as firms grew increasingly dependent on “firefighting” (and not problem prevention) to deal with problems

caused by poor process capability, firms tended to reward those who, through great efforts, resolved such problems. In the context of our sample, this means that some hotels with low quality ratings may be incentivizing the employees who provide short-term solutions to guest difficulties instead of changing the things that caused the difficulties in the first place. This represents an interesting subject for future research.

We motivated *H9–H12* by arguing that organizations can more easily afford improvements in policies and procedures, tools, rewards and recognition, and training, respectively, when profit margins are high, and, consistent with this logic, we found support for both *H9* and *H10*. Surprisingly, our results do not support the hypotheses relating prior-period profit margins to rewards and recognition (*H11*) and training opportunities (*H12*).

One possible explanation for these non-significant results is that as an organization becomes increasingly profitable, a subset of employees might conclude that management is being overly greedy or stingy in the distribution of fringe benefits (Rust *et al.*, 1996). In the context of our study, some employees might feel that they are not being fairly compensated or appropriately developed through training opportunities, given their perceived contributions to the organization's success. Such concerns about fairness have been expressed by healthcare employees (Scott *et al.*, 2011), especially when immediate supervisors are responsible for making judgments about the fringe benefits that employees receive, and they likely apply more broadly to employees in other high-contact service industries as well.

In summary, our results provide strong support for the idea that high-contact service organizations with a differentiation strategy can consistently achieve excellent external service quality by continuing to improve multiple aspects of the internal working environment, which ultimately leads to a virtuous cycle as described above. We discuss the managerial and academic implications of these results below.

With regards to the managerial implications, our results suggest that organizations characteristic of our research context should continue to reinvest in the operational aspects responsible for generating the initial success, namely, the dimensions of internal service quality. Improvement efforts of this kind typically yield results in the medium to long term, but managers, unfortunately, often experience pressure to produce short-term results (Evanschitzky *et al.*, 2012; Rahmandad *et al.*, 2018). Exacerbating this situation, the time delays we described earlier due to organizational reporting and capability development may reduce the perceived benefits associated with such improvement efforts. In other words, time delays often blur perceptions regarding cause and effect (Rahmandad, 2008; Rahmandad and Repenning, 2016; Sterman *et al.*, 2015).

The implication of this, of course, is that organizations in the high-contact service sector ought to ensure that at least some of the metrics they use to assess and motivate employees encourage decisions with a long-term focus. With this longer-term focus, the self-reinforcing feedback loops we discuss throughout the paper are more likely to operate as virtuous rather than vicious cycles in practice.

On a related note, our results suggest that managers would benefit from adopting the broad, systems view that we take in this paper in their own organizations. To do so involves acquiring data from different sources within (and potentially outside) their organizations though, since the SPC framework, at least the way we conceptualize it, cuts across multiple functions and time periods. The problem is that most organizations struggle to obtain (and then integrate) such data due to incompatible information systems, conflicting functional priorities, organizational politics, etc. (Wilder-James, 2016). What this implies is that organizations may very well need to focus effort and resources on breaking down any data silos that plague them as a first step toward adopting this systems view.

Another managerial implication is that, while virtuous cycles are possible as we discuss, managers must be cognizant of possible disruptions; a number of factors can trigger a

disruption in a virtuous cycle, and can eventually trap an organization in a vicious cycle (Morrison, 2015; Rahmandad and Repenning, 2016; Repenning and Sterman, 2001, 2002). As an illustration, a new competitor could raise the bar for customer expectations (Bhattacharjee *et al.*, 2016). In addition, an organization that experiences excessive employee turnover in a particular period might find it challenging to continue to provide customers with higher levels of service quality (Tracey and Hinkin, 2008). We recommend managers to monitor the environment for disruptions such as these, and work to mitigate their effects to the extent possible.

A related managerial implication is that organizations ought to think about how to accelerate the development of virtuous cycles (and/or how to get out of vicious cycles). Our results are based on a sample of 417 managed properties, all of which are a part of a single firm (i.e. HotelCo). In a multi-unit setting like this, managers might consider temporarily assigning employees from locations that are well-established in virtuous cycles of service quality to those that are less so, and vice versa, in order for such employees to observe, teach, and/or learn. In doing so, best practices can be transferred more systematically and rapidly across the multiple units of the firm.

With regards to the academic implications of our study, scholars have devoted considerable attention to investigating the SPC, but relatively few studies examine this framework as a dynamic system like we do (Evanschitzky *et al.*, 2012, Hogreve *et al.*, 2017). This is interesting because, as discussed earlier, a figure in Heskett *et al.*'s (1994) seminal article on the SPC clearly shows feedback loops. Our results, based on a relatively large sample size, suggest that time-lagged feedback loops should be included in future assessments of the SPC framework.

Customer loyalty is likewise a part of Heskett *et al.*'s (1994) SPC framework, but our research design, and specifically our unit of analysis, prevents us from including it in the model. To elaborate, customer loyalty occurs at a different unit of analysis than the other elements of the SPC that we examine. That is, travelers tend to be more loyal to the firm as a whole (e.g. HotelCo) and less so to a specific unit within that firm (e.g. a hotel located at "123 Street"). The implication of this, of course, is that future SPC studies with a multi-unit setting like ours need to carefully consider whether it makes sense to incorporate customer loyalty into the model.

6. Conclusions

In this study, we develop the SPC as a dynamic system, and then evaluate the model using a unique data set. Our path analysis results show that most of the feedback loops we examine can operate as virtuous cycles, such that increases in external service quality and in profit margins lead to subsequent increases in the quality of the working environment, which ultimately reimpacts performance positively, and so on. These relationships provide a reason as to why some organizations with a differentiation strategy consistently outperform competitors in high-contact service industries.

Our study contributes to the literature by expanding the boundaries of previous conceptual and empirical models that investigate SPCs. In this way, we offer academics and practitioners a rigorous, more finely-grained view of the cross-functional character of modern operational systems and the complex dynamics that these systems generate (Chuang and Oliva, 2015; Sterman *et al.*, 2015).

Although there are many strengths, like all studies this research is subject to several limitations. One is that our results are based on an analysis of 417 hotels from a single firm. Our data set is very rich, as it combines archival data from multiple functions at HotelCo over a five-year time frame, but despite this richness, the analysis of data from a single firm may influence the extent to which our findings can be generalized.

Another limitation is that we analyze US-based service operations. It is possible that the results might differ for organizations operating in countries with different economic or cultural characteristics. Future research should examine this issue in more detail.

A third limitation is that, while we do examine many of the SPC variables, our model does not include labor productivity or customer satisfaction. Incorporating such variables into the analysis might provide an even more complete understanding of the SPC as a dynamic system.

We offer some ideas for future research above. In addition, we suggest scholars replicate our analysis using research contexts that differ from ours (i.e. organizations with a differentiation strategy in the high-contact service sector). For example, according to Silvestro (2002), some aspects of the SPC framework may not be as applicable in a context where the amount of customer contact with employees is low. What this means is that the observed relationships between the various SPC variables that we examine might evolve differently over time in such a setting, and this is worthy of future study.

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