

GREENING THE SERVICE PROFIT CHAIN: THE IMPACT OF ENVIRONMENTAL MANAGEMENT PRACTICES*

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This paper explores the relationship between environmental practices and performance in services and the impact of such practices on the external portion of the service profit chain. Using structural equation modeling, it tests the hypotheses developed with data from the European hospitality industry. The findings suggest that environmental practices are positively related to performance through the mediating effect of enhanced customer satisfaction and loyalty. The paper's contributions include: the conceptual development of the relationship between environmental practices and performance in services, the incorporation of environmental practices within the service profit chain, and the testing of their impact on customer satisfaction.

(CUSTOMER LOYALTY; CUSTOMER SATISFACTION; ENVIRONMENTAL MANAGEMENT PRACTICES; SERVICE PROFIT CHAIN)

1. Introduction

Many firms have reevaluated the way they do business as a result of becoming more aware of the environmental consequences of their operations. Ensuing academic research has, in turn, actively examined and debated the relationship between the environmental strategies firms adopt and firm performance. Extant empirical work suggests that profitable firms tend to have high environmental performance, but the nature of this relationship is not fully understood yet (King and Lenox 2001a; Klassen and McLaughlin 1996). Moreover, other studies point to the positive performance implications of investing in pollution prevention technologies but find no such evidence when pollution control technologies are used (King and Lenox 2002; Klassen and Whybark 1999a).

By and large, such empirical studies have been limited to the testing of theory using mostly samples of manufacturing firms (Klassen 1993; Klassen and Whybark 1999b). The bulk of empirical research on environmental questions in operations has been directed toward issues of strategy, quality, supply chain management, and product development (Angell and Klassen 1999). In the context of services, the relationship between environmental management practices and performance, the topic of this paper, has only recently attracted the attention of researchers (Foster, Sampson, and Dunn 2000; Goodman 2000). Available evidence on the nature of this relationship has been sketchy and anecdotal at best. Such

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evidence is based largely on case studies that, nonetheless, identify important themes for future research (Salzman 2000). Examples of service firms that either focus on pollution prevention or adopt environmental management systems (such as ISO 14001) include Wal-Mart (McInerney and White 1995), the Hyatt Regency (Enz and Siguaw 1999) and Scandic hotels (Goodman 2000), and various hospitals (Messelbeck and Whaley 1999). Moreover, other examples indicate that environmental practices can be as useful in service as in manufacturing operations as a means of improving customer loyalty and employee satisfaction, reducing costs, and enhancing competitiveness (Enz and Siguaw 1999; Goodman 2000; Schendler 2001).

The sheer size of the service economy's contribution to gross domestic product adds to the importance of exploring environmental issues in services. Today, this contribution exceeds 70% in the U.S. and other industrialized countries, while more than 80% of U.S. employment is in the service sector (Fitzsimmons and Fitzsimmons 2000; Salzman 2000). As such, the service economy "merits consideration both as a source of environmental harm and as a potential instrument to reduce environmental impacts" (Salzman 2000). Specifically, while on the one hand one may expect "an environmental bonus from the substitution of services and knowledge for material intensive [manufacturing] activities," on the other "... the information revolution and rise of services [may] have a net negative impact because [services] increase overall economic activity and . . . resource consumption" (Salzman 2000). Indeed, the distinctive characteristics of services vis-à-vis goods (i.e., the intangibility, perishability, and simultaneous production and consumption of services) (Sasser, Olsen, and Wyckoff 1978) may present different challenges in deciphering the relationship between environmental practices and performance in services compared with manufacturing. It may in fact be the case that, for the past three decades, our vision of environmental pollution has been framed by smokestack industries (Salzman 2000). In practice, we know little about the environmental impacts of most service operations, how they can be managed, and what impact the environmental practices service firms adopt have on performance. The systematic examination of such issues is thus overdue.

In this paper, we explore the nature of the relationship between environmental management practices and performance in the context of services. Specifically, we investigate whether the use of environmental practices by a service firm is positively related to performance through the mediating effect of enhanced customer satisfaction and loyalty. In doing so, we build on Heskett et al.'s (1994) service profit chain framework. We argue that environmental practices are a component of a service firm's operations and as such a component of what Heskett et al. (1994) term the "front end" of the service profit chain. In this paper, then, we examine the impact of environmental practices on the "external portion of the service profit chain" and use structural equation modeling to test the hypotheses we develop with data from the hospitality industry in Europe. Our decision to focus on the aforementioned constructs is supported—in addition to the underlying service profit chain framework—by empirical work in service management and marketing that links customer satisfaction and loyalty to financial performance (Anderson, Fornell, and Rust 1997; Rust, Zahorik, and Keiningham 1995).

The paper is organized as follows. In Section 2, we discuss the theoretical background and develop our hypotheses. Specifically, we discuss the link between operations and environmental management and relate it to the case of services. Moreover, we develop our thinking as to how the service profit chain framework can serve as a basis for examining the relationship between environmental practices and performance. In Section 3, we describe our empirical study that focuses on the hospitality industry in Europe and present our methodology and results. In Section 4, we discuss our findings, provide directions for future research, and conclude.

2. Theoretical Background and Hypotheses

2.1. *Service Operations and Environmental Management*

Regulations, rising costs, awareness of the ecological effects of business activities, and stakeholder pressures have forced firms to reevaluate their strategic approach toward the natural environment (Elkington 1994; Rugman and Verbeke 1998). In light of this, researchers have argued that the effective integration of environmental management practices into operations presents numerous benefits, including lower costs and enhanced efficiencies (Hart 1995; Russo and Fouts 1997), competitive advantages through product or service differentiation (green products or services), and better servicing of niche markets (customers demanding ecologically friendly products/services) (Shrivastava 1995). Other benefits include an improved image and enhanced loyalty of key stakeholders (Goodman 2000; Rondinelli and Vastag 1996).

More specifically, a growing literature examines the competitiveness effects of environmental strategies in manufacturing. Most empirical studies focus on the relationship between environmental performance and financial performance (Dowell, Hart, and Yeung 2000; King and Lenox 2001a; Klassen and McLaughlin 1996; Russo and Fouts 1997) and find a positive correlation between the two. A smaller number of studies focus on the relationship between the implementation of environmental practices and performance and suggest that “green” firms may also be more efficient and innovative (King and Lenox 2001b; Porter and van der Linde 1995). Others, however, argue that corporate environmental programs generate unrecoverable costs, divert resources from other productive investments, and are therefore unsustainable (Walley and Whitehead 1994). Finally, some studies report mixed results (Christmann 2000; King and Lenox 2002). It is clear that the debate on the relationship between environmental practices and performance, on the one hand, and measures of market performance, on the other, continues.

Recently, the importance of the natural environment has been addressed in the context of services in general (Grove, Fisk, Pickett, and Kangun 1996; Foster et al. 2000; Salzman 2000) and in the case of the hospitality industry in particular (Enz and Siguaw 1999; Goodman 2000; Halme 2001; Schendler 2001). The latter provides evidence of the positive performance implications of environmental management measures, including cost reductions, resource savings, customer retention and loyalty, and improved employee morale. The generalizability of these results, however, is limited by the case study or anecdotal nature of the evidence they are based on. Therefore, there is a need for further empirical work to examine the relationship between environmental practices and firm performance—such as the one described in this paper.

In their effort to implement successful environmental practices, service firms face a number of unique challenges that result from the distinctive characteristics of services vis-à-vis goods (Fitzsimmons and Fitzsimmons 2000; Lovelock 1996). Here, we focus on the consequences of one such characteristic that is likely to have a major impact on environmental management efforts, namely *the presence of the customer in the system* and the resulting *simultaneity* of service production and consumption. Researchers (Chase 1981; Chase and Tansik 1983) have identified the impact of customer involvement on the service operating system as one of the most important service idiosyncrasies affecting service performance—especially in high contact service systems, such as hotels and banks, where customer involvement is typically high.

While true that most services require some direct or indirect customer involvement (Chase and Tansik 1983; Lovelock 1996), the physical presence of the customer and his role as *co-producer* in high contact service systems create numerous challenges for managers

(Soteriou and Chase 1998). Foster et al. (2000) assert that customer involvement holds potential for influencing environmental actions. Often, certain environmental activities are “hidden” from the customer as they take place in the back office. In restaurants, for example, waste disposal or recycling may take place out of customer view. In high contact systems, however, such activities also take place in the front office. An environmentally conscious customer may thus not only apply pressure on management to change company policy (Salzman 2000) but may also be involved, as co-producer, in a firm’s environmental practices, such as, for example, energy and water savings practices in the case of hotels. The challenge and at the same time the opportunity for such high contact service firms is to meet customer demands and manage customer involvement without compromising the quality of services they provide (Goodman 2000; Schendler 2001) in order to meet their overall strategic and financial objectives.

Another particularity of services vis-à-vis manufacturing, which results from the presence of an environmentally sensitive customer in the system, is the limited choice of available environmental technologies. This is significant because such a choice has important implications for operations (Klassen and Whybark 1999b). For example, unlike manufacturers who can choose between pollution control (i.e., filters, proper treatment, etc.) and pollution preventive solutions (source reduction, reusing, and recycling programs), most services—especially those of a high contact nature—are not given the luxury of a wide spectrum of options. Instead, more often than not, these choices are limited to pollution prevention.

Pollution prevention is, however, challenging in its own right. Although fewer resources are wasted and both efficiency and effectiveness are improved through pollution prevention—always compared with pollution control measures—“. . . pollution prevention typically requires direct modification of critical components of a product or process” (Klassen and Whybark 1999b). This is unlike the case of pollution control where investment can often be made with minimal disruption to current operations. The above is in line with research on service failsafing (Chase and Stewart 1994) that focuses on designing “foolproof” services and avoiding potential fail points. Consider, for example, the case of a hotel: its environmental actions need to take the form of source reduction, reuse, and recycling programs. Given the presence of the customer in the service system, few if any end-of-pipe solutions—which are widespread in manufacturing—exist. Although such lack of flexibility may be more costly in the short run and may force firms to consider more advanced forms of environmental management, available evidence from manufacturing shows that it is pollution prevention technologies that can potentially lead to performance gains in the long run (King and Lenox 2002).

Other related service characteristics, such as service *simultaneity*—the simultaneous production and consumption of services—also present challenges for environmentally minded firms. Since production and consumption occur simultaneously in services, firms may have to consider more advanced forms of environmental management, such as product stewardship. Hart (1995) discusses product stewardship strategies that consider the product’s life-cycle costs, including the consumption of the product. Given service simultaneity though, disentangling product stewardship from more conventional forms of environmental management (such as pollution prevention) becomes extremely difficult. This introduces additional challenges and complexities in crafting a service firm’s environmental management strategy.

2.2. Customer Satisfaction, Loyalty, and Performance

Satisfying the needs and desires of the consumer is among the most fundamental notions of the marketing concept. In the last two decades, various definitions of customer satisfaction

have been introduced. A recent popular definition positions customer satisfaction as an evaluation of the perceived discrepancy between prior expectations—or some other norm of performance—and the actual performance as perceived after the consumption of a good or service by a customer (Oliver 1993). Cumulative satisfaction, defining satisfaction as a customer's overall experience to date with a product or service (Johnson and Fornell 1991; Johnson, Anderson, and Fornell 1995), is thought to be a fundamental indicator of the firm's past, current, and future performance, and it is what motivates a firm's investment in customer satisfaction (Anderson, Fornell, and Lehman 1994).

The literature (e.g., Heskett et al. 1994, 1997) suggests that customer satisfaction is positively related to the concept of customer loyalty. Specifically, the marketing literature suggests that customer loyalty can be defined in two distinct ways. The first defines loyalty as an attitude: different feelings create an individual's overall attachment to a product, service, or organization and define that individual's (purely cognitive) degree of loyalty (Hallowell 1996). The second definition of loyalty is behavioral. Examples of loyalty behavior include continuing to purchase services from the same supplier and increasing the scale and/or scope of the relationship or the act of recommendation (Yi 1991). In a recent study, Oliver (1999) extends an earlier definition of loyalty to include the act of consuming, describing it as “. . . a deeply held commitment to rebuy or repatronize a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior.” Similar definitions have been presented elsewhere as well (Reichheld 1996; Tellis 1988).

Loyalty behaviors, including relationship continuance, increased scale or scope of relationship, and recommendation (word of mouth advertising) result from customers' beliefs that the quantity of value received from one supplier is greater than that available from other suppliers. Loyalty in one or more of the forms noted above increases profits through enhanced revenues, reduced costs to acquire customers, lower customer-price sensitivity, and decreased costs to serve customers familiar with a firm's service delivery system (Reichheld and Sasser 1990). A number of recent studies examine the cognitive, affective, and conative antecedents of customer loyalty as well as its consequences (Oliver 1999; Dick and Basu 1994).

The linkages between satisfaction, loyalty, and performance constitute the “external” portion of the service profit chain framework—discussed in more detail in the next section—introduced by Heskett et al. (1994) and remain the focus of recent research (Fournier and Mick 1999; Froehle, Roth, Chase, and Voss 2000). Earlier efforts utilized the PIMS database to establish a relationship between satisfaction, market share, and profitability (Buzzell and Gale 1987). Reichheld and Sasser (1990) introduced the concept of loyalty into the picture and argued that loyalty is the primary driver of profitability. Overall, there is a general consensus in the literature that improvements in satisfaction lead to higher levels of customer loyalty (Bolton and Drew 1991; Boulding, Kalra, Staelin, and Zeithaml 1993), higher revenues (Rust et al. 1995), and reduced future transaction costs (Reichheld and Sasser 1990)—all through improved customer loyalty.

Finally, evidence from the service management literature suggests that customer satisfaction influences customer loyalty, which in turn affects profitability. Proponents of this theory include Heskett et al. (1994), Reichheld and Sasser (1990), Rust et al. (1995), Schneider and Bowen (1993), and Zeithaml, Parasuraman, and Berry (1990). In this line of research, customer satisfaction is thought to be the result of a customer's perception of the value received in a transaction or relationship relative to the value expected from transactions or relationships with competing vendors (Zeithaml et al. 1990).

2.3. *Service Profit Chain and Environmental Practices*

Overall, the service-profit chain (Heskett et al. 1994) is a framework that links service operations, employee assessments, and customer assessments to a firm's profitability and growth (Kamakura, Mittal, de Rosa, and Mazzon 2002). Simply put, the service profit chain establishes relationships between market performance (revenue growth and profitability), customer loyalty, and customer satisfaction (the external portion of the chain) on the one hand, and employee satisfaction, loyalty, and productivity (the internal portion or the "front end" of the chain) on the other (Heskett et al. 1994). Specifically, it is argued that profitability and revenue growth are stimulated by customer loyalty. The latter is a direct result of customer satisfaction, which is influenced by the value of services provided to customers. Such value—created by satisfied, loyal, and productive employees—is a function not only of costs to the customer but also of the results achieved for the customer. Moreover, it is based both on perceptions of the way a service is delivered and initial customer expectations. It must finally be noted that the internal quality of the working environment—high quality support services and policies—enables employees to deliver results to the customer and drives employee satisfaction (Heskett et al. 1994).

In fact, employee involvement in process improvements emerges as a key capability associated with a firm's environmental responsiveness. Environmental performance improvements (such as waste minimization) may result from employee involvement practices or team projects (Hanna, Newman, and Johnson 2000; May and Flannery 1995). A number of such examples, mostly from manufacturing, are presented in the literature. Some examples from services are also reported further linking employee involvement in such efforts with employee satisfaction and loyalty. Specifically, Enz and Siguaw (1999) report that all four operations named as environmental best practice champions in a Cornell University study of best practices in the U.S. lodging industry indicated that such practices had a positive impact on employee morale (and thus satisfaction) and enhanced the staff's pride in the hotel. Similar results are reported by Goodman (2000) in the case of Scandic hotels.

In this paper, we argue that the service profit chain framework can be used to examine the relationship between the implementation of environmental practices—a component of a firm's operations (Angell and Klassen 1999; Hanna et al. 2000)—and performance. Specifically, in such a context, environmental practices are placed within the "front end" of the service profit chain, which Heskett et al. (1994) term "operating strategy and service delivery system." Therefore, they are arguably built into service design and as such might impact customer satisfaction and loyalty, and through them firm performance. Such argumentation is in line with recent literature that argues that the environment must be integrated with management's efforts to address the concerns of all stakeholders—with the overarching objective of operations being the improvement of customer value (Angell and Klassen 1999). More specifically, environmental practices are integrated within the service concept and alter both its structural and managerial elements, including its service delivery, service encounter, quality, and information dimensions (Fitzsimmons and Fitzsimmons 2000). For example, Scandic's top priority was to communicate its new environmental values and strategy to employees through education and training. Also, in order to increase customer participation, the company rolled out a new environmental training course called the "environmental dialogue." Lastly, with respect to information, Scandic's new \$25 million information system monitored and measured three environmental performance factors (out of eight key factors monitored) and enabled customized reporting and benchmarking that allowed information sharing and performance comparisons across the chain's hotels (Goodman 2000).

Overall, then, in this paper, we test whether higher levels of use of environmental management practices in services lead to higher levels of market performance through the

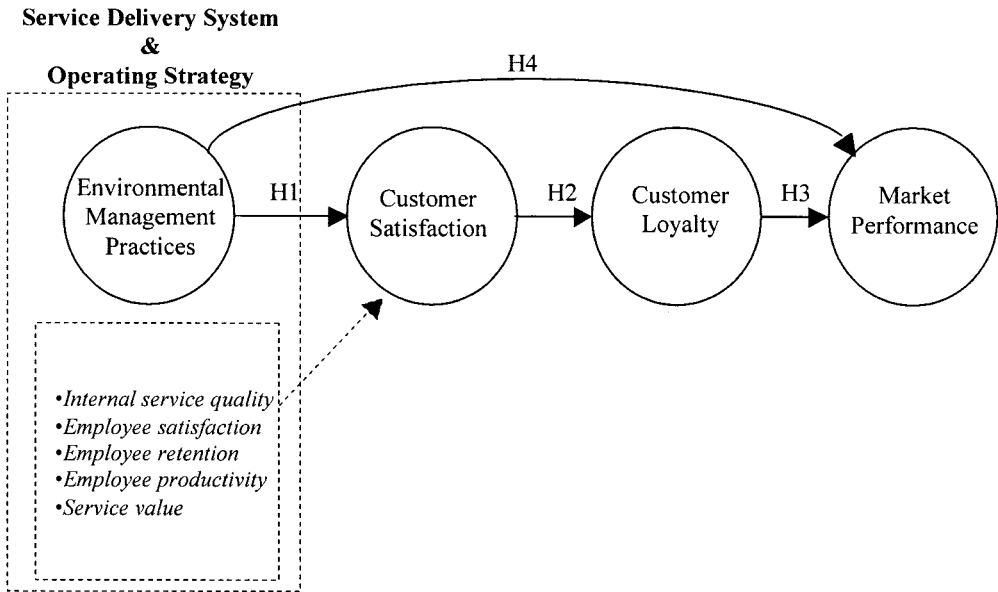


FIGURE 1. Environmental Management Practices and the Service Profit Chain.

mediating effect of customer satisfaction and loyalty. In essence, we test the impact of environmental practices on the external portion of the service profit chain. Figure 1 outlines the hypothesized relationships.

Based on the discussion of Section 2, we present the following four hypotheses:

HYPOTHESIS 1. *Higher levels of use of environmental management practices lead to higher levels of customer satisfaction.*

HYPOTHESIS 2. *Higher levels of customer satisfaction lead to higher levels of customer loyalty.*

HYPOTHESIS 3. *Higher levels of customer loyalty lead to higher levels of market performance.*

HYPOTHESIS 4. *Higher levels of use of environmental management practices lead to higher levels of market performance.*

3. The Empirical Study

3.1. Data Collection and Sample

A major data collection effort that focused on the hotel industry in the European Union (EU) was undertaken. The hospitality industry is the world's largest industry, with 120 million employees and revenues exceeding \$3.8 trillion worldwide. In Europe, the industry accounts on average for more than 10% of the local GDPs. Issues related to environmental management and sustainability have been gaining increasing attention in this industry (Anguera, Ayuso, and Fullana 2000; Enz and Siguaw 1999; Goodman 2000).

The target population of our study included hotels in the countries of Austria, France, Germany, Greece, Italy, Portugal, Spain, the United Kingdom (selected as the EU's top tourist destinations with more than 10 million tourist arrivals per year), and Cyprus, Malta, and Monaco (included because the hospitality industry contributed a significantly higher percentage of GDP and employment than the EU average). These countries are all major

tourist destinations and accounted for approximately 60% of Europe's 380 million tourists in 1999—with France and Spain being the number one and two tourist destinations in the world, respectively (World Tourism Organization 2000). The sampling frame was drawn from the 1999 Official Hotel Guide (Official Hotel Guide 1999). We focused on high-end hotels since environmental practices—being service winners (Fitzsimmons and Fitzsimmons 2000)—are most likely found in high-end establishments. In fact, most case studies reported in the literature support this assumption (Enz and Siguaw 1999; Goodman 2000; Schendler 2001). Moreover, the homogeneous clientele of such hotels (for example, with respect to income) is more likely to exert similar pressures on them to improve their environmental performance. Also, our examination of the hotel industry reveals that most high-end hotels are of medium size. Hotels in our sample were no exception. As such, our sample is also homogeneous with respect to hotel size.

The survey instrument was sent to the high-end categories of hotels listed in the *Official Hotel Guide Classification System*, that is, superior deluxe, deluxe, moderate deluxe, superior first class, and first class. The top category includes hotels characterized as exclusive, expensive, and luxurious, “. . . often palatial, offering the highest standards of service, accommodations and facilities.” The last category defines the other end of the spectrum in terms of hotel characteristics. Such hotels are described as “dependable, comfortable. . . with standardized rooms and amenities. . . that may have superior executive level or wing.”

A pilot study was first conducted, which consisted of (i) a series of in-depth interviews with hotel managers and (ii) a mail survey, during which a survey instrument was sent to 50 randomly selected hotels in the above countries. Upon completion of the pilot study, the survey instrument (discussed below) was finalized and sent to senior executives of an additional 1,238 hotels in the same countries. No problems were observed due to the fact that the questionnaire was in English, given that our population consisted of well-educated senior executives in an industry where the use of the English language is extensive. Furthermore, the constructs examined are in the epicenter of most senior managers' attention and many expressed their interest in receiving the results of our study. No biases were observed among respondents from English- and non-English-speaking countries. Data were collected during the period of May–September 1999. The response rate was 8.4% and resulted in a total sample of 104 completed questionnaires. Non-response bias was further assessed by examining differences between response and non-response characteristics with respect to size and type of hotel. No significant differences were found ($p < 0.05$).

In addition, we tested for common method bias, which could pose problems for survey research that relies on self-reported data—especially if the same person provides the data at the same time. One important concern in such cases is that common method bias may artificially inflate observed relationships between variables. We employed several procedures to avoid common method variance or to estimate its extent. First, the dependent variables were placed after the independent variables in the survey to diminish, if not avoid, the effects of consistency artifacts. Second, Harman's single factor test was performed (Harman 1967; Podsakoff and Organ 1986). If common method variance existed, a single factor would emerge from a factor analysis of all questionnaire measurement items, or one general factor that accounted for most of the variance would result. The factor analysis revealed four factors with eigenvalues greater than 1.0 that accounted for 72.2% of the total variance. The first factor only accounted for 30.4% of the variance. These results suggested that common method variance was not a serious problem in our study.

3.2. Measures

The survey items used in the survey instrument were drawn from the relevant literatures and finalized based on the results of our pilot study, as shown in the discussion that follows. Where indicated, factor analysis was used (principal components analysis with varimax

rotation) in order to assess the dimensionality of our constructs. Scale items and reliabilities along with all survey items are shown in the Appendix.

MARKET PERFORMANCE. Measures of performance used were growth in profits, growth in revenues, and market share. Managers were asked to assess how well their hotels performed relative to their competitors with respect to these measures at the time of the survey. A seven-point Likert-type scale was used (worst in industry, 1; about the same, 4; best in industry, 7). Such self-reported measures of performance relative to competitors' performance have been used extensively and successfully in the literature (Dess and Robinson 1984).

ENVIRONMENTAL MANAGEMENT PRACTICES. Measures for hotel environmental management practices were drawn from studies reported in the literature that dealt with such issues in the hospitality industry (Enz and Siguaw 1999; Goodman 2000) and were finalized during the pilot study we conducted. We also consulted the International Hotel and Restaurant Association—a global network of independent and chain operators, national associations, suppliers, and educational centers in the hotel and restaurant industry in 147 countries—which presents an annual global environmental award (sponsored by American Express TRS) in collaboration with the United Nations Environment Program. The measures were finalized through factor analysis of the relevant survey items. As shown in the Appendix, measures considered included energy saving, recycling, and water-saving practices. Managers were asked to rate the degree of use of a specific practice (“not used at all”, 1; “widely used”, 7) in their hotel.

CUSTOMER SATISFACTION AND LOYALTY. Managers were asked to rate the degree of agreement or disagreement with statements relating to customer satisfaction and loyalty levels, on whether customers' expectations were exceeded, and on whether customer retention rates were improving using a seven-point scale (“strongly agree”, 1; “strongly disagree”, 7). Schneider and Bowen (1993) report high positive correlations between self-reported and customer-reported measures of customer satisfaction. Moreover, survey respondents have extensive knowledge to answer such questions, given the level of sophistication of the hotels in our sample and information acquired through independent market research studies or from tourist operators.

3.3. *Methodology, Data Analysis, and Results*

Structural Equation Modeling (SEM) (Jöreskog 1970), also known as latent variable analysis (Loehin 1987) or causal modeling (Blalock 1985), was used to simultaneously test a measurement and a structural model to investigate our hypotheses. SEM implicitly asserts a covariance structure whose concordance with the observed covariance based on the data can be tested. One of the unique features of SEM is the ability to provide parameter estimates for relationships among unobserved variables (i.e., the latent variables).

All indicators used in the study, along with the corresponding constructs and cronbach alpha values, are shown in the Appendix. The resulting correlation matrix is shown in Table 1.

A confirmatory factor analysis using the principal components method with varimax rotation was used to further verify the dimensionality of our constructs. The results, which are shown in Table 2, suggest that the fit to a four-factor model was reasonably good.

Two SEM models were constructed as shown in Figure 2 and Tables 3–5. In addition to the hypothesized relationships between customer satisfaction, loyalty, and performance, Model A includes the direct relationship of Environmental Management Practices (EMP) on

TABLE 1
Descriptive Statistics and Correlations

Variable	Mean	SD	ENV1	ENV2	ENV3	CS1	CS2	LOY1	LOY2	PERF1	PERF2	PERF3
ENV1	6	1.414	1									
ENV2	6.25	1.061	0.461**	1								
ENV3	5.5	2.121	0.348**	0.181	1							
CS1	5.5	0.707	0.252*	0.259**	0.212*	1						
CS2	5	0.707	0.253*	0.325**	0.295**	0.767**	1					
LOY1	5	1.414	0.220*	0.163	0.255**	0.474**	0.548**	1				
LOY2	4.5	3.535	0.077	0.221*	0.218**	0.254**	0.328**	0.569**	1			
PERF1	4	0.710	-0.067	-0.012	0.151	0.099	0.165	0.139	0.345**	1		
PERF2	3	0.707	0.091	0.125	0.191	0.193*	0.288**	0.166	0.310**	0.750**	1	
PERF3	3	1.414	0.015	0.046	0.104	0.132	0.193	0.161	0.224*	0.409**	0.448**	1

*, $p < 0.05$.

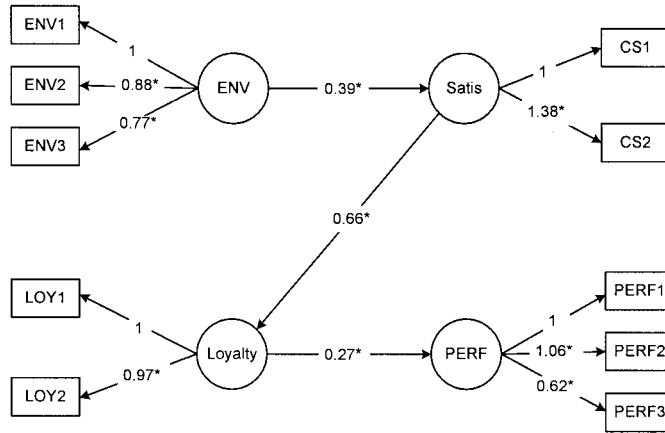
** , $p < 0.01$.

Customer Satisfaction (CS), as suggested in Hypothesis 1. Model B further includes a direct relationship between EMP and performance as suggested in Hypothesis 4. The overall validity of the models was assessed by using a multiple-fit criteria approach, as shown in Table 3. More specifically, the χ^2 value of the models is 40.008 (d.f. = 32) and 35.426 (d.f. = 31), respectively, which corresponds to a significance level greater than 0.10 for both models. Such values are much higher than the minimum threshold of 0.05, a value required for an adequate fit of the overall model (Bagozzi and Yi 1988; Bentler 1989). We must note that the overall χ^2 statistic provides a test of whether the sample covariance matrix is equivalent to the model-implied covariance matrix, within sampling error. A feature of this test is that the proposed model represents the null hypothesis in the test, not the alternative—thus the aim of the researcher is not to reject the null hypothesis. A “good” value for the χ^2 , then, is one that is associated with a “large” p -value (typical rules of thumb look for p -values larger than 0.05 or 0.10; Rigdon 1998). As shown in Table 3 the ratio of χ^2 to the degrees of freedom is also less than four to one, the maximum value for models of adequate fit (Matsueda 1982). The values of the Root Mean Square Error of Approximation (RMSEA)—the value of the discrepancy per degree of freedom—are also less than the maximum recommended value of 0.08 (Steiger 1990). Table 3 also presents the values of representative indices typically examined in SEM, including the goodness of fit index (GFI), the Non-

TABLE 2
Rotated Factor Loadings for the Four Structural Factors

Variables	Factor 1	Factor 2	Factor 3	Factor 4
ENV1	-0.09	0.08	.820	.215
ENV2	-0.01	.214	.738	-0.06
ENV3	.193	-0.08	.607	.124
CS1	0.05	.921	.147	.125
CS2	.173	.890	.241	0.01
PERF1	.901	0.01	-0.03	0.02
PERF2	.885	.115	.160	0.02
PERF3	.656	.113	-0.03	.229
LOY1	0.03	-0.04	.154	.879
LOY2	.195	.195	0.07	.827
Eigen value	3.040	1.804	1.366	1.014
Cumulative Proportion of Total Variance Explained	30.401	48.439	62.096	72.232

Model A: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance -- no direct link between EMP and Performance



Model B: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance -- With direct link between EMP and Performance

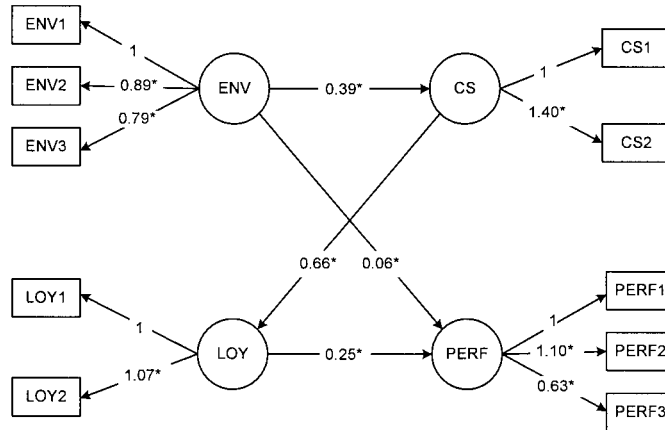


FIGURE 2. Estimated SEM Models. Model A: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—no direct link between EMP and Performance. Model B: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—with direct link between EMP and Performance.

Normed Fit Index (NNFI), and the comparative fit index (CFI), which is also the preferred index to be used in models of small sample sizes. All indices examined exceed the minimum criteria of 0.90 reported in the literature, lending support to the overall validity of the conceptual models.

The results from the measurement models are shown in Table 4, suggesting that all indicators loaded on the corresponding constructs. Finally, Table 5 and Figure 2 present the results from the structural models. These lend support to Hypotheses 1, 2, and 3, suggesting a positive relationship between environmental practices and customer satisfaction, between

TABLE 3
Goodness of Fit Summary Results

Fit Indices/Statistics	Model A	Model B
Degrees of Freedom	32	31
χ^2	40.008	35.426
χ^2/df	1.25	1.14
<i>p</i> -Value (Overall Model)	0.156	0.267
Bentler–Bonett Non-Normed Fit Index	0.97	0.98
Comparative Fit Index	0.98	0.98
GFI	0.93	0.94
RMSEA	0.05	0.04

TABLE 4
Measurement Model Results¹

Model A: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—no direct link between EMP and Performance

Indicator	Construct	Parameter Estimate	Std. Error	<i>t</i> -Value
ENV1	Env. Mgt. Practices	1	N/A	N/A
ENV2	Env. Mgt. Practices	.875	.236	3.712
ENV3	Env. Mgt. Practices	.774	.239	3.24
CS1	Satisfaction	1	N/A	N/A
CS2	Satisfaction	1.383	.169	8.170
LOY1	Loyalty	1	N/A	N/A
LOY2	Loyalty	.974	.193	5.056
PERF1	Performance	1	N/A	N/A
PERF2	Performance	1.064	.161	6.621
PERF3	Performance	.623	.126	4.935

Model B: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—with a direct link between EMP and Performance

Indicator	Construct	Parameter Estimate	Std. Error	<i>t</i> -Value
ENV1	Env. Mgt. Practices	1	N/A	N/A
ENV2	Env. Mgt. Practices	.893	.239	3.727
ENV3	Env. Mgt. Practices	.790	.243	3.254
CS1	Satisfaction	1	N/A	N/A
CS2	Satisfaction	1.402	.192	7.306
LOY1	Loyalty	1	N/A	N/A
LOY2	Loyalty	1.070	.184	5.801
PERF1	Performance	1	N/A	N/A
PERF2	Performance	1.096	.161	6.800
PERF3	Performance	.628	.127	4.933

¹ In order to define the measurement scales for the constructs, one of the links from the indicator to the construct has to be set equal to one (Bentler 1989). Consequently, for these links, the standard errors and *t*-values have been marked as “N/A” (not applicable).

customer satisfaction and loyalty, and finally between loyalty and performance. With the exception of the direct link between environmental practices and performance, all links are statistically significant ($p < 0.05$). Interestingly, Hypothesis 4 is not supported by our data. This finding emphasizes the importance of environmental management practices toward customer loyalty and firm performance, results that are achieved in the hospitality industry through the improvement of customer satisfaction.

TABLE 5
Structural Model Results

*Model A: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—
no direct link between EMP and Performance*

(Predicted sign)	Regression from	Coefficient to	Parameter Estimate	Std. Error	<i>t</i> -Value
H1 (+)	Env. Mgt. Practices	Satisfaction	.388	.123	3.147
H2 (+)	Satisfaction	Loyalty	.687	.116	5.938
H3 (+)	Loyalty	Performance	.272	.110	2.465

*Model B: Environmental Management Practices (EMP), Customer Satisfaction, Loyalty, and Performance—
with a direct link between EMP and Performance*

(Predicted sign)	Regression from	Coefficient to	Parameter Estimate	Std. Error	<i>t</i> -Value
H1 (+)	Env. Mgt. Practices	Satisfaction	.395	.127	3.121
H2 (+)	Satisfaction	Loyalty	.662	.137	4.815
H3 (+)	Loyalty	Performance	.250	.094	2.645
H4 (+)	Env. Mgt. Practices	Performance	.056	.098	0.574

4. Discussion and Concluding Remarks

In this paper, we argue and empirically demonstrate that the degree of use of environmental management practices in the hotel industry is positively related to market performance, through the mediating effect of customer satisfaction and loyalty. Specifically, our results lend support to Hypotheses 1, 2, and 3, suggesting a positive relationship between environmental practices and customer satisfaction, between customer satisfaction and loyalty, and between loyalty and performance. These findings are supported by literature, which suggests that performance gains associated with the adoption of environmental practices are related to cost reductions, resource savings, opportunities for innovation, customer retention and loyalty, and improved employee morale. In addition, our results are backed by the service management and marketing literatures, which show that improvements in satisfaction lead to higher revenues and reduced future transaction costs through improved customer loyalty.

One would expect a positive direct link between environmental practices and performance, as outlined in Hypothesis 4 and discussed in Section 2.1. However, our data do not lend support to this hypothesis. The service profit chain framework may help explain, at least in part, this non-finding. As discussed earlier, in such a context, service operations influence firm performance through enhanced customer satisfaction and loyalty. Moreover, as we argued, environmental practices can be incorporated within the service profit chain and may impact customer satisfaction, loyalty, and subsequently performance. In addition to such an explanation, other research (Christmann 2000) also reports no evidence of a direct relationship between the implementation of environmental practices and performance. On the contrary, Christmann finds that such a relationship exists through the mediating effect of complementary assets. In general, the characteristics of services vis-à-vis goods may explain, in part, the lack of a direct relationship between environmental practices and performance. Moreover, such findings emphasize the importance of environmental practices toward customer loyalty and performance—results that are achieved in the hospitality industry through the improvement of customer satisfaction. While our results point to the importance of environmental practices vis-à-vis customer satisfaction in services, future research clearly needs to further investigate this relationship.

Overall, the paper makes two contributions. First, it conceptually develops and empirically

tests the relationship between the adoption of environmental management practices and market performance in the context of services. So far, existing work has been very limited and largely based on anecdotal or case study evidence. Second, by examining the mediating effect of customer satisfaction and loyalty on the relationship between environmental practices and market performance, the paper establishes that the use of such practices is positively related to higher levels of customer satisfaction and, eventually, higher levels of performance—through enhanced customer loyalty. The significance of these mediating effects and their positive relationship with performance is especially noteworthy given rising consumer awareness, both in Europe and the United States, where consumers demand increased corporate environmental responsibility—in services and in manufacturing alike.

The service profit chain provided a framework within which to test the relationships outlined above. The intention of our work was not to fully assess the service profit chain, but rather to incorporate environmental practices as an important dimension within the framework. In fact, future work needs to fully assess the greening of the service profit chain—both in the hospitality industry and in other service contexts—paying explicit attention to firm characteristics such as size. Such an effort has significant data requirements. As Loveman (1998) points out, “the main impediment to more comprehensive empirical testing” of the service profit chain “. . . has been the absence of large sample data spanning all (or even most) of the service profit chain components.” Despite such difficulties, some research on the assessment of the service profit chain, or parts of it, has been conducted (Kamakura et al. 2002; Soteriou and Zenios 1999).

Venues for future research are in part related to this study’s limitations. Specifically, future research needs to further investigate the nature of the relationship between environmental practices and customer satisfaction and loyalty in services using more refined measures of the latter. Questions to be addressed may focus on the way or the mechanisms through which environmental practices enhance customer satisfaction and loyalty. Given the critical role of employees in this context, a full assessment of the service profit chain needs to establish how employee satisfaction and loyalty are enhanced when firms are environmentally proactive, how employee satisfaction and loyalty impacts customer satisfaction and loyalty, and through them market performance. In this context, one can look, for example, at employee environmental training or employee involvement in continuous environmental progress.

Overall, a systematic assessment of the effectiveness of service firm environmental practices is needed in future work, that is, an evaluation of their outcomes in terms of reduced environmental loads produced or cost savings achieved. Moreover, the use of finer measures of environmental practices (compared with those used in our study) that cover the entire value chain of service activities needs to be considered. These may include: first, a distinction between front- and back-office measures; second, an examination of finer measures of resource savings programs (such as energy management measures in hotels); third, an assessment of housekeeping and maintenance practices that reduce impacts, waste, and costs (Schendler 2001); fourth, a consideration of environmentally responsible practices in the design and construction of facilities (i.e., the construction of “green” rooms with a longer average life; Goodman 2000; Schendler 2001); fifth, an evaluation of the use of environmental information systems that allow customized reporting, sharing of information among managers, and also provide a benchmarking system (Goodman 2000). One may also consider issues related to suppliers. Examples that appear in case studies point to the importance of supplier–service provider collaboration to achieve environmental innovations that reduce the production of waste and the introduction of environmental considerations in the selection of goods provided. Finally, future research needs to examine the use of practices such as information provision and elicitation of customer involvement in a hotel’s environmental efforts.

Our findings shed only some light on the importance of environmental management practices and their impact on performance, in services. They do, however, point to the vast potential for future research regarding this relationship, which is amplified by the dominant presence of the service sector in the global economy.¹

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Appendix: Survey Items, Constructs, and Cronbach Alpha Coefficients

*Environmental Management Practices (ENV)**** ($\alpha = 0.681$)

1. Use of energy saving measures
2. Use of recycling practices
3. Use of water saving measures

*Customer Satisfaction (CS)*** ($\alpha = 0.861$)

1. Overall customer satisfaction levels
2. Customers stated expectations are exceeded

*Customer Loyalty (LOY)*** ($\alpha = 0.708$)

1. Overall customer loyalty levels
2. Customer retention rates have been improving

*Market Performance (PERF)** ($\alpha = 0.772$)

1. Growth in profits relative to industry average
2. Growth in revenues relative to industry average
3. Market share relative to industry average

NOTE:

*, Managers were asked to assess how well their hotels performed relative to their competitors at the time of the survey using a seven-point scale ("worst in industry", 1; "about the same", 4; "best in industry", 7).

** , Managers were asked to rate the degree of agreement or disagreement with statements relating to customer satisfaction and loyalty levels ("strongly agree", 1; "strongly disagree", 7).

***, Managers were asked to rate the degree of use of a specific practice ("not used at all", 1; "widely used", 7).

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