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Understanding the Interfaces: How Ocean Freight Shipping Lines Can Maximize Satisfaction

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Abstract

Physical distribution services are becoming increasingly important as supply chains strive to become more efficient in the logistical flow of goods to industrial customers. Performance of these services, however, takes place during encounters that customers have with various interfacing departments within the firm. These encounters may ultimately determine the level of satisfaction clients have with the service and the concomitant perceived quality. While previous research in this area has focused on service quality assessment, little attention has been given to determining the pattern of interfacing departments that maximize service satisfaction. This study examines a sample of shipping managers in Singapore who evaluated the service dimensions of ocean freight shipping lines (or companies). Using an analytical method called decision tree calculus, this article identifies the combination of interfacing departments that maximize service satisfaction. The results of this approach offer definite guidance to ocean shipping lines in terms of the importance of key interfacing departments in shaping satisfaction and perceived quality. Implications are discussed.

Keywords

Services marketing, Service encounters, Service quality, Service satisfaction, Decision tree

1. Introduction

As competition intensifies globally, service organizations face continuous and demanding acceleration in customer expectations. As these expectations are met, customers expect service quality to continue to improve in subsequent transactions with these firms [23], [37], [56], [61]. Admonitions of “keeping close to the customer” and being relationship marketing-oriented are supposed to result in a competitive advantage for a firm and market leadership. However, how to enhance customer orientation is sometimes problematic given the intangible nature of a service offering. Successful service marketing requires that a firm satisfy customer expectations during a series of interactions from the moment the service is sold to postservice activities.

Excellent service seems more the exception than the rule [17]. Customers are becoming increasingly critical of the level of quality they receive [1]. This business environment has forced firms to be more proactive in their service quality strategies if they are to be leaders in their industries and maintain satisfied customers [2]. Hence, it is not surprising that service firms spend substantial resources to measure and manage customer satisfaction. The main contention is that a satisfied customer is more likely to be loyal and a long-term client of the service provider [16]. Such satisfaction is often based on the perception of quality of how the service is offered. Differentiating service quality from competing firms can offer a strong advantage to a firm. Porter [50] argues that how a firm distinguishes itself among customers goes a long way in giving it the true strategic advantage.

The focus of this article is to explore service satisfaction in the ocean freight shipping industry and the role of internal interfacing departments (e.g., booking, claims, documentation) in differentiating the delivery of service. The delivery of service activities often occurs through a series of encounters that clients have with personnel in these interfacing departments. The level of satisfaction is often a proxy for the perceived quality of a service. Providing optimal service is an essential part of a shipping firm's service offering and can be a source of competitive advantage for a firm. Rather than attempt to use a standardized instrument to measure service quality such as SERVQUAL, the goal was to examine the collectivity of interfacing departments in shaping satisfaction using decision tree analysis. The ocean freight shipping industry is a specific business-to-business context involving a collection of service activities delivered by a firm's internal departments. The key question addressed is: “Is there a pattern of interfacing departments that is connected to satisfaction and what combination of interfacing departments lead to increased service satisfaction?”

The outline of this article is as follows. First, we discuss the importance of service in the ocean freight shipping industry and how service encounters are connected to quality, satisfaction, and differentiation. The main purpose of reviewing the background literature is to demonstrate the importance of interfacing departments in the delivery of the service. Next, we discuss the methodology, including the sample and the decision tree technique. The results are presented via decision tree diagrams with concomitant discussion. Lastly, the article concludes with implications.

2. Background literature

2.1. The ocean freight industry

The ocean freight industry plays an increasingly crucial role given the requirements by firms to keep low inventories while ordering raw material only when there is a customer demand. Ocean freight carriers are viewed as the railroads of the ocean. This industry has become an essential element in the efficiencies and effectiveness of supply chains. Any delays in shipment may have a significant impact on the profitability of the firms that depend on that shipment. In other words, any small delays in booking of shipment orders, shipment delays, etc. will have significant ripple effects in the entire supply chain. Increased global competition has also elevated the role of the ocean freight shipper in the competitive battles in various industries. Clearly, the logistic functions performed by ocean freight shipping lines are indispensable in effective and efficient supply chains. In such service environments, if customers are not treated in a helpful and courteous manner and without problems, they will go to another competitor. Differentiating service has become key to competitive positioning.

Poirier and Reiter [49] argue that the transportation function such as shipping is an area that is ripe for change as firms begin to realize the integral role it plays in effective supply chains. They contend that firms should use logistics as a primary source for identifying savings that exist in the network from supply to the purchase by the end user. Yet, knowing the determinants that affect satisfaction and perceived quality of logistical services is not easy to assess. Marketing literature indicates that physical distribution service quality has a major impact in the selection of service providers in the industrial sector [6]. Yet, very little research has investigated the factors that affect perceptions of service satisfaction in the delivery of physical distribution services. Research by Bienstock et al. [6] indicate that physical distribution service quality affects business profitability because of its association with general quality judgments and future purchase intentions. They recommend more investigation into service quality in a physical distribution context.

In reviewing the literature on the linkage between service quality and profitability, Zeithaml [67] found that little is known about what service encounters are most responsible for perceptions of service quality and what the key drivers are in each service encounter. Moreover, Fisk et al. [24] maintain that research has ignored the potential influence of interactions on the impact of a firm's service quality. Our study responds to these gaps in the literature by looking at the role of interfacing departments.

2.2. Interfacing departments and the service encounter

For supply chains to work effectively, organizational arrangements must be developed among or between partners. Handfield and Nichols [28] note that of the three components in supply chain management (i.e., information systems, inventory systems, and organizational relationships), organizational relationships are the most fragile and tenuous to develop and maintain. As a result, they recommend that firms develop a better understanding of their processes to serve effectively the customer and to view their roles as "partner-like" and not adversarial. A key element in improving relationships within the chain is to understand the expectations of customers during interactions and to identify conflicts before they become destructive.

How customers experience the delivery of service by shipping lines (or companies) has an enormous impact on how they form perceptions of service. Interactions with interfacing departments contribute immensely to these

perceptions. Services marketing literature views service quality and satisfaction as two related (but not identical) constructs [46]. Extant research suggests that service satisfaction is affected by the interaction between the customer and the service provider. This interaction is known as *service encounter*. The overall service satisfaction then depends on how the service provider manages and monitors the service encounters [10]. Other research has illustrated that a customer's service satisfaction is influenced by the behavior of the person who interacts with and delivers the service to the customer. In fact, from the customer's perspective, service quality cannot be separated from the service provider.

Interfacing departments in the shipping industry often play boundary-spanning roles because they operate at the boundary of the firm and provide a link between the external customer and the internal operations of the firm. Czepiel [19] suggests that long-term relationships are composed of a series of encounters between the firm and the customer. Bitner [9] refers to the sequence of encounters that clients have with various individuals or departments within the firm as the "service encounter cascade." A bad experience with one interfacing department can tarnish the client's overall impression of service quality even if the clients had positive experiences with multiple interactions with the various interfacing departments. Such encounters may be remote (e.g., sending billing statements by mail), by phone (e.g., discussion of details), face-to-face (e.g., clients visit the firm or vice versa), or electronically (e.g., e-mail, information from the website). Bolton and Drew [12], for example, found that customer relationships with GTE Laboratories depended more on the departments dealing with installation, repair, and sales. Hence, the types of encounters that customers experience in the delivery of the service can have an enormous impact on satisfaction and perceptions of quality.

Smith [58] found only two dimensions in consumer's evaluation of services consisting of staff-related elements (including expertise and interpersonal qualities of the service personnel) and convenience/accessibility. The staff-related elements account for almost 50% of the variation in service quality while the second factor of convenience/accessibility accounted for only 8% for the second. In sum, service personnel and interfacing departments play a crucial role in shaping clients' overall service satisfaction with the firm.

One area that has not received sufficient focus is determining the combination of interfacing departments that maximize customer satisfaction. That is, is there a pattern of interfacing departments that are linked together in some network-like fashion to maximize satisfaction? The purpose of our article is to use a decision tree calculus to identify systematically the pattern of interactions with interfacing departments that optimize service satisfaction in a business-to-business setting.

2.3. Impact of service encounters on quality, satisfaction, profitability, and service recovery

Service quality is a complex topic. It has become the most dominant theme in research in the services sector. Such research has sought how firms can develop quality services and subsequently how to maintain high service quality, as customers become more demanding. Indeed, service quality is now recognized as a key way to differentiate a firm's offering and as the most powerful competitive tool to obtain an edge over competitors [5]. Delivering superior service is seen as integral to business success. Researchers have been particularly interested in the relationship between customer satisfaction and service quality (cf. Ref. [12]). However, the bulk of such research to examine the linkage between the two has been nonempirical and anecdotal in nature [31]. Anderson and Fornell [2] suggest that the relationship between quality and satisfaction is not clear. Rust and Oliver [52] argue that customer satisfaction or dissatisfaction represents a "cognitive or affective reaction" that occurs as a response to a single or prolonged set of service encounters such as those with interfacing departments.

Satisfaction, therefore, develops when the consumer compares perceived quality with expected quality during these encounters. Service quality refers to an overall evaluation of a firm's service delivery system such as the interfacing departments [2], [45]. On the basis of empirical findings, Iacobucci et al. [31] conclude that service quality focuses on managerial delivery of the service while satisfaction related to how a customer experiences that service. Improvements in quality that do not respond to customer needs will not enhance customer satisfaction. In sum, experts in the service sector view service quality as one dimension that acts as an antecedent to satisfaction. Throughout this article, it is assumed that satisfaction and perceived quality are inextricably linked.

Zeithaml and Bitner [68] recommend that service quality must be seen in terms of process vs. technical outcomes. In the case of ocean shipping lines, the delivery of the material being shipped constitutes the technical outcome while the process outcome deals with responsiveness and effectiveness of the interfacing departments with the client. Because shippers may not be able to evaluate the technical quality of the shipping service (before it is delivered), they are likely to form judgments on the basis of the way the interfacing departments deal with them. Research has found that interpersonal experiences with the service provider may be even more important than the outcome in the satisfaction or perceived quality of the service [15], [34].

Improved service quality is likely to result in customer satisfaction [3], [11] as empirical evidence by Savidas and Baker-Prewitt [55] has verified. When customers experience a firm's service quality as favorable, the customer develops a stronger relationship with the company and vice versa [69]. Favorable assessment of service quality, therefore, will lead to favorable behavioral intentions and choice of this firm over others. Research indicates that those who experience favorable service quality are more likely to recommend the service to others [20], [21]. Other researchers argue that customer satisfaction with service quality leads to repurchase intentions, likelihood of recommending a service, loyalty, and profitability [2], [4], [10], [35], [43], [68], [69].

Several researchers have found that service quality inconsistencies can relate to poor integration and coordination in the firm [27], [38], [44], personnel issue dealing with selection, training, autonomy, empowerment and the reward structure [26], [38], [70], external communications [14], [26], [38], [44], and service delivery [14], [26], [38], [44], [70]. A common theme that unites all this research deals with the extent to which departments that interface with customers can deliver the quality of service required or demanded by the customer.

Service recovery, which deals with how the shipping firm is able to recover or give redress to mistakes it made, also is likely to affect satisfaction with the shipping lines. Substantial research has verified the importance of service recovery in maintaining loyalty and satisfaction [29]. When ocean freight shipping lines make errors in handling customer's accounts, it is crucial that they correct these mistakes promptly, effectively, and efficiently; otherwise customer dissatisfaction is likely. A positive handling of the problem is more likely to lead to a sustaining relationship while an inadequate or improper handling of the problem could lead to acrimony, negative word of mouth, and customer dissatisfaction [32]. Indeed, the literature emphasizes that service recovery methods are essential in maintaining customer loyalty and long-term commitments [22], [59], [60], [62]. Prompt, efficient, and effective correction of mistakes is also helpful in differentiating the firm from other firms who are less responsive to customer concerns or complaints. In this study, we look at the pattern of interfacing departments associated with satisfaction from service recovery.

2.4. The impact of service encounters on differentiation in physical distribution services

Designing a service delivery system requires careful attention to detail. It is crucial that the firm provide a service with features that differentiate it from the competition. The essence of differentiation of the service deals with customizing the service offering that is perceived as unique. The performance of interfacing departments contributes immensely to a firm's differentiation of its offering. If these departments perform or differentiate

their services in a way that is superior to competing firms, the firm may be viewed as superior. Ziethaml [66] reinforces this idea by discussing the concept of perceived quality vs. objective quality where perceived quality deals with the consumer's judgments about the superiority or excellence of the service.

Service differentiation also relates to ocean shipping in the number and quality of services offered. Some shipping lines have developed excellent reputations for the cutting-edge services they provide to customers including state-of-the-art use of information technology. Hence, shipping lines that can differentiate themselves in terms of the quality and reliability of their service offering develop a strong competitive edge over rival firms. Delivering a consistent level of service quality by the multiple interfaces also allows differentiation. Service must encompass a full spectrum of possibilities by which a service provider can contribute to a customer's business operations. The ultimate financial rationale for providing such services is to encourage the buyer to focus on other purchase criteria instead of just price. These other value elements can help to differentiate a service provider from others in the marketplace [17].

Marketing literature indicates that satisfaction with physical distribution service quality has a major impact in the selection of service providers in the industrial sector [6]. Yet, very little research has investigated the factors that affect perceptions of service quality in the delivery of physical distribution services. Research by Bienstock et al. [6] indicate that physical distribution service quality affects business profitability because of its association with general quality judgments and future purchase intentions. They recommend that other researchers use other contexts in business-to-business environments to investigate service quality. Empirical findings by Perreault and Russ [48] show that the quality of physical distribution was viewed as the second most important factor (product quality being the first) in influencing purchase decisions by industrial buyers. Interestingly, price was found to be less important than the level of physical distribution service quality.

Service differentiation is required to stand out from the competition. Offering superior service through various interfacing departments can do this. Customers' perceptions of these departments ultimately influence their overall perception of service and service satisfaction. Obviously, if the evaluation of interfacing departments are all favorable, then service satisfaction will also be very high. Unfortunately, it happens from time to time that service rendered by some of the interfacing departments is not up to the standard that customers expect. This will lead to lower overall service satisfaction. In such cases, superior service rendered by other departments may have a compensatory effect in that the overall service satisfaction may either be marginally affected or even enhanced. In this research, we study the impact of customers' evaluations of interfacing departments on service satisfaction and find out what combinations of interfacing departments' ratings enhance their satisfaction.

3. Method

3.1. The sample

The data were collected from shipping managers of various organizations in Singapore who regularly use the services of ocean freight shipping companies for their exporting requirements. Names of shipping managers in 985 key accounts were obtained from a large shipping company in Singapore. Some of the shippers on the list were customers of that shipping company while others were customers of competing shipping lines. From this list, 234 accounts were randomly selected; 222 of these agreed to participate in the study resulting in a 95% response rate. The main reason for the high response rate was the affiliation of one of the researchers with the National University of Singapore, an institute highly regarded by the respondents. The survey was personally administered to the respondents.

We chose the Port of Singapore since it is the world's busiest port in terms of shipping and cargo tonnage and the second busiest for container throughput. In 1999, it handled over 141,000 vessels, representing over 325,000,000 tons of cargo and 16,000,000 containers. In 2000, it handled over 17.1 million TEUs (20-ft

equivalent units of containers) while Hong Kong handled 18.1 TEUs. It operates six cargo terminals that serve as major gateways for products originating in Asia. The Singapore Strait is one of the world's busiest waterways used by international shipping. Due to its location, Singapore has become a center of multinational operations and a shipping hub with huge transshipment cargo for onward movement to many countries in the region including Australasia, China, and the Indian subcontinent. Because of its well-managed port operations and excellent infrastructure, Singapore has developed into one of the world's leading ports. Additional details on the importance of this port can be found at the Port of Singapore Authority website.

The shipping managers in the sample represented a variety of firms whose primary business was manufacturing, trading, or both. While some companies handled consumer products, others dealt with industrial products. Across the sample, the annual turnover ranged from less than \$10 million to over \$26 million (in Singaporean dollars). The annual freight expenses of these companies varied from less than \$25,000 to over \$100,000. Table 1 provides a description of the various shipping firms (i.e., clients) that constituted the survey sample.

Table 1. Sample characteristics

	Frequency	Percent
<i>Nature of business</i>		
Trading only	99	44.4
Manufacturing only	32	14.3
Both manufacturing and trading	53	23.8
Freight forwarding	37	16.6
Total	221	
<i>Main product line</i>		
Consumer products	69	30.9
Industrial products	44	19.7
Commodities	28	12.6
Combination of all three	43	19.3
Services	37	16.6
Total	221	
<i>Annual turnover (in Singaporean dollars)</i>		
Up to 10 million	101	45.3
10–25 million	54	24.2
26–50 million	25	11.2
51–100 million	16	7.2
Over 100 million	21	9.4
Total	217	
<i>Freight costs/year (in US\$)</i>		
Less than 10,000	17	7.6
Between 1000 and 24,999	33	14.8
Between 25,000 and 49,999	55	24.7
Between 50,000 and 99,999	43	19.3
Above 100,000	71	31.8
Total	219	

3.2. The measures used

In order to deliver efficient service to the customers, ocean freight shipping companies often divide their organization into a number of specialized departments or support services, each of which have an interface with the customers. A preliminary investigation and interviews with managers in freight companies identified seven such departments as detailed below. These seven interfacing departments can be found in all shipping lines since they provide essential services to external customers. Administrative departments such as HRM, legal, and office administration were excluded since these departments handle internal matters and do not interface with customers. The customers' perceptions of the shipping line's overall service quality and how it is differentiated from other shipping lines are determined considerably by their experiences with the support personnel of these interfacing departments.

Several scales were developed to measure customers' evaluations of the services provided by the interfacing departments of their most preferred shipping line on a 1 (*worst service*) to 7 (*excellent service*) scale. Because no standardized scales exist on measuring satisfaction with interfacing departments, it was necessary to construct valid scales. Extensive interviews with senior managers and department heads of the interfacing departments were conducted to identify the specific services that each department provides to customers. From these interviews, the key service functions of each interfacing department were specified. When each scale was tested for reliability using coefficient alpha, all scales exceeded .70, which is considered sufficient for reliability purposes [42]. The list below outlines the names of those seven departments, the number of scale items to measure the service of each department (in parentheses), and examples of scale items:

1. *sales and marketing* (eight items) (e.g., personalized service, product/route knowledge, help in unforeseen situations),
2. *booking services* (eight items) (e.g., availability of space, advice on delays, handling of sailing inquiries),
3. *documentation* (six items) (e.g., speedy release of delivery orders, speedy release of bills of lading),
4. *telephone services* (five items) (e.g., giving needed information, promptness in answering, courtesy/etiquette),
5. *operations* (seven items) (e.g., container type availability, condition of container, availability of space at warehouse),
6. *personal visits* (nine items) (e.g., to the shipping line office, giving needed information, prompt attention, sensitivity to customers, waiting time),
7. *claims* (three items) (e.g., fairness, speedy action, simple and convenient claims procedure).

To measure service recovery, three dimensions were measured with seven-point Likert type scales as follows: *problem handling* (two items) (i.e., informs promptly of any problems, and explains problems/difficulties), *complaint handling* (three items) (i.e., efficient in complaint handling, settles disputes quickly, settles claims fairly and quickly), and *satisfaction with claims handling* (three items). The questionnaire also measured subjects' overall satisfaction with their most preferred shipping line's service on a scale from 1 (*extremely poor*) to 7 (*excellent*).

3.3. Analysis method

We used decision tree analysis as the analytic technique to explore whether service evaluations of interfacing departments have an impact on overall service satisfaction and, if so, whether there is a sequencing or combination of interfacing department that maximizes service satisfaction. Decision tree-based techniques are also suitable for identifying nonlinear relationships and interactions among predictor variables, which in this case, are the service evaluations of interfacing departments. Decision tree analysis was used in this study because of the many advantages it offers in terms of ease of use, interpretation, handling of missing data, robustness to outliers and measurement errors, and graphical display of results (cf. [41], [47], [65]). Hence,

decision tree analysis offers a powerful approach in looking at the “big picture” in terms of how the seven interfacing departments affect satisfaction collectively.

Among the decision tree-based techniques, CHAID (chi-squared automatic interaction detector) [8], [36] and CART (classification and regression trees) [7] have been widely applied in segmentation, stratification, and interaction identification studies in the areas of direct mail, credit scoring, human resources, market analysis, and health care [53], [54], [64]. Recent studies have found that both techniques provide similar set of results [30]. In this study, we used the CHAID technique, as it is demonstrated to be the most visually understandable and suitable for marketing research applications (cf. Ref. [18]). A review of the literature found no other examples where decision tree analysis has been used in such an application of examining internal departments.

4. Results

4.1. Analysis of the evaluation of interfacing departments by service satisfaction

As a first step, we examined the properties of various multi-item scales. The scales, which measured interfacing departments' service evaluations, demonstrate high reliability levels, ranging from .91 to .95 [42]. The interfacing departments' service evaluations exhibited significant correlations ($P < .05$) with overall service satisfaction. These correlations are as follows: booking services (.63), operations (.67), documentation (.69), telephone service (.64), sales/marketing reps (.68), personal visits (.63), and claims (.37). In sum, ratings of the interfacing departments are considered as appropriate measures of the perceptions of service rendered by the interfacing departments. These ratings, in turn, are related to overall service satisfaction.

Next, for each interfacing department, we added the responses to individual scale items to form a composite index. For example, the composite index for the booking services department was obtained by summing responses to each of the eight scale items that focused on this department. Using the mean value of this composite score, the sample was divided into those shipping firms (i.e., clients) who had a favorable service perception or opinion of booking services (i.e., scores are above the scale mean), those that had an unfavorable service perception of booking services (i.e., scores are below the mean), and those that had no opinion (i.e., nonresponse). Similarly, based on the mean values of the composite indices for operations, documentation, telephone services, sales/marketing reps, and claims, shipping firms were divided into favorable, unfavorable, and no opinion groups. These seven dichotomized factors were then used as classification variables, with service satisfaction serving as the target variable. The decision tree analysis was performed as the last step to determine whether there is a combination or hierarchy of interfacing department ratings that maximizes overall service satisfaction. In essence, this analysis allows for identification of the combination of interfacing departments leading to service satisfaction.

Results of the decision tree analysis are shown in Fig. 1. As shown in this figure, the overall mean service satisfaction score is 5.91 where a score of 7 represents highest overall satisfaction. This implies that shipping firms (i.e., clients), on the average, have a favorable overall service satisfaction with ocean freight shipping lines. Since the mean rating is for preferred shipping lines, it is not surprising to notice a relatively high overall mean rating. This information is contained in the so-called root node of the tree.

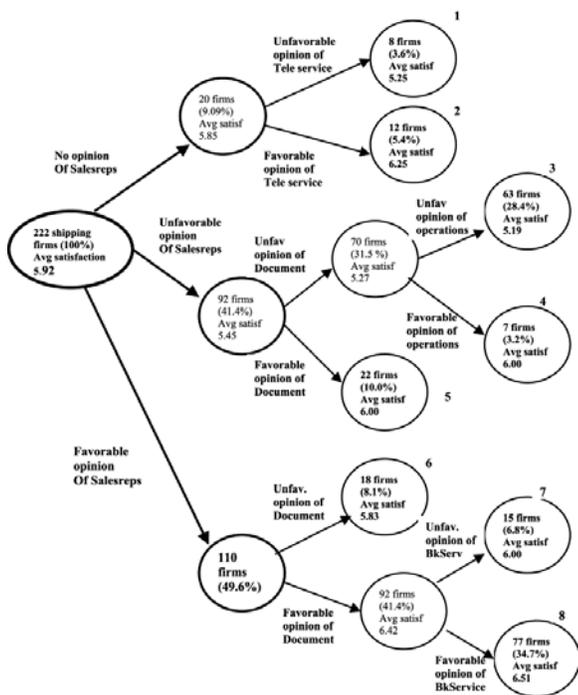


Fig. 1. Tree analysis of service satisfaction by perceptions of interfacing departments.

The decision tree technique then computed, interfacing department's service rating, is the best predictor of overall satisfaction. Since the response variable (i.e., overall satisfaction) is continuous but the predictor variables (i.e., interfacing departments' ratings) are categorical, the best predictor is one that has the strongest impact on overall satisfaction as measured by the F statistic and the associated P value. Among the predictors, ratings of marketing/sales representatives had the strongest impact on overall satisfaction ($F=41.10$, $P=.00$; for the other predictors, the F values were all significant, ranging from 31.8 to 38.3). It is likely that the marketing/sales representatives had the highest impact due to their pivotal function in providing the services. The sales representative oftentimes has the closest contact with the customer. If the customers have a general question or need assistance that they feel they are not getting from other interfacing departments, they are more likely to contact the sales person who may have initiated the contract. The marketing/sales function is the only interfacing department that performs a boundary spanning function by visiting customers while also being involved in the inside operations of the firm.

The root node was then divided into various branches based on the respondents' rating of sales/marketing representatives of the ocean freight line. Fig. 1 can be interpreted as follows. Of the 216 shipping firms in the analysis, 110 firms (51% of the sample) can be classified as having a favorable opinion of sales reps. The mean overall service satisfaction for firms in this group (or node) is 6.33, which is above the overall mean score of 5.92. The mean overall satisfaction score for the firms that have an unfavorable opinion of marketing/sales representatives is only 5.45 (as shown in the root node), which is below the mean. Fourteen firms, representing 6.5% of the respondents, had no opinion about the sales/marketing representatives of the ocean freight shipping line. For this group the mean overall satisfaction is 5.64.

At the second level of analysis, the technique identified the documentation department as the best predictor for two of the three nodes at the first level (i.e., favorable vs. unfavorable opinion groups). For the firms in the unfavorable and favorable opinion nodes for the sales/marketing representatives, firms giving a favorable rating to the documentation department provided higher F overall mean service satisfaction scores of 6.00 and 6.42, both of which are greater than the overall sample mean of 5.91. This demonstrates, for example, that even if

some of the shipping managers rated the sales/marketing representatives as unfavorable, their perception of service satisfaction (6.0) increases above the overall sample mean of 5.9 if they still rated the document department favorably.

For the node representing no opinion of sales people, the interfacing department having the strongest impact on service satisfaction is telephone services. On the basis of perceptions toward telephone services, this node unfolded into two terminal nodes. One of them is the unfavorable or no opinion of telephone services node. This node is labeled as terminal node 1, which has a mean overall satisfaction of 5.22. This score is in sharp contrast to terminal node 2, representing respondents with a favorable rating of telephone service. For this node, the mean overall satisfaction score is 6.4, which is well above the average satisfaction score of 5.92 for the sample.

At the third level of analysis, depending on the node, the best predictor is either the operations department rating or booking services department rating. For those firms that belonged to terminal node 4 and held favorable opinions of operations department, the mean overall satisfaction improved to 6.0 as compared to the mean satisfaction score of 5.27 for its parent node. Likewise, those firms that belonged to terminal node 8 provided a mean overall satisfaction of ocean freight shipping lines of 6.51. This score is higher than the mean satisfaction score of its parent node of 6.42. Firms belonging to this group have favorable opinions of both marketing/sales and the documentation department.

In sum, the decision tree analysis divided the root node comprising the entire sample into several branches (nodes) and leaves (terminal nodes), displaying a pattern of which departments are linked in terms of service satisfaction. There are eight terminal nodes. An examination of these terminal nodes reveals that the mean service satisfaction is higher whenever the ratings of interfacing departments are favorable. The highest mean overall service satisfaction occurs in node 8 where the firms had favorable opinions of sales people, documentation, and booking services. In contrast, the lowest mean overall service satisfaction occurs in node 3 where the firms had unfavorable opinion of sales reps, documentation, and operations.

Table 2 shows the relative gain or loss in service satisfaction in various nodes as compared to the root node of the tree. For example, firms that belonged to node 3 provided the lowest mean overall service satisfaction score of 5.19. As compared to the overall mean score for the entire sample (5.92), this represents a loss in service satisfaction of 12.14%. Therefore, the index of gain/loss percent for this group is 87.86, as compared to the index for the root node of 100. As one would expect, the mean overall satisfaction for those firms in node 8 that provided favorable evaluations of sales reps, documentation, and booking services improved to 6.51, indicating a gain of 10.14%. The gain/loss index for this group is 110.14. By examining the various statistics provided in Fig. 1 and Table 2, it is clear that the various combinations of interfacing department perceptions representing terminal nodes 2, 4, 5, 7, and 8 increase overall service satisfaction. On the other hand, the combination of interfacing department perceptions representing terminal nodes 1, 3, and 6 decrease overall service satisfaction.

Table 2. Analysis of service satisfaction by perceptions toward interfacing departments

Decision tree node	Node description	Number of firms	Percentage of total firms in the node	Average service satisfaction	Index of percent gain compared to root node
1	No opinion of salespeople and an unfavorable opinion of telephone service	8	3.6	5.25	88.70
2	No opinion of salespeople and a favorable opinion of telephone service	12	5.4	6.25	105.59
3	Unfavorable opinion of salespeople, unfavorable opinion of documentation department, and unfavorable opinion of operations department	63	28.4	5.19	87.69
4	Unfavorable opinion of salespeople, unfavorable opinion of documentation department, and favorable opinion of operations department	7	3.2	6.00	101.37
5	Unfavorable opinion of salespeople and favorable opinion of documentation department	22	10.0	6.00	101.37
6	Favorable opinion of salespeople and unfavorable opinion of documentation department	18	8.1	5.83	98.6
7	Favorable opinion of salespeople, favorable opinion of documentation department and unfavorable opinion of booking services	15	6.8	6.00	101.37
8	Favorable opinion of salespeople, favorable opinion of documentation department, and favorable opinion of booking services	77	34.7	6.51	109.93
Root		222	100	5.92	100

Computations from the decision tree analysis did not identify any other interfacing department ratings as the basis for creating tree branches. This is not to say that ratings of those departments do not have any impact on overall service satisfaction. In fact, all interfacing department ratings had significant correlations with overall service satisfaction. However, the technique determines whether the node at any level can be branched or divided further by examining the *F* statistics and associated *P* values. The best predictor for a node is one that has the strongest impact on service satisfaction (i.e., highest *F* value and lowest *P* value) for the firms that comprise the node. On this basis, the interfacing departments of sales people, documentation, operations, and booking services were the only ones connected in a network arrangement to maximize satisfaction.

4.2. Analysis of the evaluation of service recovery dimensions by service satisfaction

The scales used to measure problem handling and complaint handling also exhibited relatively high reliability levels with coefficient alpha ranging from .82 to .92. Both of these scales had significant ($P < .05$) correlation with overall service satisfaction. The problem handling—service satisfaction correlation was .43 and the complaint handling—service satisfaction correlation was .33. The scale that measured claims handling also was found to be reliable with a coefficient alpha score of .95. Its correlation with overall service satisfaction was .37 ($P < .05$).

Composite indices were developed for problem handling, complaint handling, and claims handling by summing the responses to individual scale items. For each scale, the mean value of the index was used to divide the sample into favorable opinion, unfavorable opinion, or no opinion groups. The three dichotomized factors of problem handling, complaint handling, and claim handling were then employed as classification variables, whereas overall service satisfaction served as the response or target variable. The data were then analyzed using the decision tree technique. The results are presented in Fig. 2 and Table 3.

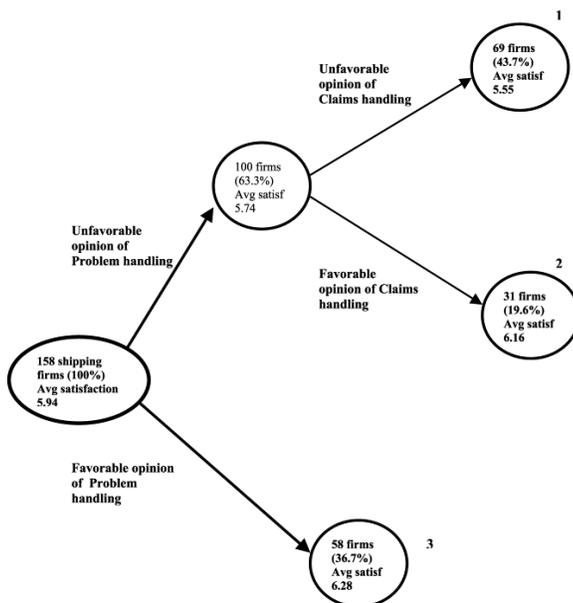


Fig. 2. Decision tree analysis of service satisfaction by perceptions of problem and claim handling.

Table 3. Analysis of overall satisfaction by opinions toward problem and claim handling

Decision tree node	Node description	Number of sampled firms in the node	Percentage of total firms in the node	Average service satisfaction	Index of percent gain as compared to the root node
1	Unfavorable opinion of problem handling and unfavorable opinion of claims handling	69	43.7	5.55	93.50
2	Unfavorable opinion of problem handling and favorable opinion of claims handling	31	19.6	6.16	103.78
3	Favorable opinion of problem handling	58	36.7	6.28	105.71
Root		158	100	5.94	100

As shown in Fig. 2, the root node of the tree indicates the overall sample size of 158 firms whose mean overall service satisfaction score is 5.98 where a score of 7 indicates highest overall satisfaction. The predictor that has the strongest relationship with overall service satisfaction is problem handling. Hence, the root node was divided into two branches based on whether the sample firms had favorable or unfavorable opinions of problem handling by their preferred ocean freight lines. Those with a favorable opinion represent 36.7% of the sample and their overall mean service satisfaction are 6.28 as indicated by terminal node 3.

The group with the unfavorable problem handling perception has a mean service satisfaction score of 5.74. At the second level of analysis, it was possible to further divide this node based on perceptions toward claims handling, the best predictor of service satisfaction for this node. Under this scenario, those who have favorable opinions of claims handling (19.6% of the overall sample) exhibit a mean overall satisfaction score of 6.16, which is above the average for the entire sample.

In summary, there is also a pattern of departments that maximizes overall service satisfaction for service recovery activities. Based on Fig. 2 and Table 3, the overall mean service satisfaction increases by a maximum of 5.71% for those who hold a favorable opinion of problem handling. For the firms that hold an unfavorable opinion of problem handling, service satisfaction increases by 3.78% only if the firms have a favorable opinion of claims handling. However, for the firms that hold unfavorable opinions of both problem handling and claims handling, overall mean service satisfaction decreases by 6.5% as compared to the entire sample. The results, then, indicate ways by which a firm can enhance the overall service satisfaction based on improving customer perceptions of service recovery factors.

5. Discussion and implications

Ocean freight shipping companies are an integral link in supply chains since they deliver raw material to manufacturers and finished or value-added goods to other members of the chain. For any shipping firm to remain part of the chain, it is essential for the firm to provide high-quality service in handling customer requirements, leading to high overall customer satisfaction. This service is delivered by interfacing departments in a series of encounters with customers, which has an impact on satisfaction. Employing decision tree analysis, a tool that is becoming popular in the field of customer relationship management, this study examined the relative impact of various departments on service satisfaction and what combination of those departments resulted in the highest overall service satisfaction.

Evaluations of interfacing departments were found to be significantly correlated with overall service satisfaction. The decision tree analysis clearly shows that favorable perceptions of service by interfacing departments lead to an overall favorable service satisfaction score. However, not all interfacing departments contribute equally to increasing service satisfaction. Among the seven interfacing departments, only sales, documentation, booking services, and operations have a significant impact. The decision tree also showed which combination of interfacing departments increased satisfaction with service. Maximum service satisfaction is achieved when service perceptions are favorable for sales, documentation, and booking services. Overall, service satisfaction can also be improved when customers have favorable perceptions of the operations department's service, even when faced with unfavorable perceptions of sales and documentation departments. Clearly, some interfacing departments seem to play a bigger role in satisfaction than others. Hence, a definite pattern of interfacing departments' service perceptions leads to highest satisfaction. Further research should investigate the extent to which this pattern may be related to cultural elements in a country or organization [39]. Johnston [33] contends that the identification of the determinants of service quality or satisfaction is a central concern for service management since it is necessary to specify, measure, control, and improve customer perceived service quality.

By studying this pattern, shipping companies can determine what interfacing departments to focus on for improving customer service in order to improve overall service satisfaction, while maintaining (as opposed to neglecting) the level of service offered by the other departments. Similarly, analysis of the impact of service recovery dimensions shows that overall service satisfaction can be maximized when customers have a favorable opinion of the way the ocean freight shipping firm handles problems. This is based on the assumption that the shipping firm maintains current service levels for handling claims and complaints. Shipping lines may wish to audit their interfacing departments to see if they are sensitive to the needs of the customer [25]. This audit can identify more specifically the nature of the customer dissatisfaction issues in each of the interfacing departments. Satisfaction can foster loyalty given that it is a prerequisite for sustaining a favorable attitude and for recommending and reusing the service provider. It is important that firms recognize that interfacing departments may not all play an equal role on satisfying customers.

The performance of the interfacing departments in delivering service activities ultimately results in either satisfied or dissatisfied customers. The intangibility of the shipping services becomes tangible by the action of the interfacing departments. Yet, intangibility presents several marketing challenges. Shapiro et al. [57] argue that visually drawing the order management cycle to identify how a customer's order is executed can help identify bottlenecks and conflicts in the delivery of the service. They believe that many firms fail to coordinate various functions and departments throughout the order management cycle because there is no "organizational setup for listening and responding to people at all levels" (p. 121). In effect, when multiple interfacing departments are involved it is crucial that the firm develop a "systems" view of how the various departments function as a collectivity. Mintzberg and Van der Heyden [40] also suggest using a process called "organigraphs" to map out or draw how a company really works. Decision tree analysis can help to identify how various departments seem to "fit together" as a combination in affecting customer satisfaction and assess which pattern of interfacing departments leads to maximum service satisfaction.

To help identify how the interfacing departments are functioning, several tools are available such as critical incident technique, blueprinting, quality function deployment (QFD), service quality information system, and Sequence-Oriented Problem Identification (SOPA). The critical incident technique is a methodology that can be used to collect and analyze especially satisfying or dissatisfying service encounters at the interfacing department level. This technique can be especially useful for identifying opportunities for improving the service delivery by interfacing departments. Service blueprinting is designed to flowchart the key activities involved in service delivery and the linkages between these activities. Service blueprints, therefore, can help to clarify the interactions between the interfacing departments and customers and can assist in exposing failure points in the service delivery process.

Zeithaml and Bittner [68] recommend using QFD as an approach to examine every stage of the service delivery system to identify areas that can be improved. This method examines three distinct sections in the firm: customer quality criteria, service company facets, and the relationship grid in terms of how the two are related. This method can be used to determine what the customer regards as quality service from each interfacing department and the extent to which each interfacing department is equipped to deliver the concomitant quality level. Botschen et al. [13] recommend using a process called SOPI to understand service encounters better. This process uses "blueprinting" to map out the sequence of steps that makeup a service encounter and then asks customers to evaluate each step they experience in the service encounter process. The SOPI method can be used to gain deep insight into customer assessments of service encounters from each department. Given the results of our study, SOPI could be used to understand why some customers are less satisfied with some interfacing departments and how other departments seem to compensate for this dissatisfaction. All these information can be used as input into a service quality information system, which can be used to collect, classify, and share service issues as recommended by Tax and Brown [62].

The methods discussed above can assist managers to understanding the service performance of each interfacing department. This understanding then can guide marketing managers on how to prioritize activities to differentiate their service offering. Since marketing budgets are limited, the marketing manager needs to allocate resources strategically. Shipping lines may wish to reengineer some processes such as documentation to raise the level of customer satisfaction. This might involve eliminating old methods that are more prone to problems or giving personnel more latitude to serve customers more effectively. Perhaps, sloppy data entry, omitted data, or improper codes may be hurting the operation of the documentation function. A firm's information technology has also an important role to play for integrating the many steps performed by the interfacing departments. Direct computer links with customers and integrated information systems can allow for a closer understanding of customer satisfaction. Advances in technology, particularly use of the Internet, can also be used to allow customers to be more informed about the many activities being performed. The Global Transportation Network, for example, will allow customers to book ocean freight, prepare documentation, track shipments, and check schedules; thereby replacing manual, paper-based processes that were traditionally performed by interfacing departments [51].

To organize the interfacing departments to better serve customers, processes may have to be changed. The chairman of Allied Signal, Larry Bossidy, said, "Despite what you read in the books, it's easier to change culture, attitudes and people than it is to change process....We have a long way to go in terms of understanding our customers....What worries me most is whether we will be able to satisfy an ever-more-demanding customer" [63].

Since the quality of employees affects how well service is provided, shipping lines must devote special care to selecting, training, and motivating those employees in departments that interface with customers. Employees need to be knowledgeable about the services they provide and have the requisite interpersonal skills to interact compatibly with customers. Investing in personal development and training that produces superior service quality may differentiate the firm from others and create a competitive advantage that is difficult to replicate. Firms that are leaders in their industries have reputations for the quality of their training programs. Internal marketing is also very important. If the interfacing departments are to deliver on promises, they need the skills, abilities, tools, and motivation to deliver—they must be empowered.

The decision tree calculus employed in this article provides a holistic way to examine the incremental influence of the activities of interfacing departments on service satisfaction and identify the weak links in the process. As customers become more demanding of those who provide logistical support in their supply chain, this concern is likely to become paramount in the future. Because each client may have different needs, each may experience the delivery of the service in varying ways. The employees in the interfacing departments who deliver the service are the service to the customer. The heterogeneity among the customers creates a situation where each may have unique demands or experience the service in different ways. Hence, because shipping services are heterogeneous across many different customers, ensuring consistent service quality is challenging. Quality service may depend on the ability and willingness of interfacing departments to satisfy clients' needs. Ultimately, the way service is delivered and differentiated may depend on the performance of the interfacing departments acting in concert.

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