

K-C Model of Three Customer-Contact Dimensions:
An Exploratory Hospital Field Test

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Abstract

This paper presents the results of an exploratory empirical field test of the K-C Model of customer contact (Kellogg, 1991; Kellogg & Chase, 1995) in a hospital setting. Seventy service workers in seven departments of a regional hospital were surveyed regarding the elements of the K-C Model based on their perceptions of a "typical" service encounter with a customer/patient. Service worker SCORE results ranged roughly equivalent to the Contact Scores used by Kellogg (1991). Both the process and the results raise important questions concerning each element of the K-C Model which are discussed. Implications for future research and practice are examined.

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Introduction

The design of the service encounter to deliver high levels of customer satisfaction and quality is a major issue facing service organizations today. Understanding the dimensions of service delivery design, of course, is a prerequisite to good design. Among these dimensions is the extent of customer involvement in the service delivery system. Kellogg and Chase (1995) have empirically identified elements of one underlying relationship between server and customer in a hospital setting that has come to be known as the customer-contact dimension. Soteriou and Chase (1998) drew on some of these elements to create a conceptual model, which they used to link the customer-contact dimension with perceived customer service quality in a hotel environment.

This paper examines the model developed by Kellogg and Chase (1995) to begin development of a new survey instrument that seeks to operationalize the model for use in any service setting. The paper begins with a brief review of the relevant literature. Then, an examination and critique of selected portions of the model are presented. This is followed by presentation of a survey instrument that is tested in a field setting in a hospital environment. The results of this exploratory study are presented along with discussion and implications for future research.

Background

Efforts to classify service operations date from the late 1970s and extended through the 1980s. Writers addressed two unique features of services: intangibility of the service "product"

and customer involvement in its delivery (e.g., Chase, 1978; Thomas, 1978). Chase (1978), in particular, called attention to the differences between face-to-face customer-contact in the "front-office" and the buffered core "back-office" operations in service facilities where customers had very little or no contact with services workers. Chase (1981) also suggested that potential facility efficiency be negatively related to the ratio of customer-contact time to service creation time. Others, such as Schemenner (1986), were concerned that degree of customer-contact only does not sufficiently capture the challenges involved in service operations management. He proposed, for example, that the dimensions of "degree of labour intensity" and "degree of interaction and customization" be used. Other classifications have also been suggested. Lovelock (1983), for instance, presented five two-by-two classification tables that contrasted pairs of dimensions such as direct recipient of the service (people versus things) with the nature of the service act (tangible versus intangible actions). Shostack (1987) classified service structures according to their degree of complexity and divergence. Wemmerlov (1990) proposed a taxonomy of service processes that included both degree of contact and complexity and divergence. Swanson and Davis (2003) examined the relationship between perceived service quality and behavioral intention. Goldstein (2003) examined service strategy in a high-contact service environment and found that service encounter management was a critical component. Sivabrovnvatana et al. (2005) explored the relationship between technology and quality management for enhancing hospital service quality. Flanagan, Johnston, and Talbot (2005) sought a better understanding of the concept of confidence in the service relationship. Jambulingam, Kathuria, and Doucette (2005) extended the customer contact dimensions to include entrepreneurial orientation. Gwinner, Bitner, Brown and Kumar (2005) found that the responsibility for customization of services falls on the frontline customer contact employee. They tested two distinct dimensions of employee adaptive behavior:

interpersonal adaptive behavior and service-offering adaptive behavior.

The customer-contact dimensions, then, continue to be examined and implemented in many areas of service operations management. Early research efforts on the customer-contact dimension (e.g., Chase, 1978; Chase & Tansik, 1983; Tansik & Chase, 1988) of service systems have been well accepted conceptually but have received limited empirical testing attention. Chase and Tansik (1983), for example, initially suggested a three by three matrix to measure customer induced uncertainty that suggested a range of scores for customer-contact from three to nine. Kellogg (1991) and Kellogg and Chase (1995) demonstrated that the degree of customer-contact in a service environment is an important contextual variable and called for further study. These studies derived an empirically based measurement model which I have designated the K-C Model (with the consent of the authors of the studies, in personal communications).

The K-C Model

Kellogg (1991) and Kellogg & Chase (1995) sought to empirically derive a measurement model for customer-contact so that many fundamental issues confronting services management could be studied rigorously. The model was created by applying two psychometric scaling techniques (multidimensional scaling and the method of paired comparisons) and content analysis to the ratings and responses of service research experts. The stimuli considered by the service research experts were 13 actual service episodes video taped in a single hospital facility. The episodes were chosen based on theoretical considerations directed toward providing the most representative episodes for model creation using 27 contextual variables.

The 33 service research experts were asked to rank the episodes based on how similar they were in terms of contact to obtain the input data for the multidimensional scaling. They were

also asked an open-ended question about what criteria they used when making their assessments. These responses were subjected to content analysis. Finally, the experts were asked a series of questions in the form: Which episode has more contact, a or b? A frequency matrix of the number of times one episode was selected over another was constructed from this data using paired comparison procedures.

Table 1. Contact Scale Scores

<u>Job Title</u>	<u>Score</u>
Dietary Workers	0.00
Unit Clerk	1.19
Gift Store Clerk	1.46
CT Tech	1.65
Housekeeper	2.13
Nurse Educator	2.23
Admissions Clerk	2.37
Nurse Aide	3.11
Billing Clerk	3.28
Licensed Vocational Nurse	3.62
Occupational Therapist	4.65
Home Health Worker	4.73
Registered Nurse	5.10

Source: Kellogg and Chase, 1994

The output of the paired comparisons reflected scale values for all episodes which provided a measure of the amount of contact for each episode, resulting in a one dimensional interval scale of contact. These contact scale scores for the 13 episodes, which each represented different job titles, are displayed in Table 1, ranging from 0.00 to 5.10.

Results of the multidimensional scaling and content analysis were compared to theory based propositions. This process identified the three measurable elements that survived the statistical analysis to explain 82% of the variability in the model derived. The three elements,

discussed in more detail below, were communication time (COMM), a measure of information richness (INFORICH), and an intimacy measure (INTIM). The measurement model thus derived, then, was:

$$\text{Contact Scale Score} = 0.317 \text{ COMM} + 0.375 \text{ INFORICH} + 0.380 \text{ INTIM} \quad (1)$$

Three elements are included in the K-C model as initially developed by Kellogg (1991). Time spent in communications between the service worker and the customer/patient in the service encounter (measured in seconds) is the first element. Time of the encounter was conceptualized in the original customer contact model (Chase & Tansik, 1983) as a key ingredient. Time is an absolute measure and represents some active behavior of the service worker and/or the customer/patient. Communications time alone captured 71% of the variability that the service experts felt differentiated one episode from another on a magnitude dimension (Kellogg & Chase, 1995).

The second element is information richness (Daft & Lengel, 1984); a concept that addresses the value of the service exchange that is not correlated with time (Kellogg & Chase, 1995). Information richness is a complex measure including feedback (the speed at which feedback between service worker and customer is received: 1. very slow (days), 2. slow (hours), 3. fast (minutes), 4. immediate), the communication channel (1. limited visual, 2. audio, 3. visual and audio), the source of communication (was the major theme of the interaction 1. personal or 2. impersonal) and the language used (1. numeric, 2. natural, 3. body, natural). Kellogg (1991) suggests that the information richness concept parallels an early customer contact example of face-to-face, telephone, and mail communication. Face-to-face is high in feedback, uses visual

and audio communications channels, is personal and has the advantage of including the full natural range of body language. In contrast, mail communication has very slow feedback, only limited visual usage, is impersonal and uses only written (numeric) language. Telephone communication falls in the middle with immediate feedback, only audio, may be either personal or impersonal, and generally natural in language.

This leads to the third element of the measurement model which is intimacy. Intimacy provides a qualitative assessment of the service encounter and is something that is beyond mere humanistic behavior (Kellogg, 1991). Intimacy in the study was defined as mutual confiding and trust as measured by a 5 point Likert scale with anchors “no intimacy” and “the highest degree of intimacy.”

The K-C Model combines the three elements by use of the following formula:

$$\text{Score} = 0.317 \text{ COMM} + 0.375 \text{ INFORICH} + 0.380 \text{ INTIM}, \quad (1)$$

where, COMM is the time of communication, in seconds;

INFORICH is the standardized average of FEEDBACK, CHANNEL, SOURCE, and LANG (see definitions, below); and ,

INTIM is intimacy defined as mutual confiding and trust as measured on a five point Likert Scale anchored by 1 = no intimacy and 5 = the highest degree of intimacy.

The resulting contact scores ranged from 0.00 to 5.10 (See Table 1).

Critique of the K-C Model

The K-C Model of customer-contact was derived from a complex statistical analysis of a

set of responses to questions provided to a group of service experts viewing short video segments of service workers in a variety of hospital settings. This analysis revealed that three sets of variables were most statistically significant as well as being intuitively appealing based on the earlier conceptualizations of the customer-contact model. Thus, the K-C Model contains the three factors of Time, Information Richness, and Intimacy, with a derived weighting of the factors. Note from the very beginning that the Time factor accounts for 71 percent of the variance in the model (Kellogg & Chase, 1995). Therefore, the first challenge in operationalizing the K-C Model was to develop a Time factor measure that would be "faithful" to the model but would also be meaningful in a field study environment.

The research design for the exploratory field study included using a questionnaire to ask service workers in an actual hospital setting a series of questions about their degree of contact with the patients they served daily. Service workers would be selected from as many of the same job classifications used in the Kellogg-Chase studies as possible. Based on results of pilot-test subjects, it was determined that a categorical time dimension would be simpler and more meaningful for the service worker to deal with on a questionnaire in this first exploratory field study. It was a calculated risk whether or not the results would be reasonably comparable to the results of the original study. One error that was clearly made in setting the time categories was the failure to consider the possibility of zero as a time dimension. The inappropriate assumption was made by the authors that all service workers would have "some" customer contact. That, of course, was not the case, as noted in the Discussion section, below.

The Information Richness factor of the K-C Model has a solid theoretical foundation and is intuitively appealing because of the relationships Kellogg (1991) points out (as noted above) to the earlier conceptualizations of the customer-contact model. The original wording of the K-C

Model was retained for the survey instrument.

The Intimacy factor, especially for a hospital setting, was intuitively appealing and was used in this exploratory study exactly as it was measured in the original study.

The intent of conducting this first exploratory field test of the K-C Model was to determine whether a good approximation of the theoretical, empirically-derived model could be achieved in the dynamic setting of a real, operating hospital, in real-time, using a survey questionnaire format to record the perceptions of actual service workers (not service experts) from a number of different departments throughout the hospital. To do this required a number of "compromises" from the original model. For example, the measure of time is by categories for this new survey instrument. Because of the variations such as this, it was decided to continue to use the weightings of the factors in the K-C Model directly from the model, for this first exploratory field test. The results obtained should suggest whether the changes were justified or not and what other methods and procedures might be utilized in future research studies.

Survey Instrument

The survey instrument used in the study reported here was developed through a series of pilot tests in several service settings. The six questions included in the survey instrument were preceded by the following directions: "Answer the following questions based on the typical contact you have with your customer (clients/patients/patrons) in the normal conduct of your current job (circle the best answer)."

The first question measures the COMM, using nine response options:

"1. Your best estimate of communication time:

less than 5 seconds 5 to 15 seconds 16 to 30 seconds

5. Describe the major theme of the interaction with the customer, i.e., is the topic mainly: impersonal or personal.

6. Describe the language used in the interaction. Is it primarily:

numeric natural spoken words combination of body language and spoken words”

The answers to the questions were coded, 1 to 4, 1 to 3, 1 to 2, and 1 to 3, respectively.

These four numbers were averaged numerically and used as INFORICH.

The three numbers thus derived from the questionnaire were inserted in formula (1) and the customer-contact score calculated for this round of testing.

The Exploratory Hospital Field Test

Data for the current study were collected in a regional hospital (as a part of a larger study of a variety of service organizations) in a medium-sized midwestern USA community. The customer-contact questionnaire was one page of a four-page questionnaire administered by the author or a designated graduate assistant (or both). The questionnaires were administered in the context of regularly scheduled staff meetings of each of the respective departments at the hospital. Average administration time was fifteen minutes.

Seventy workers in seven departments in the hospital were included in this study (see Table 2). The number of individual workers in each department ranged from 6 to 12. Each worker was asked to complete the form based on his or her best perception of a “typical” encounter with a customer/patient.

Results

Tables 2 and 3 summarize the results of the analysis of the responses from the one hundred six participants by department. Table 2 lists the SCORE calculated for each participant

in each department in accordance with formula (1) above, which range from 0.49 to 5.00.

Table 2. SCORE by Individual by Department

Dept No.*	<u>250</u>	<u>310</u>	<u>620</u>	<u>650</u>	<u>820</u>	<u>880</u>	<u>890</u>
	2.53	0.49	0.95	1.11	1.43	2.36	0.27
	2.66	0.63	1.26	1.89	2.19	3.37	1.21
	2.73	0.96	1.26	2.56	2.29	3.70	2.15
	3.20	3.02	2.47	2.89	2.40	4.04	2.33
	3.20	3.08	2.77	3.00	2.43	4.26	3.15
	3.53	3.08	2.99	3.11	2.52	4.60	3.21
	3.74	3.16	3.47	3.56	2.74		3.48
	3.76	3.42	3.83	3.56	3.07		3.48
	3.87	3.49		3.66	3.19		3.76
	4.07			3.66	3.29		3.88
	4.20			4.33	3.83		4.09
	4.40			5.00	4.95		

*Department names and numbers:

- 250 – Emergency Services
- 310 – Health Info Systems
- 620 – Pharmacy
- 650 – Physical Therapy
- 820 – Medical/Surgical Nursing
- 880 – Social Services
- 890 – Surgery

In Table 3, the departments are listed in order by the mean of the SCORE calculated for each individual in each department along with standard deviation, minimum score, maximum score, and number of participants for that department.

Table 3. SCORE by Department

<u>Department</u>	<u>Mean</u>	<u>Std Dev</u>	<u>Min</u>	<u>Max</u>	<u>N</u>
Health Info Systems	2.37	1.27	0.49	3.42	9
Pharmacy	2.38	1.09	0.95	3.83	8
Surgery	2.82	1.21	0.27	4.09	11
Medical/Surgical Nursing	2.86	.90	1.43	4.95	12
Physical Therapy	3.19	1.04	1.11	5.00	12
Emergency Services	3.50	.63	2.53	4.40	12
Social Services	3.72	.79	2.36	4.60	<u>6</u>
Total					70

Departmental means ranged from 2.37 to 3.72, with the individual calculated SCORE ranging from 0.49 to 5.00.

Service workers in six of the seven departments are roughly equivalent to the categories of Contact Scale Score used by Kellogg (1991) as shown on Table 1 (see Table 4 for a comparison). The department without an equivalent score is Emergency Services.

Table 4. SCORE Compared to Contact Scale Score by Department

<u>Department</u>	<u>Mean</u>	<u>CSS</u>	<u>Dept No.</u>
Health Info Systems	2.37	3.28	310
Pharmacy	2.38	2.23	620
Surgery	2.82	5.10	890
Medical/Surgical Nursing	2.86	5.10	820
Physical Therapy	3.19	4.65	650
Emergency Services	3.50	-	250
Social Services	3.72	4.73	880

Two of the departments here are basically nursing departments: Surgery and Medical/Surgical Nursing. Their mean SCOREs here were 2.82 and 2.86, respectively. The Registered Nurse Contact Scale Score from Table 1 is 5.10.

Discussion

As a first exploratory approximation of the K-C Model for measurement of the customer-contact construct used in a hospital field setting, this study has provided useful insights. The customer-contact measurement instrument used here has been shown to provide a range of scores not dissimilar from the range developed by Kellogg (1991), 0.49 to 5.00 compared to 0.00 to 5.10. This is a positive result of the exploratory study. As is to be expected in an exploratory study, more new questions were raised than issues settled. For instance, whereas the overall range of scores, as just noted, is in the range of Kellogg (1991), the department by department

comparison of means shows meaningful variations. Some are close, some are not. From even a cursory examination of Table 2, it can be seen that there is as much variation of scores within departments as there is across departments. We struggled with the question of even reporting department data, but needed to do so for comparison purposes (there is no individual information for which to compare with Kellogg (1991), of course. Further, the departments between the two institutions did not match up as well as one would like. These are issues that represent limitations of this exploratory study, from which we learn for the benefit of future studies.

The question of whether to provide for “no contact,” that is, a zero score, needs to be considered seriously at both the definition level and at the measurement level. It was initially assumed for this study that the questionnaire would only be administered to service workers with some contact with customers, therefore, the base of one rather than zero seemed acceptable. However, as an anecdotal example, one surgical nurse said her patients are normally asleep: “How do I rate that on your questionnaire?” My (first author) reply, at the time, was to think of a contact with a patient who was awake. Did that reply bias a portion of the study? Perhaps. It certainly does raise a new definitional concern regarding “customer-contact” that must be considered in future research efforts.

The relatively broad distribution of perceptions of service workers, even in job descriptions that would appear to be the same, is a very interesting finding of the study. Data analysis continues on the relationship of the customer-contact measures and specific job classifications. One issue that requires further study is whether the findings to date are simply an artifact of the perception measurement method or if there is a deeper meaning relative to the customer-contact construct itself that can be attached to the findings. Kellogg (1991) and Kellogg and Chase (1995) both report that the customer-contact construct is “multi-dimensional and complex.” The results of this exploratory study confirm that assessment with emphasis.

Job classifications used for comparison between the original study (Kellogg, 1991) and the current study were primarily the predominant job descriptions, in terms of number of workers in the comparable departments. As noted earlier, with Nurses, the Departments in this study were "Medical/Surgical Nursing" and Surgery, but the workers were all called, and qualified as, "Nurses." Any matching that is done must be very carefully considered. Simply looking at the spread of SCORE values by individuals (See Table 2) suggests as wide a variation within departments as between departments – a critical consideration.

One modification in the data collection procedure used for this study was in the categorization of the time of communications element. These initial results do not appear to indicate that the results were skewed because of the assumptions used, although it is much too early to reach any final conclusions. One contingency factor to examine is the inherent difference in the normal time span of various service encounters. For example, a fast food or convenience store transaction may normally span two minutes while a tax-preparation consultation might normally be fifteen minutes to an hour. What should be the role of contingency factors in the measurement of time, as well as other variables, for the customer-contact construct?

An early concern of the authors, in developing the six specific questions used in this study, was in regard to the wording used in the last four questions relative to the four factors of the information richness factor of the measurement model. It appeared that the verbiage and descriptors used by Kellogg (1991) were not all words that are in common use by many of the service workers that were surveyed for their perceptions. It was decided that it was important to stay as close as possible to the original wording in this first hospital field study. Subjects were instructed to ask questions about any word(s) or portions of the survey they did not understand. No such questions were asked in the sessions used to collect the data reported here.

Implications for Future Research and Practice

One objective of this series of studies is to develop an appropriate, cost-effective, and meaningful method of measuring the dimension(s) of the customer-contact construct. This study used a direct adaptation of the three factors reported by Kellogg (1991) to develop the measurement instrument used. The need for further study on the specifics of the use of the three factors is indicated by the results of this initial exploratory study in a hospital setting, based both on the data and on anecdotal information obtained during the data collection process. For example, while few participants asked specific questions, there was often a "feeling" that some of the questionnaire responses may have been based on guesses as much as reasoned replies. Further testing of terminology used is needed.

The time factor should be tested to determine if the categories used here yield similar results to alternative response possibilities, including a measurement of seconds of contact. In addition, further study is required on certain contingency, or situational, factors such as the difference in customer expectations of the particular encounter. Sometimes speed of the encounter is desirable, sometimes it is not. Can a simple time measurement, then, possibly provide an accurate measure of "customer-contact?" Is not the time element of customer-contact more complex than this? This issue begs for further research.

Likewise, with the measure of intimacy, must we not ask whether or not a particular act of customer-contact calls for high or low levels of intimacy in order to generate positive customer satisfaction? In addition, can a single question possibly measure the depth of feeling of intimacy inherent in any particular service encounter?

The third element, information richness, calculated from the last four questions of the questionnaire, also needs to be examined for relevance in a field setting. While it is purely an unscientific (anecdotal) observation, it seemed to the first author that there were some glazed

eyes looking at and answering these questions. In addition, further examination of the specific calculation used would be appropriate. It may well be that this factor is also one that has situationally specific applications. Is not feedback, for instance, very critical in some service encounters and nearly irrelevant in others? In which situations does this factor best measure customer satisfaction?

This exploratory field study used self-reported, perceptual responses of service workers themselves rather than perceptions and opinions of experts viewing videotape of a service worker participating in a service encounter. Whether or not there may be biases built into this methodology remains for further study. Collection of empirical data from a field setting provides a contrast to the static setting of the earlier study of the customer-contact construct. The current study provides just one approach of the many that might be proposed. Using self-reported perceptions of service workers is quite a different approach than the review of videotaped segments by services experts. This perceptual study introduces possible error elements that require constant vigilance in the analysis phase as well as in drawing conclusions. Other approaches should be theorized and tested to move toward a fuller understanding of this important construct. Where does use of electronic/internet components seem appropriate?

Within the context of the methodology employed in this study, another issue for further study is the question of what is a “typical” service encounter. How would the results be different if a different descriptor were used, for instance? For instance, could a participant-observer be utilized to record actual service encounters as they happen, in real-time? PDAs or other electronic devices may be useful in the scenario.

Without additional testing, the current survey instrument should be limited in use to situations similar to the hospital setting. Subject to the limitations of this initial field test, the instrument might be used by managers to examine the relative degree of customer contact among

the various workers in the organization.

This paper has reported results of an exploratory field test of a new measurement instrument. It has raised a number of critical additional issues to consider as further research on the customer-contact construct is considered and designed.

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