EXPLORING SERVICE CHAINS OF ELECTRONIC GOVERNMENT SERVICES: AN INTEGRAL MODEL

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ABASTACT

'Government-to-citizen' and 'government-to-employee' electronic government share the same objective: providing better e-service for governments' external customers. However, little research has employed an integral approach to explore the linkage between internal and external customer perceptions in the field of electronic government. This research employs the concept of the service profit chain and the public sector service value chain to propose an integral electronic government service chain model in order to better understand the relationships in electronic government services among constructs including internal marketing, internal service quality, internal customer satisfaction, external service quality, and external customer satisfaction. The results generally support the proposed model, except for the link between internal customer satisfaction and external service quality. Further research considering service-specific and technology-specific variables is needed to assess the generalization of the findings.

Keywords: electronic government (e-government), internal marketing, internal service quality, internal customer satisfaction, external service quality, external customer satisfaction, service profit chain (SPC), public sector service value chain

With the development of Information and communication technologies (ICTs), electronic government (e-government) has been playing an extremely important role in governance. Among major developments of e-government, 'government-to-citizen' (G2C) engages in providing better e-services to satisfy citizens, i.e., external customers' needs. 'Government-to-employee' (G2E) aims to equip government employees, i.e., internal customers, with e-services ability to deliver efficient and cost-effective services to citizens, their external customers (Carter & Belanger, 2005, citing General Accounting Office, 2001). G2C and G2E share the same objective: providing better e-service for governments' external customers. Although researchers have identified internal and external customers of e-government (Moon & Welch,

2005) and there is research exploring customer perceptions towards e-government services (e.g. Barnes & Vidgen, 2003; Horan, Abhichandani, & Rayalu, 2006), little research is found on linking the perceptions between internal customers and external customers in the field of e-government.

This study employs the concept of the service profit chain (SPC) (Heskett, Jones, Loveman, Sasser, & Schlesinger, 1994; Heskett, Sasser, & Schlesinger, 1997) and the public sector service value chain (Heintzman & Marson, 2005) to propose an e-government service chain model which integrates constructs of internal and external service, including: internal marketing, internal service quality, internal customer satisfaction, external service quality, and external customer satisfaction. This examination should increase our understanding of these critical concepts and their relationships, and thus allow public managers to better serve citizens as well as employees, through first satisfying employees by internal marketing in e-government services. The uniqueness of this study lies in assessing the internal and external services of e-government within an integral model. When testing the linkage between internal customer and external customer perceptions, this study uses individual-level data for analysis instead of group-level data, as used in most studies; i.e., external customer data is aggregated at the individual employee level to compare data across employees.

An ideal context within which to examine the above-mentioned issues is the citizen electronic complaint system (or citizen e-complaint system; CECS) in e-government services. CECS is a web-based G2C e-government system which allows citizens to file complaints online regarding government, facilitates communication between citizens, customers of government, and the government. Government employees engaging in CECS are internal customers, the management

agency of CECS is internal supplier in the context of CECS, and users of the CECS are external customers. The Kaohsiung Citizen Electronic Complaint System (or Kaohsiung Citizen E-Complaint System; KCECS) in Kaohsiung, Taiwan, will be taken as an example for this study. In the following sections, this study reviews the literature on customer-centric research in e-government services. Literature on key constructs of the proposed model and hypotheses are introduced in terms of internal and external service. The methodology of this study is then described, followed by results, discussions and future research directions.

CUSTOMER-CENTRIC RESEARCH IN E-GOVRNMENT SERVICES

From the perspective of customer service, e-government has two kinds of customers: internal and external customers. Internal customers are employees of government or governmental officials, i.e. internal users of e-government services. Citizens are external customers of e-government services, namely external users of those services.

There is a body of literature exploring perceptions of external customers towards e-government services. The objective of measuring external customer perceptions is to examine whether or not their needs are satisfied/met. These works usually measure quality of web-based e-government services or e-government websites on the basis of users' subjective perceptions. Researchers develop or adopt indicators or instruments from relevant literature to examine the level of satisfaction or quality/service quality of e-government services by collecting users' perception data. For example, Barnes and Vidgen (2003) used WebQual, with dimensions including: usability, information

quality and service interaction, to assess users' perceptions of the quality of a specific cross-national Web site provided via the OECD, before and after a process of redesign. They also used eQual (previously called WebQual) to analyze user perceptions of the quality of a national website provided by the UK government (Barnes & Vidgen, 2006). Horan et al. (2006) constructed an EGOVSAT instrument, comprising: utility, reliability, efficiency, customization, flexibility and sub-dimensions, to evaluate users' satisfaction with the Advanced Travel Information System, a form of G2C service.

Measurement of perceptions of internal customers in e-government is still in its infancy. Chen, Huang, and Hsiao (2006) presented the results of their research regarding the TCME, using nominal group technique to identify government officials' perspectives about their workloads and problems encountered, as well as to explore why citizens perceive their complaints as remaining unresolved. In addition, research in the e-government field distinguished between internal customers and external customers and explored perspectives on e-government of the two groups in terms of e-government attributes. Moon and Welch (2005), using the data collected from independently administered random surveys of citizens and bureaucrats by Hart-Teeter in 2001, found that perspectives of citizens and bureaucrat or public servants diverged in terms of: effectiveness of e-government, pace of e-government implementation, equity, and safety. For example, they found that public servants appear to be more familiar, better informed and more confident about the prospect of e-government than are citizens. They also take the lead in supporting and advancing e-government, and support a faster implementation of e-government than citizens do.

Although the objectives of G2C and G2E fall into the same category, there is little research on examining the linkage of G2C and G2E, i.e., the relationships between internal customer perceptions and external customer perceptions in e-government services. Chen et al. (2006), taking the Taipei City Mayor Emailbox

(TCME) in Taiwan as a case, presented both citizens' levels of satisfaction towards the TCME and government officials' perspectives regarding the system without analyzing their possible causal relationship. Due to the lack of an integral approach, this research employs the concept of the SPC and the public sector service value chain to propose an e-government service chain model; the aim is to examine the linkage between internal service chain (including: internal marketing, internal service quality and internal customer satisfaction), and external service chain (comprising: external service quality and external customer satisfaction), in the context of e-government services.

INTERNAL SERVICE CHAIN

Internal marketing

Internal marketing is generally considered a planned effort using a marketing-like approach to internal customers in an organization to deliver customer satisfaction. Evolving over three decades, there are two essential aspects to internal marketing. The first one reflects a process perspective, which views all employees and departments as simultaneously being internal customers of, and internal suppliers to, other employees and departments within an organization. It is closely related to the process element of the SPC. The basic premise of this perspective for internal marketing is that by increasing the quality of service transactions with internal customers, organizations can positively influence service quality transactions with external customer (Heskett et al., 1994). The second one concentrates on a human resources perspective which is grounded in the belief that external marketing success is contingent on the organization having satisfied and motivated employees, and that

creating such employees is the role of internal marketing (Berry, 1981). The focus of this perspective of internal marketing is on the relationship between the organization and its employees and how this relationship can facilitate the relationship between the employees and the customers (Lings, 2004).

Various internal marketing activities have been presented in relevant literature. Lings (2004) proposed an internal market orientation (IMO) construct[1], defining the construct as identifying and satisfying the wants and needs of employees as a prerequisite to satisfying the wants and needs of customers, which is consistent with the internal marketing concept. She grouped internal marketing activities into (a) internal marketing research: generating information pertinent to the internal market, (b) internal communications, and (c) management responsiveness: including a variety of management actions such as: job design, incentive system, management support, training, education and development, etc.

Internal service quality

The concept of internal service quality is derived from external service quality. A common definition of internal service quality is a measure of how well the internal service providers provide or respond to internal customers (Hallowell, Schlesinger, & Zornitsky, 1996; Heskett et al., 1994). While internal service quality is a construct measuring service provided by internal suppliers, it is rather different from that of internal marketing (Paraskevas, 2001). Specifically, internal marketing involves perceptions of the effort of marketing-like activities that internal service providers have made for internal customers, whereas internal service quality is about the

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[1] Gounaris (2006) modified Lings' (2004) IMO model and empirically measured the construct. He asserted that IMO appears to be a hierarchical construct, comprising three major dimensions: internal-market intelligence generation, internal-intelligence dissemination, and response to internal-intelligence, with ten sub-dimensions.

perceptions of internal customers towards the service by internal service providers.

Most researchers agree that internal marketing should improve service quality (e.g. Berry & Parasuraman, 1991). In addition, the literature also reveals that the adoption of internal marketing may improve the quality of services delivered to internal customer (Chaston, 1995). However, the association between internal marketing and internal service quality remains to be empirically verified in both public and private sectors, especially in e-government services. This leads to the first hypothesis.

Hypothesis 1: Internal marketing has a significant and positive influence on internal service quality in e-government services.

Internal customer satisfaction

There are similar ideas involved in internal customer satisfaction, such as "employee satisfaction" and "job satisfaction". A simple and direct definition for employee satisfaction is the gratification or prosperity that the employees derive from their job (Hellriegel, Jackson, & Slocum, 1999). Every job aspect that has an influence on the employee, as well as the perception that the employee has of the job/organization, is included in this definition of employee satisfaction (Eskildsen & Nussler, 2000). Job satisfaction continues to receive broad research attention, and some indexes for measuring this construct have been developed, such as the Job Satisfaction Survey (JSS, Spector, 1985). In addition, job satisfaction could be regarded as a concept of overall satisfaction (Kalleberg, 1977), and be measured in a single construct in empirical studies.

Empirical research in the service sector has proven that internal marketing influences internal customer satisfaction (e.g. Ahmed, Rafiq, & Saad, 2003; Rafiq &

Ahmed, 2000; Tansuhaj, Randall, & McCullough, 1991). However, little empirical work tests this relationship in e-government services in the public sector. This leads to the second hypothesis.

Hypothesis 2: Internal marketing has a significant and positive influence on internal customer satisfaction in e-government services.

Heskett et al. (1994) provided the SPC model, which established the relationship between internal service quality and employee satisfaction. They asserted that employee satisfaction results primarily from high-quality support services and policies, i.e., internal service quality that enables employees to deliver results to customers. Several studies empirically tested the link between employee satisfaction and internal service quality in Heskett et al.'s (1997) revised SPC model. While Silvesto and Cross (2000) found no significant correlation between employee satisfaction and internal service quality, more studies did find a positive correlation (Loveman, 1998; Pritchard & Silvestro, 2005). The link needs to be empirically tested in e-government services in the public sector. This gives rise to the next hypothesis.

Hypothesis 3: Internal service quality has a significant and positive influence on internal customer satisfaction in e-government services.

EXTERNAL SERVICE CHAIN

External service quality

The most common definition of service quality relies on global consumer judgment of the superiority of the product or service (Parasuraman, Zeithaml, & Berry,

1988). Consumer expectations of the service and perceptions of the firm providing the service are thereby integrated in another definition of service quality: customer-perceived service quality as the magnitude and direction of the discrepancy between service expectation and perceptions (Parasuraman, Zeithaml, & Berry, 1985, 1988). They developed a conceptual model of service quality, the so called 'gap model' to illustrate that service quality is the function of organizational gaps associated with the design, marketing, and delivery of service.

External customer satisfaction

One description of external customer satisfaction from service management literature is: the result of a customer's perception of the value received in a transaction or a relationship (Hallowell, 1996). Some scholars stated that the concept of satisfaction comprises three constructs: expectation, perceived performance, and disconfirmation. For example, Bolton and Drew (1991) defined customer satisfaction or dissatisfaction as a function of the disconfirmation arising from discrepancies between prior expectations and actual performance. However, other researchers argued that performance-only measures of construct have been found to be more valid and reliable than using the traditional expectancy-disconfirmation paradigm (Cronin & Taylor, 1992).

A review of the literature reveals that service quality and customer satisfaction are used quite interchangeably, which has left confusion in the literature regarding the two terms, though they differ in some respects. Emerging definitions make this distinction more clear: customer satisfaction results from individual and global transaction, which is transaction-specific and cumulative; whereas service quality involves a general impression of the superiority or inferiority of the service provider and the services (Bitner & Hubert, 1994) or a general attitude towards services (Bitner,

1990). More specifically, service quality is dependent on service content and service procedure when customers encounter the service provider. These include the service provider's attitude and friendliness, the form/design of the physical environment, complicacy of the service procedure, etc. (Gronroos, 1990).

On the other hand, the sequential order between service quality and satisfaction has been a source of much 'chicken and egg' debate. Some studies postulate that satisfaction precedes service quality (e.g. Bitner & Hubbert, 1994; Bolton & Drew, 1991; Mentzer, Bienstock, & Kahn, 1993). Other articles contradict this claim and argue that service quality is an antecedent of satisfaction (Cronin & Taylor, 1992; Oliver, 1993; Parasuraman, Zeithaml, & Berry, 1994; Rust & Oliver, 1994; Ruyter, Bloemer, & Peeters, 1997; Strandvik & Lijander, 1994). An alternative conceptualization imagines perceived service quality as both an antecedent and a consequence of satisfaction (e.g. Iacobucci, Ostrom, & Grayson, 1995; Teas, 1993). In general, though there is controversy among research in determining whether the service quality or satisfaction is the antecedent variable, the sequential order of service quality preceding satisfaction outnumbered others in the service sector. Nevertheless, this sequential order requires empirical verification regarding e-government services in the public sector. This gives rise to the next hypothesis.

Hypothesis 4: External service quality has a significant and positive influence on external customer satisfaction in e-government services.

LINKING INTERNAL SERVICE CHAIN AND EXTERNAL SERVICE CHAIN

The service profit chain

Heskett et al. (1994) first proposed the SPC model[2]. The SPC asserts that, in the service sector, satisfied and motivated employees produce satisfied customers, and satisfied customers tend to purchase more, increasing the revenue and profits of the organization. That is, there are three key factors in the SPC: employee perceptions, customer perceptions, and organizational performance; employee perceptions can be enhanced by internal marketing. Some researchers employed the concept of the SPC and examined the linkage between employee perceptions, customer perceptions, and organizational performance. For example, Rucci, Kirn, and Quinn (1998) conducted studies in Sears in the U.S. and found that a 5% improvement in employee attitudes would drive a 1.3% improvement in customer satisfaction, which in turn would drive a 0.5% improvement in revenue growth.

The public sector service value chain

Borrowing the concept of the SPC, Heintzman and Marson (2005) proposed a public sector service value chain, in which its three key building blocks: "employee satisfaction and commitment", "citizen/client service satisfaction", and "citizen trust and confidence in public institutions", are similar to the SPC. The major difference between the two models lies in the third construct: The public sector service value chain model uses 'trust and confidence' instead of 'performance' (profit) in the SPC.

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[2] Heskett et al. (1997) revised the model of the SPC. However, the revised SPC model heavily relies on the original model, with primary components and links remaining unchanged.

Heintzman and Marson provided some evidences for the link within the public sector. Moreover, they suggested that the link between employee perceptions and customer (client) perceptions requires considerably more research in the public sector to determine if the employee-customer perception relationship exists, especially for those public activities most closely involved in delivering public services to citizens.

In general, the link between employee (internal customer) perceptions and client/citizen or customer (external customer) perceptions proposed by the SPC and the public sector service value chain model provides us with a rationale to connect the aforementioned internal service chain and external service chain. Consequently, the following hypothesis is introduced.

Hypothesis 5: Internal customer satisfaction has a significant and positive influence on external service quality in e-government services.

As described above, this research proposes an integral e-government service chain model for understanding internal and external service chains in e-government services, and asserts the linkages among internal marketing, internal service quality, internal customer satisfaction, external service quality, and external customer satisfaction (see Figure 1).

Insert Figure 1 about here

METHODOLOGY

Construct measurement

Not only do attributes of the public sector differ from those of the private sector, but e-government service is quite different from traditional government service. Influential factors found in service sector literature may not be suitable, and should be modified, in the context of e-government. In addition to literature review, we conducted several in-depth interviews to overcome this limitation and ultimately to measure each link in the proposed model. Ten employees from seven agencies of the Kaohsiung City Government (KCG) who are engaged in the KCECS were interviewed to help identify internal factors regarding internal marketing and internal service quality. These seven bureaus handled a great variety and huge number of complaint cases, about 80% of all cases. Each interview covers the following topics and questions:

1. Internal marketing:

It consists of three major categories: internal market research, internal communications, and management responsiveness. Questions include: whether or not the management agency of the KCECS collects internal customers' opinions regarding the system; if there is any communication channel established between the management agency of the KCECS and internal customers; how the communication channel works; and if there is any management support action, etc.

2. Internal service quality:

Questions include evaluations of (1) the procedures of complaint-handling, (2) the e-complaint system, and (3) the management agency of the KCECS, etc.

The results of the in-depth interview are summarized as follows. There were some internal marketing activities employed by the internal supplier. The management

agency of the KCECS, the Information Management Center (IMC), collected internal customers' opinions about the system by consulting with members of the United Service Center, who are representatives of bureaus in the KCG. Internal customers could easily communicate with responsible staff of the IMC via telephone or email. Supervisors backed up employees in handling complaints. However, little internal customer was rewarded for good performance in complaint-handling. Conversely, a certain amount of internal customers were punished because of delays. Interviewees also reported that complaint-handling documents required approval from their supervisors, indicating a lack of authority in terms of settling complaints.

With respect to internal service quality, certain interviewees complained that the time frame for handling complaints was strictly enforced and unreasonable, or that sometimes complaint cases were incorrectly classified for distribution to responsible bureaus. A great amount of internal customers complained that their workloads had increased because of the establishment of the e-complaint system. Some mentioned they felt little sense of achievement from complaint-handling. As for the design and functions of the KCECS, interviewees suggested that establishing: (1) a mechanism to filter unreasonable complaints, (2) a knowledge management system, and (3) a mechanism for enhancing the frequently asked questions (FAQs) were needed to enhance the efficiency and effectiveness of the system. Despite complaints, a larger number of interviewees recognized that the KCECS works smoothly when they handle complaints, and that the IMC generally provided an effective system for staff to handle complaints.

Mapping the in-depth interview results with constructs and measurement items found in literature, this study developed theoretical constructs and finalized measurement questions/items. Detailed constructs and items of the proposed model are presented in the Appendix. For capturing internal marketing activities in public

e-service, 5 items from Ahmed et al. (2003), Conduit and Mavondo (2001), George (1990), George and Gronroos (1989), and Lings (2004) were merged with 1 item from in-depth interview (X_1 to X_6). Considering the specific characteristics of CECS that internal customers could perceive, and which might differ from those in business service, this study took Reynoso and Moores' (1995) suggestion to search for components measuring internal service quality for this specific e-service situation. Seven items (Y_1 to Y_7) were developed for this construct, comprised of five items from results of in-depth interviews and two items from consulting research by Hallowell et al. (1996) and Heskett et al. (1994). Three items (Y_8 to Y_{10}) for internal customer satisfaction were developed by consulting the works of Berry (1981), Calsir and Calsir (2004), George (1990), and Rafiq and Ahmed (1993). With respect to the measurement of external service chain construct, as the nature of handling electronic complaints in the public sector is quite different from other e-services in the private or public sectors, quality measurement scales in e-service literature need to be modified. Fulfillment, responsiveness, and reliability represent the external service quality of the KCECS, which was measured using three items (Y_{11} to Y_{13}) from Zeithmal et al.'s (2002) e-SERVQUAL scale. External customer satisfaction is explained in terms of (1) customer's perception of the value received (Hallowell, 1996), and (2) customer's overall evaluation of consumption experience (Anderson, Fornell, & Lehman, 1994; Anderson, Fornell, & Mazvancheryl, 2004; Fornell, 1992); two items (Y_{14} to Y_{15}) based on the aforementioned study were used to measure the KCECS's external customer satisfaction. In addition, demographic information, such as: gender, age, and education level, was collected. It should be noted that the questions/items in both surveys in this study were simplified and limited since the KCG considers that too many questions in the questionnaire might annoy employees and citizens.

Sample

To test the proposed model, two surveys were conducted to capture data from two groups of people: employees (internal customers of e-service) and citizens (external customers of e-service). The population of the employee survey would be staff in the KCG with an account number for handling complaints on the KCECS. Those staff members without KCECS account were excluded since they are not internal customers of the e-service. According to the Kaohsiung City Government Information Management Center (2008), the number of staff with the KCECS account is 1,597. The employee survey questionnaires were distributed through email to all staff with the KCECS account. To avoid incompletely filled questionnaires, a reminding function was designed for reminding the respondent to fill out all items when answering the questionnaire. Questionnaires were delivered to those employees, and two follow-up questionnaires were sent to non-responding staff within three weeks. On the other side, the population of the citizen survey included citizens who had filed complaints on the KCECS. Citizen survey questionnaires were accompanied by the formal reply email and were sent to the users who had filed complaints.

Data analysis and data aggregation

Data was analyzed using structural equation modeling (SEM). LISREL 8.50 was used. This study used employees as units to link the internal and external customer perceptions when measuring the e-government service chain model. To illustrate, citizen responses were aggregated/averaged at the individual employee level to compare data across employees. Each employee perception is an aggregate of his/her individual customer responses. For example, one employee handled five complaint cases and received five questionnaires from those citizens; and another employee got three questionnaires back. When linking the perceptions between employees and

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citizens, the five responses and the three responses from citizens were aggregated (averaged) according to their responsible staff, yielding two data for analysis.

Most studies have analyzed organization-level data (Loveman, 1998; Pritchard & Silvestro, 2005; Silvestro & Cross, 2000), whereas this study employs employee-level data. The internal customer perception-external customer perception linkage at the individual employee level of analysis allows for a more accurate assessment of variable effects and relationships.

RESULTS

Response rates and demographics

Seven hundred and twenty three valid employee questionnaires were totally received in the employee survey, with a valid response rate of 45.3%. With respect to citizen surveys, 13,391 valid citizen survey questionnaires returned, giving a valid response rate of 14.2%.

Table 1 shows the demographics of both internal and external customers. Three characteristics could be summarized. First, compared to internal customers, there were more male external customers. Second, external customers were younger than internal customers, the majority of whom were from "41 to 50" and "31 to 40" years old, while the former was from "31 to 40" and "30 and below". Third, both internal and external customers had a higher education level, with more than 95% and 83% respondents having completed college or higher degrees, respectively.

Insert Table 1 about here

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Model testing

After matching external customer responses to each internal customer and eliminating all unmatched responses, 417 samples were obtained. The final matched external customer samples totaled 2,581 responses, or an average of 6.2 (median 3; mode 1; standard deviation 11.6; maximum 144) external customer responses per internal customer. There was no statistically significant difference in demographics of internal and external customers between samples and paired samples (see Table 2).

Insert Table 2 about here

Prior to model testing, we examined assumptions for the structural equation modeling, including: multivariate normality[3], adequate sample size, and dealing with missing data. The result of multivariate normality test ($\Rightarrow^2$ value = 428.58, $p = 0.00$) showed that the assumption of a multivariate normal data distribution might be violated. Non-normality is taken into account when estimating the model by providing the asymptotic covariance matrix using maximum likelihood (ML) estimation. In this way, standard errors are estimated under non-normality (Bollen, 1989), and chi-square

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[3] If observed variables $x = (x_1, x_2,\ldots, x_p)$, are modeled as continuous variables (i.e. not categorical), the assumption used for SEM parameter estimation via maximum likelihood (ML) is that x is multivariate normally distributed. Lack of multivariate normality usually inflates the chi-square statistic such that the overall chi-square fit statistic for the model as a whole is biased toward Type I error (rejecting a model which should not be rejected). The same bias also occurs for other indexes of fit beside model chi-square. Violation of multivariate normality also tends to deflate (underestimate) standard errors from moderately to severely. These smaller-than-they-should-be standard errors mean that regression paths and factor/error covariances are found to be statistically significant more often than they should be. Many if not most SEM studies in the literature fail to concern themselves with this assumption in spite of its importance. (Garson, 2008)

value are adjusted[4] (Garson, 2008). Missing value was treated using the listwise deletion method. After deleting missing values, there remained 401 samples out of 417. Schumacker and Lomax (2004) surveyed the literature and found sample sizes of 250~500 to be used in "many articles", and "numerous studies …that were in agreement that fewer than 100 or 150 subjects was below the minimum. The sample size of 401 meets the sample size criteria.

Confirmatory factor analysis (CFA) was then performed to assess fitness of the model. The results of the first confirmatory factor analysis showed that the error variance of Y_{15} was negative, yielding the path coefficient from external customer satisfaction to Y_{15} (evaluation of the complaint-handling service) exceeding 1. As there were significant correlations among Y_{12} (perception regarding the response manner), Y_{14} (perception regarding the extent of complaint being resolved) and Y_{15} (Pearson correlation between Y_{12} and Y_{14}, Y_{12} and Y_{15}, and Y_{14} and Y_{15} were 0.56, 0.66, and 0.84, respectively, all reached a significance level of 0.01), this study tested individually dropping those aforementioned items out of the model. By dropping Y_{12}, the negative error variance problem of Y_{15} no longer existed. A second CFA was performed and the results indicated an acceptable fit for the model except for the SMC value items of X_5 (I got rewarded for good performance in handling complaint cases.) and X_6 (I am authorized to handle citizens' complaints when handling complaint cases.) were extremely low (0.30 and 0.16, respectively). The two items were therefore dropped out of the model. In addition, we looked back to verify the rationality of each item. As internal service quality (ISQ) is a measure of how well the internal service providers provide or respond to internal customers (Hallowell et al.,

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[4] An adjusted Satorra-Bentler Scaled Chi-Square will be provided. Meanwhile, chi-square corrected for non-normality was shown, too. This is an adjustment to chi-square which penalizes chi-square for the amount of kurtosis in the data. That is, it is an adjusted chi-square statistic which attempts to correct for the bias introduced when data are markedly non-normal in distribution (Garson, 2008).

1996; Heskett et al., 1994), Y_4 (Handling complaint cases provides me with a sense of achievement) and Y_3 (Handling complaint cases does not increase my workload) were dropped out of ISQ construct since sense of achievement through handling complaint cases and workload of complaint-handling are not good measures related to the perceptions of internal customers towards the service by internal service providers.

The overall fits of e-government service chain model testing are presented in Table 3. The results suggested an acceptable fit for the model, except for the χ^2 value [χ^2 (99, N = 401) = 380.77, p = 0.00; GFI = 0.87, AGFI = 0.82; CFI = 0.93; NNFI = 0.92; RMR = 0.040; RMSEA = 0.084]. Multivariate non-normality was adjusted, with Chi-square corrected for non-normality was 378.32 (p = 0.0), indicating a better model fit after correcting for the bias of non-normality. The composite reliability and the average variance extracted are presented in Table 4.

Insert Table 3 about here

Insert Table 4 about here

Path coefficients, error variances of observed variables, and their significance for the model are shown in Figure 2. The R^2 values for the structural equations were passable, except for the relationship between external service quality and internal customer satisfaction (R^2_{ICS} = 0.85; R^2_{ISQ} = 0.66; R^2_{ECS} = 0.65; R^2_{ESQ} = 0.0018). As indicated in Figure 2, all path coefficients in the internal and external service chains

model were significant ($p < 0.05$), except for the link between internal customer satisfaction and external service quality. As a result, H_1 and H_2 were supported, indicating that internal marketing positively influenced the internal service quality and internal customer satisfaction in e-government services (standardized coefficient 0.81 and 0.19 respectively). H_3 was supported since internal service quality positively affected internal customer satisfaction in e-government services (standardized coefficient 0.76). H_4 was also supported because the linkage between external service quality and external customer satisfaction was significant (standardized coefficient 0.80). However, H_5 was not supported. Although H_5 was not supported (standardized coefficient 0.04), these results suggest that the integrated model provides insights into the linkage of internal marketing, internal service quality, internal customer satisfaction, external service quality, and external customer satisfaction in the e-government context.

Insert Figure 2 about here

DISCUSSIONS AND FUTURE RESEARCH DIRECTIONS

Discussions

As shown in Figure 2, internal marketing positively influenced internal service quality in the example case of the KCECS; this result verifies Chaston's (1995) statement that the adoption of an internal marketing may improve the quality of services delivered to internal customer. This is also consistent with Heskett et al.'s (1994, 1997) assertion in the SPC model that internal service quality can be achieved

through: work place design, job design, employee selection and development, employee rewards and recognition, and tools for serving customers, namely the internal marketing activities. The research result also provides empirical support of this link in the e-government services, especially in the e-complaint service. The finding that internal marketing positively influenced internal customer satisfaction lends further support to existing literature, which is consistence with Ahmed et al. (2003) and Tansuhaj et al.'s (1991) works on the service sector. This indicates that the effect of employing an internal marketing approach would be the creation of more satisfied employees (Rafiq & Ahmed, 2000; Zand, 1981) exists not only in the service sector but also in the public sector. The influence of internal marketing (which was significantly modeled primarily as factors regarding internal market research, internal communications, management responsiveness, and electronic system design) was positively related to internal service quality and internal customer satisfaction in e-government service. One implication is that internal marketing activities, especially: collecting user's opinions, communications between internal customers and suppliers as well as communications among related agencies; management support; and good design of e-services employed to increase internal customer satisfaction, might be effective in the context of e-government services.

This study's empirical finding supports the link between internal service quality and internal customer satisfaction in Heskett et al's. (1994) model and is consistent with Loveman (1998) and Pritchard and Silvestro's (2005) empirical studies. The finding indicates that services provided by the KCECS management agency need to be addressed. The way internal suppliers treat internal customers, modeled as factors primarily including: management procedures and supporting mechanism, in this study, is perceived as determinants for the satisfaction of internal customers. Another implication for public managers here may be to nurture the perception that their

internal service quality contribution to the employees is conducive to the creation of a good internal working environment.

External service quality influenced external customer satisfaction in the proposed e-government service chain model. The result empirically adds support to the claim that external service quality precedes external customer satisfaction, which is consistent with Cronin and Taylor (1992), Oliver (1993), Parasuraman et al. (1994), Rust and Oliver (1994), Ruyter et al. (1997), and Strandvik and Lijander (1994). The result also provides an approach for e-government service research to simultaneously test service quality and satisfaction. This gives a more precise evaluation for e-government services.

The relationship between internal customer satisfaction and external service quality relationship was not supported in this study. Actually, empirical tests of the linkage between internal customer perceptions and external customer perceptions receive inconsistent results in service industry literature. Though some research find significant relationships between them (e.g. Rucci et al., 1998; Gelade & Young, 2005), some provide no empirical support for the linkage (e.g. Loveman, 1998; Pritchard & Silvestro, 2005; Silvestro & Cross, 2000). This study discusses possible explanations for the insignificant link between the two constructs in citizen e-complaint service, as follows.

1. Nature of complaint-handling service: one reason for the insignificant link between internal customer perceptions and external customer perceptions points to the nature of complaint service. Government complaint service and e-complaint service are unique, and generally receive lower perceived quality and satisfaction than other traditional government or e-government services. According to the satisfaction rates of the TCME and the KCECS, the citizens' satisfaction rates were both lower than 50% (Chen et al., 2006; Kaohsiung City Government Information Management

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Center, 2008). The authors investigated further, by talking to the head and responsible staff of the KCECS in the IMC. They explained that complaints regarding accusation and rights protection generally receive low satisfaction. For certain cases, for example illegal cases, complaints needed a longer time to resolve, etc., they seldom elicit positive feedback. Besides, some complainants repeatedly attempt to file complaints when they are dissatisfied, resulting in an even worse satisfaction rate. In general, the nature of citizen complaints definitely counts. When citizens file complaints which are tough to resolve, low satisfaction with the complaint-handling usually occurs. Because of the nature of "complaint" service, internal customer satisfaction might not have much influence on perceptions of external customers.

2. Mixed perceptions concerning complaint-handling service and city administration: the service quality and satisfaction regarding the e-complaint system, as perceived by external customers, might be mixed with perceptions towards city administration. To illustrate, when judging satisfaction towards "e-service", citizens might be affected by their overall satisfaction in terms of city administration or other factors. For example, one who favors the mayor, may appraise the e-service even if he/she is dissatisfied with it. Conversely, a citizen may express dissatisfaction towards the e-service because he/she feels negatively about the city administration even when the e-service may indeed be perceived as being satisfactory. In fact, in Chen et al.'s (2006) study related to the TCME, they found that citizens' appraisal of the mayor influenced their satisfaction concerning the TCME. This interference of external customer perceptions might have made the link between internal customer perceptions and external customer perceptions insignificant.

3. Technology-substituting and low service-contact service: e-service provides an alternative to traditional service, which is a technology-substituting service. However, the established alternative, e-channel for service, doesn't resolve problems

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relating to the nature of service. In the example of e-complaint service, citizens favor the e-channel for filing complaints, yet they might not be satisfied with the extent of complaint resolving, the very nature of the service. Though internal customers may be satisfied with e-service provided by internal suppliers, this internal satisfaction towards e-service might not lead to external satisfaction towards e-service. In addition, e-complaint service is not only a technology-substituting service but a low service-contact one. Silvestro & Cross (2000) postulated that in low contact service, or service where technology can be substituted for staff contact, employee satisfaction does not drive the service profit chain. This also means that the link between internal customer perceptions and external customer perceptions may be more applicable to high contact service, where interaction between staff and customers is critical to the customer value proposition. The e-complaint service is not an intensive contact service, since staff who handles complaints seldom contact complainants except for formal reply by email. Specifically, staff receives complaint cases through intranet on the KCECS, dealing with it, resolving it and then replying to complainants without usually contacting them. Moreover, the e-complaint system offers service on line, other than the traditional complaint channels such as face-to-face or telephone. The technology-substituting and low service-contact service might result in insignificant linkage between internal customer perceptions and external customer perceptions.

4. The SPC model may be too simplistic: both Pritchard and Silvestro (2005) and Silvestro and Cross (2000) argued that the relationship between internal customer perceptions and external customer perceptions is a complex one. The linkage may indeed exist at other levels of analysis, or when other variables are taken into account; but, all the same, the service profit chain, as things stand, is too simplistic to model the relationships of specific organization. Presumably the relationship between the

constructs will be more complex than is implied by the rather simplistic notion of the SPC.

In summary, it is possible that the relationship between internal customer perception and external customer perception in e-complaint service is insignificant because this service receives low satisfaction, external customers' perceptions towards complaint-handling service is mixed with those towards city administration, complaint-handling service is a technology-substituting and low service-contact service, and the SPC model might be too simplistic. This also calls for much research which considers service-specific variables and technology-specific variables, i.e. other e-government services, when examining the relationship between internal customer perceptions and external customer perceptions.

Future research directions

Despite all the care given to this study, there are several limitations of the present study that should be noted and addressed in any future research. First, this research empirically tests the links among perceptions of internal and external customers; the link between customer perceptions and performance (revenue or profit) in the SPC model, or between customer perceptions and citizen trust and confidence in the public sector service value chain, remain to be demonstrated. Future empirical study, that incorporates another important "block" in the SPC or in the public sector service value chain into the model, would be suggested.

Second, customer perceptions, including service quality and satisfaction, regarding e-complaint service were measured by self-reported questions in this study. When judging satisfaction with "e-service", citizens might be affected by their overall satisfaction with city administration, or other factors. This calls for research to rule

out those interferences when examining the link between internal customer perceptions and external customer perceptions towards a specific e-service.

Third, the questions/items in both surveys in this study were simplified and limited. We reduced the numbers of internal and external customer questions since the KCG considers that too many questions in the questionnaire might annoy employees and citizens, thereby constraining the analysis and interpretations of the proposed model. We have suggested proper items for measuring both external service quality and external customer satisfaction and those suggestions were accepted by the KCG. This will be put in practice when the second revision of the KCECS is completed; and results will be shown in our following studies.

Fourth, the empirical results of the linkage between internal customer and external customer perceptions were not supported in the example of e-complaint service in Taiwan, in this study. This study provided explanations such as: nature of complaint service, mixed perceptions of specific service and city administration, low service-contact and technology-substituting service of e-service, and the SPC model may be too simplistic. This also calls for much research considering specific variables when examining the linkage between internal and external perceptions. For example, further panel studies on various e-government services, especially e-government services involving "on-line personnel contact" or even high service contact, to assess the generalization of findings in this research, would be highly encouraged.

Finally, because it is the perceptions of internal customers in Taiwan surveyed, some cultural differences need to be taken into consideration when applying the findings of this research into practice. Empirical studies in this regard in various countries are suggested.

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APPENDIX

Appendix A. Constructs and Items of the E-Government Service Chain Model

Construct	Item
Internal marketing[a]	X_1: The management agency of the KCECS (the Information Management Center) collects my opinions pertinent to the system. (Strongly agree/strongly disagree)
	X_2: The communication channels work fine between the management agency of the KCECS and I. (Strongly agree/strongly disagree)
	X_3: My supervisors support me when I handle complaint cases. (Strongly agree/strongly disagree)
	X_4: The design and functions of the KCECS meet my need for handling complaint cases. (Strongly agree/strongly disagree)
	X_5: I got rewarded for good performance in handling complaint cases. (Strongly agree/strongly disagree)
	X_6: I am authorized to handle citizens' complaint when handling complaint cases. (Strongly agree/strongly disagree)
Internal service quality[a]	Y_1: The time frame for handling a complaint case is reasonable. (Strongly agree/strongly disagree)
	Y_2: The classification of complaint cases is reasonable. (Strongly agree/strongly disagree)
	Y_3: Handling complaint cases does not increase my workload. (Strongly agree/strongly disagree)
	Y_4: Handling complaint cases provides me with a sense of achievement. (Strongly agree/strongly disagree)

Construct	Item
	Y_5: The management agency of the KCECS provides good service for my work regarding complaint-handling. (Strongly agree/strongly disagree)
	Y_6: Handling complaint cases on the KCECS is smooth. (Strongly agree/strongly disagree)
	Y_7: The management agency of the KCECS designs and provides a good system for my work regarding complaint-handling. (Strongly agree/strongly disagree)
Internal customer satisfaction[a]	Y_8: How satisfied are you regarding management procedures and service of the KCECS? (Very satisfied/very dissatisfied)
	Y_9: How satisfied are you regarding design and functions of the KCECS? (Very satisfied/very dissatisfied)
	Y_{10}: Overall, how satisfied are you regarding the KCECS? (Very satisfied/very dissatisfied)
External service quality[a]	Y_{11}: What is your perception of time efficiency of your complaint case in the KCECS replying to you? (Formal reply received very soon/ formal reply received very late)
	Y_{12}: What is your perception regarding the response manner of your complaint case? (Very friendly/very unfriendly)
	Y_{13}: What is your perception of the KCECS as a channel for filing complaints? (Very appropriate/very inappropriate)
External customer satisfaction[a]	Y_{14}: What is your perception regarding the extent of your complaint being resolved? (Completely resolved/not resolved at all)
	Y_{15}: Overall, what is your evaluation of the complaint-handling of your complaint case? (Very satisfied/very dissatisfied)
Demographics	Gender (Male/female)
	Age (30 and below, 31-40,41-50,51-60, 60 and above)
	Education level (Senior high school and below, college/university, graduate school and above)

[a]Scaled from 5 to 1

Table 1. Internal Customer and External Demographics of the Kaohsiung Citizen Electronic Complaint System

Demographics	Internal customer		External customer	
	Frequency	Percent	Frequency	Percent
Gender				
Male	353	48.8	8,142	64.0
Female	370	51.2	4,581	36.0
Age				
30 and below	60	8.3	3,836	30.0
31-40	268	37.1	5,128	40.1
41-50	293	40.5	2,709	21.2
51-60	97	13.4	948	7.4
61 and above	5	0.7	166	1.3
Education level				
Senior high school and below	34	4.7	2,105	16.5
College/university	480	66.4	8,456	66.3
Graduate school and above	209	28.9	2,203	17.3
Total	723	100.0	13391[a]	100.0

[a]Demographic variables not totaling 13,391 represent missing values.

Table 2. Internal and External Customer Samples and Paired Samples with Significance of Fitness Test

Variable	Internal customer		External customer	
	Samples (percent)	Paired samples (percent)	Samples (percent)	Paired samples (percent)
Gender				
Male	48.8	50.1	64.0	62.2
Female	51.2	49.9	36.0	37.8
Fitness test	$\chi^2 = 0.49 < \chi^2$ (0.05, 1) = 3.84		$\chi^2 = 1.02 < \chi^2$ (0.05, 1) = 3.84	
Age				
30 and below	8.3	7.2	30.0	30.6
31-40	37.1	37.6	40.1	40.9
41-50	40.5	41.2	21.2	19.9
51-60	13.4	12.9	7.4	7.2
61 and above	0.7	1.0	1.3	1.4
Fitness test	$\chi^2 = 2.25 < \chi^2$ (0.05, 4) = 9.49		$\chi^2 = 0.87 < \chi^2$ (0.05, 4) = 9.49	
Education level				
Senior high school and below	4.7	3.8	16.5	16.6
College/university	66.4	66.4	66.3	65.9
Graduate school and above	28.9	29.7	17.3	17.5
Fitness test	$\chi^2 = 1.41 < \chi^2$ (0.05, 2) = 5.99		$\chi^2 = 0.04 < \chi^2$ (0.05, 2) = 5.99	

Note. Numbers of internal customer samples and paired samples are 723 and 417, respectively; Numbers of external customer samples and paired samples are 13,391 and 2,581, respectively.

Table 3. Measures of Overall Fit of the Internal and External Service Chains Model

Index	Model estimate	Criteria
x^2 value	380.77 ($df = 99$, $p = 0.00$)	Non-significant (Jöreskog & Sörbom, 1993)
x^2 /df	3.84	< 5 (Jöreskog & Sörbom, 1993)
Goodness of Fit Index (GFI)	0.87	> .80 (Bagozzi, & Yi, 1988)
Adjusted Goodness of Fit Index (AGFI)	0.82	> .80 (Bagozzi, & Yi, 1988)
Root Mean Square Residual (RMR)	0.040	< .05 (Jöreskog & Sörbom, 1993)
Root Mean Square Error of Approximation (RMSEA)	0.084	< .10 (Kelloway, 1998) < .06 (Hu & Bentler, 1999) < .05, good fit; < .08 acceptable (McDonald & Ho, 2002)
Normed Fit Index (NFI)	0.92	> .90 (Hu & Bentler, 1999)
Non-Normed Fit Index (NNFI)	0.92	> .90 (Hu & Bentler, 1999)
Comparative Fit Index (CFI)	0.93	> .95 (Bentler, 1995) > .90 (Kelloway, 1998)

Table 4. Summary of Measurement Scales of the E-government Service Chain Model

Measure	# Items	Composite Reliability	Average Variance Extracted
IM	4	0.86	0.51
ISQ	5	0.91	0.67
ICS	3	0.97	0.91
ESQ	2	0.50	0.33
ECS	2	0.92	0.84

Figure 1. E-government service chain model.

Figure 2. The path coefficients, error variances of observed variables, and their significance of the e-government service chain model.

Note. All numbers in this figure are standardized.

[*]$p < 0.05$