IMPACT OF CUSTOMER TRAFFIC AND SERVICE OUTSOURCING ON SERVICE TRIAD PERFORMANCE

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ABSTRACT

Many information intensive service firms deliver services through a mix of internally delivered (i.e., insourced) and externally delivered (i.e., outsourced) service process components. We examine data on top e-retailers. We expect outsourcing levels may moderate the impact of customer traffic upon e-retailer operating outcomes. We first examine drivers of the e-retailers' propensity to increase outsourcing levels. We then examine whether customer traffic and outsourcing levels relate to the firms' operating outcomes, in terms of operational performance and satisfaction. We find customer traffic is positively associated with outsourcing levels, and that outsourcing levels interact with customer traffic to determine operating outcomes.

INTRODUCTION

Many service firms today deliver services via a mix of internally delivered (i.e., insourced) and externally delivered (i.e., outsourced) service process components. Service process outsourcing has grown quickly [1]. Surveys suggest up to 90% of a firm's procurement spend can pertain to outsourced services [3]. Service process outsourcing is especially common in e-retailing, as sales processes, the customer's ordering process, and the subsequent product/service delivery process can be turned over to outsourcers.

We explore the impact of service outsourcing in e-retailing. Using a dataset on e-retailers from the USA and Canada, we examine factors driving the use of outsourcing and its impacts on e-retailer operating performance. We first examine drivers of levels of outsourcing, both for outsourced customer-facing service system components and for outsourced back-office service system components. A key driver we focus on concerns customer traffic. We then examine

whether customer traffic relates directly to the e-retailers' operating outcomes, and whether outsourcing moderates the impact of customer traffic.

Our results suggest customer traffic plays a role in driving outsourcing. We find customer traffic also plays a role in driving e-retailer operating performance, with the role of customer traffic moderated by the extent of outsourcing used by the e-retailer. In certain cases, we observe that the interaction of customer traffic with outsourcing levels exhibits counterintuitive coefficients for some business performance metrics, suggesting that at high outsourcing levels the impact of traffic may not necessarily be beneficial for e-retailer operating outcomes.

LITERATURE REVIEW

Outsourcing of services

Since the development of Internet technology, businesses have used such technologies to disaggregate existing service operations, disperse internal processes across the globe, and outsource processes to external parties for operational execution. Today, firms outsource manufacturing, service operations, design, and innovation activities, but evidence does not clearly establish the impact of outsourcing upon firm performance [12]. Research is needed to better understand the networks of outsourcers used to deliver services [3].

Little research examines the rapid growth of service outsourcing. The few studies are largely case based. Only two studies examine order fulfillment and logistics outsourcing using statistical samples [10] [11]. However, the scope of services that can be outsourced goes far beyond fulfillment and logistics. In e-retailing, retailers can disaggregate and outsource not only back-end service functions such as order fulfillment, but also front-end service functions that directly interact with customers.

Apte and Mason [1, p. 1250] state service disaggregation "occurs when one or more components in a value chain of service activities, that were traditionally carried out within an organization at a single location, are disaggregated (i.e., decomposed or dispersed) in a manner that transcends both the organizational and geographic bounds." The outcome is that the firms retain or "insource" certain service processes but "outsource" other service processes. Service disaggregation can take place for front-office customer contact oriented service activities as well as for back-office service activities related to manipulation of physical items or information processing [1]. While using a collection of outsourced modular servicing functions may be valuable to enhance service offerings, the modules alone may not be sufficient to ensure good performance [12]. Disaggregation and outsourcing of certain service components can pose both beneficial advantages and risky challenges [1].

Related research mostly examines aspects of back-end service outsourcing. However, it is important to consider front-end service outsourcing when investigating information intensive services. As Chase and Aquilano [2, p. 17] note, "the main feature that sets a service system apart from a manufacturing system is the extent to which the customer must be in direct contact." This is the case even more so for front-end service processes, suggesting researchers should separate service processes into front-end (front-office) processes and back-end (back-office)

processes. Our study differentiates between front-end service outsourcing (FEO) and back-end service outsourcing (BEO), as we expect each will be subject to different operational dynamics.

Information intensive services are particularly prone to service disaggregation and outsourcing. *Information intensity* [9] reflects the extent of information content in a firm's service and in the activities taking place throughout its supply chain that are required to get the service to its ultimate users. Electronic retailing provides a key example of a service delivery system having high information intensity, since the usual physical retailing activities get transformed into information flows in this context [7].

Impact of customer traffic on retailer performance

Customer traffic is an important variable of interest for retailers. Financial performance relates to their ability to bring traffic into stores and convert that traffic into sales. Retailers make substantial investments in marketing activities to attract traffic into their stores, and in store operations to convert traffic into sales [8]. Several notable studies use customer traffic data from brick-and-mortar retailers to understand the effect of customer traffic on sales performance [8] and improve store operations by developing traffic-based labor scheduling [6]. Customer traffic also plays an important role in decisions to outsource service system components. Several studies in the OM literature focus on different traffic-oriented aspects of service outsourcing, such as capacity planning, service outsourcing under information asymmetry, and quality concerns [13].

RESEARCH HYPOTHESES

Impact of customer traffic levels on operating performance

In e-retailing, website traffic is a standard metric used to measure performance. Retailing researchers typically treat traffic as a dependent variable and examine effects of factors such as advertising and promotion on traffic. Only a few studies examine the effects of traffic on operating performance [8], finding that store traffic drives sales volume and number of transactions. The finding that increased traffic is related to a larger number of transactions and sales volume also should apply to the e-retail context.

Hypothesis 1A. *The higher the levels of customer traffic, the higher the number of orders.*

High customer traffic to an e-retailer site should lead to slower website response times. The response time of an e-retailer site is constrained by the computing power and capacity of web servers hosting the e-retailer site and the back-end database servers. When an online shopper visits an e-retailer site, he or she sends requests to the web server to download web pages. As customer traffic increases, more webpages will need to be created and downloaded within a fixed time interval. These increased loads will inevitably slow down the response time.

Hypothesis 1B. *The higher the levels of customer traffic, the longer the website response time.*

We expect customer browser satisfaction to decrease as customer traffic increases. In e-retailing, shoppers visit a virtual store on the Internet. The crowdedness of the store will not be directly

apparent to or experienced by shoppers. Nonetheless, high customer traffic may still lead to customer dissatisfaction since it may result in delays in website responsiveness. For instance, shoppers may have to wait longer for web pages to load or for chatting with online customer support staff. Online shoppers generally are not very patient with slow e-retailer sites. Studies report responsiveness has a significant positive effect on customer satisfaction in online shopping [5].

Hypothesis 1C. *The higher the levels of customer traffic, the lower the browser satisfaction.*

Outsourcing moderating the impact of customer traffic

We argue that the positive effect of customer traffic on customer orders will be even greater as the extent of outsourcing increases. Fundamentally, more customer traffic to an e-retailer site means more customer visits to the site. Each visit provides an opportunity for a sales conversion, for which e-retailers need to have sufficient resources and capacity available.

Hypothesis 2A. *The greater the extent of outsourcing, the greater the positive impact of customer traffic on number of orders.*

Outsourcing may moderate the relationship between customer traffic and site response time. As e-retailers outsource to a greater extent, their sites should be able to respond to higher customer traffic. However, a high extent of outsourcing may also increase the complexity of delivering service and website content to shoppers, which may actually worsen the site response time above some level of site traffic. As the extent of outsourcing increases, to render webpages on the shoppers' web browsers, more and more outsourcer domains may need to be visited to download content, with no guarantee that an outsourcer will promptly alert the e-retailer when the outsourcer experiences slow response times.

Hypothesis 2B. *The greater the extent of outsourcing, the greater the negative impact of customer traffic on fast website response time.*

Increasing customer traffic is likely to worsen browser satisfaction. This effect is likely to be greater when e-retailers outsource extensively. As e-retailers outsource, they can capitalize on the outsourcers' capacity and scale to achieve efficiency gains. However, having outsourcers directly interact with customers may have negative impacts on an e-retailer's ability to understand customer needs.

Hypothesis 2C. *The greater the extent of outsourcing, the greater the negative impact of customer traffic on browser satisfaction.*

DATA AND RESEARCH METHODS

Data sources

We use archival data from the *Internet Retailer Top 500 Guide* annual survey of electronic retailers [4], which gathers data on the largest 500 e-retailers in the USA and Canada. This data

includes company profiles, business and operating performance, product type, website features, process technology, and process vendors. Our potential total five-year data set starts at approximately 2500 observations (i.e., N=500, T=5). Due to using one-year time lags for variables in some models, missing observations, or insufficient data, we end up with effective sample sizes for models that are 2000 observations or less.

Variables

Dependent Variables *FrontEndOutsourcing* (*FEO*) is a count variable of the number of customer-touching processes that the retailer reports as being performed externally by a process vendor. *BackEndOutsourcing* (*BEO*) is a similar count variable that represents the number of back-end processes. The *NumberOfOrders* processed by the e-retailer within a year is calculated by dividing the dollar-valued sales observed at each e-retailer during a calendar year by the e-retailer's average ticket (i.e., the average basket size in dollars). *WebsiteResponseTime* measures the average number of seconds that a customer request takes between clicking on a e-retailer link and the response to that click. Next, *BrowserSatisfactionIndex*, an index variable collected by ForeSee Results, indicates the general satisfaction of customers at that website.

Independent Variables Lagged *MonthlyVisits* is used to examine the propensity to outsource customer-facing and back-office service system components. *MonthlyVisits* is an estimate of the average total number of customer visits during a month within a year. *MonthlyVisits* is used as an independent variable to examine the impact of customer traffic on operational performance. To examine the impact of e-retailer outsourcing on performance, we use *FrontEndOutsourcing* and *BackEndOutsourcing*. We also interact *MonthlyVisits* with *FrontEndOutsourcing and MonthlyVisits* with *BackEndOutsourcing*.

Control Variables *WebServiceFeatures* and *CustomerServiceFeatures* are count variables of the number of website service features and the number of customer service features reported as offered by the e-retailer during the year. *WebsiteConsistency* is an index variable that controls for the variability of the e-retailer's website response time during the year. *HerfindahlIndexByCategory* controls for sector concentration, calculated within each year and merchant category. To control for firm experience, *Age* is a count variable that equals the present age for the e-retailer. We include dummy variables to capture fixed effects relevant for year, merchandise type, and merchant category.

Estimation methodology

We use several regression models to determine the impact of customer traffic on the propensity to outsource as well as the impact of customer traffic and outsourcing levels on the e-retailers' operating outcomes. The tables below note which regression models are used.

ESTIMATION RESULTS

We instrument the propensity to outsource back-end and front-end processes. Table 1 shows that coefficients for *Lag1.LnMonthlyVisits* are both statistically significant. A one percent increase in

the previous year's monthly customer traffic is associated with an increase in back-office and front-office service system outsourcing levels of 0.098 and 0.127.

We use fitted values of BEO and FEO in Table 2 regressions, which presents results for the impact of outsourcing and customer traffic on performance. For brevity, we present only fully specified models. Hypothesis 1A predicts that higher levels of traffic are associated with higher number of orders. We find that the coefficients of traffic are positive and insignificant. This hypothesis is supported when the interaction terms are not included. Hypothesis 1B predicts that higher levels of traffic are associated with longer website response time. We find that the coefficients of traffic increase response time, but are insignificant. Again, we find weak support of Hypothesis 1B when interactions are not included. Hypothesis 1C predicts that higher levels of traffic are associated with lower browser satisfaction. However, our results do not support this hypothesis, suggesting the opposite.

Table 1: Propensity to outsource back-end and front-end processes

	BEO	FEO
Intercept	6.635***	2.216**
	(0.772)	(0.823)
Lag1.WebsiteResponseTime	0.007	0.018+
	(0.008)	(0.009)
Lag1.WebsiteConsistency	-0.032	-0.034
	(0.033)	(0.038)
Lag1.LnMonthlyVisits	0.098*	0.127*
Lag1.WebServiceFeatures	0.036***	0.060***
	(0.009)	(0.011)
Lag1.CustomerServiceFeatures	0.012	0.095***
	(0.026)	(0.029)
Age	-0.117***	-0.063*
	(0.030)	(0.031)
Merchant Type dummies	Included	Included
Merchandise Category dummies	Included	Included
Year dummies	Included	Included
N	1678	1678
Log likelihood	-2746.777	-2903.318

Notes:+p<0.10;*p<0.05;**p<0.01;***p<0.001. Standard errors in parentheses. Models estimated using panel Tobit.

Hypothesis 2A predicts that with increasing levels of outsourcing, the impact of customer traffic on the number of orders will be even more positive. We find that the coefficients of both interaction terms are significant at $p<0.05$. Thus, we find support of this positive interaction effect. Hypothesis 2B predicts that with increasing levels of outsourcing, the impact of customer traffic on website response time will be even more positive. In contrast, we find that outsourcing levels negatively moderates this relationship, improving website response times. Two opposite forces (i.e., economies of scale and increased complexity) seemed to affect the moderating role of outsourcing on the relationship between customer traffic and site response times. Our findings suggest that the effect of economies of scale outweigh the effect of increased complexity as a result of high outsourcing. Hypothesis 2C predicts that with increasing levels of outsourcing, the

impact of customer traffic on browser satisfaction will be even more negative. Our findings support this effect.

Table 2: Estimation results for impact of outsourcing

	Number of Orders	Website Response Time	Browser Satisfaction Index
Intercept	10.205***	-9.612	---
	(1.451)	(9.956)	
BEOhat	0.154	3.560*	5.248+
	(0.189)	(1.639)	(3.162)
FEOhat	-0.421**	-0.899	4.634*
	(0.162)	(1.199)	(2.145)
LnMonthlyVisits	0.015	0.267	3.622***
	(0.078)	(0.487)	(1.028)
BEOhat x LnMonthlyVisits	0.017*	-0.143**	-0.108
	(0.007)	(0.052)	(0.122)
FEOhat x LnMonthlyVisits	0.021*	0.032	-0.384**
	(0.010)	(0.053)	(0.129)
HerfindahlIndexByCategory	0.410+	0.342	1.087
	(0.230)	(2.271)	(3.560)
Age	0.039+	0.077	0.517*
	(0.021)	(0.158)	(0.244)
Merchant Type dummies	---	---	Included
Merchandise Category dummies	---	---	Included
Year dummies	Included	Included	Included
N	1655	1665	345
R^2	0.695	0.057	
Log likelihood			-783

Notes:+p<0.10;*p<0.05;**p<0.01;***p<0.001. Robust standard errors clustered at e-retailer level in parentheses. NumberOfOrders and WebsiteResponseTime are estimated using fixed effects. Satisfaction estimated using ordered logit.

DISCUSSION AND CONCLUSION

Our study makes several contributions. First, our study is the first to examine roles of outsourced e-services in successfully executing e-commerce transactions, and how this outsourcing affects the relationship between customer traffic and e-retailer operating performance. Second, our study contributes to service operations literature by differentiating between front-end and back-end service outsourcing. Few empirical studies differentiate between front-end and back-end service outsourcing.

With respect to propensity to outsource, results indicate front-end and back-end outsourcing are driven by common factors. Customer traffic and web service features are significant factors that increase e-retailer propensity to outsource front-end and back-end services.

With respect to the impact of customer traffic on operational performance, we found that outsourcing has significant moderating effects on the relationship between customer traffic and operating outcomes. However, for some of the operating outcomes, either front-end outsourcing or back-end outsourcing play a moderating role, but not both.

As hypothesized, as customer traffic increases, both back-end and front-end outsourcing will have larger positive effects on the number of orders processed. These findings suggest outsourcing appears to be a means for e-retailers to increase their capacity to process customer orders as a result of increased customer traffic. This strategy applies to both front-end and back-end services. However, as customer traffic increases, front-end service outsourcing has no effect on the site response time. In contrast, back-end service outsourcing does enable faster response time. Next, as site traffic increases, high levels of front-end outsourcing actually lead to lower browser satisfaction. However, as site traffic increases, high back-end outsourcing has no significant negative effect on browser satisfaction.

E-retailers need to keep improving operating performance and shopper satisfaction to generate more repeat purchases. Outsourcing seems to be an intuitive choice for e-retailers to expand capacity to accommodate more site traffic. Yet, our results suggest that this tactic should be approached cautiously. Our results show that front-end outsourcing and back-end outsourcing can have considerably different impacts on site response time and browser satisfaction as site traffic increases.

Our study has several limitations. First, our sample is not a random sample since it consists of the top 500 e-retailers in North America. Next, due to data availability, we can only construct some operating performance measures including the number of orders, website response time, and browser satisfaction. Several future research directions are possible. Research might examine whether a single service outsourcer's process is used differently by different focal service firms. Research might consider whether the resulting services end up as recognizably different service experiences, or whether they result in feature duplication and experience commonality. We hope our study stimulates more research on service outsourcing as this is a topic of practical importance because of the wide spread of outsourcing but has been empirically understudied.

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