ABSTRACT

Service firms have become highly competitive in terms of providing the delivery. The delivery quality in terms of delivery commitments impact the customer in deciding for the service. Computing the delivery commitments in stochastic service systems is a real challenge. Delivery commitment forms a key parameter in formulating the service level agreements in B2B markets. In our current work we propose a queuing theoretic approach for computing the delivery commitments. The authors employ basic Probability theory to propose two bounds on delivery commitment time. Further, we investigate the effect of learning in service networks. They believe that their work can provide a simple and easy framework for quality analysis in stochastic service networks.

Keywords: Business-To-Business Markets (B2B Markets), Delay Sensitivity Index, Delivery Commitment, Learning in Service, Queuing Theory

INTRODUCTION

Service networks are a key for success in the global economy. The striking feature of service networks is usually high profit to investment ratio. Service networks compete mainly on the delivery time. Delivery commitment time in this regard forms a key parameter in formulating the service level agreements especially in B2B markets. In B2C markets the guaranteeing of delivery time via commitments can help the service firm to attract a larger market share. For example 3PLs such as FedEx, DHL, UPS promise money back guarantee if the actual delivery time exceeds the guaranteed delivery time by 60 seconds (DHL, 2009; FedEx, 2008; UPS, 2008).

In the manufacturing networks say for example Dell PC network focuses on service delivery and supply chain efficiency as key strategies. “Given that good product performance is common in the PC industry; the competitive battlefield is now focused on service delivery and supply chain efficiency” (Chopra & Meindl, 2001). Dell also provides online lead-time quotes to customers ordering personal computers via internet. Similar examples of competition with delivery commitment can be seen in...
cable industry, banks, call centers, amusement parks etc., for details please see (Ho & Zheng, 2004; Hopp & Sturgis, 2001). ERP vendors are focusing their attention on developing efficient systems which could help various sectors in delivery commitment (both for B2B and B2C markets) in terms of available-to-promise (ATP), capable-to-promise (CTP) etc. (Hopp & Sturgis, 2001).

Delivery commitment time is the promised delivery time by which a customer gets her service requested. Committing for delivery in service networks is proved to attract higher market share (Ho & Zheng, 2004). However a tight delivery time commitment has both benefits as well as costs associated with it. Tight delivery time commitments will attract impatient customers at the same time there can arise a need for extra capacity (resources e.g., manpower, machinery etc.). Customers have become ultimate driving force in service network commitments. The stochastic nature of the service chains makes it complex for the analysis of delivery commitments. We make the following contributions to literature:

• Framework for delivery commitment in stochastic service networks (SSN’s) via simple queueing model;
• Two bounds on delivery commitment time of SSN;
• Defining a delay sensitive index;
• Exploring the effects of learning in service via delay sensitivity index.

The paper is organized as follows: We discuss literature that is relevant to our work and contrast our work with prior work. Model description section follows literature review. We present the analysis of SSN and compute bounds on delivery commitment time and numerical illustration after the model description. Finally, the paper is concluded with future research directions.

RELEVANT LITERATURE

Delivery commitment research is increasingly gaining the attention of researchers in the industry. The literature on this demanding area however is scant. In this section, we focus on relevant papers that are in line with our research. There are two different streams of literature with respect to delivery commitment. First stream address the estimation of delivery commitment time and the second stream focuses on ways of optimizing the delivery (commitment) time. We focus on the first stream in the current research. For an understanding of optimization of delivery time (lead time) interested readers are pointed to Miltenburg and Sparling (1996). Ho and Zheng, (2004), present the necessity of delivery commitment with regard to marketing and operations interface. The authors investigate the impact of delivery commitment with regard to marketing and operations interface. The authors investigate the impact of delivery commitment and quality of delivery on the market share using queueing theory. They also prove the existence of Nash equilibria in duopolistic competition.

Hopp and Sturgis (2001), present a simple yet robust policy for quoting lead-time to customers based on (M/M/1 and M/G/1) queuing models. They consider an optimization framework for minimizing the customer lead-times subject to customer constraints (fill rate, tardiness etc.). Literature has focused on queuing models for computing sojourn time in system. This sojourn time can be lead-time in project development activity, manufacturing activity etc. In service networks we refer this as delivery time. For example, Y. Narahari and Kumar (1999) present a multiclass queuing model for analyzing the effect of lead time acceleration in product development. Kim (2001) presents a survey indicating the effects of customer condition on distributor’s commitment. He also indicates the difference between supplier commitment and distributor commitment with respect to customer conditions.
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