Chapter VI

Pricing and Service Quality in Electronic Commerce

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INTRODUCTION

Increased numbers of companies are conducting trade over the Internet. According to a report the AMR Research, we are at the midst of the business-to-business (B2B) growth (as of October 2000). They foresee aggressive growth rates through 2004, causing fundamental changes to the way businesses do business with each other. There is not a day passing without new numbers and forecasts arising about the current state or the future of the Internet Economy. One thing is certain though: the impact of the Internet on the business rules and how they are conducted is tremendous. A recent study from the University of Texas at Austin (Barua and Whinston, 2000) shows that the e-commerce portion of the Internet Economy alone tops the banking, aerospace and drug industries in revenues.

The study divides the Internet Economy into four layers. The first layer consists of the telecommunications companies, Internet Service Providers, Internet backbone carriers, local access companies and manufacturers of end-user networking equipment. In the second layer, Internet Applications Infrastructure involves software products and services necessary to facilitate Web transactions and transaction intermediaries. In addition to the software products that help facilitate Web transactions, this layer of the Internet Economy includes the consultants and service companies that design, build and maintain all types of Web sites, from portals to full e-commerce sites. The third layer, called the Internet Intermediary Indicator, consists of businesses that do not generate transaction-related revenues in the same way as the companies in other layers. There is a distinct type of company that

operates in layer three, one that is predominantly an Internet pure-play. While not directly generating revenues from transactions, their Web-based business generates revenues through advertising, membership subscription fees and commissions. Many of the layer three companies are purely Web content providers, while others are market makers or market intermediaries. Finally, the companies that are included in layer four are only those companies that are conducting Web-based commerce transactions (Barua and Whinston, 2000).

In this chapter, we analyze the pricing structures in each of the four layers of the Digital Economy, outlined above, and analyze the relationship between different pricing strategies and customer service quality concept. We provide a selective survey of the vast amount of related literature in the intersection of economics, marketing and computer science as well as point to open research problems and current efforts to understand the pricing and service quality issues in electronic commerce.

**PRICING AT LAYER ONE**

Layer one consists of networking hardware/software companies, Internet backbone providers and Internet Service Providers. The main focus of research in this area is to use pricing as a strategic tool to allocate scarce network resources among its users in the most efficient way with the assumption that they act selfishly. One of the seminal papers in this area is by Mendelson (1985). A considerable amount of literature that cites this paper forms a branch of literature on pricing and resource allocation in data networks at the intersection of computer science and economics. In general, those who surf the Internet are the ones whose opportunity cost of time is low. For a sustainable network operation with satisfied users, there needs to be a pricing system that is not only socially fair but takes into account the heterogeneous valuation of services by different customers as well. Mendelson (1985) studies the effects of queuing delays and users’ related costs, on the management and control of computing resources. The novelty of his approach comes from embedding the representation of performance of computer systems with queuing systems, into the standard microeconomic framework used to study price and capacity decisions, therefore creating an interdisciplinary approach to the problem. He represents quantity of computing per unit of time or, equivalently, the number of standardized transactions (or jobs) processed per unit of time, by \( q \). Associated with this level of usage is the value function \( V(q) \), which is an aggregate of users’ subsystems. The change in the value function with an additional change in the transaction is equal to the price of that transaction.

\[
\frac{dV(q)}{dq} = p
\]

The connection to the queuing representation of computer services is made by observing that the transactions in a computer system are actually their arrival rate.
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