

Guidelines for Network Service Pricing: An Extended Model Considering Increase of Network Users

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Abstract. In this paper, we provide an evaluation model for marketable quality and profitability. We define the marketable quality as a qualitative aspect of profitability. We apply the real values of some leading manufacturing corporations in Japan to our proposed model to analyze its accuracy. From the analysis, we found that theoretical and real standard values of the marketable quality indicator were very close. This shows that the proposed model has a good approximation. From the fair relation of network service providers and users, we present the network pricing guidelines and extend our proposed network service pricing model considering network externalities.

1 Introduction

Now the economy society is shifting from the economies of scale to the quality enhancement. For this reason, the achieved standard profitability depends on the free competition between corporations. This is a very important concept that should be considered to evaluate the corporation profitability. The corporation profitability is conceptually considered to be a function of two variables: the qualitative and quantitative aspects. In fact, the quality and quantity are independent variables. But, for the profitability, there is a relation between them.

The Break-Even Point (BEP) ratio expressed in the following equation is used as an indicator related to profitability to measure the degree of safety against a risk of loss.

Table 1. Annual relevant indicator values in the manufacturing industry

Item	Year												
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
r	1.128	1.159	1.207	1.214	1.198	1.154	1.109	1.087	1.100	1.127	1.146	1.135	1.098
Est. β	77.09	76.59	81.77	83.82	85.55	83.62	76.49	72.92	72.06	73.77	74.20	77.34	71.34
AGAV	28.37	29.41	32.78	35.19	37.49	33.58	32.45	31.30	32.12	33.56	35.08	34.51	31.15
AFC	37.49	38.93	41.73	45.08	49.14	45.92	46.38	45.30	47.82	48.40	50.10	50.63	48.63
β_0	0.606	0.574	0.561	0.569	0.596	0.628	0.622	0.617	0.596	0.581	0.565	0.600	0.592
$E(\beta)$	79.48	77.72	77.00	77.44	78.93	80.68	80.36	80.08	78.93	78.11	77.22	79.15	78.71

$$\text{BEP Ratio} = \text{Sales at BEP} / \text{Sales} = \text{Fixed Costs} / (\text{Sales} - \text{Variable Costs})$$

This indicator is based on the profit graph presented by Knoeppel [1]. Another profitability indicator (relative annual profit) has been obtained from the rate of operation and the rate of operation at the BEP [2].

$$\text{Relative Annual Profit} = \text{Rate of Operation} / \text{Rate of Operation at BEP} = \text{Marginal Profit} / \text{Fixed Costs}.$$

We consider the relative annual profit as a profitability indicator in this study. We define the marketable quality based on the quality aspects of products and services provided by corporations. In order to define the quality, Garvin [3] considers five viewpoints, i.e., transcendent, product based, user based, manufacture based and value based as main approaches. We define the marketable quality as a qualitative aspect of profitability (value based).

In this work, we present an evaluation model for marketable quality and profitability and extend our model for network service pricing. Furthermore, we enhance our network service pricing model considering network externalities.

The paper is organized as follows. In the next section, we present a model to evaluate the marketable quality and profitability. In Section 3, we give the econometric methodology. In Section 4, we present network service pricing guidelines and the extended network service pricing model. Finally, in Section 5, we give some conclusions.

2 Proposed Model

2.1 Basic Variables

If a certain corporation consists of m kinds of processes or divisions for a certain period, we consider the capacity of process i be T_i^c , and its costs (fixed costs) be F_i , where $i = 1, \dots, m$. The necessary capacity of process i is assumed to be T_i and the marginal profit which is calculated as the value of sales minus the variable costs is assumed to be M .

There is a minimum required level (minimum passing level) to purchase a product considering a sacrifice (price or fee) from the customers' side related to the quality of products or services given by a corporation. This means the minimum level to be achieved, even if the sacrifice is small. Therefore, we consider the minimum passing level as P_0 and the other levels as P .