

A Theoretical Foundation of the Learning Curve Eine theoretische Begründung der Lernkurve

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1. Problem

Although the learning curve concept is successfully applied in economic reality (Abell, Hammond, 1979), it still lacks a comprehensive foundation in the theory of the firm (Yelle, 1979; Amid, 1986). Especially the question of organizational learning (March, Olson, 1976) as determinant of the firm's cost dynamics has not been resolved yet. Therefore, the objective of this study is to give a theoretical foundation of the learning curve by explaining organizational learning as a determinant of the firm's cost dynamics.

We proceed in the following way: First we discuss the theoretical insufficiencies of the learning curve concept. Second the determinants of the cost dynamics of the firm are analyzed. Thereby we show that, besides economies of scale and economies of volume effects, especially organizational learning determines the firm's cost dynamics. Finally, the learning curve as a dynamic cost curve is derived from a sequence of period cost curves. Thereby we examine the influence of organizational learning on the learning curve under constant and increasing returns to scale.

2. Insufficient Theoretical Foundation of the Learning Curve

The general formulation of the learning curve is given by

$$AC_t = AC_0(Q_t/Q_0)^{-b}.$$

AC_0, AC_t = cost per unit at times 0 and t , respectively;
 Q_0, Q_t = cumulative output at time 0 and t , respectively;
 b = constant, which reflects the learning rate.

It shows that the average costs decrease by a fixed percentage as the cumulative output increases.

The theoretical problem of this curve lies in not sufficiently explaining the causal relationship between the costs and their determinants. The theoretical critique can be summarized by the following arguments:

- (1) b is a constant and is not differentiated according to the determinants of organizational learning; only "manual" learning represented by the elasticity of unit costs to cumulative output is considered (Baloff, 1965-66).

