

Measures of Competivity and Performance for Manufacturing Companies

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1. Introduction

- 1.1. There are a number of frequently used performance indicators which have varied in popularity over the last 30 years or so.
- 1.2. Competivity or competitiveness is a more recent concept which has not acquired (yet) a precise definition. We need to give it one, ideally to complement other performance measures already in use.

2. Existing performance measures

- 2.1. Mostly these are financial returns on capital and labour separately, or as combined in a specific project.

Added value measures

As used in the UMIST Process Manufacture lectures, these are:

r_L = added value per unit of labour cost

$$\frac{A}{L} = \frac{G_1 q_1}{F_{14} + F_{13}} \quad (1)$$

r_C = Added value per unit of capital employed

$$\frac{A}{C} = \frac{G_1 q_1}{C_1} \quad (2)$$

So-called 'Total Factor Productivity' means in general terms the output (added value) obtained from labour and capital in a combination which will vary with technology and firm.

One way of doing this which is consistent with a firm's accounting and could give a national figure is to take taxable profit as the surplus generated by the firm after allowing for labour and capital usage:

$$F_{11}^{(4)} = (G_1 q_1) - L_1 - \alpha C_1 \quad (3)$$

where:

L = cost of labour employed

$$\alpha = \left(\frac{\text{insurance} + \text{interest} + \text{depreciation}}{\text{capital employed}} \right)$$

where in the EEM:

$$\text{Insurance} \equiv F_{12}^{(1)}$$

$$\text{Interest} \equiv F_{12}^{(2)}$$

$$\text{Depreciation} \equiv F_{11}^{(2)}$$

Thus total factor productivity is then:

$$\begin{aligned} \text{TFP} &\equiv \frac{\text{Added value}}{L_1 + \alpha C_1} \\ &= 1 + \frac{\text{Taxable profit}}{L_1 + \alpha C_1} \end{aligned} \quad (4)$$

2.2. Return on investment measures

There are basically 2 approaches:

- (i) Instantaneous
- (ii) Long term

2.2.1. Instantaneous return

These are simply measures of profit divided by capital employed or shareholder funds or shareholder capital as represented by their equity, none of which are the same. Company performance is probably best represented by:

$$r_p \equiv \frac{\text{taxable profit}}{\text{total net assets}} = \frac{F_{11}^{(4)}}{C_1} \quad (5)$$

By contrast, shareholder performance (ie. from the stockmarkets point of view) is represented by:

$$\begin{aligned} r_s &\equiv \frac{\text{after tax profit}}{\text{total equity value}} \\ &= \frac{F_{11}^{(8)}}{\text{total equity value}} \end{aligned} \quad (6)$$

2.2.2. Long term return

This is best assessed by the discounted cash flow method expressed over a given period of time e.g. 10 years. The net present value (NPV) is that present investment which would give the same value of cash flows obtained from the firm over a 10 year period, allowing for the (assumed) inflation rates (i), thus:

$$\text{NPV} = \sum_{n=1}^{10} F_{11}^{(4)} \frac{1}{\left(1 + \frac{i}{100}\right)^n} \quad (7)$$

3. Competivity

Competivity is, in general terms, the ability of a company to expand or at least hold its market share against competition.

Thus a firm is competitive if:

$$\frac{dS_{14}}{dt} \geq 0 \quad (8)$$

Where S_{14} is given by Eq (5) in the EEM flowsheets.

If the market coverages are unchanged then Eq (8) implies that:

$$\frac{dV_{14}}{dt} \geq \frac{dV_{04}}{dt} \quad (9)$$

i.e. the value (benefit / price) of the firms products is increasing at least as fast as its competitors year by year. This model calculates these values at equation (5) of the EEM flowsheet. Thus competitiveness measure C_M :

$$C_M \equiv \left(\frac{dV_{14}}{dt} - \frac{dV_{04}}{dt} \right)$$

is closely linked to the performance measures in section 2 – particularly by long term return NPV/(Capital invested).