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Masterkurs Produktion und Logistik
Lösungsblatt 2

Beispiel 1

a)

$$q^* = \sqrt{\frac{2kd}{h}} = \sqrt{\frac{2 * 5 * 20 * 5000}{12 * 0{,}15}} = 745{,}36$$

$$TC_{745} = \frac{d * k}{q} + d * c + \frac{h * q}{2} = \frac{5000 * 5 * 20}{745} + 5000 * 12 + \frac{12 * 0{,}15 * 745}{2} = 61341{,}64094$$

$$TC_{746} = \frac{d * k}{q} + d * c + \frac{h * q}{2} = \frac{5000 * 5 * 20}{746} + 5000 * 12 + \frac{12 * 0{,}15 * 746}{2} = 61341{,}64129$$

$$=> q^* = 745\ bzw.\ TC_{q^*} = 61341{,}64094$$

b)

$$I_r = t_l * \frac{d}{t_{Arbeitstage}} = 14 * 1{,}5 * \frac{5000}{250} = 420$$

$$T = \frac{q^*}{d} = \frac{745}{5000} = 0{,}149\ Jahre\ * 12 = 1{,}788\ Monate$$

c)

$$TC_{d'} = \sqrt{2 * k * d' * h} + c * d = \sqrt{2 * k * 1{,}3 * d * h} + c * d = \sqrt{1{,}3} * TC_{q^*} = 1{,}14 * TC_{q^*}$$

Die Gesamtkosten würden sich um 14% erhöhen.

Beispiel 2

a)

$$q^* = \sqrt{\frac{h+v}{v}} * \sqrt{\frac{2kd}{h}} = \sqrt{\frac{10+50}{50}} * \sqrt{\frac{2 * 200 * 300}{10}} = 120$$

$$TC_{q^*} = \sqrt{\frac{v}{h+v}} * \sqrt{2 * k * d * h} + c * d = \sqrt{\frac{50}{10+50}}\ \sqrt{2 * 200 * 300 * 10} + 100 * 300 = 31.100$$

b)

$$s^* = \frac{h * q^*}{h+v} = \frac{10 * 120}{10+50} = 20$$

$$\bar{S} = \frac{s^2}{2q} = \frac{20^2}{2 * 120} = 1{,}67$$

$$\bar{I} = \frac{(q-s)^2}{2q} = \frac{(120-20)^2}{2 * 120} = 41{,}67$$

c)

$$\sqrt{\frac{h+v}{v}} > 1 => q^*_{Fehlmenge} > q^*_{Standard}$$

$$0 < \sqrt{\frac{v}{h+v}} < 1 => TC_{Fehlmenge} < TC_{Standatd}$$

Beispiel 3

a)

$$m^* = \sqrt{\frac{2kd}{h}} * \sqrt{1-\frac{d}{r}} => h = \frac{2kd}{m^{*2}} * 1-\frac{d}{r} = \frac{2*15000*576}{40^2} * 1-\frac{576}{50*12} = 432$$

b)

$$q^* = \sqrt{\frac{2kd}{h*(1-\frac{d}{r})}} = \sqrt{\frac{2*15000*576}{432*(1-\frac{576}{50*12})}} = 1000$$

$$TC_{q^*} = \sqrt{(1-\frac{d}{r})} * \sqrt{2kdh} + c*d = \sqrt{(1-\frac{576}{50*12})} * \sqrt{2*15000*576*432} = 17280$$

$$\bar{I} = \frac{q^**(1-\frac{d}{r})}{2} = \frac{1000*(1-\frac{576}{50*12})}{2} = 20$$

$$T_r = \frac{q^*}{r} = \frac{1000}{50*12} = 1{,}67$$

$$N_{q^*} = \frac{d}{q^*} = \frac{576}{1000} = 0{,}576$$

c)

$$0 < (1-\frac{d}{r}) < 1 => q^*_{Produktion} > q^*_{Standard} \quad bzw. \quad m^*_{Produktion} < q^*_{Standard}$$

Beispiel 4

a)

$$q_1 = \sqrt{\frac{2kd}{p*c_1}} = \sqrt{\frac{2*500*12*2000}{0{,}25*250}} = 619{,}68$$

$$TC_{619} = k*\frac{d}{q_{1,1}} + c_1*d + h*\frac{q_{1,1}}{2} = 500*\frac{12*2000}{619} + 250*2000*12 + 0{,}25*250*\frac{619}{2} = 6038729{,}86$$

$$TC_{620} = k*\frac{d}{q_{1,2}} + c_1*d + h*\frac{q_{1,2}}{2} = 500*\frac{12*2000}{620} + 250*2000*12 + 0{,}25*250*\frac{620}{2} = 6038729{,}84$$

$$q_2 = \sqrt{\frac{2kd}{p*c_2}} = \sqrt{\frac{2*500*12*2000}{0{,}25*200}} = 692{,}82 < 1000 => 1000$$

$$TC_{1000} = k*\frac{d}{q_{1,1}} + c_c*d + h*\frac{q_2}{2} = 500*\frac{12*2000}{1000} + 200*2000*12 + 0{,}25*200*\frac{1000}{2} = 4837000$$

$$q_3 = \sqrt{\frac{2kd}{p*c_3}} = \sqrt{\frac{2*500*12*2000}{0{,}25*190}} = 710{,}82 < 12000 => 12000$$

$$TC_{12000} = k*\frac{d}{q_3} + c_c*d + h*\frac{q_3}{2} = 500*\frac{12*2000}{12000} + 190*2000*12 + 0{,}25*190*\frac{12000}{2} = 4846000$$

$$TC_{1000} < TC_{12000} < TC_{620} => q^* = 100\ bzw. TC^* = 4837000$$

b)

$$\frac{500 * 12 * 2000}{x} + 190 * 2000 * 12 + 0{,}25 * 190 * \frac{x}{2} \leq 4837000 => 23{,}75x^2 - 277000x + 12000000 \leq 0$$

$$x_+ = \frac{277000 + \sqrt{277000^2 - 4 * 23{,}75 * 12000000}}{2 * 23{,}75} = 11619{,}67$$

$$TC_{11619} = k * \frac{d}{q} + c_3 * d + h * \frac{q}{2} = 500 * \frac{12 * 2000}{11619} + 190 * 2000 * 12 + 0{,}25 * 190 * \frac{11619}{2} = 4836984$$

$$TC_{11620} = k * \frac{d}{q} + c_3 * d + h * \frac{q}{2} = 500 * \frac{12 * 2000}{11620} + 190 * 2000 * 12 + 0{,}25 * 190 * \frac{11620}{2} = 4837008$$

$$TC_{11619} < TC_{1000} < TC_{11620} => TC_{Verhandlung} = 11619$$

$$Veränderung = \left|\frac{11619 - 12000}{12000}\right| = 0{,}03175 = 3{,}175\%$$