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JUSTIFICATION OF TRENDS WHEN CYCLIC VARIATIONS OF INDICATORS

This article speaks about reflection of time indexes of progress and it give estimate, which describe the direction of economic progress of organizations.

Keywords: Reflection. Time indexes. Progress. Estimate. Direction of economic progress.

There are cycle processes in to economic. It's necessary them test for admission management solutions. For this affect is needed to use concept of trend of senses of indexes of indicators. There are offer next approaches to use.

If $X^{\min 2} > X^{\max 1}$ and $(X_i, X_{i+1}) \sim X_2 > X_1$, then it can consider, that trend of change s of concept of economic development of organizations as positive and strong.

If $X^{\max 1} > X^{\max 2}$ and $(X_i, X_{i+1}) \sim X_2 > X_1$, then it can consider, that trend of changes of concept of economic development of organizations as positive, but weak.

If $X^{\max 1} = X^{\max 2}$ and $(X_i, X_{i+1}) \sim X_2 > X_1$, then it can consider, that trend of change s of concept of economic development of organizations as simply positive.

If $X^{\max 1} < X^{\max 2}$ and $(X_i, X_{i+1}) \sim X_2 < X_1$, then it can consider, that trend of changes of concept of economic development of organizations as negative and strong.

If $X^{\max 2} > X^{\max 1}$ and $(X_i, X_{i+1}) \sim X_2 < X_1$, then it can consider, that trend of changes of concept of economic development of organizations as negative but weak.

If $X^{\max 2} = X^{\max 1}$ and $(X_i, X_{i+1}) \sim X_2 < X_1$, then it can consider, that trend of changes of concept of economic development of organizations as simply negative.

Border (limit) between strong or weak of trends of negative or positive characters are needed mathematical estimate.

Trend is stable variations of fluctuating operational indicators of organization. It is often required with measured fluctuations of values of its economic condition indicators to set limits of the trend of enterprise operation indicators growth theoretically [1]. To determine them in a first approximation we assume that the life cycle of organization is sinusoidal. Peak values of indicators in this cycle are A_m . It is measured average values of i-indicators - $X_{i+1} = X_i$. It

is required to set a coefficient of proportionality (coefficient of the trend - k, where $k > 1$) among values X_i, X_{i+1} , if growth of indicators is observed. In addition it is satisfied a relation that maximum of values of i-indicator in the previous cycle is not more than minimum of values of i-indicator in the consequent cycle (Fig. 1).

$$\text{Let } \overline{X_{i+1}} = k \overline{X_i}(1), k > 1, A_m = \text{const}, X_i^{\max} \leq X_i^{\min 2} \quad (1)$$

Construct the following (Fig. 1).

Draw a tangent - BA between the points $X_i^{\max}, X_i^{\max 2}$ and the line of average values of i-indicator - ML through the points X_i, X_{i+1} . From the point A ($X_i^{\min 2}$) drop a perpendicular - AF to ML. From the point M (X_i) drop the perpendicular MN to DN (line X_{i+1}) From the point N draw the line NK parallel to ML, and drop from the point D to NK the perpendicular DK.

From constructed right-angled triangle AMDN express $\sin \alpha$:

$$\sin \alpha = \frac{DN}{MD}$$

where $DN = X_{i+1} - X_i (MN \perp DN)$ Inserting dependence (1) for X_{i+1} fix

$$DN = \overline{X_i}(k-1), aMD = T_{ou}$$

In this case:

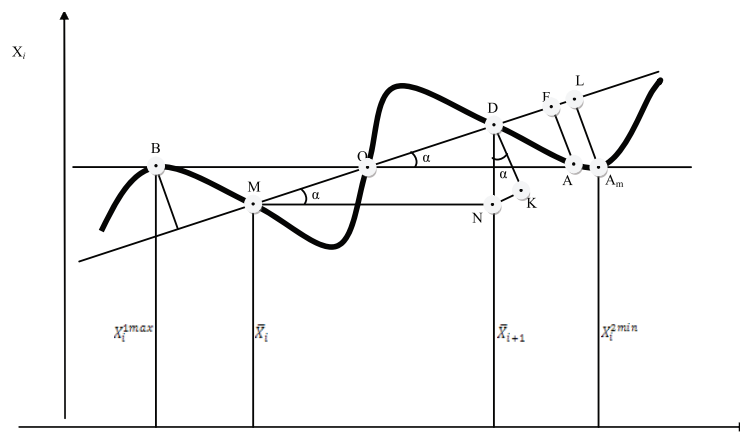


Fig. 1. Graph with trend

$$\sin \alpha = \frac{x_i(k-1)}{T_{ou}} \quad (2)$$

Consider the similar triangles (fig.1):

$$\triangle OFA \sim \triangle MDN$$

(DF coincides with MD, $FA \perp DF$, $DM \perp MN$). It is followed from the triangle $\triangle OFA$

$$\tan \alpha = \frac{FA}{FO} \quad (3)$$

where $FA \leq A_m, FO \leq OL = 3/4 T_{ou}$ which are to be inserted into the expression (3), then:

$$\tan \alpha = \frac{4A}{3T_{ou}} \quad (4)$$

It is followed from the similar triangles $\triangle DNK \sim \triangle OFA$ ($DN \perp OA$, $DK \perp OF$):

$$\cos \alpha = \frac{DK}{DN} \quad (5)$$

where $K \leq A_m, DN = X_i(k-1)$, which are to be inserted into the formula (5) and transform it:

$$\cos \alpha = \frac{A_m}{X_i(k-1)} \quad (6)$$

Taking into account that $\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$ include values $\sin \alpha$ from the equation (2), and $\cos \alpha$ from the formula (6). Set the constraints for $\tan \alpha$ from the expression (4).

Get the inequation after transformations:

$$\frac{[X_i(k-1)]^2}{T_{ou}A_m} \leq \frac{4A_m}{3T_{ou}} \quad (7)$$

Modify the inequation (7) with respect to k

$$k \leq 1 + \frac{A_m}{X_i} \sqrt{1.33} \quad (8)$$

Insert k under the inequation (8) into the expression (1) and get as a result:

$$X_{i+1} \leq X_i + A_m \sqrt{1.33}$$

In this case trend will have stable growth when cyclic sinusoidal changing i-indicator, provided its each value on consequent measures will satisfy the in equation (9).

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