UDC 005.8:004.9

Main aspects of project management and development programs of IT-availability of the manufacturing enterprises

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Abstract
The analysis, theoretical and practical aspects of the formation and management of the IT-availability increasing program were covered. The models of the current and planned state of IT-availability assessment were represented. The selection of priority projects by support types became the basis of the program forming method of IT-availability increasing.

Introduction

Currently, the activities of manufacturing enterprises is carried out in the era of knowledge economy and based on the use of modern information technology (IT) with taking into account such features of products as: a high level of uniqueness, complexity and research intensity, individual character of development and production, the wide range of products requiring accompaniment for all life cycle stages, long terms and significant development costs in accordance with the customer requirements.

The introduction of IT in all phases of the project lifecycle is one of the important directions of projects terms reduction of products production projects, ISS

$$Inf = \{Met\_sup \cup Lin\_sup \cup Math\_sup \cup Prog\_sup \cup Tech\_sup \cup Inf\_sup \cup Org\_sup\}$$

(Inf) is characterized by a certain level of represented types of the support that must be interconnected within the structural and functional elements of ME.

In accordance with the existing definition of the technological maturity as a measure of enterprise availability to effective management of its activities and development on the basis of the project approach, the models of the enterprise technological maturity CMM (Capability Maturity Model for Software) [9], ORMZ [10] G. Kerzner

[11] and IPMA Delta organizations assessment [12] was decided to examine each type of support on five development levels (level 1 - minimum acceptable performance for the enterprise, 5 - the maximum required).

According to the analysis results of the IT-availability of current state for each support type the availability level is determined, which in time may increase or decrease.

Model of formation of the IT-availability improving content program of the enterprise

When forming the program content to increase IT-availability we should understand for what types of structural units and software it is necessary to conduct appropriate activities. To do this you need to know what the error ratio between the current and planned state of the enterprise IT-availability is. The error ratio can be determined by comparing the current and planned state. For this it is necessary to make their assessment.

Assessing of the current state of the enterprise IT-availability is proposed to determine the "bottom up", starting from every workplace and thus through the hierarchy of structural and functional elements ending with the whole enterprise, i. e. the level of IT-availability in each workplace should be determined separately for each type of support:

$$\{R_i^{met}, R_i^{lin}, R_i^{math}, R_i^{pro}, R_i^{tech}, R_i^{inf}, R_i^{org}\}$$

where R_i – i-th workplace. Understanding of the IT-availability level in each workplace separately for each type of software will make it possible to calculate the integral index of IT-availability for the workplace intended to be determined by using the expert assessments (weight coefficients).

The information for the prioritization of projects within the improvement program formation model of IT-availability was obtained based on the processing of results of the expert assessment of the changing features.

For the significance of the weighting coefficients by type of software the leading ME experts are recommended to involve. In particular, they can be leaders and leading experts of following departments: production, personnel, quality, finance, economic programs and complete objects directors, technical management, logistics management and from the chief engineer office.

To reduce the subjectivity of at least two representatives from each area assessment are proposed to involve.

The experts will be asked to assign an importance coefficient of each support type for every workplace. Thus the level of IT-availability of i–th workplace R_i will equal $R_i = \sum_{j=1}^{7} W_j \cdot R_i^j$, where W_j - weighting coefficient of j –th support type.

To determine the current level of IT-availability of the departments, divisions and the whole enterprise, a person making the decision is offered to choose one of the assessment variants: the minimax (the level of IT-availability is determined by the maximum and minimum values), the arithmetic mean (the level of IT-availability is determined by the maximum and minimum values) and the expert (the IT-availability level is determined by taking into account the weight ratio to the support type)

That is the level of IT-availability ($\{O_y^j\}$) y –th department of i–th type of support is equal to

$$O_y^j = \min\left\{R_i^{y\,j}\right\}, \text{ or } O_y^j = \max\left\{R_i^{y\,j}\right\}, \text{ or}$$

$$O_y^j = \left\{\frac{\sum_{i=1}^{n} R_i^{y\,j}}{n}\right\}, \text{ or } O_y^j = \sum_{j=1}^{u} W_j \cdot R_i^{y\,j} \text{ respectively,}$$

where R_i^{yj} – IT-availability level of j -th type of support of i–th workplace, that is located in y-th department; n – the number of workplaces in the department.

Similarly, the current level of IT-availability of divisions and the entire enterprise is determined (Fig. 1)

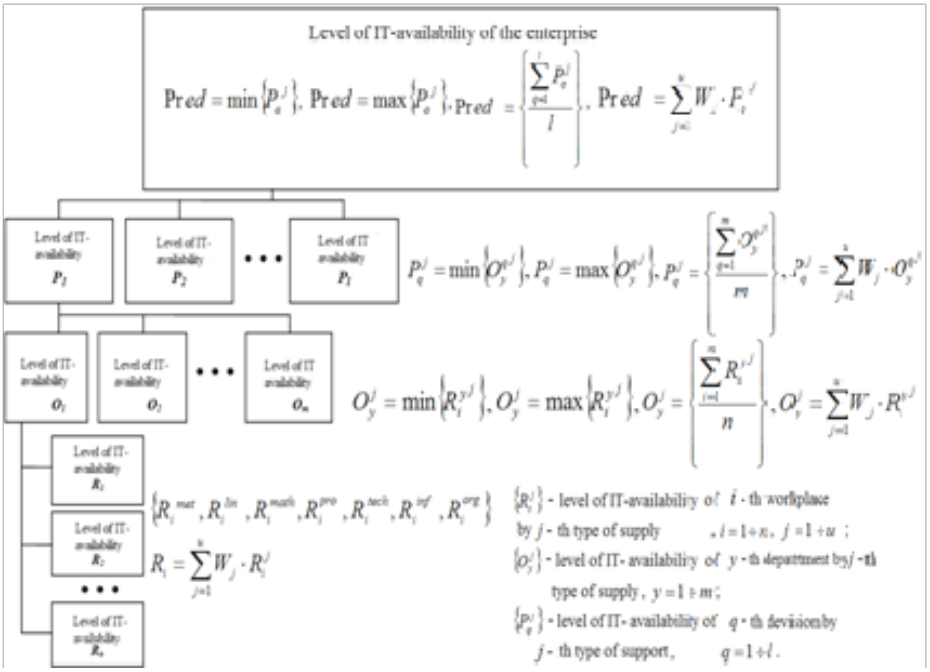

Figure 1. Assessment model of the current and planned state of the IT-availability

The planned state of the enterprise IT- availability is proposed to determine by "bottom up" as the existing project portfolio dictates the overall level of IT-availability. Selecting the most rational variant of the planned state is performed by taking into account such additional restrictions as uniform workplace capacity, integration of fieldwork etc.

Model of project plans formation for IT-availability improving program

Let us consider management process of the IT-availability improving program on ME as a set of projects by the type of support:

$\theta = \{\theta_1, \theta_2, \theta_3, \dots, \theta_n\}$, where θ_n –projects by the types of support.

To implement the project θ_n it is necessary to perform management action $F^j = \{f_i^j\}, j = \overline{1, n_i}$.

Every action is characterized by the parameters of $f = \langle R, N, P, C, S, I \rangle$, where f –action on the formation of the information support system; R –regulations of the action performance; N –quantitative measure of the action (implies the number of processed documents, the amount of input data, etc.), P –actions performer; C–the costs necessary to perform the action;S –the need for resources;I –condition for the implementation of action.

The implementation of the improving IT-availability program based on the structuring of the information support system, which will provide access to the necessary information in the shortest time and at the lowest cost.

The structure of the improving ME IT-availability program should be defined by functional relationships in the projects information environment. The task of building the projects management rational content to the types of software is formed in such a way that, on the basis of the necessary management actions in the projects, it is necessary to create such a program for IT –availability improving,

for which: $\sum_{i=1}^{n}\sum_{j=1}^{n_i} C(f_j^i) \to \min$, where $C(f_j^i)$ - costs of actions implementation f_j^i with limitations: $\Sigma;\ \Phi; t(f_j^i) \le t_{max}(f_j^i); I$,, where Σ - structural elements of the enterprise; F - functional elements of the enterprise; F –functional elements of the enterprise; $t(f_j^i) \le t_{max}(f_j^i)$ –time allowed to implement the function f_j^i. The limitations of the IT-availability improving program objective function are the structural and functional elements of the ME, ensuring a certain level of costs on the actions implementation of the projects management and also time, management and technological conditions for the implementation of these actions.

It is also necessary to consider that within the implementation of the projects by type of the software actions can be unified and specialized.

Unified actions are described by current business processes and implemented by the existing structural elements of the enterprise, and for implementing the specialized establishment of the separate structures

specifically for a particular project by the type of the software is required.

Assessment of the effectiveness of IT-availability improving programs

With increasing level of IT-availability the costs for implementing projects on the ME products development are reduced. The program of increasing of IT-availability is aimed primarily at improving the efficiency of the enterprise. Based on the implementation of research results into practice of the ME, the project implementation of IT-availability improving program would reduce the cost of ME products development.

Implementation of the information support depends on factors such as a stable investment in the purchase of existing and development of new ISS, management support, the active development of IT services in the enterprise, etc.

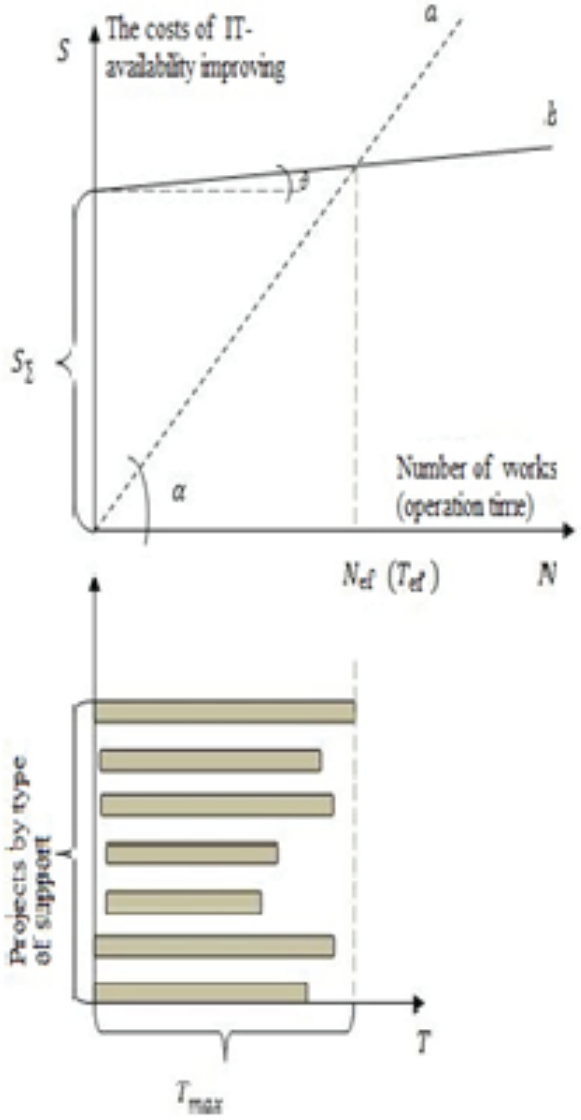

Figure 2. The schedule of one-time investments utilization on improving the IT-availability

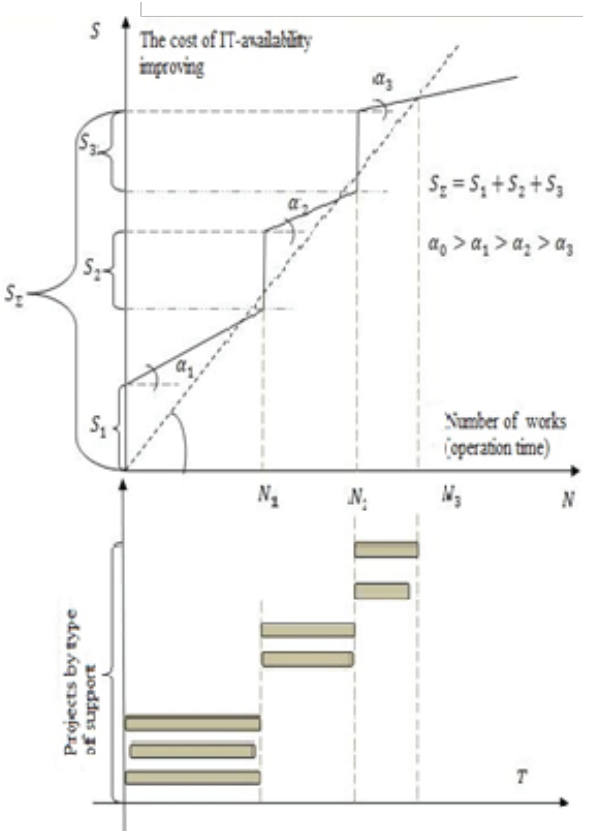

Figure 3. The phased schedule of investments utilizing to increase IT-availability

Case 1. Let us consider the case when at once the resources for the implementation of all projects on improving the IT-availability by the types of support are available (Fig. 2). As can be seen from the figure, before the implementation of projects to improve IT-availability the cost of ME products development are increased with typical permanence.

When the investments (S_Σ) on the development of information support system of processes development, production and management are utilize, the costs on the products design are significantly reduced (line b), as IT-availability increasing reduces the prime cost of the products.

Case 2. Let us consider the option of projects financing by type of software that occurs in stages (Fig. 3). Using the method of system condition indirect assessment the priority of selection and types of support of the divisions (workplaces) are determined and they are included in the priority implementation of IT-availability improving projects. As can be seen from the figure, with each increasing the level of IT-availability, the costs (S_1, S_2, S_3) on the products development are reduced respectively.

Conclusion

The approaches to planning and management of the IT- availability improving program are discussed in the article. For the prioritization of projects the

model of the IT-availability improving program was developed based on I. Leung model of indirect state assessment.

The deepening and development of theoretical positions of the project management processes and IT-availability improving programs allowed us to develop a method of forming the IT-availability improving program for solving the problem of content and planning formation of the IT-availability improving program implementation with taking into account projects priority, time constraints and resource capabilities of the enterprise followed by the assessment of its effectiveness in reducing the costs of implementing the project portfolio of the industrial products developing.

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