PRODUCT MODEL OF INFORMATION RESOURCES MANAGEMENT OF A PROJECT-ORIENTED ENTERPRISE

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ABSTRACT *In the article it is proposed to consider resource management processes as separate projects of creation and provision of information resources (PCPIR). To manage such projects product structure is developed. Such classes of information resources as external, interim, internal and final resources are formalized. Their relationship and transformation in process of the implementation of information procedures are shown. Procedures of creation and provision of information resource are allocated. It is shown that the informational product is formed on basis of interpenetration final information resource in the knowledge of the consumer. Features of PCPIR in terms of construction of management models are defined. Dependent processing technology from product PCPIR structure is attributed to these features. It is shown that in PCPIR it is necessary to start tasks as late as possible, closer until the late start. It is determined that the PCPIR oriented to information resource quality. The definition of quality of information resources is given and its measure is proposed. It is shown that the product model can provide projects of creating and provision of information resources in the form of patterns that reflect different approaches to the implementation of these projects, depending on their characteristics and specificity. The model of information resource management on basis on bipartite graphs is presented. The use of this model is shown in the example of project of creation and provision of the project statute.*
Keywords: product model; information resource; project management

ПОПРОДУКТОВА МОДЕЛЬ УПРАВЛІННЯ ІНФОРМАЦІЙНИМИ РЕСУРСАМИ ПРОЕКТНО-ОРІЄНТОВАНОГО ПІДПРИЄМСТВА

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АНОТАЦІЯ *В статті запропоновано розглядати процеси управління інформаційними ресурсами як окремі проекти створення та надання інформаційних ресурсів (ПСНІР). Для управління такими проектами розроблено попродуктову структуру. Формалізовано класи інформаційних ресурсів: зовнішні, проміжні, внутрішні та кінцеві. Показано їх взаємозв'язок та взаємоперехід в процесі реалізації інформаційних процедур. Виділено процедури створення та надання інформаційного ресурсу. Показано, що інформаційний продукт формується на основі взаємопроникнення кінцевого інформаційного ресурсу в знання споживача.*
Ключові слова: попродуктова модель; інформаційний ресурс; управління проектами

Introduction

Present development period of Ukrainian business is linked to the economic and political crisis and to the output to the relatively stable development, characterized by the development of project activities in all areas of national entrepreneurship. However, the management of any enterprise can not exist without an effective information interaction both within the enterprise and the environment. Ensuring such effective information interaction requires a new organization of processes of management of operating, production and project activities that are focused not just on solutions of functional tasks, but ensure the formation of an information resource of systems that solve these problems. New information technologies that form a such resource are necessary.

So many project-oriented enterprises need to improve their work creating new methods, models and tools of information management.

Today there are many scientific works that are devoted to the problem of resource management in enterprises [1-6]. Using of product model that was used for the management of logistical and human resources of a project-oriented enterprise is proposed in the article [7,8].

The purpose of the study

The purpose of the article is to describe product model of a project-oriented enterprise resource management.

Presentation of basic material

The paper proposes to apply the project approach to the creation and use of information resource of project-oriented enterprises. The essence of this approach to resource management is the creation and use of this resource is considered as the project implementation with all the attributes and components of the control system. Because when you create and use any information resource you must to plan actions (project integration management and project content management), organize work services, monitor, consider the risks, information communications, human resources, sometimes - procurement, etc. In the future such projects will be called Project of creation and provision of information resources (PCPIR) [9].

In projects of creation and provision of information resource a set of processes of creation, receiving, analysis, processing, storing and providing information to various participants of PCPIR is implemented. And the result of the project is an information resource for customers. A wide variety of information resources, which are the products of separate stages of PCPIR is created and used in projects during its receiving. Consider these products in terms of procedures of the creation and transmission of information (Figure 1).

In the PCPIR management each information resource can be internal, external, intermediate or final.
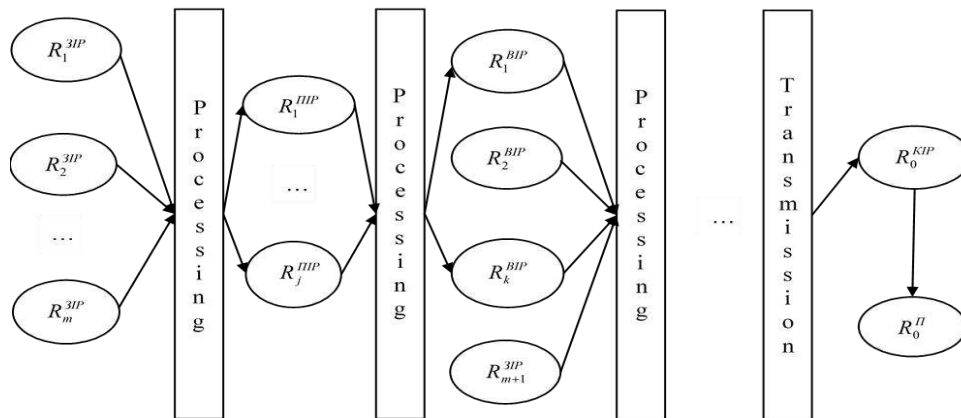

Fig. 1 - Scheme of the process of an information resource creating and providing

Definition 1. The interim information resource (IIR) – the information resource that received in PCPIR and which is not suitable for consumer use because of incompleteness, but to be used to create an information product:

$$R^{\Pi IP} = I^{C}(R^{3IP}, R^{BIP}),\qquad(1)$$

where

$R^{\Pi IP}$ – the interim information resource;

R^{BIP} – the internal information resource;

R^{3IP} – the external information resource;

I^{C} – the procedure of creation of the information resource.

In the fig. 1 these are the following resources: $R_1^{\Pi IIP}, R_j^{\Pi IIP}$.

IIR is formed from the external and internal information resources by the procedures of creation of the information resource.

An IIR consumer is an enterprise department or a PCPIR subject, which requires an interim information resource to implement procedures for the formation of other intermim or final information resource. When a consumer receives IIR it integrates with other data and knowledge of the consumer and becomes an internal information resource PCPIR.

Definition 2. The internal information resource – the information resource transmitted in PCPIR for further use for receiving another interim or final information resource.

$$\forall R^{BIP} \exists R^{\Pi IP} : \; R^{BIP} = I^{\Pi}(R^{\Pi IP}),\qquad(2)$$

where

$R^{\Pi IP}$ – the interim information resource;

R^{BIP} – the internal information resource;

I^{Π} – the procedure of transmission of the information resource;

In the fig. 1 these are the following resources: $R_1^{BIP}, R_2^{BIP}, R_k^{BIP}$.

Definition 3. The external information resource (EIR) – the information resource that is created outside the project.

In the fig. 1 these are the following resources: $R_1^{3IP}, R_2^{3IP}, R_m^{3IP}, R_{m+1}^{3IP}$.

This resource is not formed in PCPIR, but it is available in a project-oriented enterprise.

Definition 4. The final information resource (FIR) – the product of the project of creation and provision of the information resource.

$$R^{KIP} = I^C(R^{3IP}, R^{BIP}),\qquad(3)$$

where R^{KIP} – the final information resource,

In the fig. 1 this is the following resources: R_0^{KIP}.

Definition 5. The information product (IP) – accepted for consumer use and integrated with his knowledge final resource.

$$R^{\Pi} = I^{\Pi}(R^{KIP}),\qquad(4)$$

where R^{Π} – the information product.

In the fig. 1 this is R_0^{Π}.

Definition 6. The procedure of provision the information resource (I^{Π}) – the process of the information resource transfer and integration with correspondent/consumer knowledge.

Definition 7. The procedure of creation the information resource (I^C) – the process of analysis and processing of information resource by services of project-oriented enterprise or by the information system.

Now consider the requirements and features of PCPIR for various classes of projects.

Features PCPIR management compared to traditional project management are:

1. Links between tasks determine not so much the technology (as in traditional projects), but the readiness of incoming IR created in previous works. In fact, each model PCPIR management is a dynamic model that reflects the dependence and sequence in receiving and use the interim IR, which are then used to get the final information resource.

2. Because the end point of information procedures is not the IR creation, but its receiving by staff that implement the following procedures (where this resource is input), the type of communication is not the traditional models of network "finish-start" (FS), but rather rare "start-finish" (SF). This means that the previous procedure will end only when the performers following procedure will start their work (to accept the internal information resource in use). This brings these models with algorithmic (in terms of the need to check the quality of IR: if incoming IR quality meets the requirements, you can get started).

3. Based on feature 2 it is beneficial to start procedures implementing "as late as possible". This is due to the fact that often the quality of the information resource can be checked only in comparison with other IR that is used to create a new IIR or FIR. Thus, even before creating some IR performer must wait until all the IR will be received for the following procedure in order to get a response about compliance its IR to quality requirements.

4. The result of the information procedure does not include quantitative measures. The result of the information procedure is the IR for which can be set only quality assessment. We cannot say the procedure has given much or little information. We can only say that this information gives the opportunity to make decision or not. And this is a category of quality.

Let's introduce the concept of quality.

Definition 8. The information resource quality - is compliance of the information resource with the requirements of completeness, availability, accuracy, clarity, timeliness.

Definition 9. Estimating of the information resource quality is a numerical value that determines the part of consumers (for the interim information resource - correspondents) which would satisfy the received resource.

$$\alpha_k = \Lambda(R_k^v),\qquad(5)$$

where $\Lambda(R_k^v)$ – function for estimation of the information resource equality R_k^v;

α_k – measure of the quality of the information resource R_k^v.

Thus, the measure of quality is a number between 0 and 1. If 0 - Nobody will be satisfied with this information resource. If 1 – everyone will be satisfied.

5. The feature control for PCPIR is that it does not include verification of the number of information resources, but includes a check of conformity of the actual formation IR plan in control points (milestones). PCPIR is controlled by duration and results of the work (IR quality). The quality of the project product is not determined at the end of the project, but by results of the formation of certain IIR. Each task gives the part of the product IR. The quality of this IR is verified before performing the successor procedures (when converting it to the internal information resource).

5.1. Duration control:

Definition 10. PCPIR duration – the time required to complete all tasks within the PCPIR.

At duration control, it is checked whether the actual duration of the project exceeds the planned duration and whether the sequence of implementation procedures for receiving and providing the information resource is not broken.

$$C_i = T_i^p / T_i^f;\qquad(6)$$

where C_i – reference value;

T_i^p – the planned project duration Π_i;

T_i^f – the actual project duration Π_i.

If

$$C_i \leq 1,$$

then PCPIR is implemented as planned.

If

$$C_i > 1,$$

then PCPIR task will be completed with a delay.

5.2. *Quality control:*

At quality control, it is determined whether the received IRs meet the requirements of the persons that are responsible for the project.

If

$$A(R_i^v) \leq \Lambda(R_i^v), \tag{7}$$

where $A(R_i^v)$ – responsible for the project requirements for information resource quality R_i^v,

then the result of PCPIR corresponds to the query.

If

$$A(R_i^v) > \Lambda(R_i^v),$$

then, the PCPIR result does not meet the requirements and it needs to finalize.

Discussion of the results

Product model can provide project of creation and provision of information resources in the form of patterns that reflect different approaches to the implementation of these projects, depending on the characteristics and specificity.

Such models include: hierarchical, linear, iterative, algorithmic, cross-border models and models based on bipartite graphs.

In the figure 2 the project of creation and provision of project statute using bipartite graphs is presented.
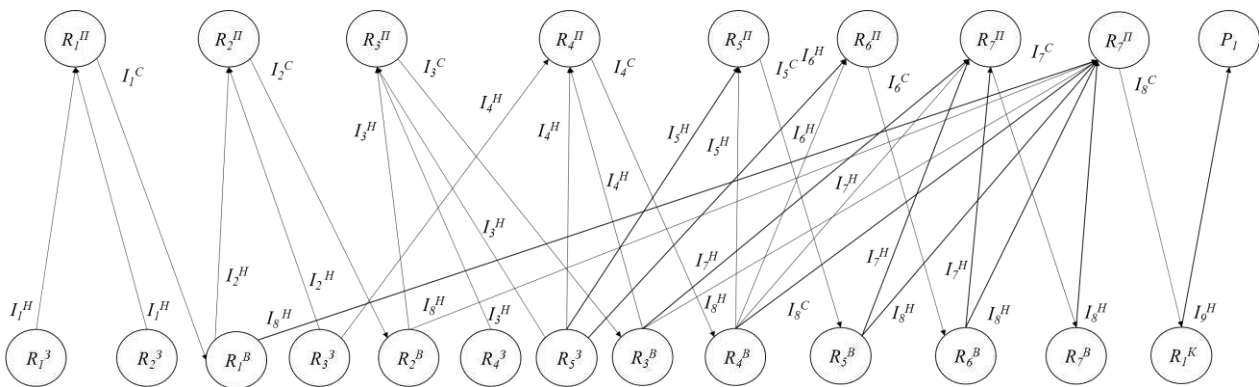

Fig. 2 - Model of the project of creation and provision of project statute

Figure designation:

1. External information resources: R_1^3 - project scopes, R_2^3 - project requirements, R_3^3 - project product requirements, R_4^3 - description of the project team, R_5^3 - templates of standard projects.

2. Internal information resources: R_1^B - project justification, R_2^B - project product management plan, R_3^B - project team management plan, R_4^B - project plan, R_5^B - project risks management plan, R_6^B - project quality management plan, R_7^B - project budget management plan.

3. Interim information resources: R_1^Π - project justification, R_2^Π - project PBS (product breakdown structure), R_3^Π - project OBS (organization breakdown structure), R_4^Π - project plan, R_5^Π - project risks management plan, R_6^Π - project quality management plan, R_7^Π - project budget management plan.

4. Final information resource: R_1^K - project statute.

5. Information product: P_1 - project statute.

6. Procedures: I_1^C, I_1^H - creation and provision project justification, I_2^C, I_2^H - creation and provision project product management plan, I_3^C, I_3^H - creation and provision project team management plan, I_4^C, I_4^H - creation and provision project plan, I_5^C, I_5^H - creation and provision project risks management plan, I_6^C, I_6^H - creation and provision project quality management plan, I_7^C, I_7^H - creation and provision project budget management plan, I_8^C, I_8^H -

creation and provision project statute, I_9^H - project statute use.

Such product model is the basis of the information resources management system of the project-oriented enterprise "PrimaDoc", which was implemented at the Taras Shevchenko National University of Kyiv and at the others Ukrainian project-oriented enterprises. [10]

Conclusions

In the article resource management processes are presented as separate projects. To manage such projects suggested to use the product model in which information resources are divided into interim, external, internal and final. Features of management of project of creation and provision information resources compared to traditional project management are shown. It is shown that on the basis of the product model it is possible to develop different types of models depending on the specific application of information resources. These models include: hierarchical, linear, iterative, algorithmic, cross-border models and models based on bipartite graphs. A project of creation and provision a project statute represented by bipartite graphs was given as an example.

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АННОТАЦИЯ *В статье предложено рассматривать процессы управления информационными ресурсами как отдельные проекты создания и предоставления информационных ресурсов (ПСПИР). Для управления такими проектами разработано попродуктовую структуру. Формализована классы информационных ресурсов: внешние, промежуточные, внутренние и конечные. Показано их взаимосвязь и взаимопереход в процессе реализации информационных процедур. Выделено процедуры создания и предоставления информационного ресурса. Показано, что информационный продукт формируется на основе взаимопроникновения конечного информационного ресурса в знания потребителя.*
Ключевые слова: *попродуктовая модель; информационный ресурс; управление проектами*