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CATEGORY MODEL OF LOGISTICS INFORMATION MANANGEMENT SYSTEM OF COMMERCIAL ENTERPRISE

[1]Dr. Amjad Miqdadi, [2]Prof. Safwan Al Salaimeh,
[1]Business Administration Departme Administrative and Financial Sciences Faculty, Aqaba University of Technology, Aqaba,Jordan,
[2]Software engineering department, Information Technolofy Faculty, Aqaba University of Technology, Aqaba, Jordan.
[1]amiqdadi@aut.edu.jo

Abstract: In recently becoming more common logistics information management system (LIMS)such systems are created to coordinate the production and business activities, financial and economic support and information services units integrated set of interrelated organizational technological systems. The logistics informational management systems have the following subsystems:

Logistics store of raw materials and components production of finished products.
Thus, it becomes possible to increase productivity and minimize production costs due to operational processing information on the status of individual elements of the object management.
In this paper the preliminary survey of the control object can be represented as an instance of the model formation (6), that is forming element object class subcategories L^S, L^P, and L^u , the transition from the general form morphisms (7) to their specific filing defined sequencing of morphisms by establishing the type of law of forming (8) and verification of the results obtained on a specific way of formation of commutative diagram (chart) (9) and verification of all the relevant condition of equality works of morphisms.

Keywords: logistics, computerization activities, morphisms, category, relationship, processing.

Introduction:

In recently becoming more common logistics information management system (LIMS)such systems are created to coordinate the production and business activities, financial and economic support and information services units integrated set of interrelated organizational technological systems[1]. The logistics informational management systems have the following subsystems:
Logistics store of raw materials and components production of finished products.
Thus, it becomes possible to increase productivity and minimize production costs due to operational processing information on the status of individual elements of the object management.
This approach allows for a fresh look at the problem of computerization activities such a large class of object management, as commercial enterprises. Allowing the majority of commercial facilities objects management can be regarded as a consistent implementation of logistics subsystems: procurement of goods, storage of goods, transportation and storage of good in temporary storage warehouse (for object management with distributed structure), processing of goods (production), the final distribution goods.

While the share of the processing of goods (production), which is the most complex in computerization, is subject to trade controls are fairly small. In most cases these process are considered together and implementation with storage process of goods [2, 3, 4].

At the same time there is a model establishment and operation of an information management system undirected and used in the design and operation of logistics information management systems. So the task of developing a set of models of the creation process and operation of such systems, invariant with respect to the subject areas of the management – object is important enough studies have shown[4,5,6,7]. Most preferred mathematical apparatus for a formalized description of the creation and operation of the system invariant with respect to the domain a management objects is a

$$M^C = (B, AB, A, E, R, T, \mathrm{F}_{AB}^{B}, \mathrm{F}_{E}^{AB}, \mathrm{F}_{R}^{AB}, \mathrm{F}_{T}^{AB}, \mathrm{f}_{E}^{A}, \mathrm{f}_{R}^{A}, \mathrm{f}_{T}^{A}, \mathrm{f}_{AB}^{A}), \qquad (1)$$

Where B- number of subsystems information management systems;

AB – many typical tasks subsystem component from variety of B;

I. Many tasks subsystem component from a variety of B;

E- set of software needed to meet the challenges of a variety of A, as follow:

$$E =< E_C, \mathrm{E}_M, \mathrm{E}_A, \mathrm{E}_\mathrm{P}, \mathrm{E}_\mathrm{T} >, \quad (2)$$

E_C – information support, necessary for solving problems of plurality of A;

E_M – mathematical support, necessary to solve the problem of plurality of A;

E_A – algorithmic support, which necessary to solve the problem of a plurality of A;

E_P – software which necessary to solve the plurality of A;

E_T – technical support which necessary to solve the problem of plurality A;

R – Many specialists, necessary to solve problem of plurality of A;

T – a lot of time required for solving the problem of plurality of A;

$F_{AB}^{B}, \mathrm{F}_E^{AB}, \mathrm{F}_R^{AB}, \mathrm{F}_T^{AB}$ - Distribution of many of types of tasks, software, specialists and among the elements of time for many subsystem, types of tasks respectively, as injective mapping of the form:

$$F_{AB}^{B}: \begin{cases} B \to 2^{AB} \\ b \to AB_b \end{cases}, F_E^{AB}: \begin{cases} AB \to 2^{E} \\ ab \to E_{ab} \end{cases}, F_R^{AB}: \begin{cases} AB \to 2^{R} \\ ab \to R_{ab} \end{cases}, F_T^{AB}: \begin{cases} AB \to 2^{T} \\ ab \to T_{ab} \end{cases}, \quad (3)$$

$2^{AB}, 2^{E}, 2^{R}, 2^{T}$ - The sets of all subsets of AB, E, R, T, such that

$$F_{AB}^{B}(b) = AB_b, \mathrm{F}_E^{AB}(ab) = E_{ab}, \mathrm{F}_R^{AB}(ab) = R_{ab}, \mathrm{F}_T^{AB}(ab) = T_{ab}; \quad (4)$$

$AB_b, \mathrm{E}_{ab}, \mathrm{R}_{ab}, \mathrm{T}_{ab}$ - Many types of tasks included to the specific subsystems, provision of a specific type of task, specialists, required to address a particular type of task, required solving time for a specific type of task, respectively, such that

$$AB = \bigcup_{b \in B} AB_b, \mathrm{E} = \bigcup_{ab \in AB} E_{ab}, \mathrm{R} = \bigcup_{ab \in AB} R_{ab}, \mathrm{T} = \bigcup_{ab \in AB} T_{ab}, \quad (5)$$

$f_{AB}^{A}, \mathrm{f}_E^{A}, \mathrm{f}_R^{A}, \mathrm{f}_T^{A}$ - Injective mapping, prescribers each task certain type of problems, support, specialist and the required time for decision accordingly.

The creation of information management system in accordance with the model (1) implies consistent implementation of model element (1) in accordance with steps standards of information technology. Like this pre-project survey corresponds to the implementation the element B, stages of formation of the complex system requirement (requirement specification) – implementation elements AB, A, E, R, T, and display $F_{AB}^{B}, \mathrm{F}_E^{AB}, \mathrm{F}_R^{AB}, \mathrm{F}_T^{AB}$, stages engineering design implementation of the element E and display F_E^{AB}, detailed design stages a adjustment element E and implementation of maps $f_{AB}^{A}, \mathrm{f}_E^{A}, \mathrm{f}_R^{A}, \mathrm{f}_T^{A}$.

Model (1) can be used when creating logistics management systems. For logistics systems becomes important to identify the presence of subsystems and their relationship, and the law that govern the system in the whole and separately subsystems at different levels of granularity. Given the above element B of model (1) in the construction of logistics information management system can be described category G_E (B), which consists of three subcategories

$$G_E(B) = \left(L^S, L^P, L^U, \Phi_{L^P}^{L^S}, \Phi_{L^U}^{L^P}\right) = [a, b, c, \varphi_b^a, \varphi_c^b], [d, e, g, \varphi_e^d, \varphi_d^e], [r, s, t, \varphi_s^r, \varphi_t^s], \phi_{L^P,}^{L^S} \phi_{L^u}^{L^P}] \quad (6)$$

Where L^S- subcategory describes a subsystem for purchasing goods;

L^P- subcategory describes a subsystem of storage and handling of goods;

L^u- subcategory describes a subsystem of consumption sale goods;

a, b, c – objects subcategory L^S, is structured sets and describe respectively many of bill of goods to provide all required object management trading services, many of product line to specify certain types of commercial services and a variety of product line to provide specific trade services;

φ_b^a, φ_c^b – Morphs, describes the relationship of object subcategory L^S, injective maps f_b^a, f_c^b, for which fair conditions, similar (4) and (5)

$$F_b^a : \begin{cases} a \to 2^b \\ a_j \to b_a \end{cases}, F_c^b : \begin{cases} b \to 2^c \\ b_j \to C_b \end{cases}, F_R^{AB} \qquad (7)$$

j- Indicator identifying the corresponding element structured set;

d,e,g – objects subcategory L^P, are structured sets, and describes a number of process, respectively storage and handle all the product line, many processes of storing and processing of certain types of product line and many process of storage and processing of a particular product line.

φ_e^d, φ_g^e – Morphisms, describes the relationship of object subcategory L^P, the provision of which is generally similar to the representation (7);

r, s, t – objects subcategory L^u, is a structured sets and describe respectively a lot of consumers of all products line, certain set of consumer products line and many consumers specific product lines;

φ_s^r, φ_t^s – Morphisms, describes the relationship of object subcategory L^u, the provision of which is generally similar to the representation (7);

$\phi_{L^P}^{L^S}, \phi_{L^u}^{L^P}$ - Functors, describe the relationship of subcategory L^u.

Changes the contents of objects of $G_E(B)$ can be represented by sequence Morphisms $\varphi_a, \varphi_b \varphi_c \varphi_d \varphi_e \varphi_g \varphi_r \varphi_s \varphi_t$ display the item object class subcategories L^s, L^P, and L^u.

Similar elements related subcategory and the structure element of the class of the objects, generally remains unchanged, but affected only possible content of these elements sequence data morphisms designed to describe the operation of the law of the logistics information system, which generally represents a nonlinear stochastic programming[1].

$$S^* = \arg extr E\left\{\sum_{j=1}^{k} \lambda_j \left[Q_j(S) - Q_j^*\right] / Q_j^*\right\}, \qquad (8)$$

Where S^* - the desired state of the logistics system.

S_D – the range of the permissible states of the system (feasible region), satisfying the material balance equation conversion sequence information, stage of development of quasioptimal plans and management decision; S- the current state of the logistic system.

Q_i – the current value of the i criterion of efficiency, used for evaluating the received transition from the current state to the desired;

Q_i^* - Desired efficiency criterion;

λ_i - weight performance criteria in which $\sum_i^K \lambda_i$=1;

E{.}- Expectation operator communication is read defined morphism subcategories and morphism $\varphi_a, \varphi_b \varphi_c \varphi_d \varphi_e \varphi_g \varphi_r \varphi_s \varphi_t$, submitted commutative diagram

$$f_{A_2}^{A_1}\begin{array}{ccc} A_1 & \xrightarrow{\varphi A_1} & A_1' \\ \downarrow & & \downarrow f_{A_2'}^{A_1'} \\ A_2 & \xrightarrow{\varphi A_2} & A_2' \end{array}, \quad f_{A_3}^{A_2}\begin{array}{ccc} A_2 & \xrightarrow{\varphi A2} & A_2' \\ \downarrow & & \downarrow f_{A_3'}^{A_2'} \\ A_3 & \xrightarrow{\varphi A_3} & A_3' \end{array},$$

$$f_{B_2}^{B_1}\begin{array}{ccc} B_1 & \xrightarrow{\varphi B_1} & B_1 \\ \downarrow & & \downarrow f_{B_2'}^{B_1} \\ B_2 & \xrightarrow{\varphi B_2} & B_2 \end{array}, \quad f_{B_3}^{B_2}\begin{array}{ccc} B_2 & \xrightarrow{\varphi B2} & B_2' \\ \downarrow & & \downarrow f_{B_3'}^{B_2} \\ B_3 & \xrightarrow{\varphi B_3} & B_3' \end{array}, \qquad (9)$$

$$f_{C_2}^{C_1}\begin{array}{ccc} C_1 & \xrightarrow{\varphi C_1} & C_1 \\ \downarrow & & \downarrow f_{C_2'}^{C_1} \\ C_2 & \xrightarrow{\varphi C_2} & C_2' \end{array}, \quad f_{C_3}^{C_2}\begin{array}{ccc} C_2 & \xrightarrow{\varphi C2} & C_2' \\ \downarrow & & \downarrow f_{C_3'}^{C_2} \\ C_3 & \xrightarrow{\varphi C_3} & C_3' \end{array},$$

In this case shall be observed for the condition that the product of the corresponding two morphisms for example ($\varphi_A \cdot f_b^{a_1} = \varphi_{b_2}^{a_1} . \varphi_{b_2}$, and so on).

Result:

In this way, stage of the preliminary survey of the control object can be represented as an instance of the model formation (6), that is forming element object class subcategories L^S, L^P, and L^u , the transition from the general form morphisms (7) to their specific filing defined sequencing of morphisms by establishing the type of law of forming (8) and verification of the results obtained on a specific way of formation of commutative diagram (chart) (9) and verification of all the relevant condition of equality works of morphisms.

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