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NEW APPROACHES REGARDING THE CREATION OF VIRTUAL ENTERPRISES IN THE NATIONAL NETWORK

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Abstract. The paper presents a new concept of Virtual Enterprises (V.E.) in a complex approach as a regional network of economic entities as potential constitutes of a V.E. That make possible creation of a data base of technological, collaborative and behaviorist attributes allowing a selection process by clustering in the attribute space potential selections of V.E. groups able to produce the goal product. The attributes classification is a good support to reengineering works, inside the network entities, to achieve organizational need imposed by the V.E. participation.

1.Introduction

The Virtual Enterprise is an advanced form of associative and collaborative economic activity and the start is contemporaneous with first manufacturing production.

One of actual definition of V.E. describes this concept like " a temporary network of independent companies, in relation any with other through informatics technology by which divided the competences, the infrastructure and the business process in the purpose to satisfy the requests of the market. The definition of the network can be the "cooperation unofficial form which develop by change methods of informations, people and social norms".

2. The model of Virtual Enterprise

The creation of V.E. is a initiative at competition of two primary requests:

- investors request to start the product in manufacturing and on market, with short production cycle and minimum costs;
- manufacturing economic entities request, the potential participants in the structure of V.E. is to fructify the production capacities on maximum.

The V.E has the life cycle divided on six stages:

- the conception – establish the relation and the strategy of V.E.;
- the competition – the primary test of the product on the market;
- the configuration –development and adaptation of the infrastructure and production capacities;
- the operative management – V.E manage the production, delivery and support product in profit conditions
- the final – the end of agreements and the results evaluation

3. Concept of national network for Virtual Enterprises – RENIV - Premises

The common development of V.E. pass following stages:creation

a) – seting the request of investitors and the definition of the object (product, service;

b) – extractions of technological and constructive dates of product ;

c) – appeal to potential participants, possessor of technologies, from lisr or by Internet on base of specialized portal, specify the technological requests;

d) – partners selection.

In these stages the approach by informatical product must make in c) stage.

The approach by national network concept of potential participants/partners in evolution of differents V.E. offers many advantages:

- creation of a data base of technological, collaborative and behaviorist attributes allowing a selection process
- are using only representations for technological attributes describe by „processes" (fractal approach) allowing a optimal selection by attributes clusters of potential partners;
- potential partners included in data base can to organize the technological processes in according with the requests by definition of attributes in network by reenginering works and virtual simulation;
- complex informaticl approach of registration process and selection of partners in network.

4. Aspects regarding the selection of parameters for creation of V.E. in the network

The success of V.E. like efficiency and finality depends by the partners quality and adequate of this for objective/object.The existence of data base of registration entities in network is a favored premise. The selection criterions must to vise the technological requests and behavioural/collaborative.

In esence the partners selection for V.E. with defined objective, attended by adequate informatic system crossing stages following:

- the representace of the object (product/service) of V.E. by technological attribute which defined him
- the entities selection from data base of network must make in two stages:
  - ❖ Stage 1 – selecting in the technological attributes space, the attributes of object and to ensure that these find in attributes set declarate by the partners from network.
  - ❖ Stage 2 – selections refining of stage 1 must make in the behavioural and collaborative attributes space.

5. Informatic mechanism of V.E. network

The informatics system V.E. will be a complex product which contains modulus:

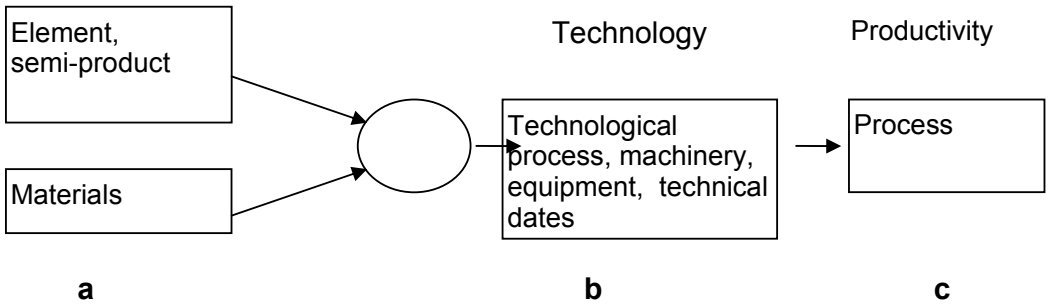
- logging modulus in network;
- requirement modulus;
- communication modulus in network;
- operative modulus; selection tools of clusters;
- optimizing and modeling tools.

The public information, dissemination and access in system will be making by specialized site.

6 Technological classes and specified attributes

The realization of the product is the development result of parallel/sequential technological processes row, the architecture production system can be compound by working technological nucleus, with conceptual equivalent type holistic and fractorial.

The working technological nucleus can be:



The feature **„ working technological nucleus"** is defined by 3 zones:

a) – **input** with defining of material type which enter in process or the product compounds of the product, semi-products or assembly entered in process;

b) – **technological zone** in which the technological concept reunites the technological process with specified operations, machineries and necessary equipments and the process features which is refer at processing requests, necessary qualities, production type;

c) – **output** from nucleus defined by processing compound, compound, manufacturing material, assembly, product.

Was defined in project 6 classes (A-F) with 14 parameters categories which will define the technological attributes frame like clustering space and a associated technological class (S).

The classes define: a)the technologies, b)operations and techniques, c)Compounds type, d)technological machineries, e)semi-product materials, f) technological dates, s) fabrication preparation

The registration made by the potential partner in network of "technological nucleus" must make attend (28 digits).

Example with development stages of a registration:

No.	Registration stage	CUMULATIVE TEXT	CUMULATIVE CODE												
			CT	A_1	A_2	B_1	B_2	C	D_1	D_2	E_1	E_2 E_3	F_1	F_2	F_3
0	1	2	3	4	5	6	7	8	9	10	11	12 13	14	15	16
1	1	Metal	01												
	2	Metal cutting	01	08											
	3	Metal, cutting, turning	01	08	01										
	4	Metal, cutting, turning, horizontal spindle	01	08	01	01									
	5	Metal, cutting, turning, automatic	01	08	01	01	03								
	6	Metal, cutting, turning, automatic, spindle	01	08	01	01	03	04							

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	7	Metal, cutting, turning, automatic, CNC with automatic control	01	08	01	01	03	04	05							
	8	Metal, cutting, turning, automatic, CNC with automatic control	01	08	01	01	03	04	05	02						
	9	Metal, cutting, turning, automatic, from carbon	01	08	01	01	03	04	05	02	02					
	10	Metal, cutting, turning, automatic, from carbon steel, usual	01	08	01	01	03	04	05	02	02	01				
	11	Metal, cutting, turning, automatic, laminate bar	01	08	01	01	03	04	05	02	02	01	02			
	12	Metal, cutting, turning, automatic, diameter <10mm	01	08	01	01	03	04	05	02	02	01	02	03	X	
2	12	Metal, cutting, turning, automatic and diameter 10–100 mm	01	08	01	01	03	04	05	02	02	01	02	04	X	
1, 2	13	Metal, cutting, turning, automatic, manufacturing precision IT 07	01	08	01	01	03	04	05	02	02	01	02	04	X	04

Example with two registrations:

No.	CUMULATIVE TEXT	CUMULATIVE CODE													
		CT	A_1	A_2	B_1	B_2	C	D_1	D_2	E_1	E_2	E_3	F_1	F_2	F_3
1	Metal, cutting, turning, horizontal spindle, automatic, spindles, machinery with high productivity, CNC with automatic control, carbon steel material, usual, from laminate bar, diameter Ø10mm, manufacturing precision IT 07	01	08	01	01	03	04	05	02	02	01	02	03	X	0
2	Metal, cutting, turning, horizontal spindle, automatic, spindles, machinery with high productivity, CNC with automatic control, carbon steel material, usual, from laminate bar, diameter Ø10mm-Ø100mm, manufacturing precision IT 07	01	08	01	01	03	04	05	02	02	01	02	03	X	0

7.Economic, logistic and behavioral attributes

These sub serve at selections refining on technological attributes

Economic parameters

Parameter	expression
Dynamic of turnover	Percentage increase or decrease on 3 years on percentage scale
Dynamic of human resources	Percentage increase or decrease of human resources reported of dynamic turnover
Company near money	Percentage increase or decrease of near money in last years
Duty degree of company	Fluctuation in last 3 years, reported at turnover

The weights are in unitary scales (1-4 or 1-5) with optimal value “1”

Behavioral Parameters

The administrator must check the declarations.

Parameters	Scalar expression
The degree of completion of contractual business	Evaluation in 4 percentage scales according by economic entity
Contracts/orders weight/ with delay on delivery	Evaluation in 4 percentage scales
Weight of cancellation Contracts or cancellation orders from the contacts total	Evaluation in 4 percentage scales

Logistic parameters

These parameters look at acquisition evaluation and delivery of partners in network.

Acqusition Degree

Acquisition must be sure and qualitative with suppliers list	Evaluation YES/NO (according of SMC Procedures)
Scheduled acquisition from market without suppliers list	YES/NO
Uncertain acquisition	YES/NO

These registrations can be controlled by “network Administrator”.

Delivery of the product

With respect of delivery diagram	Evaluation DA/NU
With delivery delays	Evaluation in 3 percentage scales

Management Parameters

These parameters reflect the technical level of manager act.

Informatics of all departments	Percentage evaluation of activities number, functional departments
Technological informatics	În 3 stages, one point for: - designing informatics; - production norm informatics; - informatics of technical control and production automation
Commercial and marketing informatics	Evaluation: YES / PARTIAL (over 50%) /NO Declaration

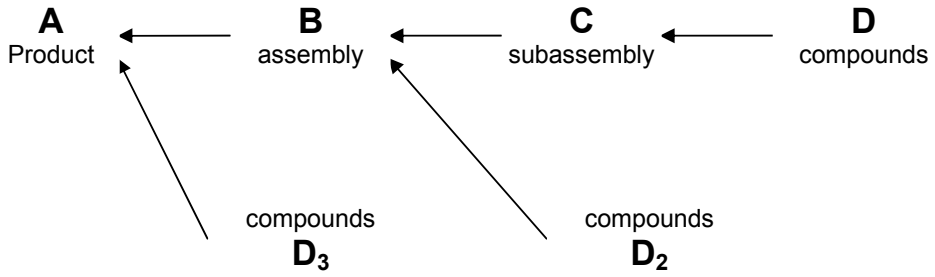
8.Technological characterization

The defining of functional dates put the product in users zone who define not the technological parameters, first informations regarding requests like: human security, environment protection, the form, size, mass, medium (industrial processes, infrastructure, transport, personal use).

The importance of constructive date which determine technologic the products class present that the assembly operations, control, final testing are technological operations which must be in a specialized enterprise.

The constructive levels of product

The product is represent in this schedule:



The diagram lattice points represent assembly operations specifically in AB lattice points and not in lattice points **BCD** and **CD**.

Regarding the production/realization of V.E. objective is important to tell the security source for production of assembly, subassembly, compounds.

For assembly, subassembly, compounds the source can be:

- acquisition from free market;
- partial realization in V.E.
- total realization in V.E.

The compounds can be:

- commune; usual assembly compounds from the market;
- specific – realize in product manufacturing

Example of operation sheet for a compound

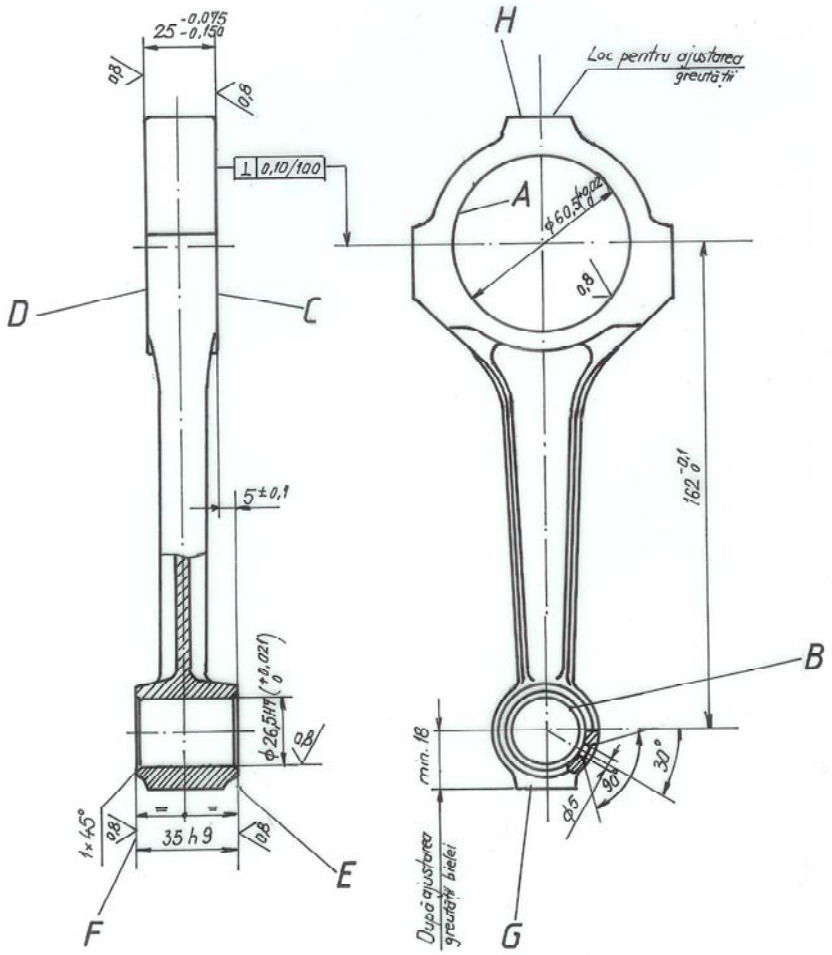
For example we choose one type piece - connecting rod

Date for Operation Sheet
Assembly: heat engine
Unit: connecting road - link
Compound: connecting rod
Compound weight: 960 gr. (Fz: 03)
Technological principal dimension : Ø60 (F01: 04) [1)]
Pieces/product Number : 4
Piece Material : (example: OLC 45)
Heat Treatment: (example nitridation)

For execution of the piece is necessary the **TECHNOLOGICAL FLOW:**

1. Drop Forging;
2. Cutting (turning) of surface A;
3. Cutting (milling) of plane surface C;
4. Cutting (milling) of plane surface D;
5. Cutting (turning) of surface B;
6. Cutting (milling) of plane surface E;
7. Cutting(milling) of plane surface F;
8. Cutting (milling) of plane surface G;
9. Cutting (milling) of plane surface H;
10. Cutting (boring) of surface A;
11. Cutting (boring) of surface B;
12. Cutting(drilling) Ø5;
13. Heat Treatment (nitridation);
14. Cutting(grinding) of plane surface C;

15. Cutting(grinding) of plane surface E;
16. Cutting (grinding) of plane surface D;
17. Cutting(grinding) of plane surface F;
18. Cutting (grinding) of surface C;
19. Cutting(grinding) of surface B;
20. Cutting(grinding) for surface G balancing
21. Cutting (grinding) for surface H balancing;
22. Control.



Connecting rod

CUMULATIVE TECHNOLOGICAL OPERATIONS

- – Forging – operation: 1;
- – Cutting – operations: 1, 5;
- – Milling – operations: 3,4,6,7,8,9;
- – Boring – operations: 10, 11;
- – Drilling – operations: 12;
- – Heat Treatment (nitridation) – operation: 13;
- – Grinding – operations: 14, 15, 16,17,18,19,20,21;
- – Control – operation: 22.

Technological operations: the 21 technological operations presented in technological sheet

Cumulative technologies : technological operations [2)] ;

A … presented in technological sheet

Special requests : lot and quality mark [3)];

The definition of technological chain:

Cumulative operations Chain: B… H

Free operation / independent: A. [4)]

Operation Sheet of the compounds / section operation in cumulative code

		TECHNOLOGICAL OPERATIONS CODE											EXPERT NOTES									
													EXPERT RECOMMANDATIONS			TYPE TOOLS		COMPLEX TOOLS					
Compound: Connecting Rod Cumulative code		CT	A_1	A_2	B_1	C	E_1	E_2	E_3	F_1	F_2	F_3	C_2	D_1	D_2	S_1	S_2	1	2	3	4	5	
A	Forging	01	04	03	X	07	02	02	02	09	03	10				01	02		X				
B	Cutting	01	08	01	X	07	02	02	02	04	03	07	02	03	02 03								1)
C	Milling	01	08	02	01	07	02	02	02	08	03	08	02	03	02 03								2)
D	Boring	01	08	09	X	07	02	02	02	04	03	04	02	03	02 03								3)
E	Drilling	01	08	03	X	07	02	02	02	03	03	06	02	03		03	01	X					4)
F	Heat treatment nitridation	01	16	03	X	07	02	02	02	13	03	X											5)
G	Grinding	01	08	06	X	07	02	02	02	04	03	04	02	03	02 03								6)
H	Control																						7)

9 Conclusions

The regional approach makes possible creation of a data base of technological and behavioral attributes.

That makes possible selection by clustering of partners of V.E. on ask objectif.

The attributes classification is a good support to reengineering works, inside the network entities, to achieve organizational need imposed by the V.E. participation.

One informatics mechanism will assist the national network of V.E. in selection stage and in life cycle of creation entity.

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