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LOGISTIFICATION OF FLUID STREAMS

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Abstract: During the research I examine the possibility and conditions of the service processes logistification. Therefore I compared the different service flow processes by an empirical analysis process. The first step was to find when two sequences are equivalent. Different fluids are flown in flows and they flow on slightly different node aggregation. In consequence the base question of the research is which processes are equivalent. Examination of the processes was analysed by different aspects. Thereafter specific service flow processes were analysed, and I examined whether the fluid considered primary exists. How the fluids transform on different nodes. Whether is it essential what medium the fluid stream through? As a result of my examinations I came to the important conclusion that every service process could be logistificated.
Keywords: service process, fluid stream process, logistification, similarities

1. Introduction

Production services can be well modelled from logistics aspect. The production and service processes are different in their environment. Therefore the adaption of the logistic analyses related to production could be good device for the analysis of the service processes. The production processes are well-defined systems of the fluid stream, they are handled by the science of the logistics supply chain management. So we can manage the service processes from fluid aspect.

2. Empirical process analysis

Starting assumption: If the items of the process are repeated in some intervals on the timeline of the sequence, we could say there is a similarity in the sequence. If the elements of nodes are not repeated periodically and in a sequence there are 4-6 nodes and the other sequence has a t+1 element, we could say the sequences are not similar.

Treatment of the customer demand: (could happen in this way):

1. Establishing a contact
2. Claims processing
3. Purchasing (row) materials
4. Planning level
5. Customer confirmation
6. Implementation
7. Product availability

If we research the satisfaction of the customer demand process we can do it in two ways:

a) If the process goes on all the nodes which were mentioned before.
b) If the process affects the first two points and immediately goes to the 7th point.

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If we want to compare the agricultural machine production with the car manufacturing from the point of view of customer demand satisfaction and production, these two sequences are the same, because the beginning and the end of the two sequences are the same and the feature of the fluids flown in them is not essential from the flow aspect.

Conclusion: My starting assumption was not totally proved, because the sameness of the first and last nodes can be considered a fundamental condition.

To my research I compared further processes.

2.1. Online purchasing ↔ in-store shopping. Online shopping always starts with conceptualization of a customer demand then a virtual basket is established.

Virtual basket is a virtual product line. During the ordering this virtual product line transforms to document and in the payment period it will be money. Between the payment and the merchant the document appears again which in fact is an account.

It can be seen well, that the fluid transforms in different nodes and moreover we could see a primary fluid in the form of information.

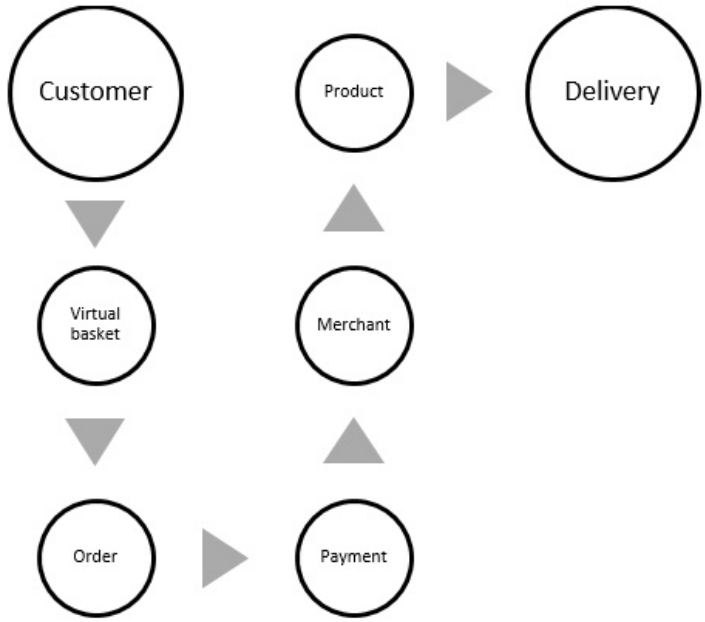

Figure 1. Process of online purchasing

We can say it again that the in-store shopping always starts with customer demand which it transforms into information in the process and this information transforms again to product and during the payment period a new fluid appears in the form of money.

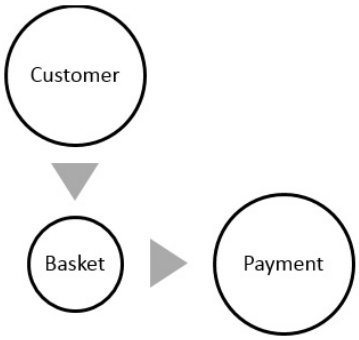

Figure 2. Process of in-store shopping

2.2. Single ticket purchasing ↔ Market purchasing. Single ticket purchasing has a simple process structure. The customer demand transforms to money. In this case the information is when I tell the cashier what kind of ticket I would like to buy. Actually it can be seen again, that the customer demand transforms again.

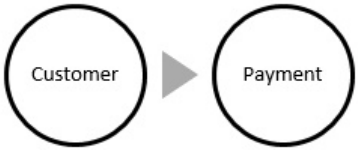

Figure 3. Process of single ticket purchasing

In the case of market purchasing the same fluids flow in the process and it transforms in different nodes too.

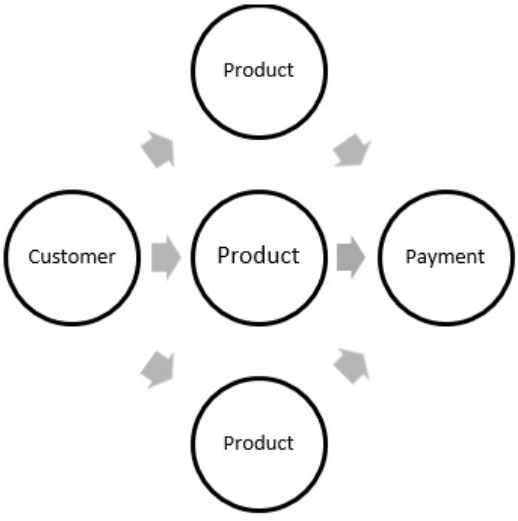

Figure 4. Process of market purchasing

2.3. Financial process in a company. In the case of the company the process always starts with customer demand. In this cycle could see the best how the fluids transform in different nodes. As I mentioned the process begins with customer demand, then it transforms to information after it transforms into document and perhaps it can be stated that the information always transforms according to conditions and requirements of environment. Besides it is worth to mention that inside the corporate circulation could be found another cycle too which it is a production/manufacturing period where the information is the most significant fluid in addition to material flow.

I would like to emphasize how important role has the information in the different processes. It has great importance because if the information is flown and transformed then it has got measure that is (i. e.), it is measurable.

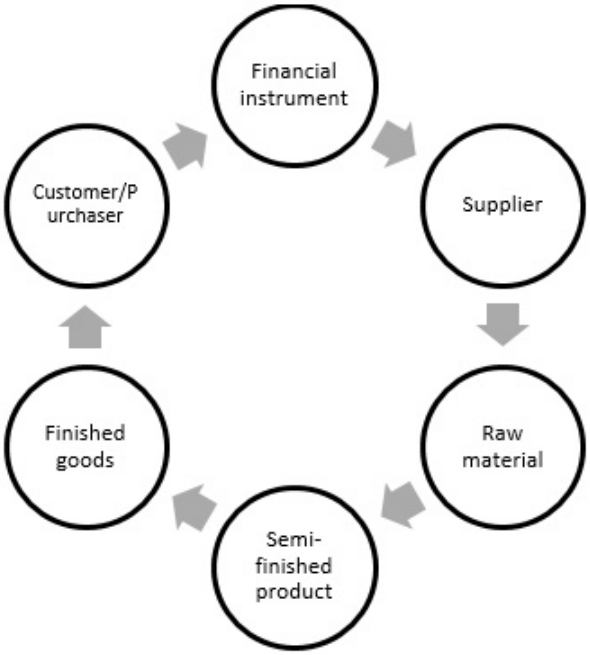

Figure 5. Money circulation of the company
Prepared by the author based on Sinkovics [1]

"Namely the information is not just dimensionless quantity, but besides it is mostly psychological and not physical quantity." [2]

The measurement of the amount of information appeared in Hartley's theory for the first time. This was followed by Shannon's theory, which also uses a stripped-down message model, but this is an improved model, which also examines, that what kind of uncertainty is eliminated by message. Shannon stated the following basic principles, that is why he could lay down the measurement of the amount of information to probability funds (the amount of information defined in this way has a serious pragmatic aspect as well):

1. Probability field is the event field of all possible message and combination of the event field's probability.

2. Sure and impossible events do not have “news value”, that is, their information amount is zero.
3. If the independent events appear together, their information amounts are added.
4. The more amount of information an event has, the more unexpected that is the less probability it has.
5. The amount of information depends solely and exclusively on the probability of event.
6. In two valued and equal-probability event field the amount of information appearing in any condition can be considered a unit.

According to the statement mentioned above, the information amount – function will be logarithm, which is based on two [3]:

$$I = \begin{cases} -\log_2 P(A) = \log_2 \frac{1}{P(A)} \text{ ha } P(A) > 0 \\ 0 \text{ ha } P(A) = 0 \end{cases} \quad (1)$$

After the examination of the processes my goal was to try systematizing and categorizing the different processes. During the classification I took the axioms into the consideration and the fact that the time and space cannot be divided, since the time –as definition- means status change which can be established by displacement.

Then I created the following groups which I proved by giving examples:

- Primarily temporal: credit, insurance, online purchasing with paying credit card, buying shares and bonds
- Primarily spatial: bank transfer, material flow within warehouse, online purchasing with cash on delivery, shop and market purchasing
- Closed-linear: weaver
- Nonlinear: decision - making situation for example: during the car manufacturing the paintwork is damaged
- Open-circuit process
- Closed-circuit process

Comparing the different processes, I came to the conclusion that it is not essential, in what medium the fluids flown from the flow aspect furthermore the longest “chain” of the process will be the process.

3. Theses

Due to the process researching I realised that it is not important where the fluid stream as the fluid could transform in nodes in our model and in every process-system we could find a primary flow. Moreover the longest chain of the process will be the main process. Two processes can be considered same, as it is minor matter how many nodes are in different processes. The customer demand satisfaction is the common point of the production process and service process too.

Any service system is a good process system with fluids and in every case could logistification that is why we could make the mathematical model which is same with production model of logistics system.

My two theses are:

T1: The service processes could be logistificated.

T2: In every case a fluid considered primary can be found in service processes.

4. Uncertainty factors of Real-time Gross Settlement System (RTGS)

After these examinations I started to research the factors of uncertainty arising in the process. I would have liked to know what and how people could perceive from the uncertainty in a process flow?

I researched the Real-time Gross Settlement System's process. I asked the questions whether the domino effect exists in RTGS. If yes, what further faults it generates in the process. Where could node's uncertainty be in the flow? Furthermore what could be perception correction factors?

The RTGS, i.e. the domestic payment system operated by the Hungarian National Bank, has been working since 3 September 1999.

The RTGS is designed for settlement of high value and urgent payments which will be final and irrevocable after their automatic real time settlement. After the settlement the affected participants will receive a notification without delay. As a messaging network it uses the SWIFT system.

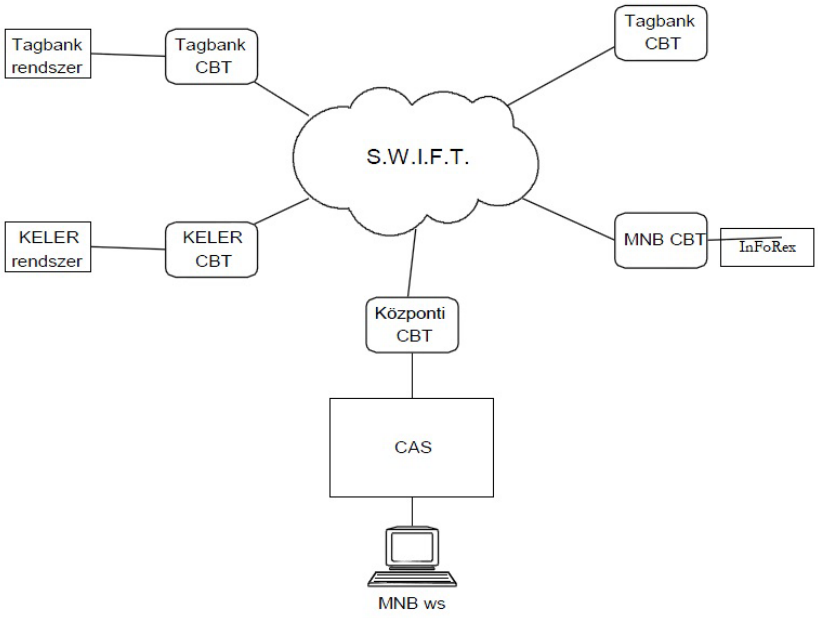

Figure 6. Structure of RTGS [4]

Transaction types that can be settled in RTGS:

- bank-to-bank items,
- customer payments,
- cash side of the DVP- transactions,
- central bank transactions.

RTGS participants:

- credit institutions
- KELER (securities clearing house, participant)
- MNB (regulator, operator, participant)
- the Hungarian State Treasury,
- the Hungarian Post.

Payments are fulfilled in case of sufficient funds are available. In addition to positive account balance intraday credit covered by the eligible securities provided by the Hungarian National Bank in order to finance the liquidity need of the settlement. Upon need, during the day the asset portfolio pledged to obtain intraday credit can be modified. The efficient liquidity management is assisted by the central queue management system, the use of priorities and the gridlock resolution algorithm as well as the RTGS monitor facility. [Hungarian National Bank]

Components of System Architecture:

- **SWIFT FIN Copy**: A network which is work as safe and reliable communication system between the Hungarian National Bank and member of RTGS. As a matter of fact it serves the member's payment orders.
- **CBT** (Computer Based Terminal of members): CBT of members serve as an interface between the members of RTGS through the SWIFT network that allows you to send payment orders within RTGS for immediate fulfilment. Optionally used for monitor the RTGS monitoring and modification of the payment order.
- **CAS** (Central Accounting System) - Central account management system of RTGS: Settles the payment orders finally and irrevocably.
- **Central CBT - CIM** (Central Interface Module): An interface between the CAS and the SWIFT network.
- **KELER** (Central Clearing House): This provides DVP (Delivery Versus Payment) settlement for OTC and other securities transactions via CAS on current accounts.
- **Central Interface Module of Hungarian National Bank**: it joins in the same way with other RTGS's member to the system [5].

At first I examined whether the domino effect exists in RTGS and where could node's uncertainty be in the flow?

In our research the domino effect means the entropy's increase flow through the process.

Taking this interpretation into consideration, we could say there is no domino effect in RTGS. In RTGS' process there is no entropy flow, because in the case of the domino effect an uncertainty should flow through process. Contrary to this in RTGS the error codes stop the uncertainty that is why it does not generate the domino effect.

The uncertainty can be eliminated by SWIFT's message system because the user is informed of the success of the transaction or if the transaction is rejected because of any mistake.

For this reason the SWIFT system can be considered as the terminating means of RTGS uncertainty.

It can be said that the system is provided with the error codes against the possible problems. These error codes are very clear, because the reason of the fault is determined very exactly in the SWIFT message. In consequence, it can be stated that this code system has entropy reducing effect because of high information carrying capacity.

However, it is not sure that the length of incident increases the uncertainty further because the period doesn't necessary affect the rate of entropy increase caused by us. According to our assumption every incident causes entropy increase on any node of the system.

Node uncertainties occur after the receiving of submission, which usually leads to the damage of payment and this shock mostly occurs because of SWIFT's fault. The next node uncertainty can appear in Central Accounting System depending on liquidity. For example when CAS informs the customer with the MT298-SMT700 SWIFT message if so-called line arises due to inefficient fund. In the case of queuing up we can talk about again node uncertainty because of gridlock.

4.1. Positive perception generation. By positive perception generation factors the RTGS member tries to perceive the real entropy and thereby the member's perception will be better.

These factors could be the following:

- All direct RTGS members must participate in a successful testing process, which certificates that the member is technically suitable for sending and receiving RTGS messages and the RTGS member can require the other demanded criteria. The National Bank makes out a certificate about this test and within five working days the National Bank send the Technical Qualification Certificate to the tested member.
- The members receive real-time notification about realization of payment orders, arising the line and important events happening in the system.
- It is possible to create a query by SWIFT message and use RTGS Monitor to make the liquidity treatment easier.
- With the queries the following pieces of information can be available:
    - RTGS member's account
    - Handed payment orders joined the line
    - Organizational information related to RTGS' member
    - Free-form messages
    - Information related to the operational day
    - Accounted and credited payment transactions [5]

5. Summary

During the research I examine the possibility and conditions of the service processes logistification. Therefore I compared the different service flow processes by an empirical analysis process. The first step was to find when two sequences are equivalent. Different fluids are flown in flows and they flow on slightly different node aggregation. In consequence the base question of the research is which processes are equivalent. Examination of the processes was analysed by the following aspects.

- If two processes go on the equivalent nodes, could they be the same?
- Is the order of nodes important?
- How many similar nodes should the process go on proportionally?
- How significant the fluid streaming in the process is?

Thereafter specific service flow processes were analysed, and I examined whether the fluid considered primary exists. How the fluids transform on different nodes. Whether is it essential what medium the fluid stream through?

After the analyses the following conclusions were made:

- T1: The service processes could be logistificated.
- T2: In every case a fluid considered primary can be found in service processes.

As a result of my examinations I came to the important conclusion that every service process could be logistificated.

Literature

[1] Sinkovics, A. (2007) *Cost and financial controlling (in Hungarian).* Complex Kiadó, Budapest, p. 165

[2] Cullmann, G.; Denis-Papin, M; Kaufmann, A. (1973) *Science of the information (in Hungarian).* Gondolat, Budapest, p. 115

[3] Gubán, Á.; Gubán, M.; Hua, S. (2012) *Information, data, intelligence (in Hungarian).* Saldo, Budapest, pp. 20-21.

[4] *Hungarian National Bank: RTGS.* Available at: http://www.mnb.hu/Penzforgalom/pe_elszamolasirendszerek/pe_viber [Accessed 28 February 2014]

[5] *Hungarian National Bank: RTGS system description.* Available at: <http://www.mnb.hu/Root/Dokumentumtar/MNB/Penzforgalom/Penzforgalom_szolgaltatas/mnb_uzletszabalyzat/20110404/1_sz_mell_VIBER_rendszerleiras_2011_04_04.pdf.pdf > [Accessed 21 February 2014]