BUSINESS CONTINUITY MANAGEMENT SYSTEM IN THE TRANSPORT

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ANNOTATION

Continuity of Undertaking in the Transport Companies is an activity which aims at minimizing necessary time to restore the operations. The reduction of time of the disruption of the undertaking is vital in order to prevent a crisis. The seriousness of such a crisis usually grows exponentially and fast reaction and reduction of time to solve the problem is essential. The Continuity of Undertaking can help solve possible critical situation which may disrupt the activities of the transport companies. Furthermore, it can ameliorate possible consequences and efficiently smooth away possible aftermath of disruption of transport operation. The analysis and evaluation of BCMS is to strengthen the resilience of a transport company in order to better reach its key objectives.

Keywords: system continuity, method, system analyze

1 INTRODUCTION

Business Continuity Management System (BCMS) generally increases resilience of a company against disruption, interruption or loss of ability to fulfill own strategic objectives. Ensuring the continuity of transport in the case of disruption of this activity is solved by the European Integral Transport area.

[1]

2 ANALYSIS OF THE BUSINESS CONTINUITY

The basic core or the quintessence of business undertaking in the transport company could be found by analysing the business continuity of the company undertaking. It is based on decomposition of the whole into its essential parts. The objective of the analysis is the identification of the essential parts of the system i.e. to get to know their nature and legality. There are several ways how to familiarize ourselves with the core parts. We can choose between mechanical or systematic approach to analysis. The BCMS analysis is based on systematic approach – system analysis.

System analysis

BCMS is essentially a group of organizational, personal, material, technical, financial and other inputs to supply the vital sources for business undertaking and to strengthen the resilience against emergency situations and consequent crisis.

The goal of BCMS is to strengthen the continuity of the studied entity. The continuity can be defined as a smooth transition from one state to another where this transition does not cause significant tension or a conflict. The organization carries out its critical activities on an acceptable level even during extraordinary events and crisis situations. BCMS has two inputs and two outputs. The first input is a set of activities and the second is a set of resources. Two initial inputs are transformed by the continuity system into two outputs: transformed a set of activities and transformed a set of resources.

[3], [4]

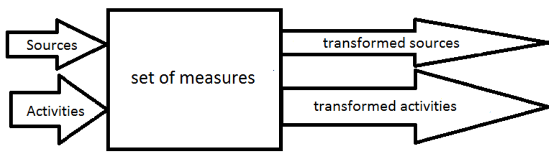

Figure 1: Model of the system in the first distinction level

Based on the Checkland's typology systems can be divided into physical and transcendent [5]. The transcendent systems are beyond human cognizance but we cannot deny its existence (e.g.: feelings, energy). We can define BCMS based on the Checkland's methodology; the basic process of defining has three phases: cognitive, model and implementation.

The first phase takes place in the real system of the undertaking. Goal of the first phase is an overview of the situation. So called fishbone method can be used in this phase. Among others we can determine the basic views, angles of the views from which the system will be analysed (Figure 2). The first point of view is the view of the transport company on the system, the second is the view of the state where the transport company is located, and important is also the view (opinion) of the customer.

[5], [6]

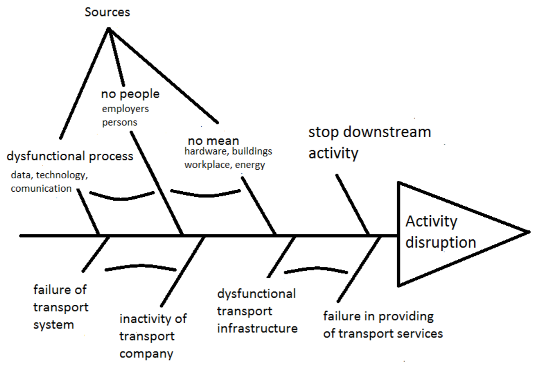

Figure 2: Fishbone BCMS

source: Authors

After we gained sufficient overview of the object, we can start with the second phase. In the second phase, we create core system definitions, which are based on the methodology of soft systems. It is possible to use CATWOE method. CATWOE is a mnemonic help:

- *C* – Clients (have advantage or disadvantage from system undertaking)
- *A* – Actors (responsible for managing the system)
- *T* – Transformation process (what is the subject of the system)
- *W* – Worldview (purpose of transformation)
- *O* – Owners (can stop transformation)
- *E* – Environmental contains (influencing elements outside of the system)

The ratios in the systems in this method are presented from different views and are based on the role they play in the system. Transformation of the core definitions from abstract to the real world is represented by the scheme on Figure 3.
The structure of the system is the method which connects inputs and outputs of the elements in the system. No parts of the system can be lost during dissolution and all the parts must be integrated back into the system if needed.

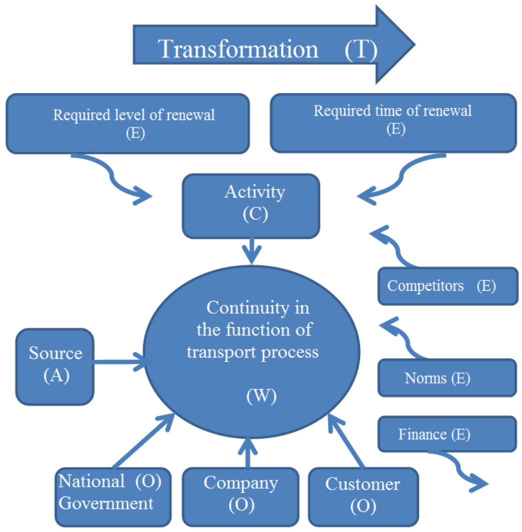

Figure 3: Transformation of CATWOE activities continuity in reality

source: Authors

From the experience, it is possible to predict the system behavior. E.g. if there is a shortage of a certain resource and consequently a relevant operation stops, this could disrupt other activities. Situation is figured on Figure 4.

[5], [7]

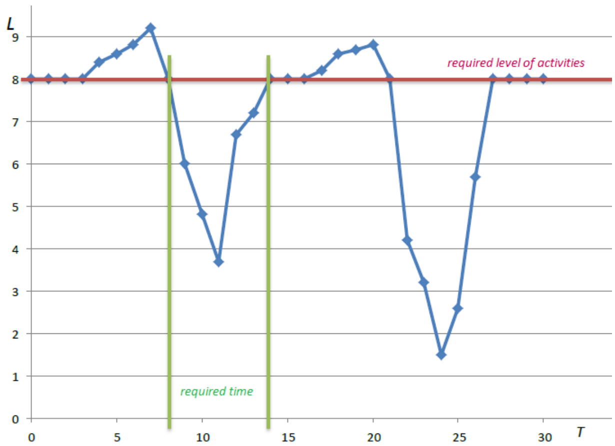

Figure 4: Behaviour of BCMS

source: Author

Synthesis of Business Continuity

The synthesis of the BCMS starts from the very basics of continuity. The authors define that the BCMS is unsteady when it is deflected from the steady point and does not return to that point or it is unsteady if not oscillated around the steady point (moves away from this point). To determine the level of stability BCMS it is necessary to find the steady point. In the analysis it was found, that the system steady point is a predetermined desired level of activities. Another characterizing feature of the system is the availability of the desired state. The system is reachable if all its states are reachable. Continuity system has a predetermined recovery time. The authors of this article said that recovery time is final and fixed.

By synthesis we can find the inner rules of the functioning of business continuity. To determine the nature of the function of BCMS we had to find the initial links first. The authors assume that discontinuity event will proceed from the external environment through the system boundary. System boundary is a function of the system into the internal environment. This process of entering anything from outside, through a certain level inside, is known as absorption. The essence of BCMS function is the ability to absorb incident discontinuity. The ability of the body to absorb anything can be expressed as its absorbing capacity. Because the system actually absorbed exceptionality, the authors approximate the behavior of that with the term capacity of business continuity label like C_{BC}.

The authors label L as the grade level of activities. The desired level is known like L_0. The optimal and minimal level is labeled as an L_d discontinuity of activities. The value ΔL is the difference between the required level of activity and the minimum of the level of activity.

The second reference value is the time. From the graph of system behavior in Figure 4 is clear that it is a constant value and does not change with the impulses from the neighborhood, or inputs or outputs. The total variable is identified by the author like a T. The value of “time” expresses the requirement from management to "time" of the recovery, i.e. how long, but even here, at what pressure and other values must achieve the required level of activity. This value is still same.

For clarification is necessary to supplement the basic parameters of ΔT. The authors assume there is a difference between the initial pulse, leading to discontinuity of the system, which is here designated as T_d and time value T_o achieve the desired level of activities.

The authors also assume that the final value of the immediate capacity of C_{BC} can be determined as a proportion of the difference between the degree of activity levels and the difference between final and initial recovery time. It is possible to say that the analysis was derived from the basic relationship of the system capacity of business continuity.

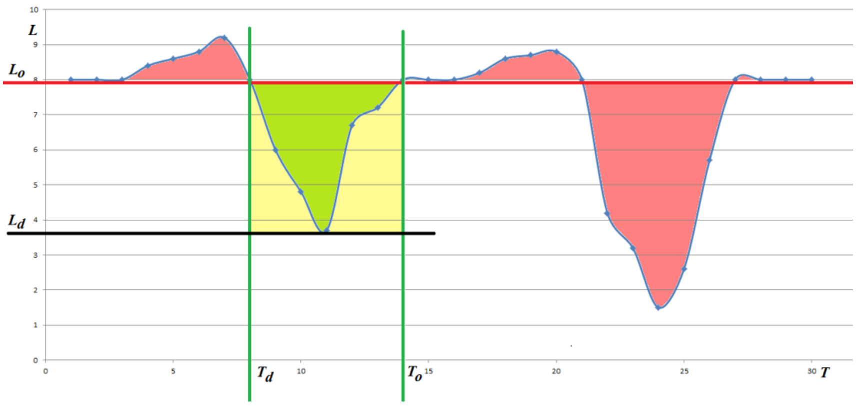

Figure 5: Instant capacity of BCMS

source: Authors

$$C_{CB} = L_o - L_d / T_o - T_d = \Delta L/\Delta T$$

The link expresses the relation between the levels of activities that must be in operation during the specific time. In this specific time must be restored to a certain level. The capacity of the continuity system of activities is determined like a share of possible time for recovery and for a change of activities level.

The link can be brought back to the behavior graph for a finding of another dependant. In Figure 5 the green shading shows the capacity of the system behavior continuity at a certain level L_d.

In the picture is clear, that basic running of the system can be described by the function $f(T)$.

In this case $f(T)$ is a function of the business continuity system capacity. For next logical step it is necessary to assume that $f(T)$ is a function of one real variable. Only then we can argue that function $f(T)$ is a plurality of ordered pairs of T and L wherein each T which is an element of the domain is assigned to exactly one L, which is an element of the field values. This function is mostly written as mathematical formula and shows a graph in the Cartesian coordinate system. Each point in the graph relates to the tool representing one ordered pair T and L. If a specific mathematical formula is known and a specific number is assigned to T, the numerical value of the whole equation after this substitution would be the value L. It can be said that the value of the function at a point T is L, or that the point L is the image of the point T. It is also necessary to find domain D and the range of the values H for the function $f(T)$ Domain D of the function $f(T)$ is closed interval $\langle T_d, T_o \rangle$ and the range of the values H of the function $f(T)$ is a set of elements L from which each will belong to any of the elements T. In the contrast to the domain, the range of values can not be determined by simply making a list of the elements or by the interval (composed from the elements) because from such list it would not be clear which T is assigned to L. Therefore it is necessary to define the range of values H by the mathematical relation. By this mathematical relation for every element T is assigned element L. That relation is usually described by the mathematical formula, although it could verbalized description of the relation between T and L. For determination of the functional value L it is necessary to find the dependency on the T value. Because value T is not interval but specific „time“ system must viewed as dynamic.

The dynamic system could be described by dynamic conditions, which describe system changes at the time. System status at any time determines a vector which is in the state space of a dynamic system. State space determines values that can take the state vector of the dynamic system. The state vector consists of variables plurality that can take values from an interval. The interval of these values determines the full state space. The set (in this set is a state vector) can be called an attractor when the system is in the infinite time. Attractor of a dynamic system is the desired state. BCMS goes to the predetermined level of activity (by the authors).

Then it could be assumed that the attractor of this dynamical system is a fixed point, and the system in infinite time, due to resources and other activities, will become stabilized at a certain stable condition. In this part, it needs to be reminded, that it can no longer be considered a dynamic system, but the system in a stable condition should be considered as a static system. A change of view of the system only helped authors to find H. For verbal description of H it could be said that to every T in the interval $\langle T_d, T_o \rangle$ is assigned one L. This L is inversely proportional to T. To express this idea using a mathematical formula is inefficient for the purpose of this article due to large number of coefficients expressing single influences and other specifics.

3 EVALUATION OF SYSTEM CONTINUITY

The resulting summary of the analysis and synthesis can be used for evaluation of BCMS. From the findings, that the system can be determined by its capacity C_{CB}, the authors proceed to determine possibilities of its evaluation. Based on a modified formula:

$$C_{CB}(T_d - T_o) = \sum_{i=d}^{o} L_i$$

Here:

C_{CB} is a capacity of BCMS, $\sum_{i=d}^{0} L_i$ is a sum of individual values all required actions in the interval $\langle T_d, T_o \rangle$.

Interval $\langle T_d, T_o \rangle$ is constant all the time. Since static it acts the same in every moment of the incident. This value is not needed for the overall evaluation of the system.

It is important to know, how big capacity must be in order to eliminate the system. The system must be able to absorb the inaction of further required activities. The maximal ability of continuity system process is visible in Figure 6.

This feature is called a cardinality of the capacity of business continuity by the authors and it is declared $|C_{CB}|$. To determine the value of $|C_{CB}|$ is based on the logic reason, and the formula is:

$$|C_{CB}| \geq \sum_{i=d}^{o} L_i$$

Where:

$|C_{CB}|$is the cardinality of BCMS capacity.

The cardinality of the business continuity capacity determines the total value of continuity business measured by the company.

The value L expresses the level of activity. In Figure 6 is shown the level of activity degree that is performed in a particular level L_x . It can be assumed that in a properly configured system business continuity of enterprise value L_x follows the optimal border. In the company, this border must be reached. This border was introduced by author and it has been reported as L_o. Demanded level in the business continuity system is in the fact optimal border. Overall assessment of business continuity can be by the authors realized the derived relationship:

$$|C_{CB}| = \sum_{i=1}^{o} E_{BCi}\, w_i / \sum_{i=1}^{o} w_i$$

Where is:

$|C_{CB}|$ is the cardinality capacity of business continuity,

w_i the weight values of individual activities,

$\sum_{i=1}^{o} E_{BCi}\, w_i$ the sum of the weighted value of continuity of operations in the interval $\langle T_d, T_o \rangle$.

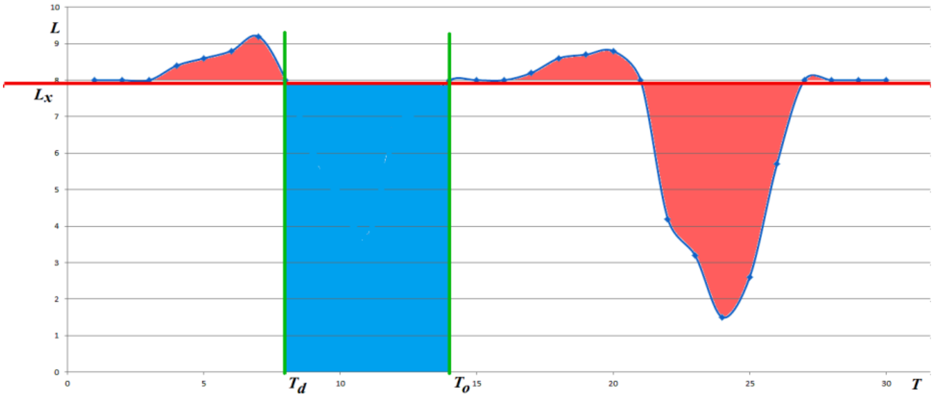

Figure 6: Determination of $|C_{CB}|$

source: Author

4 CONCLUSION

In the evaluation of BCMS, the results of the system analysis were used. The results can be also used to predict the forces, actions or steps towards achieving a continuity of operations, which is based on pre-agreed time horizons and recovery levels.

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