THE MANAGEMENT TOOLS USED IN THE DECISION-MAKING PROCESS

Professor PhD Daniela POPESCU
University of Craiova
Email: dpopescu1964@gmail.com
Associate Professor PhD Sorina GÎRBOVEANU
University of Craiova
Email: sorinagirboveanu@gmail.com

Abstract:
The specificity of the different management tools and their diversification have represented the starting point for taking into consideration the process decision program chart and the activity network diagram. The analysis of these management tools gives the possibility of understanding the complexity of the management problems and their practical importance. At the same time, going in the intimacy of these instruments shows us the complex relations among components, activities, management matrices. That is why we resorted to the separate discussion of these tools in order to point out both the specific elements of these tools and the ways of putting these into practice.

Key words: *decision program chart, network activity diagram, brainstorming, general plan*

JEL Classification: O10, O29, D00, P46

1. Introduction

This study analyses and debates some management tools which are especially applied on the level of the team and section. The following aspects are discusses: the matrix chart, priority matrix, the chart schedule of the decisional process and the network activity chart. These tools are used in order to reach certain goals which do not always follow the plan, and the last minute changes may have serious consequences and may avoid surprises and identify possible countermeasures.

The matrix chart gives the possibility of certain individuals from within the team to identify, analyse and give a classification to the relations between two or more variables. Information is presented in a form of a chart/table and can be subjective or objective, being able to be given symbols with or without numeric values.

These tools establish the priority of problems, objectives, characteristics and others, based upon criteria weighed using a combination between the technical tree charts and matrix. Once an element is prioritized efficient decisions can be taken. The priority matrix is made to rationally reduce the options of a team before detailed planning intervention.

If we refer to the process decision program chart we might show that stating the objective with stating the objective of the team that is planning a successful conference. The activity starts with the first stage, which consists in registering, presenting and the conditions. Only the presentation activity is presented. In some cases a second level of detailed activity may be used. The team makes a brainstorming in order to determine what could go wrong in the conference and these are presented on the ”what if” level. The countermeasures are obtained through brainstorming and put in a balloon on the last level. The last step is the evaluation of the countermeasures and the selection of the optimum ones by placing an O beneath. We notice an X under the rejected ones. This tool makes the team members think of what might happen in a process and how the countermeasures could be adopted.

A last management toll used on the team level is the team network diagram. This tool has different names as: program evaluation and prediction tools, critical path method, arrow diagram and nod activity. It offers the team the possibility to program an efficient project. The diagram presents objective fulfilment durations, and the critical activities path. Afterwards, it is presented the elaboration procedure for the diagram and the analysis of the steps to be followed and the main information from each stage.

The benefits of the network activities diagram are: (1) determining a division in real time by the users, (2) the team members understand their role in the general plan, (3) the areas which stop the circulation may be discovered and solved through corrective actions and (4) the members are concentrated on critical objectives. In order for this tool to work, the duration of the objectives has to be corrected or completed.

2. Elements of group decision-making process

Why? One of these instruments relies on the interrogation method. Although this instrument is very simple, it is also efficient. It may act as a key in finding the cause which makes this problem happen focusing more on the process rather than on people. The procedure is to describe a problem in specific terms and afterwards to ask the question ”why?”. This question has to be asked for many times in order to find out what is the cause of the problem. We will present an example below:

Why are we late with the delivery of the products?

It was not scheduled on time.

Why?

There were many technical changes.

Why?

They were made on the request of the customers.

The team suggested the change of the delivery date after the technical changes are executed.

This tool is useful in the development of the critical thinking. It is a frequently found method to solve the problems as fast as possible.

Force fields analysis. This analysis is used to identify the forces and the factors which might influence the problem or the purpose. It helps us to understand better in order to strengthen the positive points and to inhibit or eliminate the weak ones. The procedure is to define the objective, to determine the criteria of evaluating the improvement actions, to use the forces which promote or restrain

the achievement of the objective, to prioritize the forces from the strongest to the weakest, and to strengthen the actions which sustain the positive forces and weaken the negative ones. We will illustrate this aspect through an example:

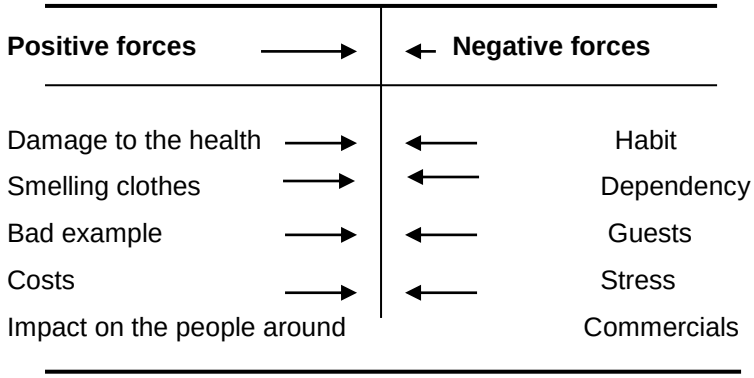


Figure 1. Goal: Giving up smoking

The gain is to determine the positive and negative situations of the problem, encouraging people to agree and to make competition a priority and to identify the main causes.

3. Type of diagram used on decision-making process

The matrix chart. The matrix chart gives the possibility of certain individuals from within the team to identify, analyse and give a classification to the relations between two or more variables. Information are presented in a form of a chart/table and can be subjective or objective, being able to be given symbols with or without numeric values. The Quality Functions Development (QFD), is a revealed example of how the matrix chart is used. There are at least 5 standard shapes: L shape (2 variables), T shape (3 variables), Y shape (3 variables), C shape (3 variables) and the X shape (4 variables). Our discussion will be limited only to the L shape, which is the most used one. (Popescu, 2008), (Constantinescu, 2011)

Figure 1 illustrates the matrix chart for the use of the seven tools for planning management. The procedure for the chart is for the team to select the factors which affect the success plan. Then select the appropriate form, which in our case is the L shape from the chart. This step is followed by determining the relational symbols. Any symbol can be adopted, and this needs to be explained in the chart's footnote. The numeric values are sometimes associated with symbols as being done in the case of QFD. The last step is the filling in of the matrix through the analysis of each box and the submission of a proper symbol.

The matrix chart presents clearly the relation between the two variables. This encourages the team to think in the related terms after their power and different models.

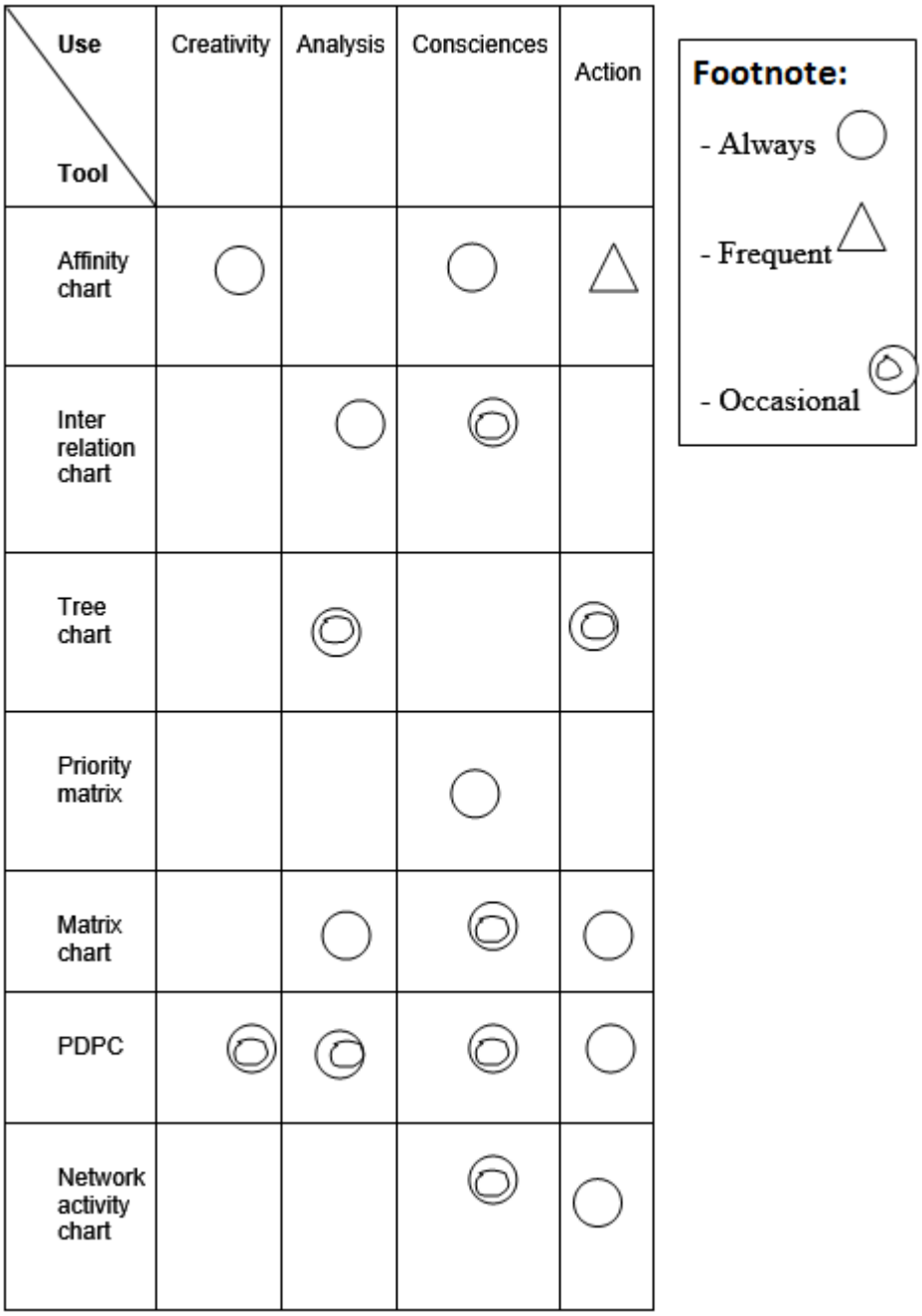


Figure 2. Matrix chart for the seven management tools

Priority matrix. These tools establish the priority of problems, objectives, characteristics and others, based upon criteria weighed using a combination

between the technical tree charts and matrix. (Popescu, 2008) Once an element is prioritized efficient decisions can be taken. The priority matrix is made to rationally reduce the options of a team before detailed planning intervention. It is used with a combination between the tree charts and matrix as in the 2nd illustration. There are 15 implementing options, but only the first three, starting from the ”train supervisors” and the last ”acquiring transportation lorries”, are presented in the tree chart. There are 4 implementation criteria as shown in the upper part of the matrix. The priority matrix is the most difficult from the instruments, so that is why we will list the procedure steps. (Popescu, 2008), (Enciclopedia calitatii, 2005)

1. The L shape matrix is built, combining the options which are at the lowest level of detail in the tree diagram criteria. This information is given in table no. 1

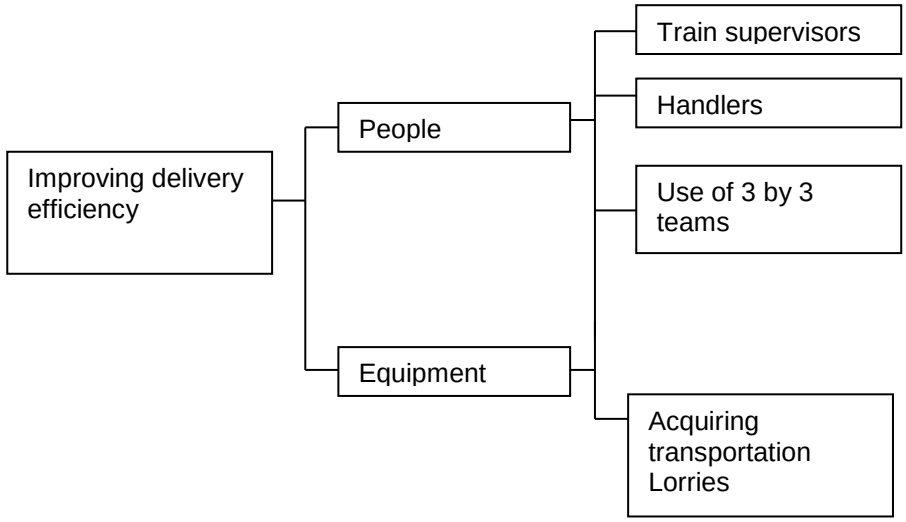


Figure 3. The priority matrix for the improvement of the efficiency in deliveries

Table 1.

Improving the efficiency in deliveries using the consensus criteria method

Options	**CRITERIA**				
	Rapidly to implement	**Accepted by users**	**Available technology**	**Small expenses**	**Total**
Train operators	13(2,10) = 27,3	15(1,5) = 22,5	11(0,45) = 5	13(0,35) = 4,6	**59,4**
Train supervisors	12(2,1) = 25,2	11(1,59) = 16,5	12(0,45) = 5,4	8(0,35) = 2,8	**49,9**
Use of 3 by 3 team	8(2,1) = 16,8	3(1,5) = 4,5	13(0,45) = 5,9	14(0,35) = 4,9	**32,1**
Acquiring transportation lorries	6(2,1) = 12,6	12(1,5) = 18	10(0,45) = 4,5	1(0,35) = 0,4	**35,5**

2. Determining the implementation criteria using the Nominal Group Technique (NGT) or any other technique which satisfy the selection criteria. Using NGT, each member of the team writes on a piece of paper the most important criteria for him. These are listed on a table and the team members write on another paper the importance of each criteria. Those criteria with the highest values are the most important. The team decides how many criteria to use. In this situation, the team decides to use criteria from the upper part of the matrix.

3. Prioritize the criterion using NGT. Each member of the team assesses the criterion considering the total value of the criteria to be 1 and the results are summed for the whole team as in the below example:

Table 2

The criteria	***Member #1***	***Member #2***	***Total***
Accepted by users	0,30	0,25 ...	1,5
Low costs	0,15	0,20 ...	0,35
Rapidly implemented	0,40	0,30 ...	2,10
Available technology	0,15	0,25 ...	0,45
	1,00	1,00 ...	

4. Using NGT, an order in the importance of criteria is established, we make the average of the result and round-up to give us the most appropriate whole number. So this should be from 1 to the number of options.

5. We calculate the importance of the criteria for each criterion through multiplying the place it held with the degree of importance of the criterion as in table 1. The options with the highest total are the ones that should be implemented first.

There are yet 2 more techniques that are more complicated, these can be found through Memory Jogger Plus+.

The process decision program chart. The processes for the achievement of certain goals do not always go according to the plan and the last minute changes may be serious consequences. The process decision program chart (PDPC) avoids surprises and identified the possible countermeasures. Figure 4 illustrates the process decision program chart. (Popescu, 2008), (Sitnikov, 2014)

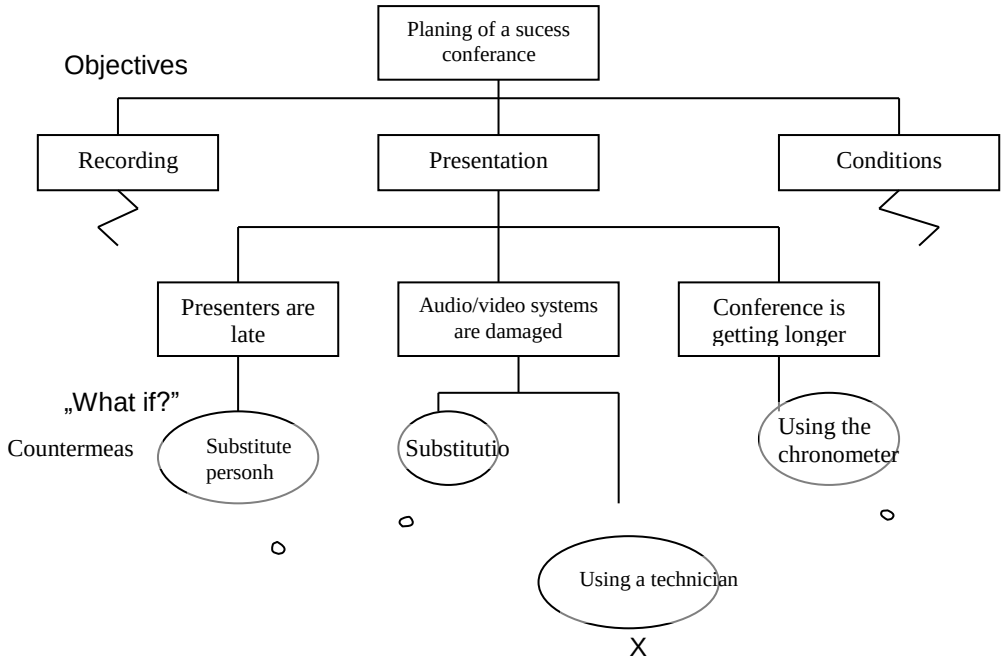
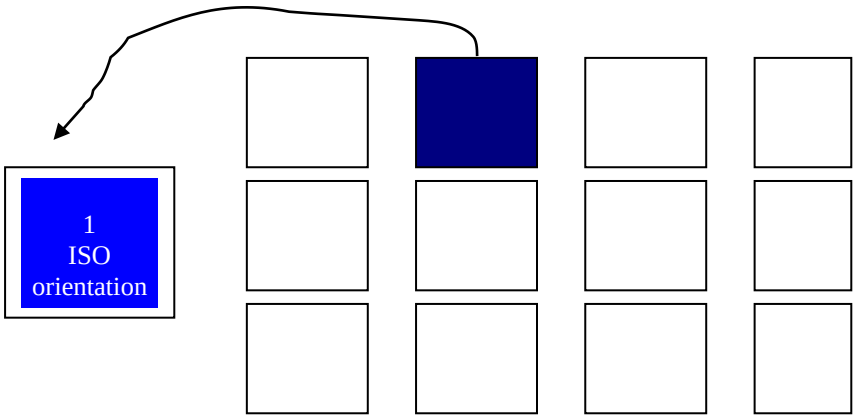


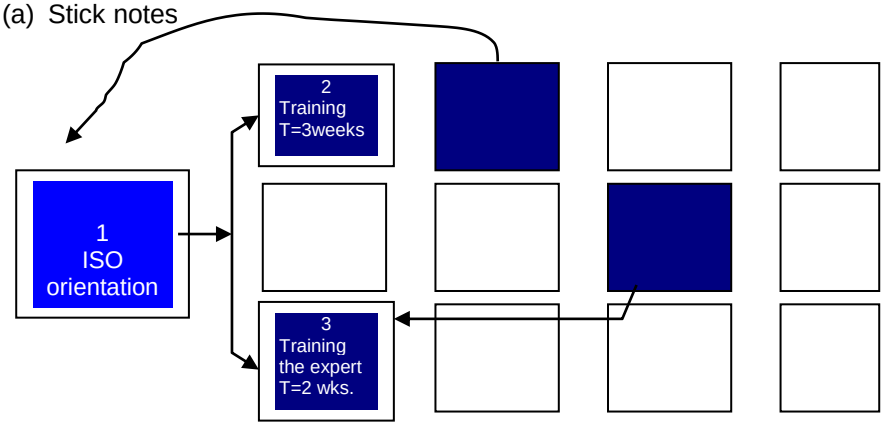
Figure 4. Process decision program chart for the organisation of a conference

The procedure starts with the statement of the objectives which represents the planning of a successful conference. The activity starts with the first stage which is recording, presenting and conditions. Only the presentation activity is illustrated. In some cases a second level of detail activities can be used. The team makes a brainstorming in order to determine what could go wrong in the conference and these are presented on the ”what if” level. The countermeasures are obtained through brainstorming and put in a balloon on the last level. The last step is the evaluation of the countermeasures and the selection of the optimum ones by placing an O beneath. We notice an X under the rejected ones. This example used a chart. The process decision program chart may also use a different format in the listed activities. The probability in percentages for an ”if” to happen will be included in a box. The countermeasures should be plausible. The process decision program chart should be used when the objective is new or unique, complex or the existence of a failure risk. This tool makes the team members think of what might happen in a process and how the countermeasures could be adopted. This makes available the mechanism for the efficient minimization of the uncertainty in an assimilation plan. Network activity diagram. This tool has different names as Program Evaluation and Revision Techniques, (PERT), Critical Path Method (CPM), Arrow Diagram and Activity on Nod (ADAN). It gives the team the possibility to program an efficient project. (Popescu, 2008) (ISO 9000, 2015) The diagram presents achievement durations, simultaneous objectives and the critical path method. Here is the procedure below:

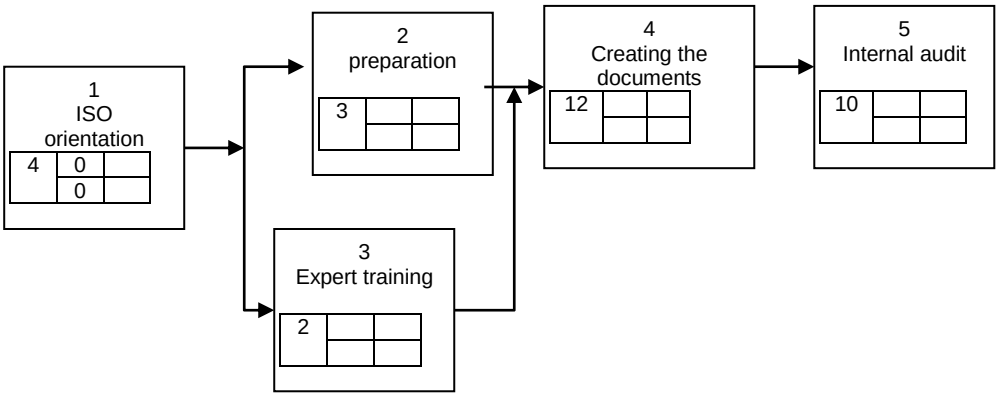
1. The team makes a brainstorming, presents all the objectives for the project completion. These are written on notes and made available for all members.
2. The first objective is localized and placed in the left extreme of a working blackboard, as in figure 5(a).
3. Ay objective which can be accomplished simultaneously are placed in the lower part as in figure 5(b).
4. The 2 and 3 stages are repeated until all objectives are placed in their correct sequence, as in figure 5(c).
5. Observation: because of the space limits not all objectives are presented.
6. Numbering each objective and drawing the connective arrows. Determining the fulfilment duration of the objectives and putting them in the left box below. The durations are presented in hours, days or weeks.
7. Determining the critical path by completing the four boxes left for each objective. As we presented below, these boxes are used for the most recent time (ES), the most recent finish (EF) and the latest start (LS), and the latest finish (LF).



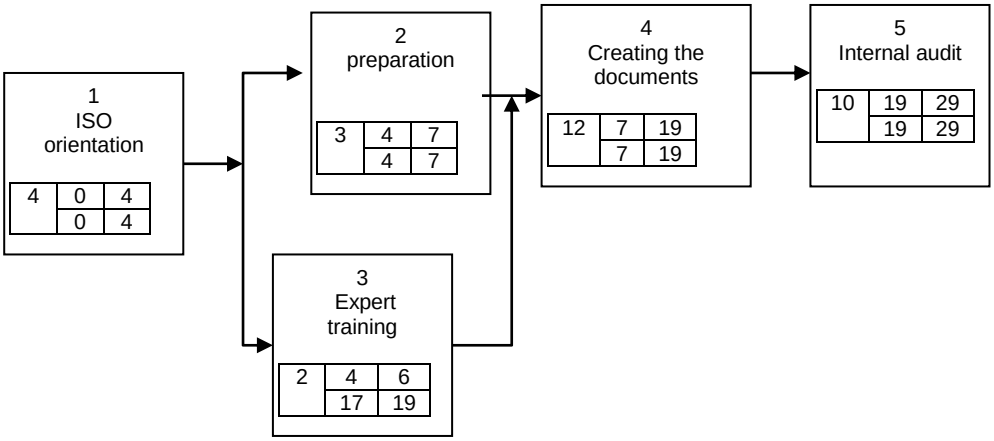
(a) Stick notes



(b) Stick notes



(c) Network activity diagram



(d)

Time of activity (T)	The most recent start time (ES)	The most recent finish (EF)
	The latest start (LS)	The latest finish (LF)

Figure 5. Network activity diagram

ES for the 1st objective is 0, and EF is 4 weeks later using the equation EF = ES + T, ES for the 2nd objective is 4 weeks the same as EF for the 1st objective and EF for the 2nd objective is 4+3 = 7. This process is repeated for the 4th and 5th objective and gives a total time of 29 weeks for the completion of the internal audit. If the project were after hours, LS and LF should equal ES and EF for each of these 3 objectives. These are presented in Figure 2(d).

The 3rd objective, the expert training should not be in the sequence with the other objectives. It should only be concluded in 19 weeks, because ES is 19 for the 5th objective. That is why LF for the 3rd objective is 19 and LS is 17. The expert training may start after the 1st objective which would be and ES of 4 and an EF of 6. Slowing down the 3rd objective is LS – ES (17 – 4 = 13). The critical path is the highest time for the connection of the activities and is manifested when the slowdown for each objective is zero, so it is 1, 2, 4, or 5.

Although these tools can be used individually, they are more efficient when they are used as a system for the implementation of an improvement plan. Figure 6 presents a flow chart for this interrelation.

The team should follow this sequence or to modify it in order to meet the total circumstances.

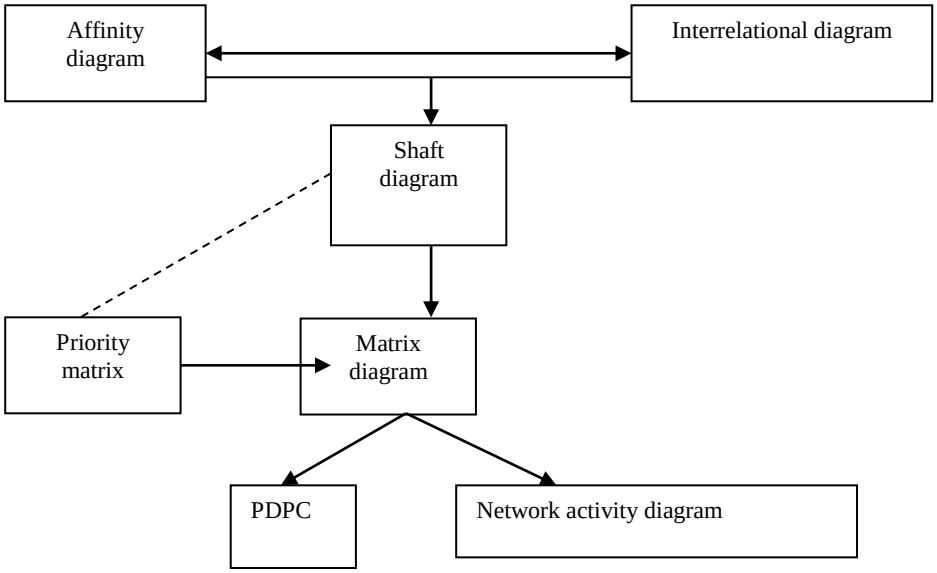


Figure 6. Diagram flow system

The benefits of the network activities diagram are:

(1) determining a division in real time by the users,

(2) the team members understand their role in the general plan,

(3) the areas which stop the circulation may be discovered and solved through corrective actions and

(4) the members are concentrated on critical objectives.

In order for this tool to work, the duration of the objectives has to be corrected or completed. (Popescu, 2008)

3. Conclusions

Quality control circuits are groups of people from a working unit which meet regularly to identify, analyse or outsource issues involving quality or other criteria from their field of work. They choose their own problems and focus on issues

regarding life quality of employees or linked to health, safety, focusing instead on the improved work processes. Often these groups are maintained longer periods of time, working from one project to another. The circles of quality control in Japan had some success and likewise they have enjoyed it for the first time even abroad in different corners of the world. The big disadvantage was the lack of support from the middle management part. Without team managers or someone who needed to supervise directly as members of quality council they couldn't convince the management to implement their recommendations.

Starting with referring to different types of teams we can appreciate further the signification of some instruments of management used by some teams to fulfil their mission. In this purpose we will go further with the analysis of some management instruments used by the teams. Through this step we follow up a deeper understanding of the team role, and on the other hand, the clarification of some new parts of management instruments available to teams that can be used in practice. More concretely we will analyse the matrix chart, priority matrix, the chart schedule of the decisional process and the network activity chart.

This study analyses some management tools which can be used by teams and in some cases by individuals. Most of these tools rely on subjective information. At the same time, the use of these tools proved to be beneficial in the process of improving the quality of the products, of reducing their costs, and of applying the development policies for the new products.

The matrix chart gives the possibility of certain individuals from within the team to identify, analyse and give a classification to the relations between two or more variables.

These tools establish the priority of problems, objectives, characteristics and others, based upon criteria weighed using a combination between the technical tree charts and matrix. Once an element is prioritized efficient decisions can be taken.

If we refer to the process decision program chart we might show that stating the objective with stating the objective of the team that is planning a successful conference. The activity starts with the first stage, which consists in registering, presenting and the conditions. Only the presentation activity is presented.

A last management toll used on the team level is the team network diagram. This tool has different names as: program evaluation and prediction tools, critical path method, arrow diagram and nod activity. It offers the team the possibility to program an efficient project. The diagram presents objective fulfilment durations, and the critical activities path.

The complexity of the contemporary economy determines on a large scale the usage of the most varied methods and management techniques. This requirement comes from another necessity that is providing a high efficiency which is imposed under the circumstances of a higher consumption of material resources for the development of various human resources. Under these circumstances, the study and the application of management in different sectors is highly important. This results in the need of analyzing of some special management tools which can be very efficient for the teams and in case tools for individuals. These do not use solid data but they rely on subjective information. The use of these tools proved to be useful in the improvement process, reducing the costs and applying the policy and developing new products. We will analyze some management tools which can be applicable on the level of the team.

REFERENCES

Constantinescu, D., Gîrboveanu, S. R., Dumitraşcu, E. (2011). *Comunicare organizațională*. Craiova. Editura PROUniversitaria

Hinescu, A. (coord) (2004), *Managementul calităţii*, Cluj-Napoca, Editura Risoprint

Olaru, M. (2004). *Managementul calității.* București. Ediția a II-a, Editura Economică

Popescu, D. (2008). *Managementul calității. Principii și tehnici.* Craiova. Editura Universitaria

Paraschivescu, A.O. (2007). *Managementul calității*. Iași. Editura Tehnopress

Sitnikov C.S. (2014). *Managementul calităţii totale*. Craiova. Editura Sitech

* * *, *Enciclopedia calității***,** (2005). București, Editura Oficiul de Informare Documentară pentru Industrie, Cercetare, Management.

* * *, ISO 9000/2000**,** Quality management system

* * *, ISO 9000/2008, Quality management system

* * *, ISO 9000/2015, Quality management system