

MASARYK UNIVERSITY  
FACULTY OF ECONOMICS AND ADMINISTRATION  
ESF:BPH\_EPS1 ENTERPRISE RESOURCE PLANNING SYSTEMS 1

## SEMINAR WORK

**(UTILIZATION (APPLICATION) OF THE THEORY OF CONSTRAINTS (TOC),  
CRITICAL CHAIN PROJECT MANAGEMENT (CCPM) AS A PROJECT  
MANAGEMENT METHODOLOGY BASED ON TOC PRONCIPLES.)**

**By : MARY MOLETE**

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- 1. How would you apply CCPM and TOC tools (e.g. CRT=Current Reality Tree) for the planning of Your own dissertation work (writing the dissertation is in fact a project)? Can you name the main project risks? Do you know how to diminish (to reduce) these risk factors (to avoid obstacles)? Name at least 10 obstacles !!**

## **The theory of Constraints**

According to the Statements on Management Accounting the Theory of constraints (TOC) systems-management philosophy developed by Eliyahu M. Goldratt in the early 1980s.

### **Some of the TOC attributes are as follows:**

- The fundamental thesis of TOC is that constraints establish the limits of performance for any system
- Most organizations contain only a few core constraints
- managers should focus on effectively managing the capacity and capability of these constraints if they are to improve the performance of their organization
- The Big Idea: Every process has a constraint (bottleneck) and focusing improvement efforts on that constraint is the fastest and most effective path to improved profitability.
- In manufacturing, the constraint is often referred to as a bottleneck.
- TOC may be referred to as the weakest link in the chain

### **The Theory of Constraints provides a powerful set of tools for helping to achieve that goal, including:**

- The Five Focusing Steps (a methodology for identifying and eliminating constraints)
- The Thinking Processes (tools for analyzing and resolving problems)
- Throughput Accounting (a method for measuring performance and guiding management decisions)

### **A successful Theory of Constraints implementation will have the following benefits:**

- Increased profit (the primary goal of TOC for most companies)

- Fast improvement (a result of focusing all attention on one critical area – the system constraint)
- Improved capacity (optimizing the constraint enables more product to be manufactured)
- Reduced lead times (optimizing the constraint results in smoother and faster product flow)
- Reduced inventory (eliminating bottlenecks means there will be less work-in-process)

### **The Five Focusing Steps of TOC :**

1. Identify the constraint
2. Exploit the constraint
3. Subordinate and synchronize the constraint
4. Elevate performance of the constraint
5. Repeat the process

### **Critical Chain Project Management**

“schedule network analysis technique that modifies the project schedule to account for limited resources” (Dwivedi,n.d) .

### **Characteristics of CCPM :**

The planning: Critical Chain - the Critical Chain is defined as the longest chain [not path] of dependent tasks. In this case, ‘dependent’ refers to resources and resource contention across tasks/projects as well as the sequence and logical dependencies of the tasks themselves. This differs from the Critical Path Method.

Estimations – To reduce the behaviors and time wasting associated with having too much embedded safety, Critical Chain Project Management recommends that task estimates are cut to half the length of a “normal” duration.

Safety – Critical Chain Project Management uses safety ‘Buffers’ to manage the impact of variation and uncertainty around projects. The safety at a task level is aggregated and moved to strategic points in the project flow.

## **Application of TOC**

To describe and illustrate the application of TOC I will plan my Dissertation project with the tool.

### **The Five Focusing Steps of TOC:**

#### 1. Identifying the Constraint

In order to identify the single part of the process that limits the rate at which the goal is achieved I will outline my project plan step by step:

1. Choose my research area
2. Conduct preliminary research (scope out the topic)
3. Decide on my research topic
4. Decide on methodology
5. Submit/present research proposal for approval
6. Finalize topic & methodology
7. Conduct your research (fieldwork)
8. Analysis/data processing
9. Writing up
10. Submission

The following tasks to be completed during the project may cause the delay of the plan:

- Conduct preliminary research (scope out the topic)
- Submit/present research proposal for approval
- Conduct research (fieldwork)

The research about the desired area may be time consuming depending on the availability of resources, if there's lack of resources possibilities are this task may delay the presentation or rather the submission of the research proposal. It is possible and likely for the members of the panel or associates or whoever involved during the research proposal to decline the topic if the calculated resources, the research question and proposed area is not deemed sufficient which may delay the project as well, lastly field work has been deemed as time consuming particularly in case of utilization of interviews as the method of data collection.

Ways to reduce risk factors

- Research project will resume next semester, during summer holidays I will ensure that I gather as much information as I can, ensure that I complete some of the time consuming activities out of the plan schedule beforehand.
- Get contact details of my data collection sources e.g. inform firms that I want to interview in advance to avoid unnecessary delays.

### Critical Chain Project Management

Task	Resources	Time Resources(Duration in days)	predecessor
1. Choose my research area	-	12 days	-
2. Conduct preliminary research	Internet, Books,	14 days	1
3. Decide on my research topic	-	14 days	1 & 2
4. Decide on methodology	Internet, Articles, Books	14 days	3
5. Submit/present research proposal for approval	Gathered Information	10 days	4
6. Finalize topic & methodology	Gathered Information	14 days	5
7. Conduct you research (fieldwork)	Firms	42 days	6
8. Analysis/data processing	Gathered Information	28 days	7
9. Writing up	Gathered Information	42 days	7 & 8
10. Submission	-	7 days	9

Figure 1.1 Schedule of Tasks

**Risk Factors**

In writing the dissertation the following can be deemed as the risks of the project plan:

- Lack of reputable sources, refers to the actual sources that can be useful for my dissertation for example library books.
- Language barriers (books are written in Czech language)

Ways to reduce the risks:

- Explore other libraries around the Czech Republic
- Make use of soft copies when finding it hard to access reputable resources

**Construction of the Gantt Chart**

Dates	September	October	November	December	January	February
Choose my research area						
Conduct preliminary research						
Decide on my research topic						
Decide on methodology						
Submit/present research						
Finalize topic & methodology						
Conduct you research (fieldwork)						
Analysis/data processing						
Writing up						
Submission						

*Figure 1.2 Gantt Chart*

The above Gantt Chart present the sequence or rather the array of tasks or activities to be followed in order to achieve the successful outcomes of the project.

**2. What kind of effects do you expect by possible using buffers (time buffers) during the working out of your thesis (dissertation or other chosen project)? Can you explain what is the time buffer. How you can measure a reached results (used metrics such as time, resource capacity, costs, good -will and so on).**

Buffer is is the extra time added into a time estimate to keep a project on track. The purpose of buffer is risk management, circumstances and unertainties occur that may prolong the project. Risks and uncertainties tend to subtle in some projects therefore additional time allowance is added to compensate for such uncalled events. Buffer time allows me to account for unforeseen circumstances without prolonging the project plan.

**Effects I expect from utilizing the time buffer**

- My project days will be expanded to allow for unforeseen circumstances
- Should the risks be controllable and clear at the beginning of the project, the tasks can be completed in harmony
- More effective and efficient outcomes because the level of frustration and the demand to work under pressure will be minimized or lessened

**Gantt Chart with Time buffers**

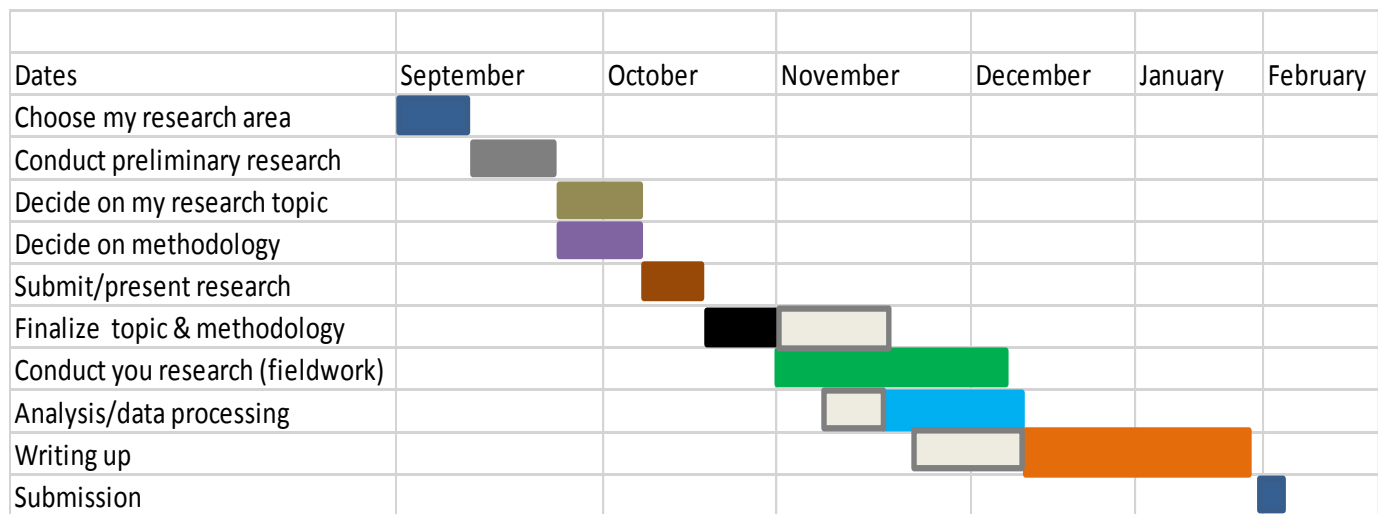


Figure 1.3 Gantt Chart with Time buffers



**3. Can you specify by use of Thinking Process Tools Your personal bottleneck as far as studying processes or writing a work or working on assigned school tasks (by other tutors) is concerned? Create CRT (see full meaning above) and create a list of Undesirable Effects (named by You as it was mentioned already in clause 1)**

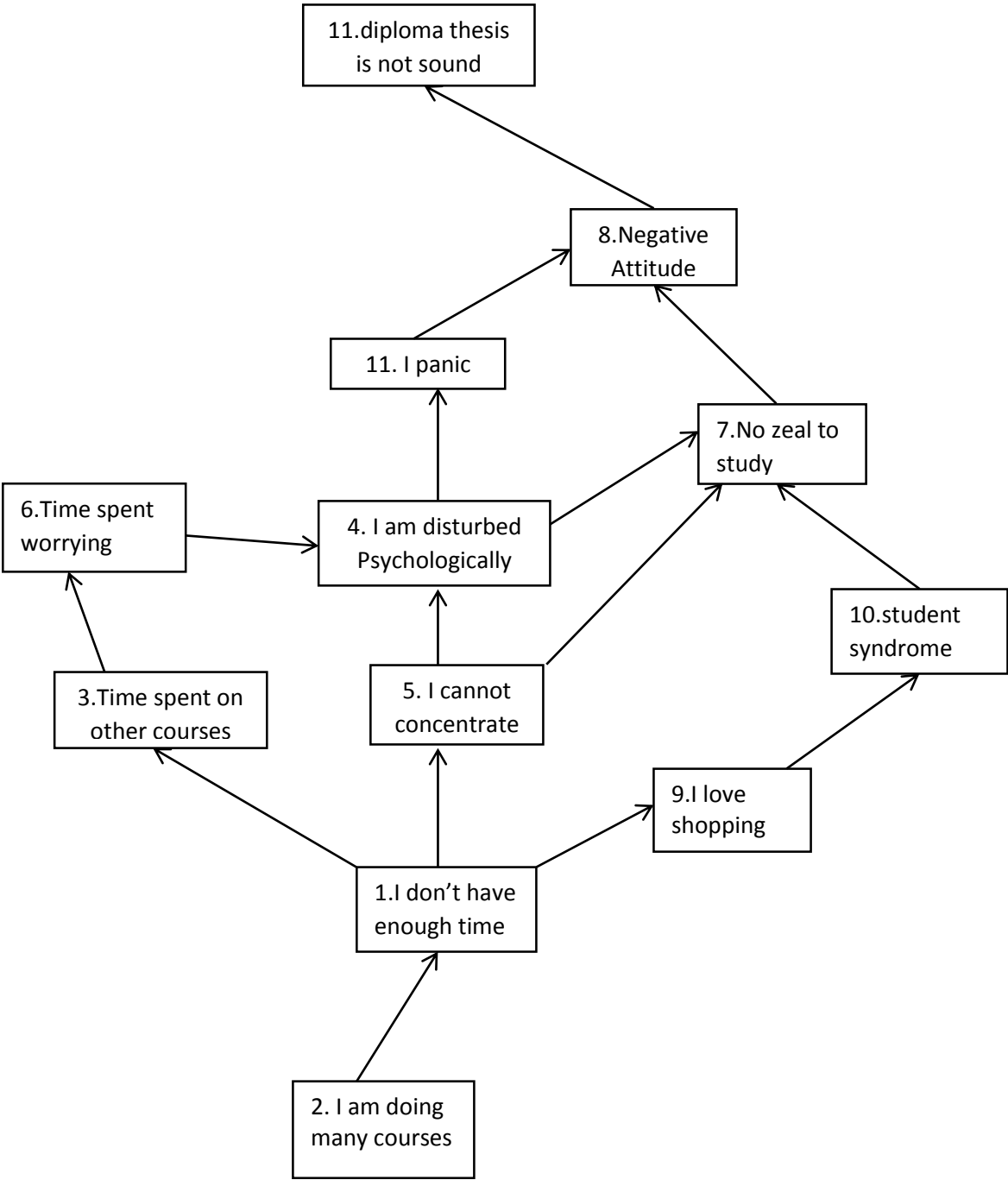
**Thinking Process Tool** : “ a suite of logic trees that provide a roadmap for change. They guide the user through the decision making process of problem structuring, problem identification, solution building, identification of barriers to be overcome, and implementation of the solution“ (Mabin)

Current Reality Tree : According to (Evers& Van Cauwenberghe) Current Reality Tree helps you to find one or a few root causes for problems you're facing. Now you know where to intervene to really solve the problems.

**List of Undesirable effects (UDE) for my Project**

1. I don't have enough time
2. I am doing many courses
3. Most of my time is spent on studying for other courses and exam preparations
4. I am disturbed Psychologically
5. Most of the time I cannot concentrate
6. I spend most of my time worrying and reminiscing about the past
7. I don't have the zeal to study anymore
8. I tend to have attitude when I can't find relevant information
9. I love shopping
10. I have student syndrome
11. I panic when I don't have enough time to finish my tasks
12. My diploma thesis is not sound

**Construction of Current Reality Tree**



*Figure 1.4 Current Reality Tree*

4. **Create with use of already existing set of UDE's Ishikawa fishbone diagram and put some weights meaning numbers specifying an importance of assign reasons. It was clearly shows in Ishikawa FBD power-point presentation. Based on the set of assigned score create Pareto Lorenz curve. The principle is also show in just mentioned presentation. Specify most important reasons. Compare with root problem found by use of Current Reality Tree.**

### Ishikawa fishbone diagram

“The Fishbone diagram (also called the Ishikawa diagram) is a tool for identifying the root causes of quality problems. It was named after Kaoru Ishikawa, a Japanese quality control statistician, the man who pioneered the use of this chart in the 1960's (Juran,1999). Cited from (Ilie & Ciocoiu,2010)

### Construction of Ishikawa fishbone diagram with Undesirable effects

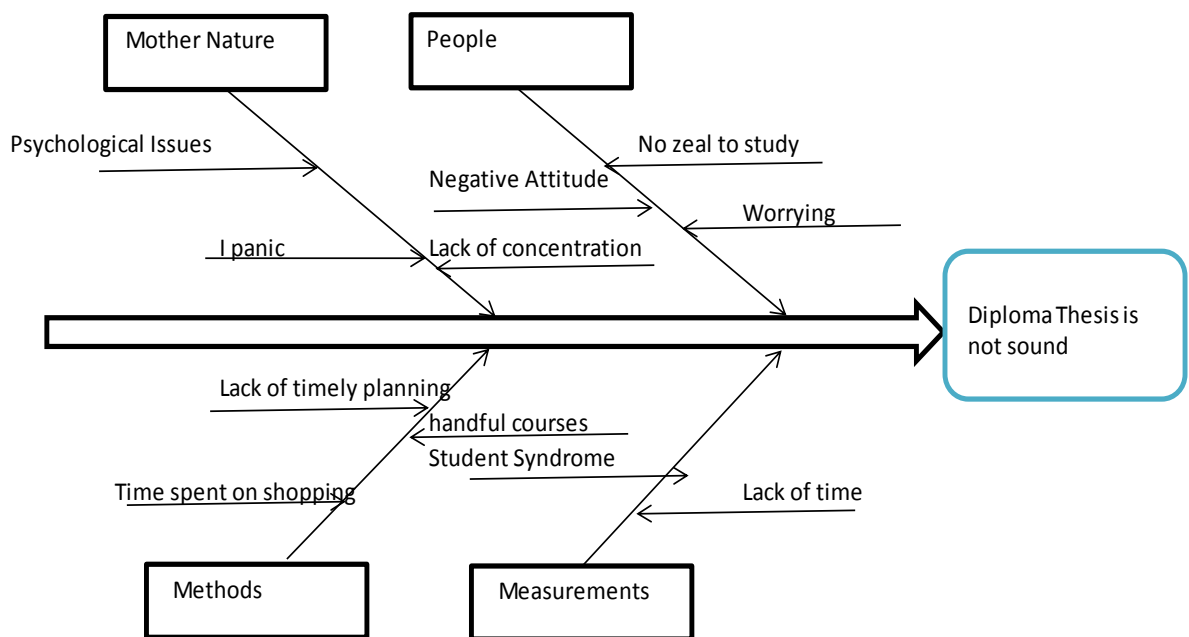


Figure 1.5 Ishikawa fishbone diagram

## Weights of the Activities

Item Category	Weights	Cummulative Total	Percent
Lack of time	90	90	29%
psychological Issues	83	173	55%
Student Syndrome	76	249	80%
Lack of Concentration	23	272	87%
Time spent on shopping	18	290	93%
Handful Courses	12	302	96%
Negative Attitude	8	310	99%
I panic	3	313	100%
Total	313		

Figure 1.6 Calculation of weights

To indicate or weigh the importance of each activity, I utilized the cumulative table as presented above.

## Pareto Lorenz curve

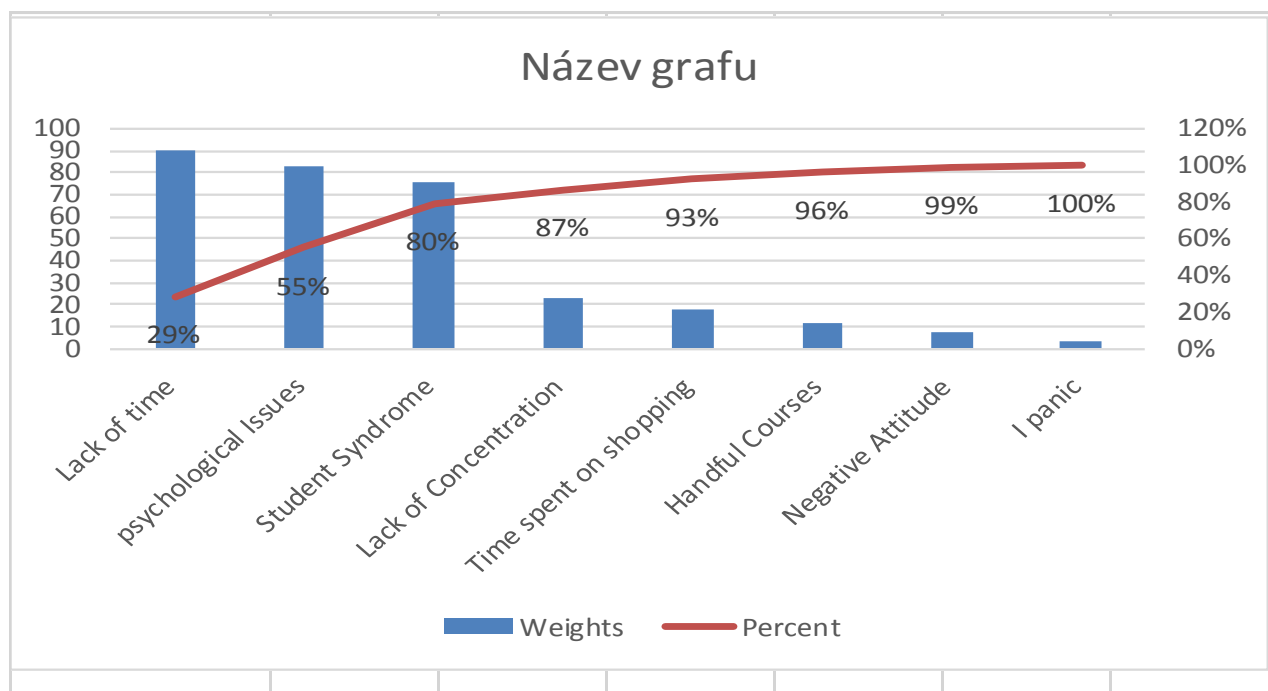


Figure 1.7 Pareto Lorenz curve

- The Lorenz curve is a graphical representation of the distribution of income or of wealth.
- 80/20 principle is used to derive the Pareto Lorenz Curve for my Diploma seminar and it can be concluded that first three tasks are worth 80 percent of the entire plan hence 80/20 principle.

***5. State clearly Your suggestions how to improve Your dissertation writing ( or any other chosen project) and related benefits.***

- Risks and uncertainties are subtle in a project however timely planning makes it possible to allow for such and be in the position to deal with them without delaying the entire project .
- Utilization of Gantt charts should be taken into consideration to ensure that enough time has been allocated to each task
- The use of bottlenecks, identify them and make time allowance and deal with them thoroughly
- Other tools can be used as well such as future reality tree which represents the reality we want to move to - the system as we would like it to operate

## References

Dwivedi U, (n.d). Critical Path Method and Critical Chain Project Management, Available from <http://www.refresh.com/CriticalChainProjectManagement.pdf>  
Accessed on 19 April 2016

[http://www.goldratt.co.uk/resources/critical\\_chain/](http://www.goldratt.co.uk/resources/critical_chain/) Accessed on 19 April 2016

Ilie G & Ciocoiu C.N, (2010). Management Research and Practice: *Application of Fishbone Diagram to determine teh risk of an event with multiple causes management research and practice*. Vol. 2 Issue 1 (2010) p: 1-20. Available from <http://mrp.ase.ro/no21/f1.pdf>.