MTAT.03.231
Business Process Management

Practice 6
Quantitative Process Analysis 1
(Flow Analysis)

Marlon Dumas
Mariia Markovska, Maria Häling
Time measures

- Processing time
- Waiting time
- Time taken by value-adding activities
- Time taken by non-value-adding activities
- Time between start and completion of a process instance

Cycle time
Cycle time efficiency

Processing Time (Theoretical Cycle Time) ÷ Cycle Time = Cycle Time Efficiency CTE

CTE (Cycle Time Efficiency)
Flow analysis equations for cycle time

\[ CT = \max(T_1, T_2, \ldots, T_N) \]

\[ CT = p_1 \cdot T_1 + p_2 \cdot T_2 + \ldots + p_n \cdot T_N \]

\[ CT = \frac{T}{1 - r} \]
Flow analysis of cycle time

Cycle time = 1.25 + 3 + 3 + 1.4  = 8.65 days
Flow analysis of processing time

Application received → Check completeness X → Check credit history → Assess application X → Make credit offer

- 20% application incomplete
- Check completeness: 80% success, 2 hours
- Check credit history: 0.5 hour
- Assess application: 2 hours
- Make credit offer: 60% granted, 40% denied

- Notify rejection: 0.5 mins.

Processing time = \(\frac{2}{0.8} + \max(0.5,3) + 2 + 0.6 \times 2 + 0.4 \times 0.5\) = 8.9 hours

Cycle time efficiency = 8.9 hours / 8.65 days = 12.9%
Exercise 1

Consider the following process model. Each task is annotated with its mean processing time.

1. Calculate the theoretical cycle time of this process.
2. Let us assume that the cycle time of this process is 2 business days (16 hours). What is the cycle time efficiency of this process?
Exercise 2

Calculate the cycle time efficiency of the following process. The cycle times and processing times of each task are given in the table below.
Exercise 3

Which of the following expressions allows us to calculate the theoretical cycle time of the process?

a) 60 + 540 + 120 + 1200 + 240 + 60
b) 60 + 0.9\times540 + 120 + 0.85\times1200 + 0.8\times240 + 60
c) 60 + 0.9\times540 + 120 + 0.85\times(1200 + 0.8\times(120 + 60))
d) 60 + 0.9\times(540 + 120 + 0.85\times(1200 + 0.8\times(240 + 120 + 60)))
e) 60 + 0.9\times(540 + 120 + 0.85\times(1200 + 0.8\times(240 + 60)))
Exercise 4

Calculate the theoretical cycle time of the Admission process, assuming the following.

- The process starts when an online application is submitted online.
- It takes 2 weeks for the documents to arrive to the admissions office by post.
- The check for completeness takes 10 minutes. In 20% of cases, the completeness check that some documents are missing. If so, an e-mail is sent to the student automatically by the admission management system.
- An admissions officer spends 10 minutes to put the degrees and transcripts in an envelope and send them to the academic recognition agency. The time it takes to send the degrees to the academic recognition agency and to receive back a response is 2 weeks.
- About 10% of applications are rejected after the academic recognition assessment.
- Checking the English language test results takes 1 day on average, but in reality the officer who performs the check only spends 10 minutes on average per check.
- About 10% of applications are rejected after the English language test.
- It takes on 2 weeks between the time students service sends the copy of an application to the committee and the moment the committee makes a decision. The committee spends 1 hour examining an application.
- It takes on average 2 days (after the decision is made by the academic committee) for the students service to record the committee’s decision in the University admission system.
- Recording a decision takes 2 minutes. Once a decision is recorded, a notification is automatically sent to the student.
University Admission Process Model

New application submitted 

- Documents received by post 

- Check documents for completeness 

- Validate documents with agency 

- Check English test results 

- Assess application (academic committee) 

- Record decision 

- Application processed 

- Application rejected 

- Missing info 

- Ask missing information or documents