Scheduling I.

Scheduling in construction

Aims and purposes of scheduling

• To forecast the events/activities in the project
• To expose likely difficulties of the future, and help to solve them
• To forecast the requirements of money and other resources
• To minimize the unproductive time of men and machines
• To lay down deadlines
• To use as a control tool
Scheduling in construction

Affecting factors:
• Technology:
  • Time span of actual work;
  • Time span of technical breaks;
• Law, regulation (e.g. working hours...);
• Financing (incomes – expenses, ...);
• Location (limited space/accessibility, ...);
• Time period (weather conditions, holidays...);
• ...

Scheduling in construction

• Types of schedules (during a building project)
  • It has to be detailed (and accurate) enough for the actual use – project manager, construction manager, general foreman, skilled workers, etc. → contents, time unit
  • The later it is made, the more accurate and detailed it can be

- Framework schedule
- Draft schedule
- General time-plan
- Master program
- Detailed time-plan
- Time control
Scheduling in construction

• **Information in a schedule**
  - The **time needed** for each construction process (in some cases the available time span)
  - **Technical content** to each construction process
  - **Connections** between processes in time, in space
  - Chronological order (sequence) depending on technology
  - **Time span** of the project/construction
  - Starting/finishing **date**
  - **Resources** needed during the construction processes → during the whole construction
  - Together with the cost calculation: **costs** of each activity → costs during the construction

Scheduling in PM

Project time management (PMBOK)

• **Activity definition**
• **Activity sequencing**
• **Activity duration estimating**
• **Schedule development**
• **Schedule control**
“Time planning”

• Determine what is to be done: OUTCOMES (plan)
• Work Breakdown Structure (WBS)
• List of activities (tasks)

Production process • realising the building
Building processes • realising the superstructure
Technology processes • construction of the 1st floor r.c. slab
Activities • making the reinforcement for a slab

• Activities: processes made in one time, at one place, by one group of workers

“Time planning”

Relations between activities
• Technological conditions: order of activities based on technological reasons
  • Formworking and pouring of concrete
  • Ceramic tile on wall and floor
• Organisational conditions: one worker-one job-one place-one time
  • The number of skilled workers – one job at the same time
  • Size and location of the place of work - allowing adequate working space
"Time planning"

- **Quantities for each task**
- **Assigning resources**
  - Material (construction material, auxiliary structures, ...)
  - Human (management, skilled workers – labour)
  - Equipment (machines, heavy equipment, power tools, ...)
  - Area
  - Money
- **Estimating the time required for the processes:**
  - Standards
    - Performance standard [time/unit] (h/m³, h/m²...)
    - Standard output [unit/time] (m³/h, pcs/h)

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"Time planning"

Estimating time: the duration of the processes

\[
\text{Work [time]} = \frac{\text{Volume [unit]}}{\text{Standard output [unit/time]}}
\]

\[
\text{Work [time]} = \text{Volume [unit]} \times \text{Performance standard [time/unit]}
\]

\[
\text{Duration [time]} = \frac{\text{Work [time]}}{\text{Allocated resource [unit]}}
\]

- **Work**: time of process for one unit of resource
- **Duration**: time of process for the allocated units of resource
„Time planning”

**RESOURCES**

**QUALITY**

**QUANTITY (VOLUME)**

**OUTCOMES**

**TECHNOLOGY**

**ACTIVITY**

**DURATION**

**NETWORK**

**APPROPRIATE?**

**SCHEDULE REPRESENTATION**

**ORGANISATIONAL CONDITIONS**

**TECHNOLOGICAL CONDITIONS**

**LOGICAL FRAMEWORK**

**Schedule representations**

- Timetable (tabular or alpha-numerical schedule)
- Bar chart, Gantt chart
- Cyclogram
- Network
References

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