2C11

Business economics and entrepreneurship

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Lecture 5: Project management – support activities (06/05/2014)

European Erasmus Mundus Master Course
Sustainable Constructions
under Natural Hazards and Catastrophic Events
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Universitatea Politehnica Timişoara

LIST OF LECTURES

Lectures

L1 Trends and challenges for the construction industry
L2 Business strategies and business development in construction companies
L3 Financial management in construction companies
L4 Project management – generalities
L5 Project management – support activities
L6 Project management systems applied in constructions
L7 Entrepreneurship issues
L8 Standard contracts in civil engineering
L9 Risk management in construction company
L10 Summary and discussion of the exam questions

Applications

A1 General presentation of the case study (WTP – Hunedoara)
A2 Financial analysis and management in construction company (WTP – Hunedoara)
A3 Cash flow analysis (WTP – Hunedoara)
A4 Visit – WTP Hunedoara
A5 Project's presentation

L5 PROJECT MANAGEMENT – SUPPORT ACTIVITIES

OBJECTIVES

- **Student is familiar with the purpose and the advantages of Bills of Quantities**
- **Student has knowledge about the construction of a Gantt Diagram**
- **Student understands which are the main issues related to the marketing analysis**
- **Student knows how to develop a marketing plan**

L5 PROJECT MANAGEMENT – SUPPORT ACTIVITIES

TOPICS

I. BILL OF QUANTITIES (BoQ) - THEORY

- Definition
- Purpose
- Advantages
- Categories of works
- Contingency sum
- Observations
- Example

II. GANTT DIAGRAM - THEORY

- Definition
- History
- Steps
- Advantages
- Drawbacks
- Complementary planning

III. BUSINESS DEVELOPMENT

- Marketing analysis
- Sales
- Customer Service

I. BILL OF QUANTITIES (BoQ) - THEORY

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I. BILL OF QUANTITIES (BoQ) - THEORY

Definition

- A bill of quantities (BoQ) is a **document used in tendering in the construction industry** in which materials, parts of the work, labor (and their costs) are itemized.

- A Bill of Quantities is prepared by Quantity Surveyors to provide an extensive and itemized trade list, including a **description and quantity, of each of the components or items** required for a construction project.

- The main purpose of a Bill of Quantities is to itemize and define a project so that all **tenderers are preparing their price and submission on the same information**. What is necessary for the project?

!!! The BoQ is based on national standards called “estimating books”.
Estimating books provide the relevant costs of the materials and labor costs of the operations or trades used in construction. As the rates for materials and labor change due to inflation, these books are frequently republished.

I. BILL OF QUANTITIES (BoQ) - THEORY

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I. BILL OF QUANTITIES (BoQ) - THEORY

Purpose

- Bills of quantities are prepared by a “taking off” in which the **cost of a building or other structure is estimated from measurements in the Architects, Structural Engineers**, and other building consultants drawings.
- These are used to **create a cost estimate** such as in regard to the square area in meters of walls and roofs, the numbers of doors and windows, and systems as heating, plumbing and electrics. Similar types of work are then brought together under one item, a process known as "abstracting".

- It also **help planning the activities** – see Gantt diagram

- **Sufficient time is needed** to be set aside (well in advance) in the design and documentation schedule and before tendering for **the preparation of the BoQ**.

Note: If a BoQ is prepared in the correct and agreed format, they may form part of the Contract – that is, they become a contract document. And so the Contract Sum can be adjusted against the items, quantities, descriptions and rates included within it.

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I. BILL OF QUANTITIES (BoQ) - THEORY

Advantages (1/2)

- The preparation of a BQ has numerous **advantages**, such as:
(see http://costplanner.com.au/bill-of-quantities-explained/)

  - Assisting the **comparison and assessment of tenders**, as tenders will be based on the same information
  - Providing a good and fair basis for **assessing variations during construction**;

Note: A Bill of Quantities can only be as good as, and as accurate as, the documents it is based on. Incomplete drawings, vague schedules and performance-based specifications do not form a good basis for a useful and comprehensive BoQ.

  - Being a **basis** for assessing and recommending progress claims and **payments**;
  - Helping to **reduce the tender period** (and its associated costs) as the tenderers then do not have to reproduce the tender documents for their own use (though it may take weeks), and sometimes rough or abridged, measurement and builders' quantities;

I. BILL OF QUANTITIES (BoQ) - THEORY

Advantages (2/2)

- The **priced bill of quantities will also**:
  - Assist with the **agreement of the contract sum** with the successful tenderer.
  - **Provide a schedule of rates** assisting with the valuation of variations.
  - Provide a basis for the **valuation of interim payments**.
  - Provide a basis for the **preparation of the final account**.
  - And it also provides a **basis for project cost analysis**, so that future cost planning efforts have reliable information to refer to.

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I. BILL OF QUANTITIES (BoQ) - THEORY

Categories of works

Examples of works requiring BoQ - http://www.designingbuildings.co.uk/wiki/Bill_of_quantities

A - Preliminaries and general conditions.	J - Waterproofing.	S - Piped supply systems.
B - Complete buildings, structures and units.	K - Linings, sheathing and dry partitioning.	T - Mechanical heating, cooling and refrigeration systems.
C - Existing site, buildings and services.	L - Windows, doors and stairs.	U - Ventilation and air conditioning systems.
D - Groundwork.	M - Surface finishes.	V - Electrical systems.
E - In situ concrete and large precast concrete.	N - Furniture and equipment.	W - Communications, security, safety and protection systems.
F - Masonry.	P - Building fabric sundries.	X - Transport systems.
G - Structural carcass, metal and timber.	Q - Paving, planting, fencing and site furniture.	Y - General engineering services.
H - Cladding and covering.	R - Disposal systems.	Z - Building fabric reference specification.

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I. BILL OF QUANTITIES (BoQ) - THEORY

Contingency sum

- A Contingency sum is an **item** found within a Bill of quantities (BoQ).
- The item refers to **unforeseeable cost** likely to be incurred during the contract.
- There are **two types of contingency sum**:
  - The first refers to a **specific item** i.e. 'additional alterations to services when installing said shower unit'; where an item for alterations to existing services is not contained within the BoQ but some work is envisaged.
  - The second type of sum is where **money can be allocated to any item**, within the BoQ, in the same way as the above example or used as 'additional work to be undertaken by the contractor, at the request of the contract administrator'.

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I. BILL OF QUANTITIES (BoQ) - THEORY

Observations

- Bills of quantities can be **prepared elementally or in works packages**, and are most useful to the contractor when they are prepared in work sections that reflect likely **sub-contract packages**. This makes it easier for the contractor to obtain prices from sub-contractors and is more likely to result in an accurate and competitive price.
- The bill of quantities should identify the **different kinds of work required**, but should not specify them as this can lead to confusion between information in the bill of quantities and information in the specification itself.
- Disputes can occur where there is **discrepancy between the bill of quantities and the rest of the tender documents** (for example where an item is included in the drawings and specification but not in the bill of quantities), or where there has been an arithmetical error. Generally the priced bill of quantities will take precedent, and the client will be responsible for their own errors or omissions, which may be classified as relevant events (or compensation events) giving rise to claims for an extension of time and loss and expense. However if an ambiguity or error is noticed by the contractor during the tender process, it is best practice for them to tell the client, even if there may be some commercial advantage to them not doing so.
- Bills of quantities are **normally only prepared on larger projects**. On smaller projects, or for alteration work the contractor can be expected to measure their own quantities from drawings and schedules of work.

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I. BILL OF QUANTITIES (BoQ) - THEORY

Example

BILLS OF QUANTITIES OF A PIGGERY STRUCTURE OF ST. PETER'S MINOR SEMINARY - MADERA

ITEM	DESCRIPTION	UNITS	Q'TITY	RATE	AMOUNT
	SEC. A PRELIMINARIES				
1.01	Site clearance	Item			20,000
1.02	Pegs and Profile	Item			10,000
1.03	Nails 2" & 3" (mixed)	Kg.	1	1,500	1,500
1.04	Hoes	No.	3	3,000	9,000
1.05	Spades	No.	2	6,500	13,000
1.06	Pick axe	No.	2	7,000	14,000
1.07	Axe	No.	1	3,500	3,500
1.08	Wheelbarrows	No.	2	60,000	120,000
1.09	Sisal strings	No.	Roll	1	1,800
1.10	Panga		1	3,500	3,500
1.11	Setting out	Job			30,000
1.12	Excavation of trenches to foundations	Job	1		40,000
	Sub-Total				**266,000**
	Sec. B: Strip Foundations				
2.01	Portland Cement	Bag	20	16,000	320,000
2.02	Sand	Trip	3	10,000	30,000
2.03	Coarse aggregate 13mm	Trip	2	70,000	140,000
2.04	Water	Item			20,000
	Add labour costs				153,000
	Sub-total				663,000
	Section C: Plinth wall				
3.01	Burnt clay Bricks	No.	2,500	60,000	150,000
3.02	Portland cement	Bag	9	16,000	144,000
3.03	Sand	Trip	2	10,000	20,000
3.04	Water	Item			20,000
	Add labour costs				100,000
	Sub-total				434,000
	Sec. D: Oversite concrete				
4.01	Hardcore 150mm	Trip	7	50,000	350,000
4.02	Portland cement	Bag	22	16,000	352,000
4.03	Sand	Trip	2	10,000	20,000
4.04	Coarse aggregate 13mm	Trip	2	70,000	140,000
4.05	Water	Item			50,000
	Add labour cost				250,000
	Sub-total				1,162,000
	Sec. E: Wall up to roofing level				
5.01	Damp proof course	Roll	1	15,000	15,000

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II. GANTT DIAGRAM - THEORY

- Definition
- History
- Steps
- Advantages
- Drawbacks
- Complementary planning

III. BUSINESS DEVELOPMENT

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II. GANTT DIAGRAM - THEORY

Definition

- Gantt charts make it easy to **visualize project management timelines** by transforming task names, start dates, durations, and end dates into cascading horizontal bar charts

- Using a Gantt chart can help fine-tune the project timeline for any size of project, and helps in many general **planning tasks**.

- Gantt Chart is a graphical representation of tasks as segments on a time scale. It helps plan and monitor project development or **resource allocation**.

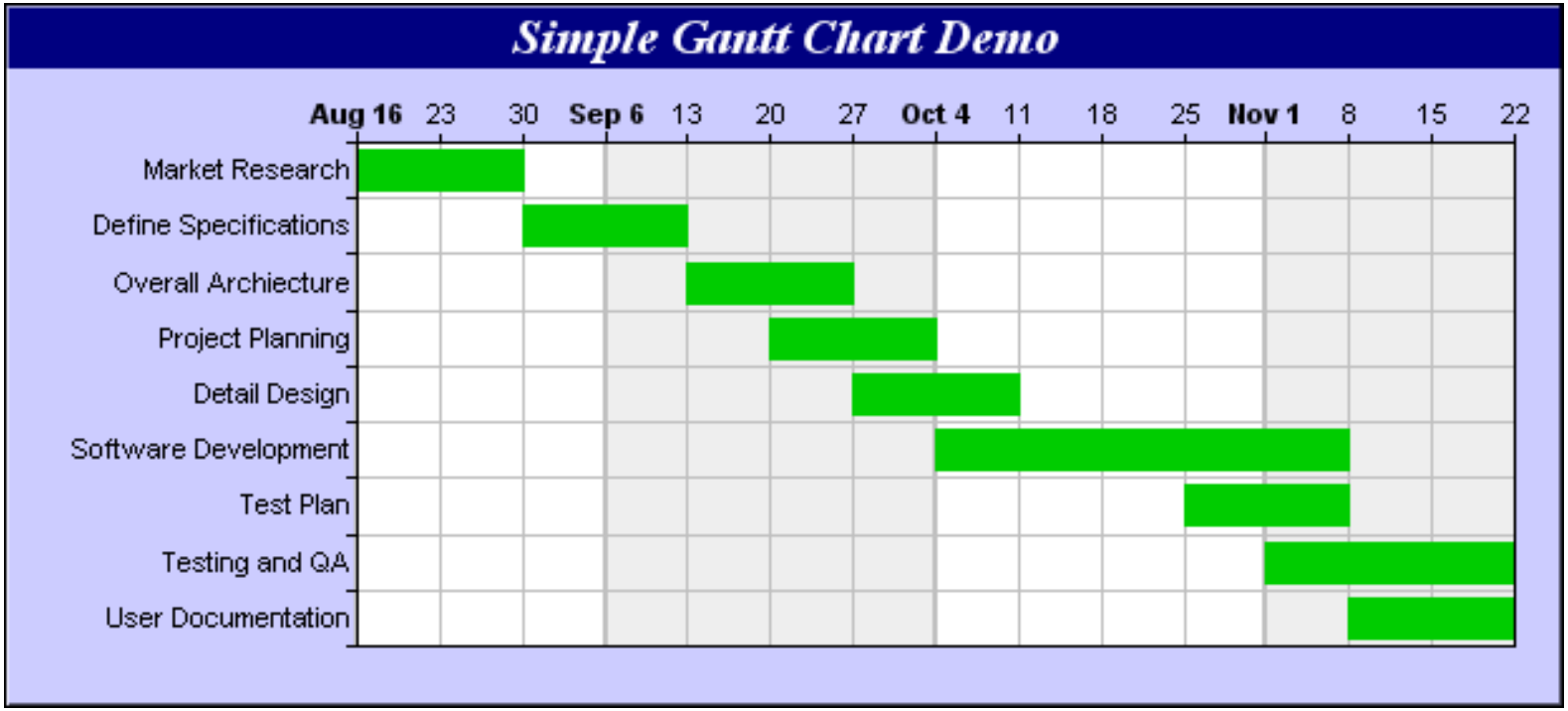
- It is a project management tool that managers can use to ensure that a successful project is **delivered in time and within budget**.

- The vertical axes of the Gantt chart is a column with **lists of tasks**. The **horizontal axis is a time scale**, expressed either in absolute or relative time.

II. GANTT DIAGRAM - THEORY

Definition

Example



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II. GANTT DIAGRAM - THEORY

History

Gantt charts are sometimes called as Gant Chart (Herrmann, 2005).

- Henry Gantt created many **different types of charts**. The purpose was to see whether production was on schedule, ahead of schedule, or behind schedule.

- Henry Gantt (1903) describes **two types of balances**: the **man's record**, which shows what each worker should do and did do, and the **daily balance of work**, which shows the amount of work to be done and the amount that is done.

- The daily balance has **columns for each day** and **rows for each part or each operation**.

- Heavy vertical lines indicate the starting date and the date that the order should be done. According to Gantt, the graphical daily balance is a **method of scheduling and recording work.**

II. GANTT DIAGRAM - THEORY

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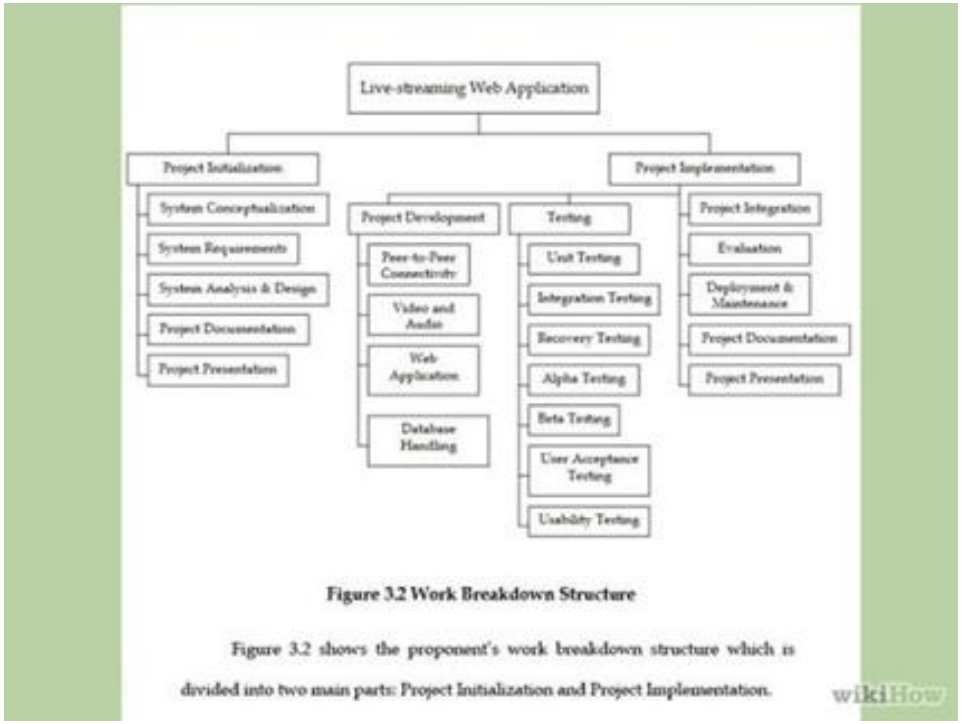
II. GANTT DIAGRAM - THEORY

Steps

http://www.wikihow.com/Create-a-Gantt-Chart

1. Understand the work breakdown structure

The Gantt chart is meant to help with a comprehensive goal of planning and implementing a work breakdown structure, which is the **overall structure of the project**.



2. Gather necessary information about all steps or processes included in a greater project.

II. GANTT DIAGRAM - THEORY

Steps

http://www.wikihow.com/Create-a-Gantt-Chart

3. Build timelines.

While looking at all of the assembled information, determine **how long each project step or process will take**. Add this into the mix, and plot lengths for individual bars that will represent phases or processes.

Table 3.2 Project Schedule

Task Name	Owner	Duration
1. Project Proposal		**51 days**
1.1 System Conceptualization	All	8 days
1.2 Review Requirements	All	8 days
1.3 System Analysis & Design	All	39 days
1.4 System Documentation	All	21 days
1.5 Presentation Preparation	All	4 days
1.6 Presentation Proper	All	1 day
2. Development		
2.1 Software Development		*78 days*
2.1.1 User Interface Design		15 days
2.1.2 Live Stream Module	All	33 days
2.1.3 Database Architecture	All	10 days
2.1.4Conference Module	All	34 days
2.1.5Record Module	All	19 days
2.1.6Document Module	All	19 days
2.2 System Integration	*All*	*7 days*
2.3 System Testing		*6 days*
2.3.1 Unit Testing	All	1 day
2.3.2 Integration Testing	All	1 day
2.3.3 Recovery Testing	All	1 day
2.3.4 Alpha Testing	All	1 day
2.3.5 Beta Testing	All	1 day
2.3.6 Usability Testing	*All*	1 day
2.4 System Review		*11 days*
2.4.1 Evaluation of Testing Results	All	3 days
2.4.2 Improvements of the System	All	8 days
3. Project Checking		**8 days**
3.1. Deployment and Installation	All	8 days
4. User Acceptance Testing		**30 days**
4.1 User Acceptance Testing	All	20 days
4.2 Evaluation of UAT	All	10 days
5. Final Presentation		**18 days**
5.1 System Documentation	All	17 days
5.2 Project Presentation	All	1 day

II. GANTT DIAGRAM - THEORY

Steps

http://www.wikihow.com/Create-a-Gantt-Chart

4. Lay out all of the bars on the graph

The Gantt chart **assembles all pieces** relative to a fixed deadline. Within a greater project deadline, the **timeline for smaller processes becomes clear** for those who are looking at the Gantt chart.

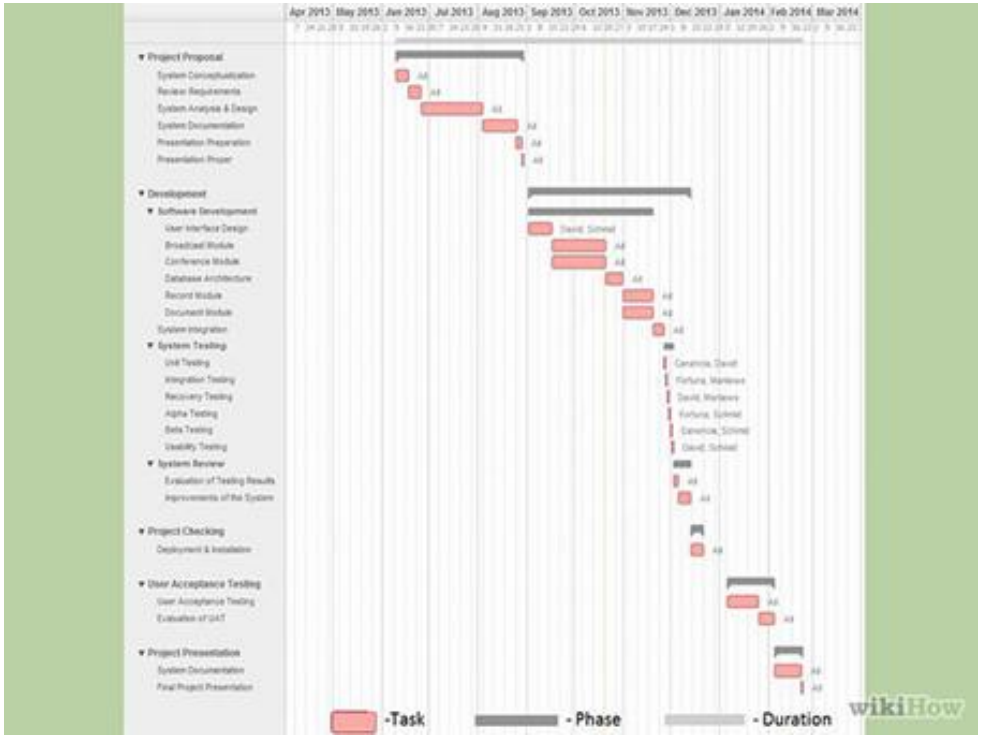
II. GANTT DIAGRAM - THEORY

Steps

http://www.wikihow.com/Create-a-Gantt-Chart

5. Evaluate dependency or relationships between phases or processes (a simple logic or calculation – see critical paths procedure).

Looking at the Gantt chart can also make it clear which parts of a project are dependent on others **AND IF** the task can be performed in the same time or not.



6. Implement the Gantt chart in software (professional)

II. GANTT DIAGRAM - THEORY

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II. GANTT DIAGRAM - THEORY

Advantages

!!! The four main features of the Gantt diagram are: milestones (key moments), resources, status (if we compare the projection with the realized tasks), dependencies.

Why building a Gantt diagram?

- We can monitor the individual tasks (very important to manage the dependent tasks!)
- The length of the time for each task is shown
- Tasks can be viewed as a calendar, with their start, duration and deadline.
- Links can be shown between independent tasks
- Give a quick view of what happens in every stage or the project and in the next period
- How long a project should take for completion
- Resources required for tasks can be linked to the tasks!

II. GANTT DIAGRAM - THEORY

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II. GANTT DIAGRAM - THEORY

Possible drawbacks

- Can be considered a too simplistic planning tool
- Does not provide sufficient detailed information for complex projects
- The need for updating can be considerable
- The time for each task must be estimated before the start (risk of poor estimation)
- It is difficult to show where is a slack time in the project
- Critical paths in the project are not easy to be identified.

II. GANTT DIAGRAM - THEORY

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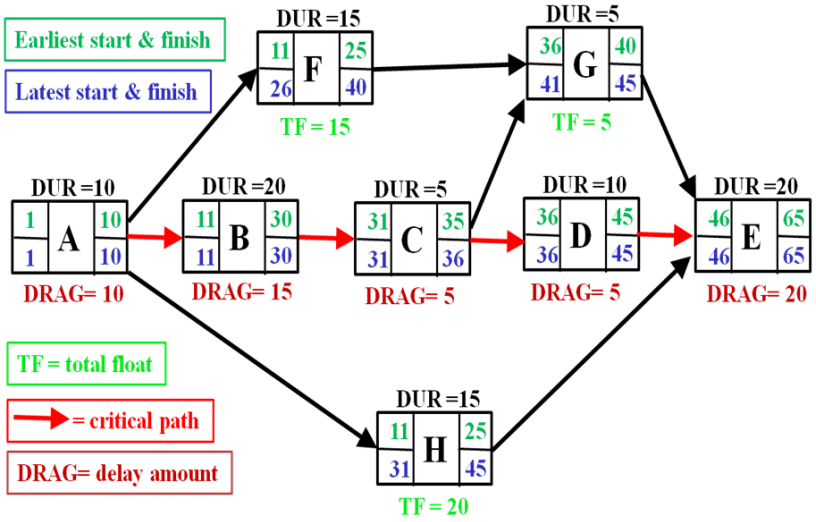
II. GANTT DIAGRAM - THEORY

Complementary planning

Critical Path Analysis (CPA)

- Helps the project managers to calculate the **minimum length** of a time-project (tasks can be performed in different way or in a different order)

- **The idea**: The activities are dependents and must to be finished into a specific order



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III. BUSINESS DEVELOPMENT

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III. BUSINESS DEVELOPMENT

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III. BUSINESS DEVELOPMENT

Marketing analysis

Definition

- The action or business of **promoting and selling products or services**, including market research and advertising

- The process of **communicating the value of a product or service** to customers, for the purpose of selling that product or service.

- Marketing = **creating business opportunities** by:
  - Retaining Current Customers
  - Attracting New Customers

- Marketing is **the science of choosing target markets** through market analysis and market segmentation, as well as understanding consumer behavior and providing superior customer value.

III. BUSINESS DEVELOPMENT

Marketing analysis

Generalities and steps

- **Response to questions**: What Types of Construction Services does the Company Want to Perform? What Segment of the Overall Market is Targeted?
- Define Relevant Market
- Identify Major Purchasers
- Identify Factors Impacting Purchase
  - Willingness to Purchase
  - Ability to Purchase
- Identify Decision Process Used
  - Extensive Problem Solving
  - Limited Problem Solving
  - Routine Response Behavior
- Identify Service Characteristics Valued
- Identify Competition
- Target Prospective Customers

III. BUSINESS DEVELOPMENT

Marketing analysis

Marketing Process

- Planning
  - Marketing planning process is **derived from the overall business strategy**
  - **Positioning** = identifying a market **opportunity**, and developing a solution based on market research, segmentation and supporting data
  - **Marketing strategy**: (i) depth understanding of the market environment, particularly the competitors and customers; (ii) a strategy looks at the longer term view of the products, goods, or services being marketed; (iii) considers the resources a firm has, or is required to allocate in effort to achieve an objective.
- Market Selection
  - The market selection process should result in a **prioritized market portfolio**; a prioritized list of markets worthy of investment and pursuit.
  - Identifying the **target market** is an essential step in the development of a marketing plan.
- Coordinating Resources and Actions
- Implementation
- Evaluation

III. BUSINESS DEVELOPMENT

Marketing analysis

Marketing Initiatives

- Corporate Goals That Affect Marketing Initiatives
  - Type of Construction
  - Geographic Reach
  - Type of Services
  - Pricing (Bid or Negotiated)
  - Market Share

- To be successful, contractors must:
  - Understand the Opportunities
  - Organize to Take Advantage of the Opportunities
  - Obtain Work
  - Satisfy Customers While Making a Profit

III. BUSINESS DEVELOPMENT

Marketing analysis

Types of marketing (1/2)

- **Strategic** marketing (long-term):
  - embraces the thought process that occurs before your message is broadcast to the masses.
  - starts with understanding who your customers are and what is important to them
  - examples: Market Research you did to determine a need for what you offer; Competitive Intelligence; Customer/prospect feedback; How you determine what your customer needs to hear; How you determine where your customer goes for information

- **Tactical** marketing (short-term):
- is the execution of your marketing plan, such as generating leads, placing media, creating marketing tools, and implementing a follow-up system
- just putting a marketing message in an appropriate medium for your customers to hear or read is not good enough. The strategy must derive from an understanding of what's important to them.

III. BUSINESS DEVELOPMENT

Marketing analysis

Types of marketing (2/2)

- **Tactical** marketing (short-term):
- Examples of Tactical Marketing instruments: Emails (text/html/audio/video), Direct Mail Pieces, Postcards, letters, flyers, Speaking engagements, Networking Events

- **Internal** marketing: making the employees feel as if they're the customer, so that they learn to more easily promote the company's products and goals.

- **Right-time** marketing: is an approach to marketing which selects an appropriate time and place for the delivery of a marketing message

- **Guerrilla** marketing is an advertising strategy in which low-cost unconventional means (graffiti or street art, sticker bombing, flash mobs) are used, often in a localized fashion or large network of individual cells, to convey or promote a product or an idea.

III. BUSINESS DEVELOPMENT

Marketing analysis

Factors That May Influence Sale of Construction Services (1/2)

- History of Successful Performance Including On-Time Completions, Cost Within Budget, and Limited Punch Lists
- Successful Relationships and Repeat Business With Subcontractors
- History of On-Time Payments to Suppliers and Subcontractors
- Adequate Financial Assets to Fully Fund Projects
- Availability of Experienced Field Personnel and Adequate Field Organization
- Availability of Home Office Backup
- Knowledge and Use of Latest Technologies of Construction
- Presence in Geographic Area of Project
- Have a Reputation of Using Good Subcontractors and for Building Good Quality Projects

III. BUSINESS DEVELOPMENT

Marketing analysis

Factors That May Influence Sale of Construction Services (2/2)

- Ability to Manage a Complex Project
- Experience in Scheduling, Packaging Bids, and Negotiating
- Ability to Determine the Most Economical Building and Environmental Systems and Expertise in Life-Cycle Cost Analysis
- Evidence of a Team-Player Attitude
- Past Record of Working Productively With Contractors and Designers
- Capability to Handle the Administrative Functions and Paperwork
- Past Performance Record and Reputation
- Familiarity With Local Environmental Requirements
- Excellent Safety Record on Previous Projects
- Have a Good Record of Solving Problems Rather Than Creating Problems That Cause Delays and Excessive Extra Costs

III. BUSINESS DEVELOPMENT

Marketing analysis

Marketing Assets and Liabilities

- **Assets**
  - Performance Longevity
  - Customer Relations
  - Organization: Talented and Experienced People
  - Subcontractor Relationships
  - Equipment and Field Forces
  - Diversity of Markets
  - Position in Commercial Market
  - Position in Business Community
  - Location Within Growing Region
  - Financial Strength

- **Liabilities**
  - Dependence on Weakening Market
  - Lack of Sophisticated Management Tools
  - Management Transition
  - Poor Employee Morale
  - Division Between Field and Home Office
  - Inadequate Staff
  - Loss of Market Standing to Competition

III. BUSINESS DEVELOPMENT

Marketing analysis

Marketing Strategy

- **Basic**
  - Type Market Selection
  - Type Demand to be Stimulated
  - Product Focus
  - Customer Relationship Management

- **Alternative**
  - Stimulating Demand by Increasing the Number of Users: (i) Increasing the Willingness to Buy; (ii) Increasing the Ability to Buy;
  - Stimulating Demand by Increasing the Rate of Purchase: (i) Broaden Usage of Services; (ii) Increase Service Use Levels; (iii) Encourage Replacement.
  - Stimulating Demand by Retaining Existing Customers:(i) Maintain Satisfaction; (ii) Meet Competition;(iii) Establish Relationship With Customers.
  - Stimulating Demand by Acquiring New Customers: (i) Provide Better Quality Than Competitors; (ii) Provide Lower Cost Than Competitors; (iii) Emphasize Unique Attributes; (iv) Focus on Limited Numbers of Special Segments of the Market
  - Market Penetration
  - Market Extension
  - Service Development
  - Diversification

III. BUSINESS DEVELOPMENT

Marketing analysis

Developing a Marketing Plan

- **Considerations**:
  - Who Are Our Best Customers?
  - Who Are Our Potential Customers?
  - How Should We Approach Them?
  - What Should We be Saying to Them to Convince Them to Buy From Us Rather Than Our Competitors?

- **Development**
  - Establish Marketing Objectives
  - Analyze Current and Prospective Customers
  - Analyze Competition
  - Develop Marketing Strategies
  - Develop Marketing Action Plans
  - Establish Performance Criteria

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