LOGISTICS
-
STOCK AND THEIR MANAGEMENT

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The aim of the lecture is to clarify importance of stock and the essence of their management

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Logistics
-
Stock and their management

Structure of the lecture

Stock and their types
Stock creation factors
Stock management factors
Stock management phases
Stock management level indicators
Approaches to stock management

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STOCK

- current or short-term assets of the company
- their characteristic feature is that they are consumed or produced by the enterprise (as a result of the purchasing or production process)

- main stock categories:
  - **material**:
    - ❖ raw materials and basic material
    - ❖ auxiliary and operating substances
    - ❖ fuel
    - ❖ spare parts
    - ❖ packaging and small assets

- **stock of own production:**
  - ❖ work in progress
  - ❖ semi-finished products
  - ❖ finished products
- **goods**

- signaling levels of stock:
  - minimum stock
  - maximum stock

- functional components of stock:
  - current stock
  - safety stock
  - technical and technological stock
  - seasonal stock
  - speculative stock
  - emergency stock

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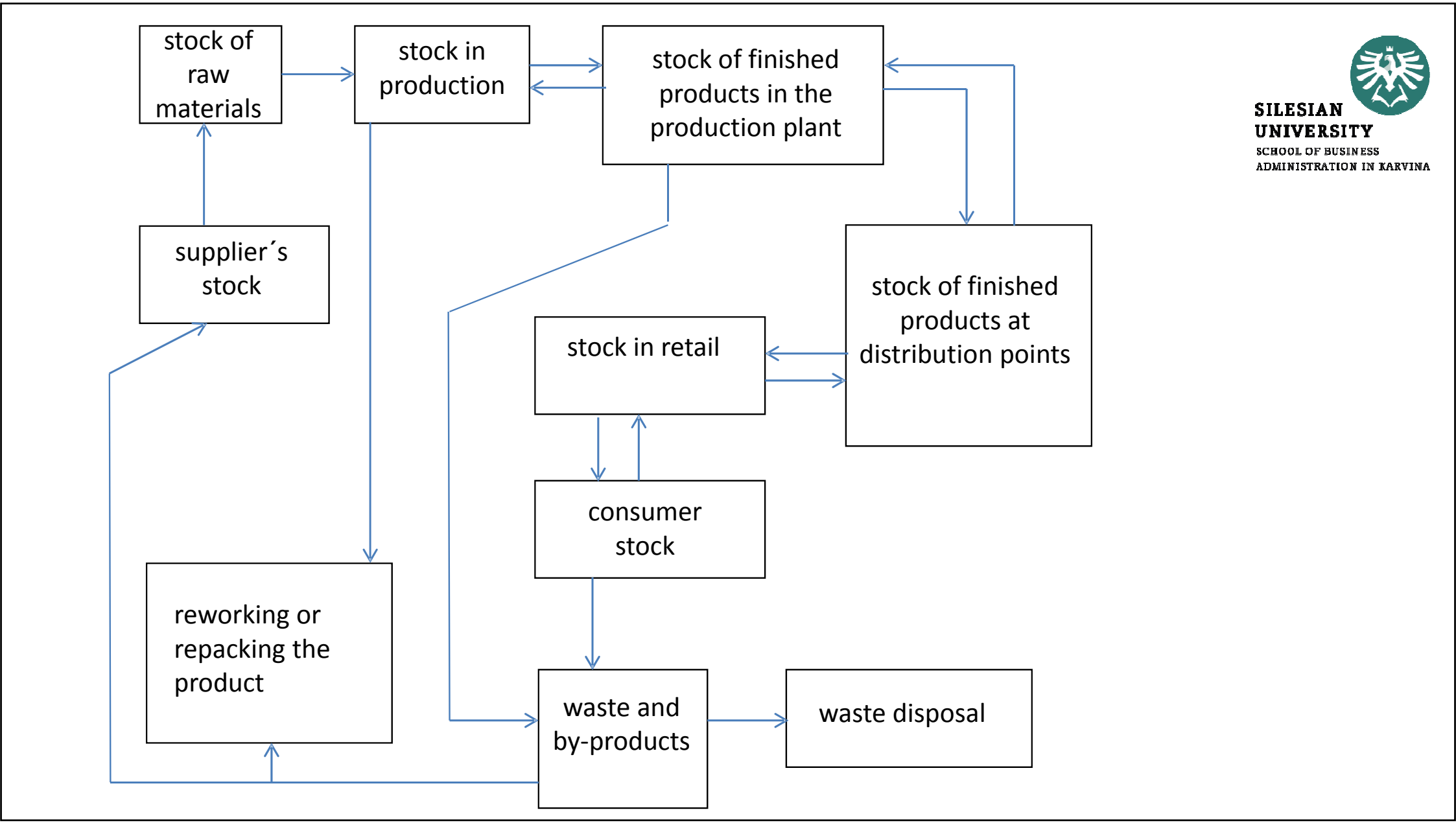
Reasons for stock creation:

- differences between resources (supply) and needs (demand) in terms of time, place and amount of their origin and use
- continuous and flexible production process
- differences between forecasted (planned) needs and actual consumption
- proper process or completion of the technological process

- discount when purchasing in larger delivery quantities
- purchase of raw materials at a time when there is enough on the market
- trying to avoid the problems caused by the lack of raw materials on the market
- delay sales in periods of low demand and allowing speculative profits from sales in later periods of high demand
- creation of optimal production or transport batch



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STOCK MANAGEMENT

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- stock level regulation
- goal:
  - to maintain stock in a size and structure that meets the needs of the business while respecting the economic efficiency criteria
- logistics stock regulation focuses on 2 conflict areas:
  - **performance** that is closely related to delivery readiness
  - **economy**, thus reducing the cost of stock

- basic groups of factors influencing stock management:
  - **external factors** (factors of the surroundings of the enterprise) - in market and mixed economies are considered primary
  - **internal factors** (business microenvironment factors)
- the most important external regulator - **the state of supply and demand in the relevant stock market**
- basic factor of internal regulation - **costs of maintaining and securing stock**

Internal Stock Management Factors:

- how the storage of stock works - we have one or more products; stock is drawn periodically or non-periodically
- how the storage is replenished - immediately, randomly, gradually, there are delays or not
- how goods are taken from the storage - randomly or deterministically
- there are some losses in the storage
- restrictions - storage size, financing

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Stock management levels

- **strategic stock management** - a set of decisions on the amount of financial resources that the company can allocate from the total available resources to cover stock in a given amount and structure
- **operative stock management**
  - keeping of specific types of stock at the level and structure as appropriate to in-house cost needs
  - based on the classification of stock according to functional components

- **phases of stock management** in a broader sense:
  - stock record:
    - ❖ basic and indispensable source of information on the state and movement of stock
    - ❖ captures phenomena signaling a material or value change in stock
  - stock analysis:
    - ❖ tool for identification and evaluation of structural, quantitative, qualitative, material and value changes in stock
    - ❖ monitors factors that affect the state and movement of stock

- stock inspection:
  - allows us to identify the levels of stock management
  - degree of adherence to certain rules and guidelines of the supervisory authorities for the control and use of stock
  - inspection of the method of disposal of unnecessary, redundant, event. unusable stock
  - quality control of stock record and analysis

- self regulation:
  - stock management in a narrower sense
  - continuous monitoring and evaluation of the state and movement of stock on the basis of adopted rules
  - flexible provision of feedback in case of deviations from the desired state and development

Development of stock in time

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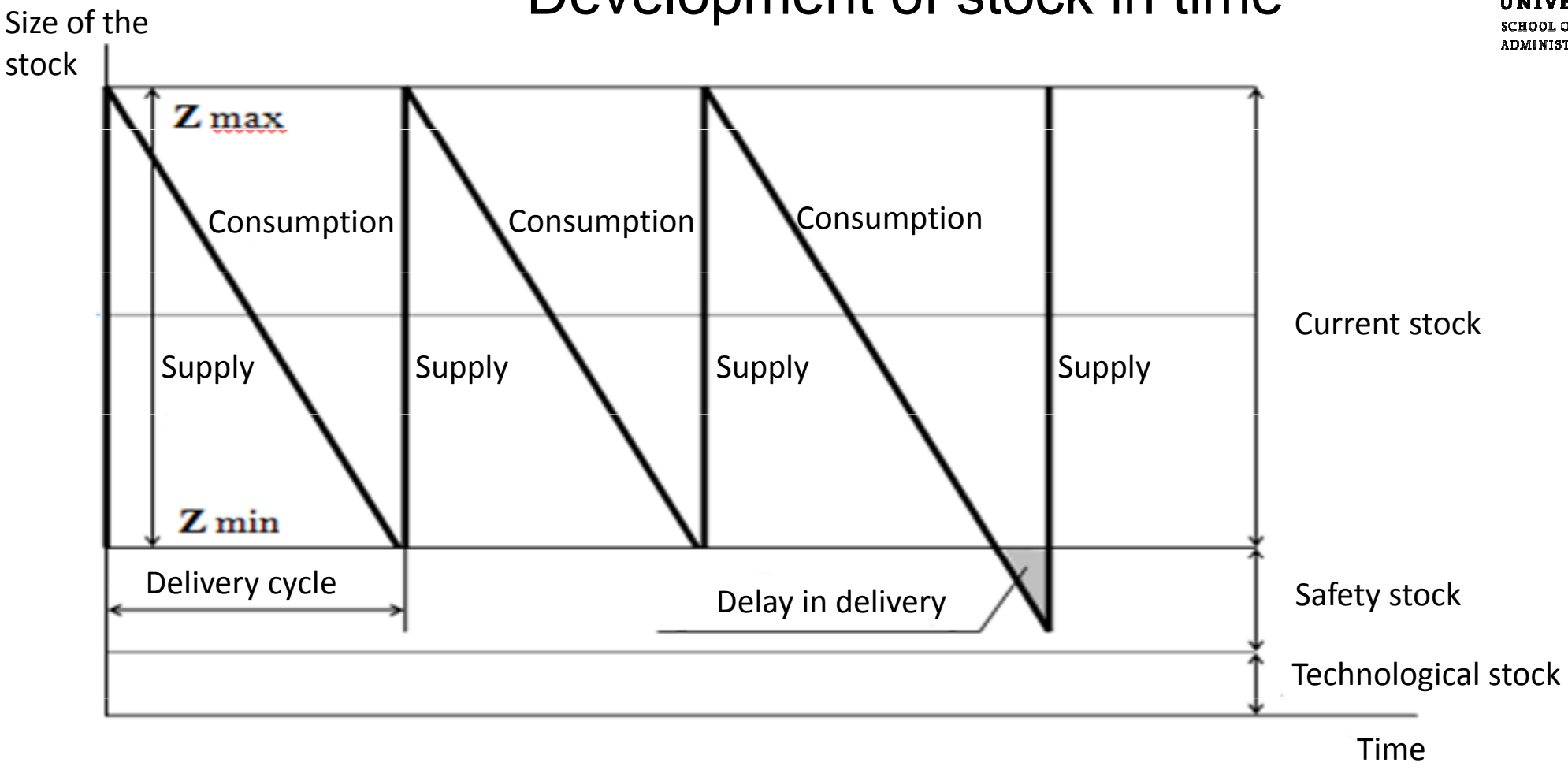

Stock management level indicators

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- bearer of a specific amount of stock in an enterprise is a realized supply, the amount of which is converted into stock during the storage process

average current stock

1. in conditions of continuous even consumption

$$Z_b = \frac{D}{2}$$

where

D ... supply

2. in conditions of uneven consumption

$$Z_b = \frac{Z_{\max} - Z_{\min}}{2}$$

where

Z_{min} … minimal level of stock

Z_{max} … maximal level of stock

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total average stock Z_C

sum of the average current stock and all fixed components of stock

immediate stock

- actual physical stock
- available stock
- balance stock

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turnover (turnover rate) of stock

$$O = \frac{S_o}{Z_c}$$

where

S_o … consumption for the period under review [CZK]

Z_c … total average stock [CZK]

stock turnover time

$$T_O = \frac{360}{O}$$

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In stock management, we always need to know the answers to basic questions:

1. What and when to order?
2. How much to order?
3. What's in stock?
4. How to ensure the accuracy of stock data?

Stock management methods and techniques

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1. Optimization methods

- they follow the theory of stock management + principle of cost optimization
- finding a minimum total costs
- in the area of purchasing, this principle is used, for example, to calculate the optimum size of supply

Total cost of ordering and storage

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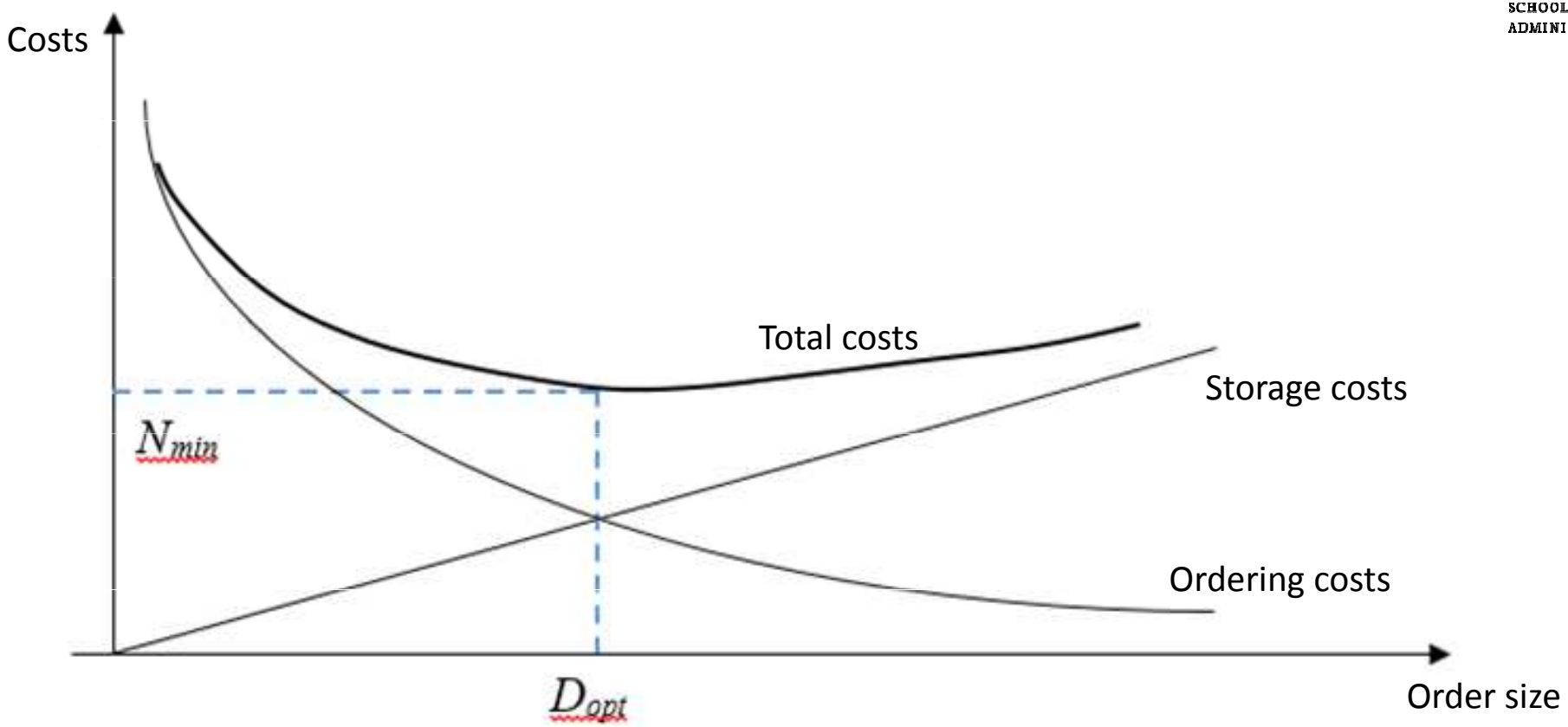
$$N(D) = c_1 \frac{D}{2} + c_2 \frac{P}{D}$$

where

- c_1 … unit storage costs per year
- c_2 … costs of one delivery
- D … size of one delivery
- P … annual demand (annual amount of supplies)
- $D/2$ … average stock
- P/D … number of delivery cycles


Costs
Total costs
Storage costs
Ordering costs
N_{min}
D_{opt}
Order size

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optimum supply size

$$D_{opt} = \sqrt{\frac{2Pc_2}{c_1}}$$

optimal (minimal) costs

$$N_{min} = \sqrt{2Pc_1c_2}$$

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2. Pull Systems

- proactive system triggered by the power of customer demand
- *Just-In-Time* (JIT) + *Kanban*
- originally the automotive industry – Toyota
- today global logistics technology

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3. Push Systems

- characterized by the creation of stock - the amount and structure determined on the basis of forecast demand
- traditional supply systems Just-in-Case (JIC)
- traditional in European countries and America
- possibility of elimination of the risks of timely non-delivery at the expense of increased storage and maintenance costs
- existence of safety stock

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4. Differentiated stock management system

- where stock arises and what are the causes of its formation
- selection of the items to achieve the lowest stock levels
- application of selected methods of stock management
- building of selected contractual supplier-customer relations
- creating logistics chains
- for risk items there is a need to maintain safety stock (even if using the JIT concept)

- basic method for analysis and reduction of maintained stock - ABC analysis:
  - to sort all delivered items based on delivered volume (number of pieces) and prices of individual items into 3 groups A, B, C:
    - ❖ group A: items with a low delivery volume and high value
    - ❖ group C: items with a high volume of supply and low value
    - ❖ to achieve the lowest stock for the most expensive items and for items difficult to store

Effect of stock turnover on stock maintenance costs

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Example: the relationship between average stock level for different number of turnovers, maintenance costs, and savings

Turnover	Average stock [CZK]	Stock maintenance costs [CZK]	Cost saving [CZK]
1	750000	300000	-
2	375000	150000	150000
3	250000	100000	50000
4	187500	75000	25000
5	150000	60000	15000
6	125000	50000	10000
7	107142.86	42857.14	7142.86
8	93750	37500	5357.14
9	83333.33	33333.33	4166.67
10	75000	30000	3333.33
11	68181.82	27272.73	2727.27
12	62500	25000	2272.73
13	57692.31	23076.92	1923.08
14	53571.43	21428.57	1648.35
15	50000	20000	1428.57

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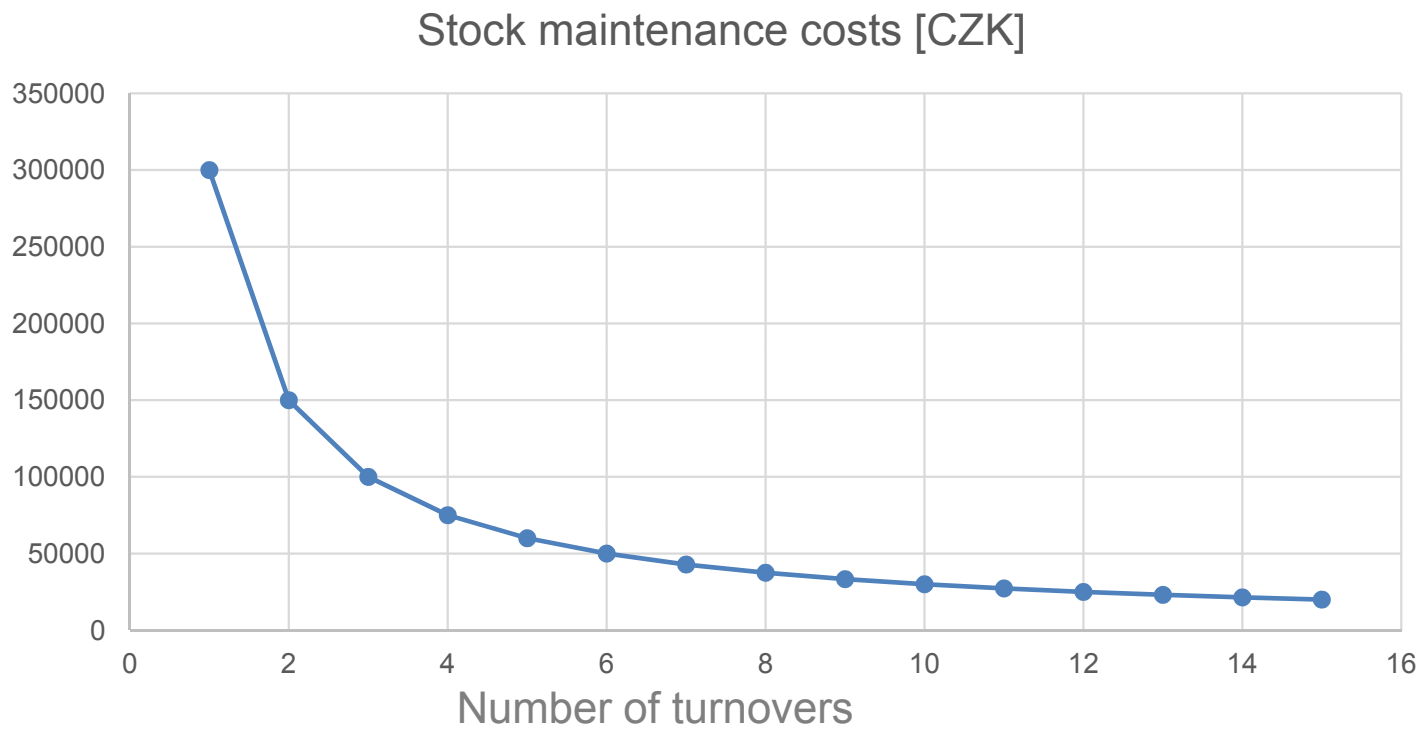

Summary of the lecture

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You can:

- Explain the importance of stock creation
- Describe the types of stock
- Clarify the nature of stock management
- List stock management indicators
- Characterize individual approaches to stock management