PERENCANAAN & PENGENDALIAN PRODUKSI
TIN 4113

Course Outline (1)

Materi (6 Pertemuan):
- Introduction to PPC & Demand forecasting (1)
- Demand forecasting (2)
- Sales & Operations Planning
- MPS
- MRP
- Independent demand inventory models

Evaluasi (2 Pertemuan):
- UTS
- UAS

Course Outline (2)

Tugas (2 Pertemuan):
- Tugas 1: Perencanaan Aggregate dengan Solver
- Tugas 2: Disaggregation dengan Solver

Tugas Besar (8 Pertemuan):
- Deadline Tahap 1: Pertemuan 3 (7/7)
- Deadline Tahap 2: Pertemuan 5 (14/7)
- Deadline Tahap 3: Pertemuan 7 (18/7)
- Deadline Final: UAS (21/7)

Kontrak Perkuliahan

Pertemuan & Materi
- RPKPS

Penilaian
- Tugas
- Tugas Besar
- Short quiz
- UTS (Pertemuan 4: 11/7)
- UAS (Pertemuan 8: 21/7)

Referensi
- Smith, Spencer B. Computer Based Production and Inventory Control, Prentice-Hall, 1989.

Lain-lain
- Minimum kehadiran: 100%
- Tidak melakukan kecurangan
Pertemuan 1

• Outline:
  - Competitive Advantage of Manufacturing Industry
  - Product Positioning Strategy
  - Process Positioning Strategy
  - Definisi dan fungsi Perencanaan & Pengendalian Produksi
  - Struktur organisasi
  - Karakteristik Peramalan
  - Cakupan Peramalan
  - Klasifikasi Peramalan

• Referensi:
  - Smith, Spencer B. Computer Based Production and Inventory Control, Prentice-Hall, 1989.

PENGANTAR PPC

Beberapa Pertanyaan

• Apa peran industri manufaktur dalam kehidupan kita?

• Apa yang membuat sebuah industri manufaktur unggul dalam persaingan?

Competitive objectives

- Doing things RIGHT  Get a QUALITY advantage
- Doing things FAST  Get a SPEED advantage
- Doing things ON-TIME  Get a DEPENDABILITY advantage
- CHANGING what you do  Give a FLEXIBILITY advantage
- Doing things CHEAPLY  Get a COST advantage
Product Positioning Strategy

<table>
<thead>
<tr>
<th></th>
<th>Procurement</th>
<th>Fabrication</th>
<th>Assembly</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MTS</strong></td>
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<tr>
<td><strong>ATO</strong></td>
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<td><strong>MTO</strong></td>
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<tr>
<td><strong>ETO</strong></td>
<td>●</td>
<td>●</td>
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</tbody>
</table>

Make to Stock (MTS)

- Items tend to be standard
- A customer is not willing to tolerate delay in receiving the product
- Management is required to maintain stock of finished products
- Produced in a flow shop / mass production system

Assemble-to-Order (ATO)

- Product variety tend to be large, produced from standard components and sub-assemblies with a short assembly lead time.
- Options, subassemblies, and components are either produced or purchased to stock
- The customer enjoys for some customization, yet has a short wait for delivery

Make- or Engineer-to-Order

- Produce specialty goods
- In many situations, the design of the item is part of what is purchased
- The final product is usually a combined of standard components and other components custom designed for the customer
- The manufacturer often purchases materials after the order is placed
- The customer must be willing to tolerate a long lead time
Decoupling Points Vs Lead Times

Flow Shop
- The product always follows the same sequential steps of production
- Could be continuous or discrete flows
- The production process generally is arranged to minimize materials handling
- Inventory planning and control is driven by the rate of flow
- Balanced capacity of different works stations along the line is important

Batch Production
- Two or more products are manufactured in the same facility
- Long setup time between batch → each batch should run for several hours or days to achieve economies of scale
- Equipments tend to be more general purpose, and thus less efficient, than the flow shop
Job Shop

- Organization of similar equipment by function
- Orders may follow similar or different paths through the plant, suggesting one of more dominant flows
- The layout is designed to support great diversity of flow among products and large WIP
- Many different lots could be in the production facility at the same time
- Resource availability must be coordinated with order planning

Diskusikan:

Pabrik TV, Mobil, dan Kapal

- Bedakan posisinya pada spektrum Volume dan Variasi
- Model layout apa yang digunakan?
- Bedakan strategi manufakturnya
- Seberapa penting ramalan penjualan produk akhir pada produk-produk tersebut?
- Hal-hal apa yang menjadi kinerja kritis sistem produksi tersebut?
- Dalam bentuk apa rencana produksi akan dibuat?
- Dalam bentuk apa inventory akan disimpan?

Terminologies

- Production Planning and Control (PPC)
- Production Planning and Inventory Control (PPIC)
- Manufacturing Planning and Control (MPC)
**Sumber Daya Produksi:**
- Bahan baku dan komponen
- Tenaga kerja
- Mesin dan peralatan

**Proses Eksekusi / Implementasi**

**Output:**
- Produk akhir
- Waste

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**Why Plan?**

To satisfy customer demand, ensure the availability of resources
- Material
- Capacity

Demand | Resources
---|---
**PPC FUNCTIONS**

- Planning Production
- Planning Inventories
- Planning Capacities
- Authorization of Production and Procurement
- Control of Production, Inventories and Capacities
- Storage and Movement of Materials

1. PPIC is only one function in a production system. The function is not to work in isolation, but it needs good cross functional team with other functions.

2. PPIC is also an agent in a company which should foster good coordination with suppliers, subcontractors, customers, and other relevant parties within a supply chain.

Conflicts Between Functions

- We should always have enough inventory so that none of the customer orders are missed
- Our inventory turnover rate is too low; we need to have our inventory level reduced by 10% this year
- We need to have a better delivery schedule from our suppliers. Too much inventory increase difficulty in managing store activities
- I don't want my machine to have more than one setup in a week. Too many changes from customers significantly deteriorating our productivity

Bad cross functional team: Some causes

- Marketing team did not know the load of the production system and made decisions without consulting Production people
- When issuing materials, warehousing people often forget to input the transaction to the system
- Information about late material delivery from suppliers is not shared with other functions
- Engineering changes not communicated to other functions
PPC for Networked Companies

- It is very often one company does not perform the whole PPIC functions. Rather, the functions are spread over a number of different points within a networked companies.

- For example, many multinational companies do the strategic plan and procurement centrally, but make detailed plan in a local office.

Collaborative Planning

- A new issue in production planning and control is the emergent trend of companies doing collaborative planning.

- This is important to make better synchronisation and visibility across the supply chain.

PERAMALAN
Memprediksi masa depan...

➤ **Hal yang sangat sulit!!!!!!**

*Every woman is frightened of a mouse.*
MGM head Louts B. Mayer in 1926, to young cartoonist named Walt Disney

*640k ought to be enough for anybody.*
Bill Gates, Microsoft founder, 1981

*The Internet will collapse within a year.*
Bob Metcalf, founder of 3Com Corporation, in December 1995

*Sumber: Forecasting for the Pharmaceutical Industry (Cook, 2006)*

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Cakupan Peramalan

- Berdasarkan Kategori Tingkat Keputusan
  - Tingkat Kebijakan
  - Tingkat Produk
  - Tingkat Proses
  - Tingkat Desain Pabrik
  - Tingkat Operasional

Cakupan Peramalan

- Berdasarkan Unit Bisnis
  - Perencanaan Keuangan
  - Perencanaan Pemasaran
  - Perencanaan Produksi
  - Perencanaan Penjadwalan

Characteristic of Forecasts

- *Forecast involves error >>> they are usually wrong*
- *Family forecast are more accurate than item forecast. Aggregate forecasts are more accurate.*
- *Short-range forecasts are more accurate than long-range forecasts*
- *A good forecast is more than a single number.*

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Choosing a Forecasting Method

- Objective data available?
  - Yes: Delphi Methods
  - No: New product methods

- New product situation?
  - Yes: Extrapolation/Time Series methods
  - No: Neural nets

- Large changes in environment?
  - Yes: Causal method
  - No: Segmentation/Classification methods

- Good information on relationships?
  - Yes: Causal method
  - No: Segmentation/Classification methods

- Much data on causal variables?
  - Yes: Causal method
  - No: Segmentation/Classification methods

- Major data problems?
  - Yes: Segmentation/Classification methods
  - No: Causal method

Klasifikasi Metode Peramalan

- Proyeksi
- Causal

Pendekatan Kualitatif

Pendekatan kualitatif menawarkan fleksibilitas terkait dengan ketersediaan data yang ada. Umum digunakan untuk peramalan item produk yang benar-benar baru. Klasifikasi lebih lanjut dari pendekatan kualitatif yaitu:
- Pendapat perseorangan ahli
- Pengambilan pendapat ahli secara kelompok
- Survei pasar
- Analogi historis
- Metode delphi

Pendekatan Kuantitatif

Memiliki kelebihan terkait kehandalan dari hasil analisa karena diolah dengan menggunakan hukum statistik dan matematika yang lebih baku dibandingkan pendekatan kualitatif. Namun disisi lain memerlukan kecukupan data sebagai dasar perhitungan. Secara umum diklasifikasikan menjadi 2 metode yaitu:
- Metode proyeksi
- Metode Causal
Metode Proyeksi

Teknik peramalan dengan metode proyeksi adalah dengan melihat pola dari rangkaian waktu dari data historis kemudian memperpanjang pola dari data tersebut untuk didapatkan nilai ekspektasi atau perkiraan dimasa depan. Pendekatan kuantitatif berhubungan erat dengan rangkaian waktu (time series). Untuk mendapatkan penjelasan terkait rangkaian waktu (time series) adalah dengan menggambarkanya kedalam sebuah grafik. Secara umum jenis dari rangkaian waktu (time series) dibagi 3 yaitu:

- Konstan
- Trend
- Musiman

Pola Permintaan Konstan

Pada klasifikasi ini permintaan berfluktuasi pada tingkat sama sepanjang waktu. Contohnya adalah permintaan sabun dan pasta gigi.

Pola Permintaan dengan Kecenderungan (Trend)

Pada klasifikasi ini permintaan memiliki kecenderungan baik turun maupun naik secara tetap. Contohnya permintaan untuk produk smartphone.

Pola Permintaan Bersifat Musiman

Permintaan mengalami siklus fluktuasi yang berulang dengan pola tertentu. Permintaan terhadap sarung atau pupuk.
Demand Management

Where possible, calculate demand rather than forecast. If not possible...

![Diagram of Demand Management]

Examples of Production Resource Forecasts

<table>
<thead>
<tr>
<th>Forecast Horizon</th>
<th>Time Span</th>
<th>Item Being Forecast</th>
<th>Units of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-Range</td>
<td>Years</td>
<td>- Product lines</td>
<td>Dollars, tons, etc.</td>
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<tr>
<td></td>
<td></td>
<td>- Factory capacities</td>
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<td></td>
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<td>- Planning for new products</td>
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<td></td>
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<td>- Capital expenditures</td>
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<td>- Facility location or expansion</td>
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<td>- R&amp;D</td>
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<tr>
<td>Medium-Range</td>
<td>Months</td>
<td>- Product groups</td>
<td>Dollars, tons, etc.</td>
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<tr>
<td></td>
<td></td>
<td>- Department capacities</td>
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<tr>
<td></td>
<td></td>
<td>- Sales planning</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Production planning and budgeting</td>
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<tr>
<td>Short-Range</td>
<td>Weeks</td>
<td>- Specific product quantities</td>
<td>Physical units of products</td>
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<tr>
<td></td>
<td></td>
<td>- Machine capacities</td>
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<td></td>
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<td>- Planning</td>
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<td>- Purchasing</td>
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<td>- Scheduling</td>
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<td></td>
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<td>- Workforce levels</td>
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<td></td>
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<td>- Production levels</td>
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<td></td>
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<td>- Job assignments</td>
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</tr>
</tbody>
</table>
Pertemuan 2 - Persiapan

- **Tugas Baca:**
  - Metode Peramalan:
    - Simple Time Series Model:
      - Moving Average & Weighted Moving Average
      - Exponential Smoothing
      - Double Exponential Smoothing (Holt's)
      - Winter's Method for Seasonal Problems
  - Error Forecast
    - MAD
    - MSE
    - MAPE
    - MFE atau Bias