Inventory Management Practice of Fun Sports

IMA Case Competition
Fiveplus 1498

Main problem: profit growth was not robust enough

$$Gross\ Profit\ = Sales\ -\ Cost$$

Changes in sales and gross profit of Fun Sports

Main problem: profit growth was not robust enough

Gross Profit = *Sales* - *Cost*

Changes in sales and gross profit of Fun Sports

1. Falling Price

2. Insufficient Sales Volume

Transparent info on price

Inaccurate prediction + *Inflexibility of OEMs*

Fierce price competition

Loss of potential sales

Big discount during promotion campaigns

Main problem: profit growth was not robust enough

$$Gross\ Profit = Sales - Cost$$
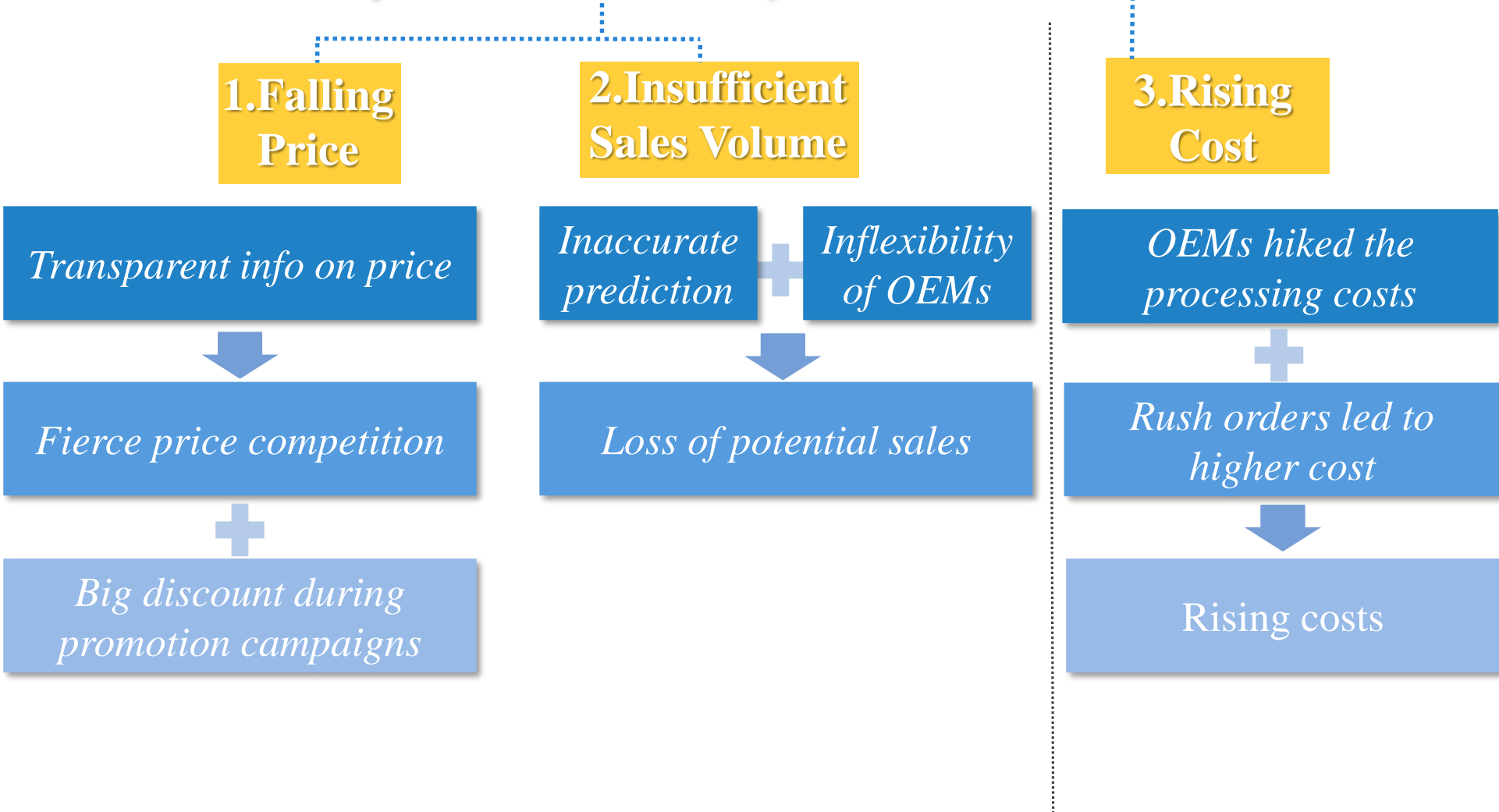
Changes in sales and gross profit of Fun Sports

1. Falling Price

Transparent info on price

Fierce price competition

Big discount during promotion campaigns

2. Insufficient Sales Volume

Inaccurate prediction

Inflexibility of OEMs

Loss of potential sales

3. Rising Cost

OEMs hiked the processing costs

Rush orders led to higher cost

Rising costs
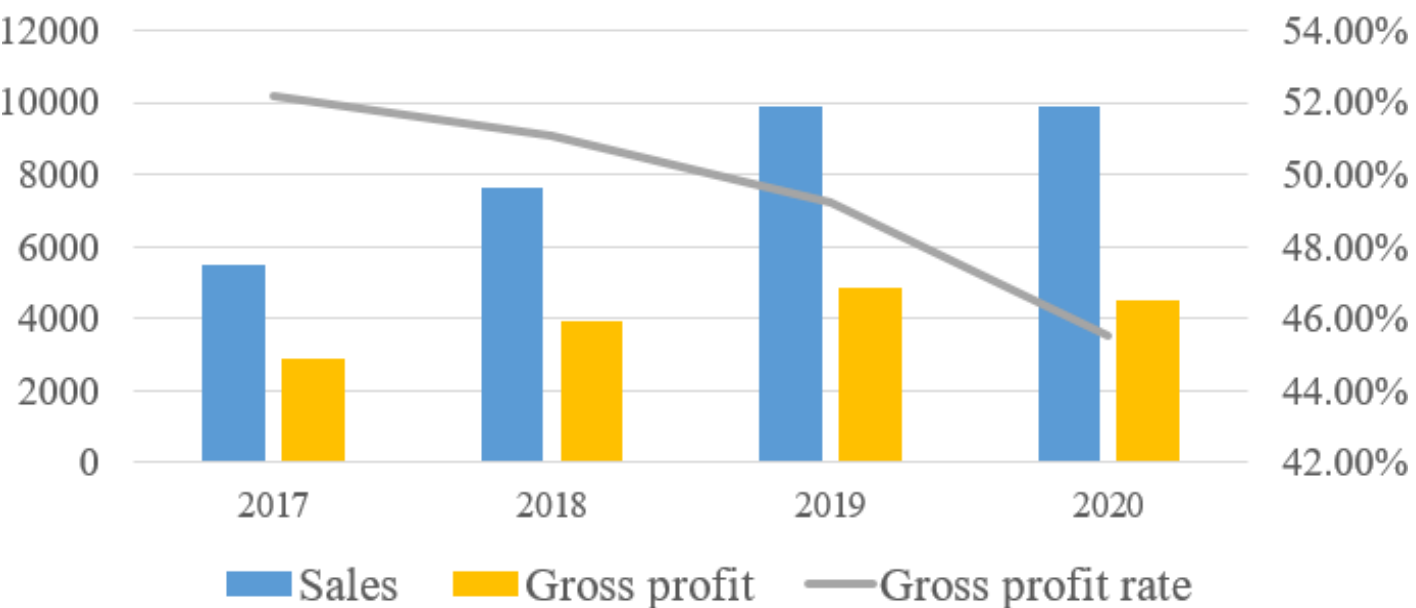
Specifically, sales forecasting is a serious problem

Predicted value V.S. Actual value
(take multi-functional climbing frames for example)
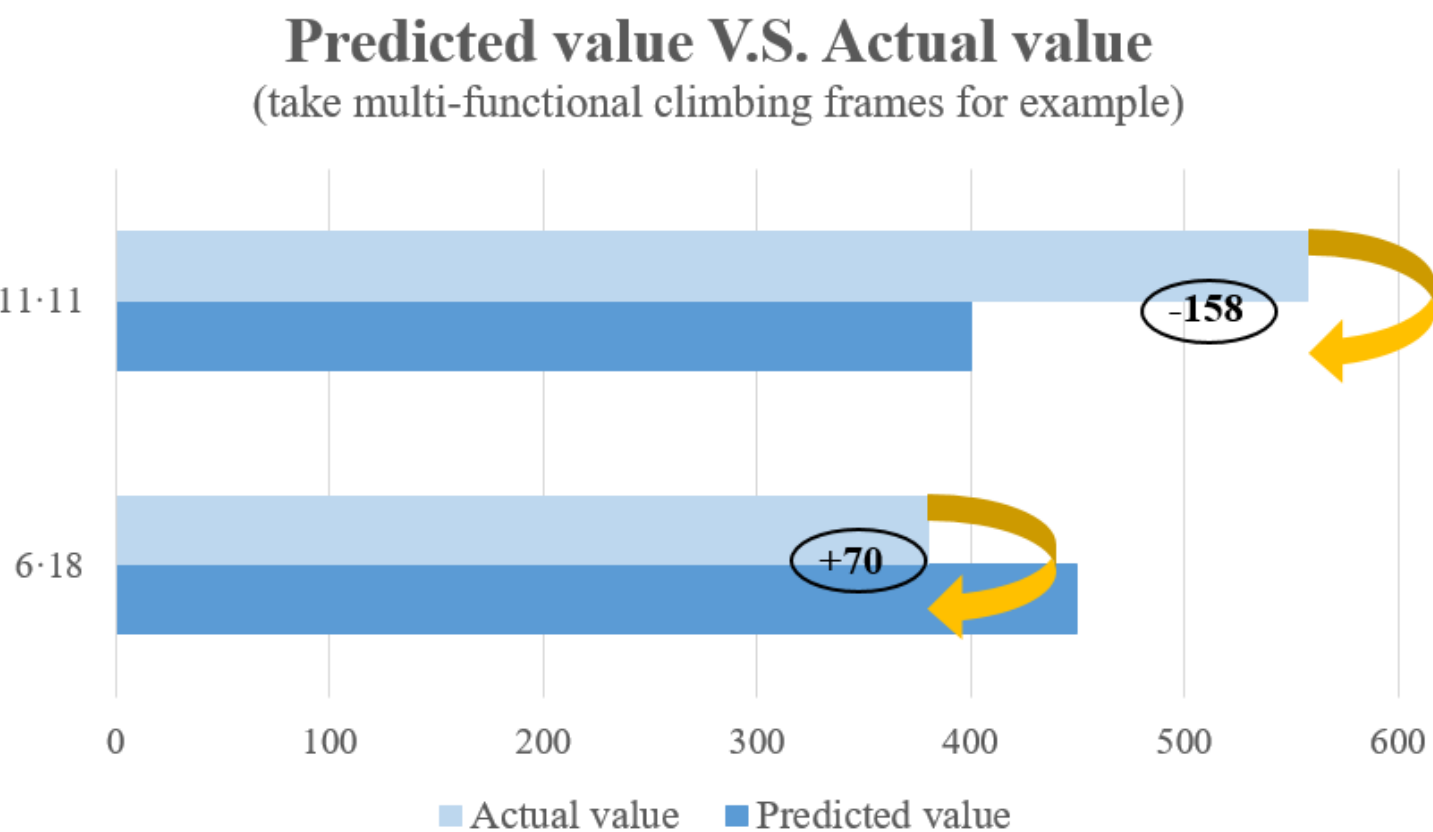
Current approach to sales forecasting

Sales target **+** *Recent sales performance* **+** *The expected effectiveness of promotion efforts*

Uncertainties in sales forecasting

☐ *External environment:* The pandemic

☐ *Platform activities:* Unclear about Tmall's preferential policy for the "Double Eleven" event

☐ *Company's new marketing policy :Unsure about the effective of Zhitongche, Live-steaming sales and boutique homestays*

We already have some sales forecasting methods and useful data…

The sales forecasting methods we found

Qualitative Forecasting

☐ **Market Investigation Method**

☐ **Judgement Analysis Method**

- *Opinion gathering method*

  | *Senior manager's opinion method* |
  | *Sales-force-composite method* |
  | *Purchasers' expectation method* |

- *Delphi Method*

- *Expert Panel Method*

- *Customer Simulation Method*

Quantitative Forecasting

☐ **Trend Predictive Analysis**

- *Arithmetic average method*

- *Moving weighted average method*
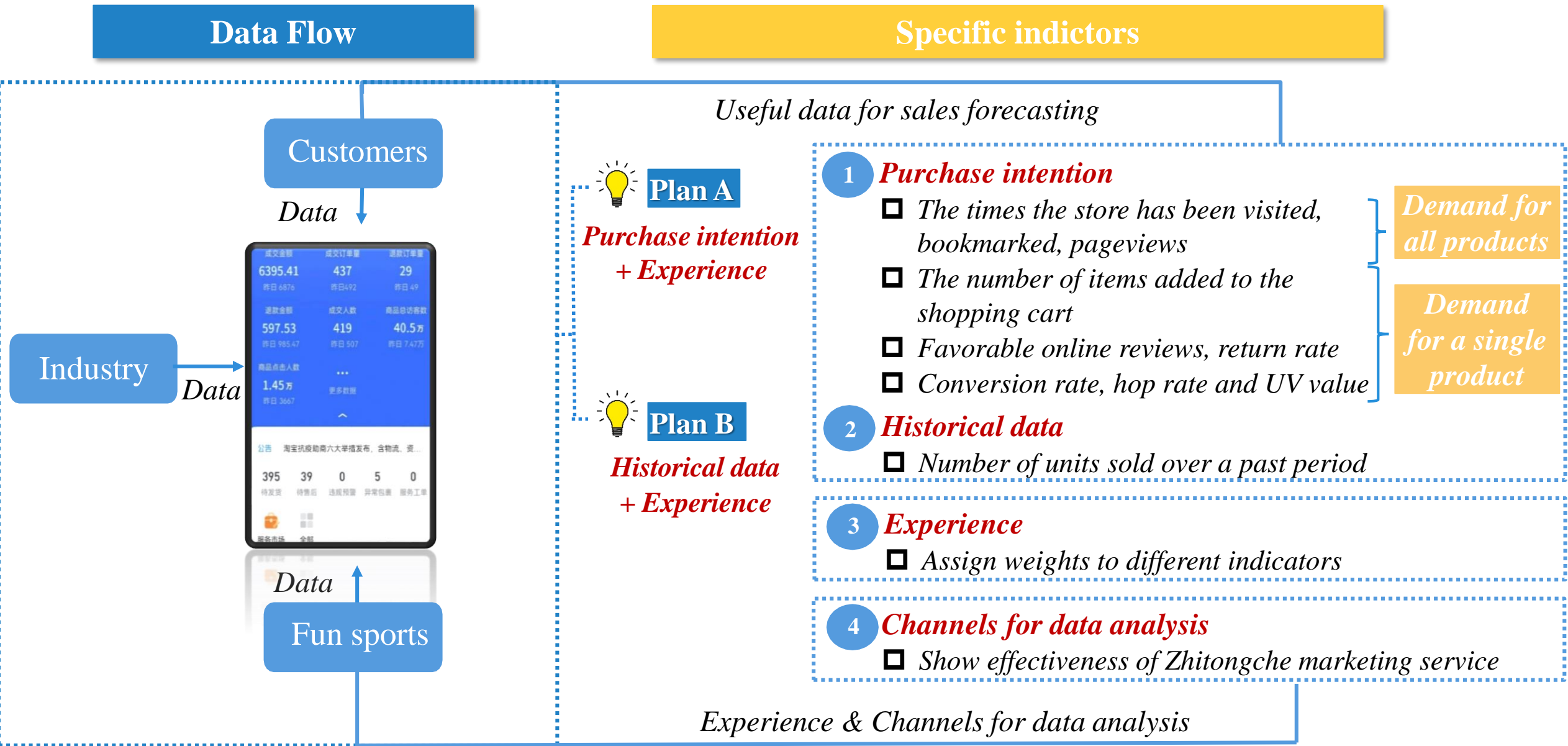
- *Exponential smoothing method*

☐ **Causal Predictive Analysis**

- *Unary linear regression method*

- *Multi-element linear regression method*

☐ **Time Series Analysis**

Useful data from Tmall's "Business Advisor"

Data Flow

Customers

Data

Industry → *Data*

Data

Fun sports

Specific indictors

Useful data for sales forecasting

💡 **Plan A**

Purchase intention + Experience

💡 **Plan B**

Historical data + Experience

1 *Purchase intention*
- ☐ *The times the store has been visited, bookmarked, pageviews*
- ☐ *The number of items added to the shopping cart*
- ☐ *Favorable online reviews, return rate*
- ☐ *Conversion rate, hop rate and UV value*

2 *Historical data*
- ☐ *Number of units sold over a past period*

3 *Experience*
- ☐ *Assign weights to different indicators*

4 *Channels for data analysis*
- ☐ *Show effectiveness of Zhitongche marketing service*

Demand for all products

Demand for a single product

Experience & Channels for data analysis

However, we are still working on the usage of these data and method ……

Content

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Optimize Sales Forecasts: Start With Data, End With Judgement

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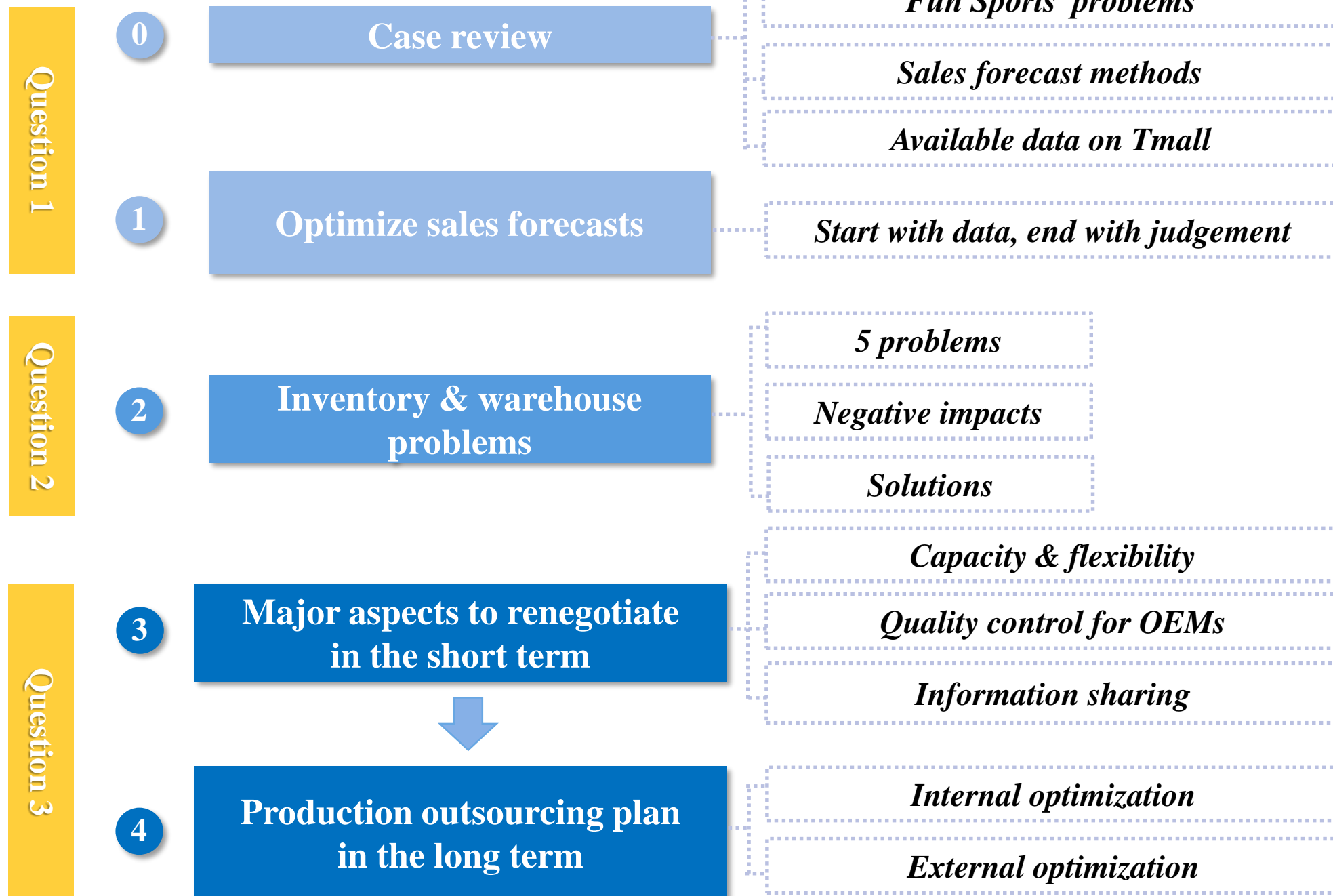
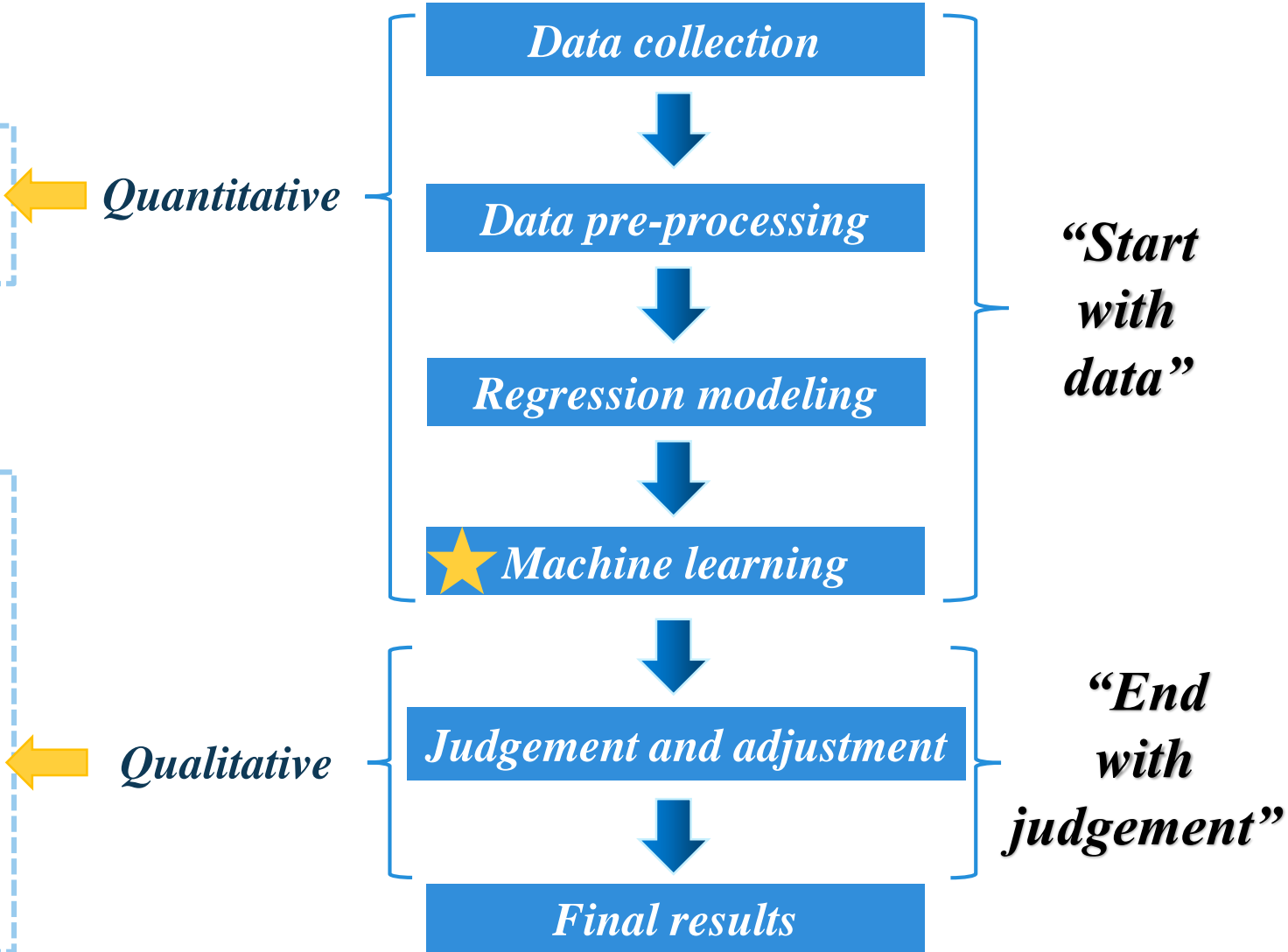## Suitable sales forecasting methods

Quantitative analysis

☐ **Causal Predictive Analysis**

- *Multi-element linear regression method*

Qualitative analysis

☐ **Market Investigation Method**

☐ **Judgement Analysis Method**

- *Opinion gathering method*
- *Delphi Method*
- *Expert Panel Method*
- *Customer Simulation Method*

Process of optimizing sales forecast
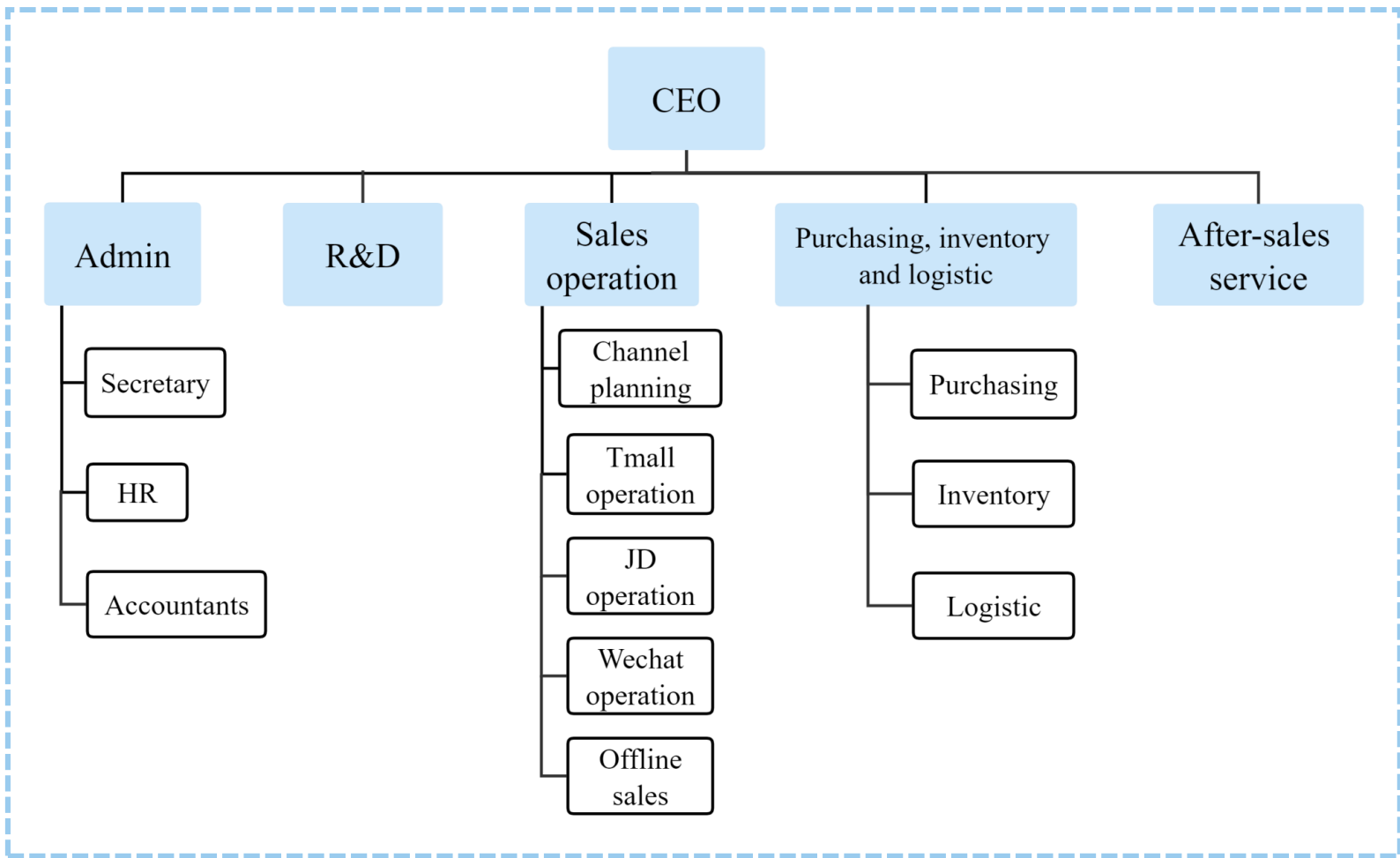
Data collection

↓

Data pre-processing

↓

Regression modeling

↓

⭐ *Machine learning*

↓

Judgement and adjustment

↓

Final results

← *Quantitative*

← *Qualitative*

"Start with data"

"End with judgement"

Optimize Sales Forecasts: Start With Data, End With Judgement

| **Data collection** | *Data pre-processing* | *Regression modeling* | *Machine learning* | *Judgement and adjustment* | *Final results* |

Rich data sources help improve the accuracy of sales forecasts

Internal data

```
                          CEO

   Admin    R&D    Sales        Purchasing, inventory    After-sales
                   operation    and logistic             service

   Secretary       Channel      Purchasing
                   planning

   HR              Tmall        Inventory
                   operation

   Accountants     JD           Logistic
                   operation

                   Wechat
                   operation

                   Offline
                   sales
```

External data

Government

Economic and demographic data
e.g. per capital disposable income

Consulting companies

Industry data & development trend
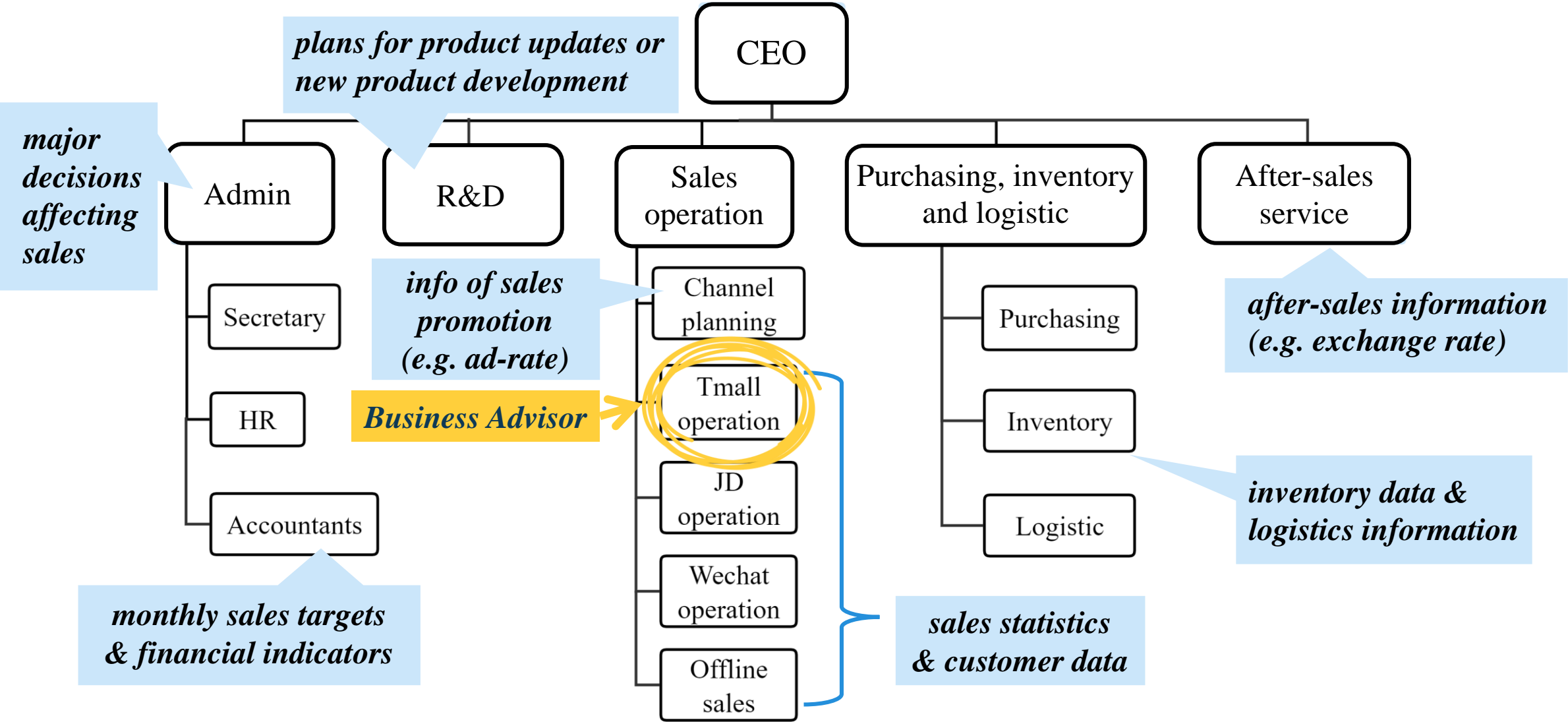*e.g. industry climate index*

Rival firms

Data disclosed in public documents
e.g. R & D investment cost

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Optimize Sales Forecasts: Start With Data, End With Judgement

| **Data collection** | *Data pre-processing* | *Regression modeling* | *Machine learning* | *Judgement and adjustment* | *Final results* |

▶ **Collecting internal data requires collaboration among all departments**

plans for product updates or new product development

major decisions affecting sales

CEO

Admin — Secretary, HR, Accountants

R&D

Sales operation — Channel planning, Tmall operation, JD operation, Wechat operation, Offline sales

Purchasing, inventory and logistic — Purchasing, Inventory, Logistic

After-sales service

info of sales promotion (e.g. ad-rate)

Business Advisor

after-sales information (e.g. exchange rate)

inventory data & logistics information

monthly sales targets & financial indicators

sales statistics & customer data

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Optimize Sales Forecasts: Start With Data, End With Judgement

| Data collection | Data pre-processing | Regression modeling | Machine learning | Judgement and adjustment | Final results |

Variable table (✔ : can be retrieved from Business Advisor)

Type	Variable name	Symbol	Definition
Explained variable	future sales	y	Sales volume over the next period
	width	x1	Product line quantity
	length	x2	The number of product items included in the product line
	depth	x3	The number of models offered for each item in the product line
	historical sales ✔	x4	Historical sales volume in the past period
	popularity ✔	x5	Popularity = store views ÷ industry views
Explanatory variables	ad-rate	x6	Advertising expenses spent in the past period
	promotion effect ✔	x7	The effectiveness of sales promotion policy
	favorable rate ✔	x8	The number of positive comments received in the past period
	exchange rate ✔	x9	Exchange rate over the past period
	ICI	x10	Industry climate index
	growth rate of PCDI	x11	Per capital disposable income growth rate

Internal data

External data

Optimize Sales Forecasts: Start With Data, End With Judgement

Data collection	**Data pre-processing**	*Regression modeling*	*Machine learning*	*Judgement and adjustment*	*Final results*

1. Deal with data missing values

Why missing? ➤ **How** to deal with?
- Fill it
- Delete it
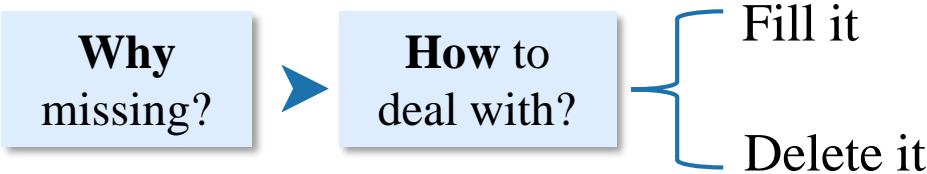
3. Correlation analysis

- **Purposes**

Data dimension ➤ Model complexity ➤ **Generalization ability**
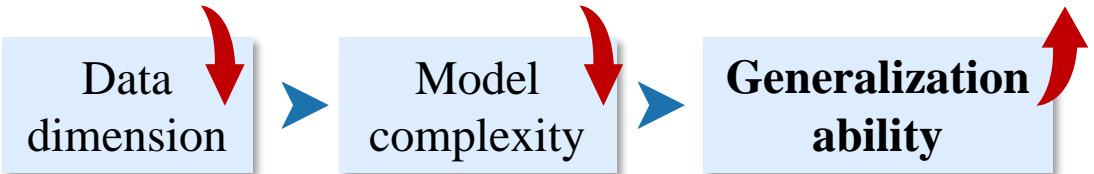
- **Methods**
  - Pearson

    $$corrcoef(X,Y) = \frac{cov(X,Y)}{\sigma(X)*\sigma(Y)}$$

  - Cosine of Angle between vectors
  - Spearman
  - Kendall

    $$\cos(\theta) = \frac{A \cdot B}{\|A\|\|B\|} = \frac{\sum_{i=1}^{n} A_i \times B_i}{\sqrt{\sum_{i=1}^{n}(A_i)^2} \times \sqrt{\sum_{i=1}^{n}(B_i)^2}}.$$
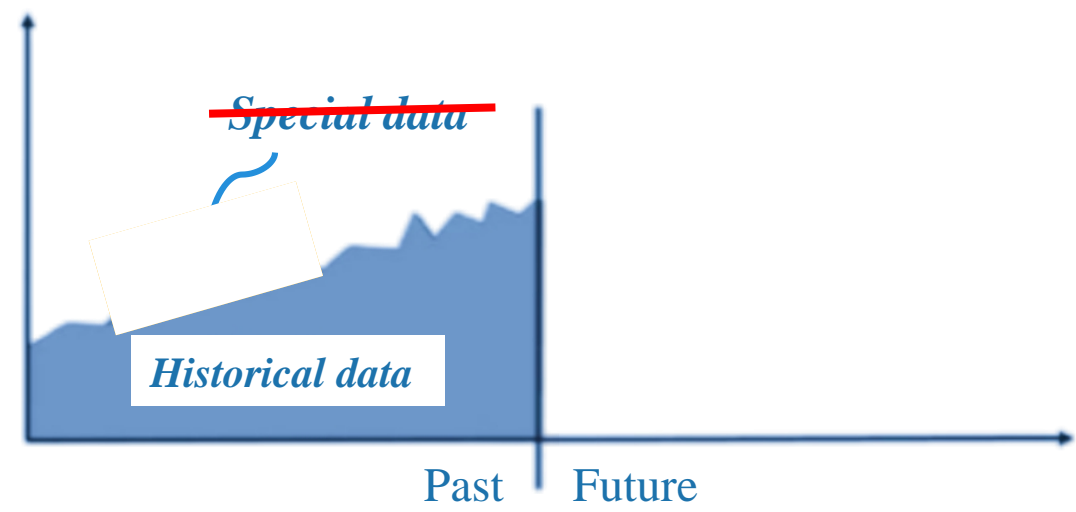
2. Sort out historical data of benchmark demand

- One **key assumption** of this forecasting method

sales forecasting is based on **repeatable** historical data of **benchmark demand**

Eliminate special data
e.g. sales volume resulting from non-repetitive promotional events

~~*Special data*~~

Historical data

Past   Future

Optimize Sales Forecasts: Start With Data, End With Judgement

| Data collection | Data pre-processing | **Regression modeling** | Machine learning | Judgement and adjustment | Final results |

Causal Forecasting Methods: Multiple Regression Forecast Method
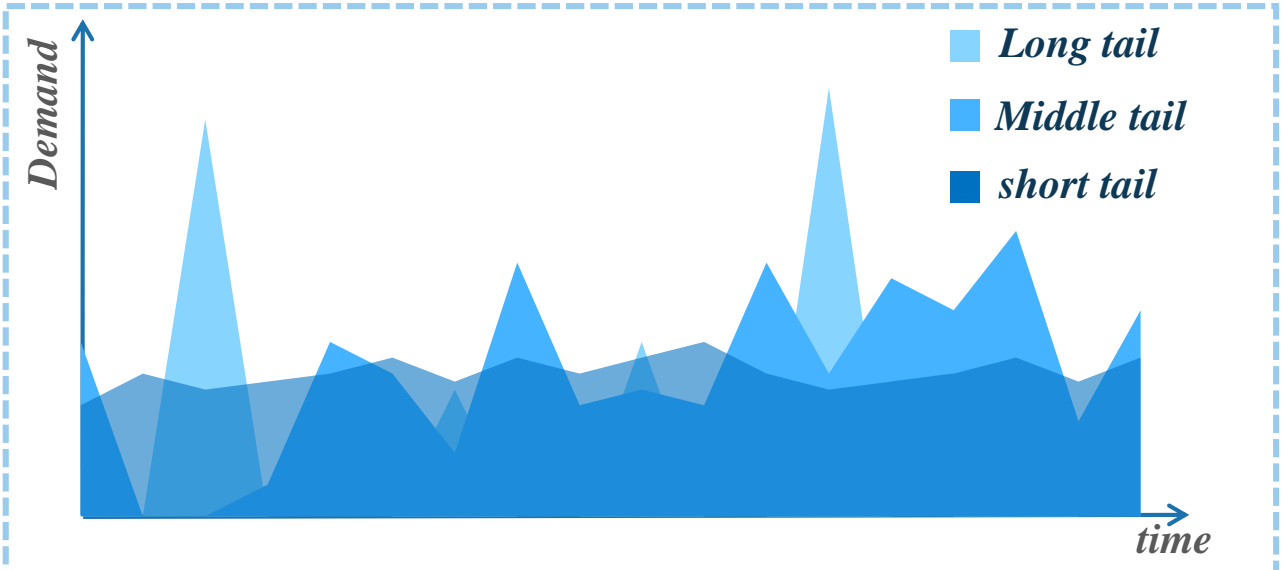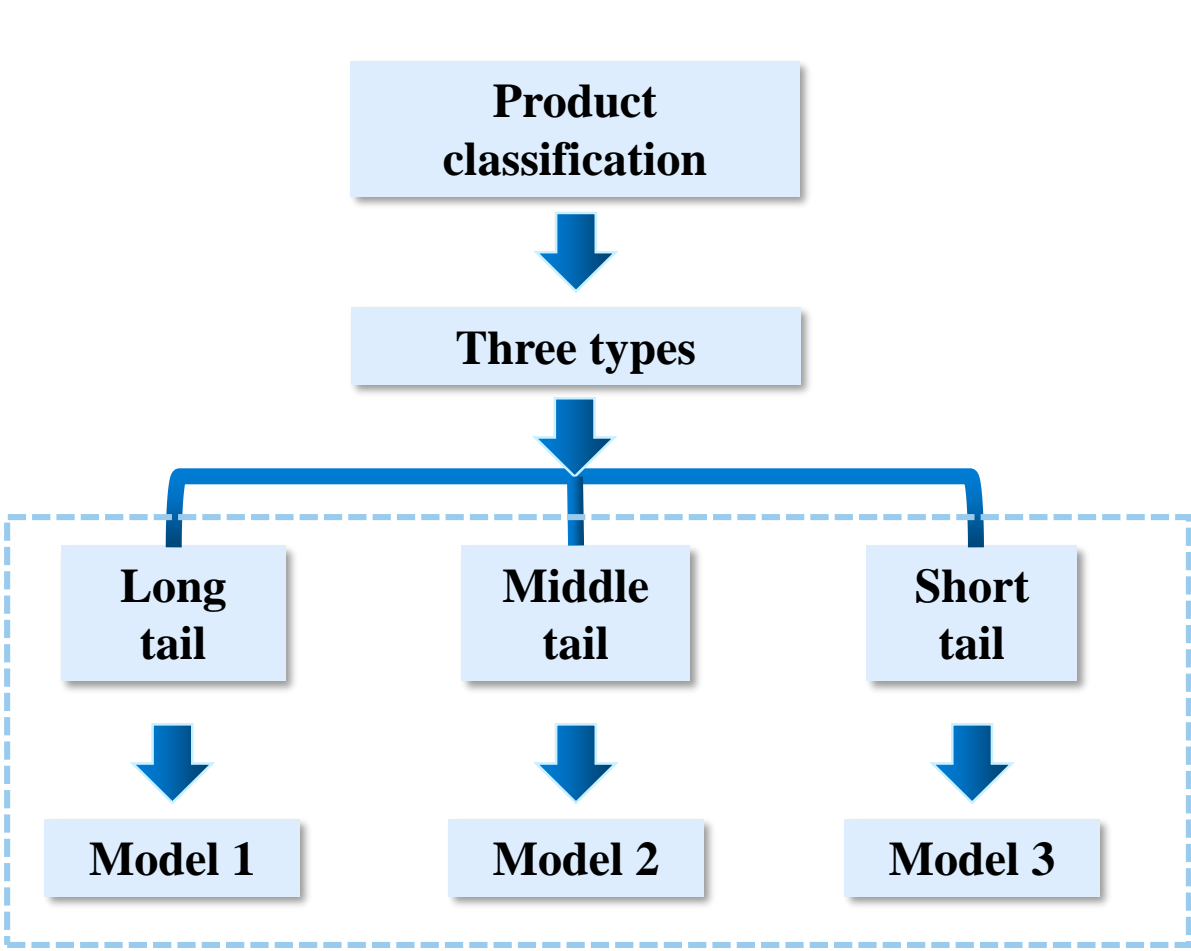
Types	Frequency	Stability	Forecast difficulty
Long tail			
Middle tail			
Short tail			

Different types of products have different data characteristics.

Optimize Sales Forecasts: Start With Data, End With Judgement

| *Data collection* | *Data pre-processing* | *Regression modeling* | **Machine learning** | *Judgement and adjustment* | *Final results* |

Neural networks

Theoretical principle

neuron

explanatory variables

connection weight

$$y = f(\sum_{i}^{n} w_i x_i - \theta)$$

threshold

M-P Neuron Model

Optimization thought

so as to find the **optimal parameters** of the model

global minimum

local minimum
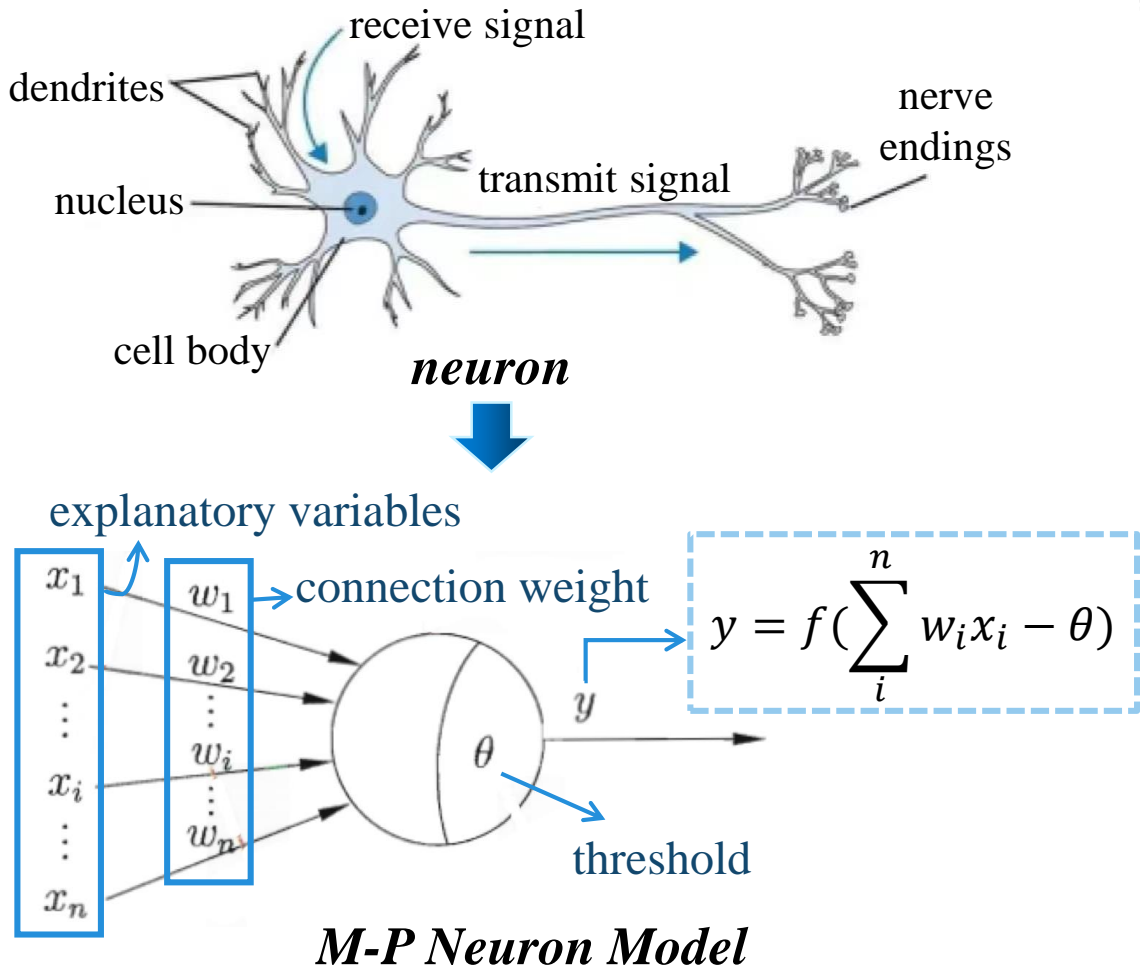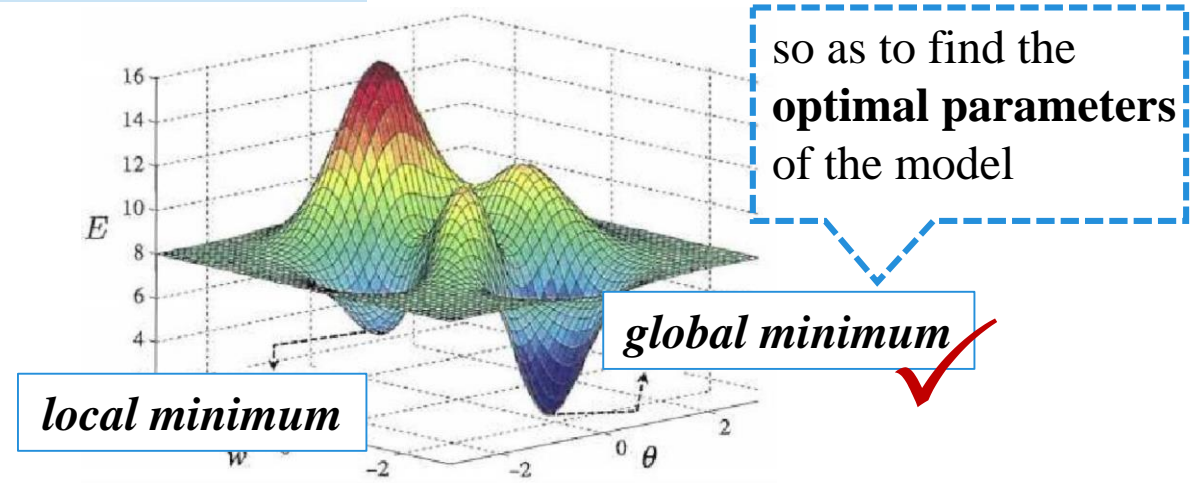
Prediction results after model optimization

• historical data

predictive values

Optimize Sales Forecasts: Start With Data, End With Judgement

Data collection	*Data pre-processing*	*Regression modeling*	*Machine learning*	***Judgement and adjustment***	*Final results*

Purpose of judgement

> Consider the **special circumstances** that not reflected in the data to **revise the forecast**.
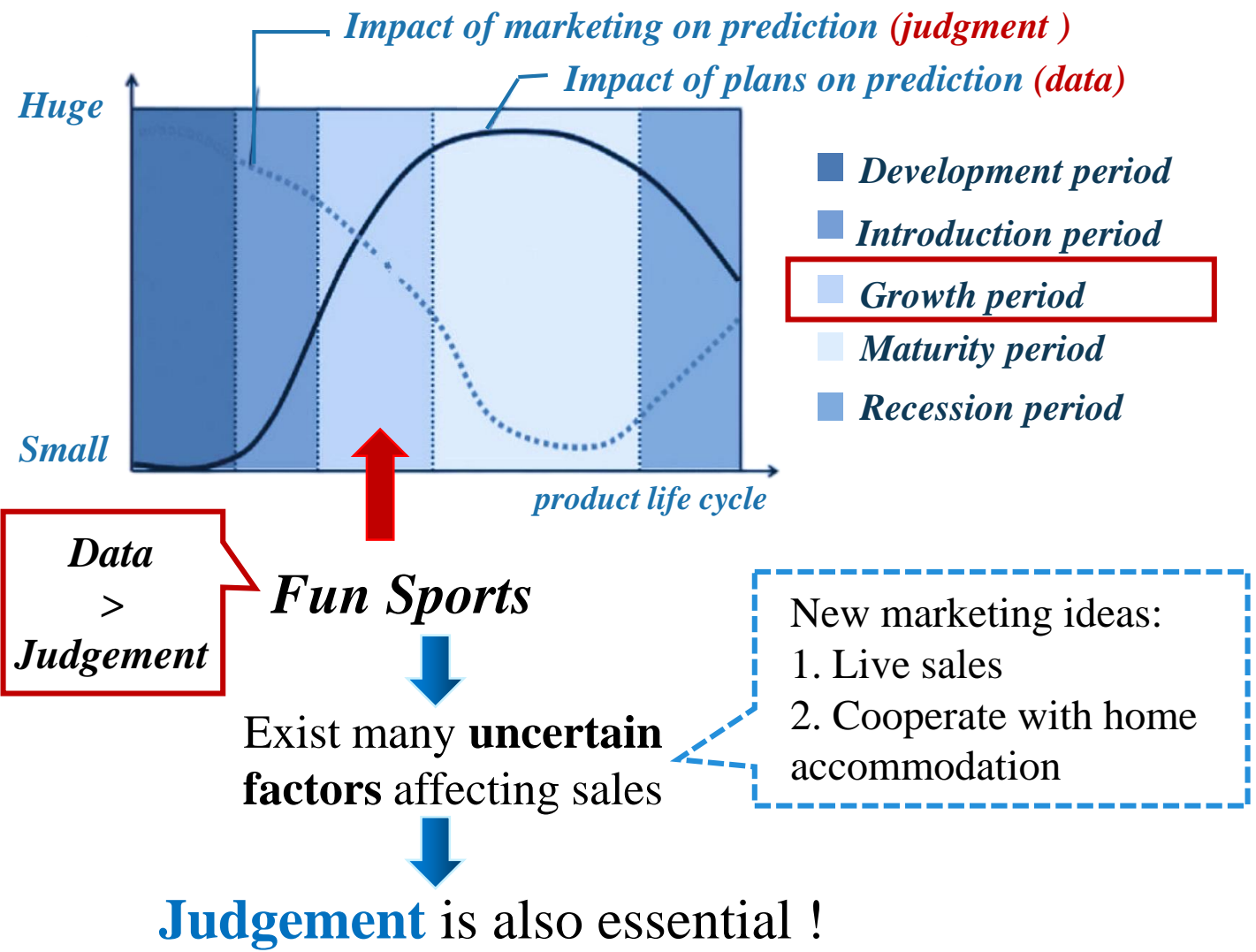
Removed special historical data

Historical data

Past | **Future**

Future special circumstances

Historical data | *Sales forecasts*

Past | **Future**

Data : Judgement = ?

*Impact of marketing on prediction (**judgment**)*

*Impact of plans on prediction (**data**)*

Huge

Small

product life cycle

- ■ *Development period*
- ■ *Introduction period*
- ■ *Growth period*
- ■ *Maturity period*
- ■ *Recession period*

Data > Judgement

Fun Sports

Exist many **uncertain factors** affecting sales

New marketing ideas:
1. Live sales
2. Cooperate with home accommodation

Judgement is also essential !

Optimize Sales Forecasts: Start With Data, End With Judgement

| Data collection | Data pre-processing | Regression modeling | Machine learning | *Judgement and adjustment* | Final results |

Multisectoral collaboration

▶ Cross sectoral participation in forecasting to avoid *bullwhip effect*.

Senior Manager Opinion Method

Market Research Method
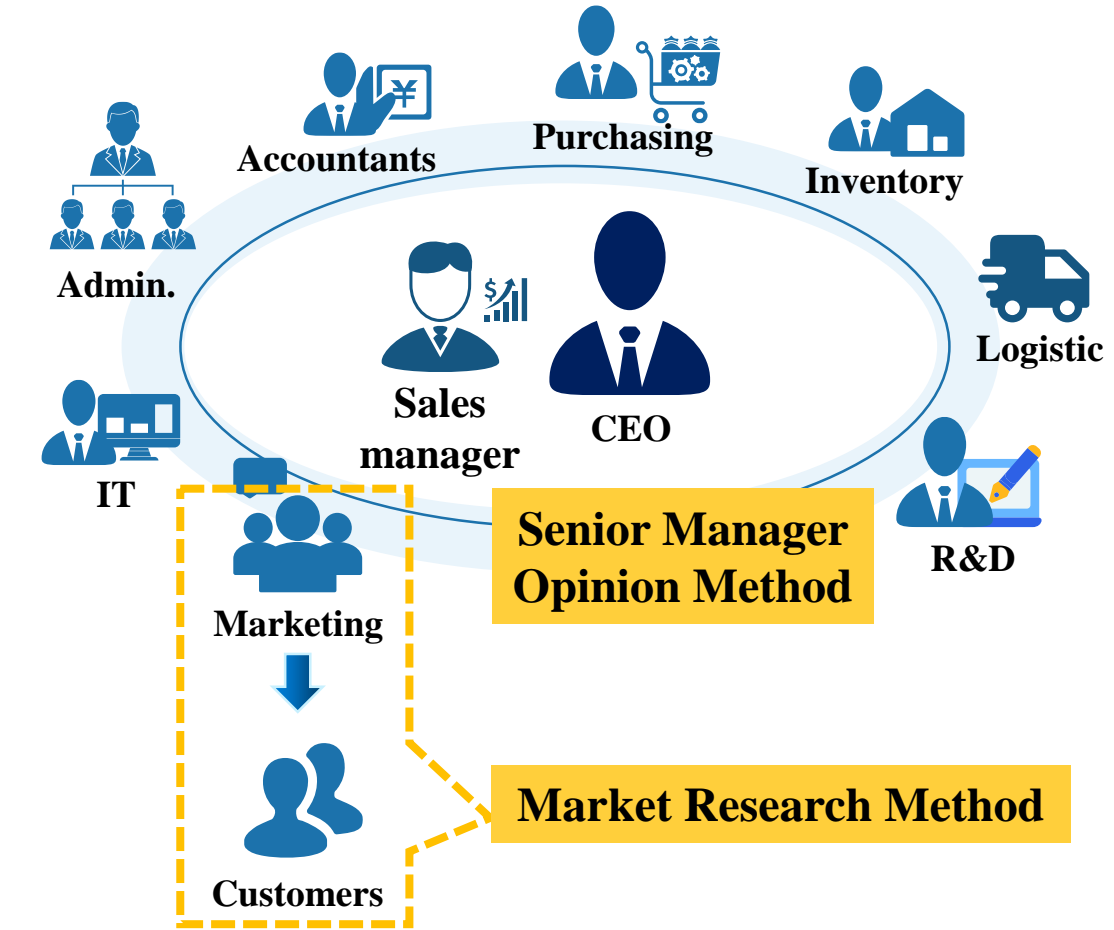
Other available qualitative analysis methods

▶ Delphi Method

▶ Expert Meeting Method

▶ Customer Simulation
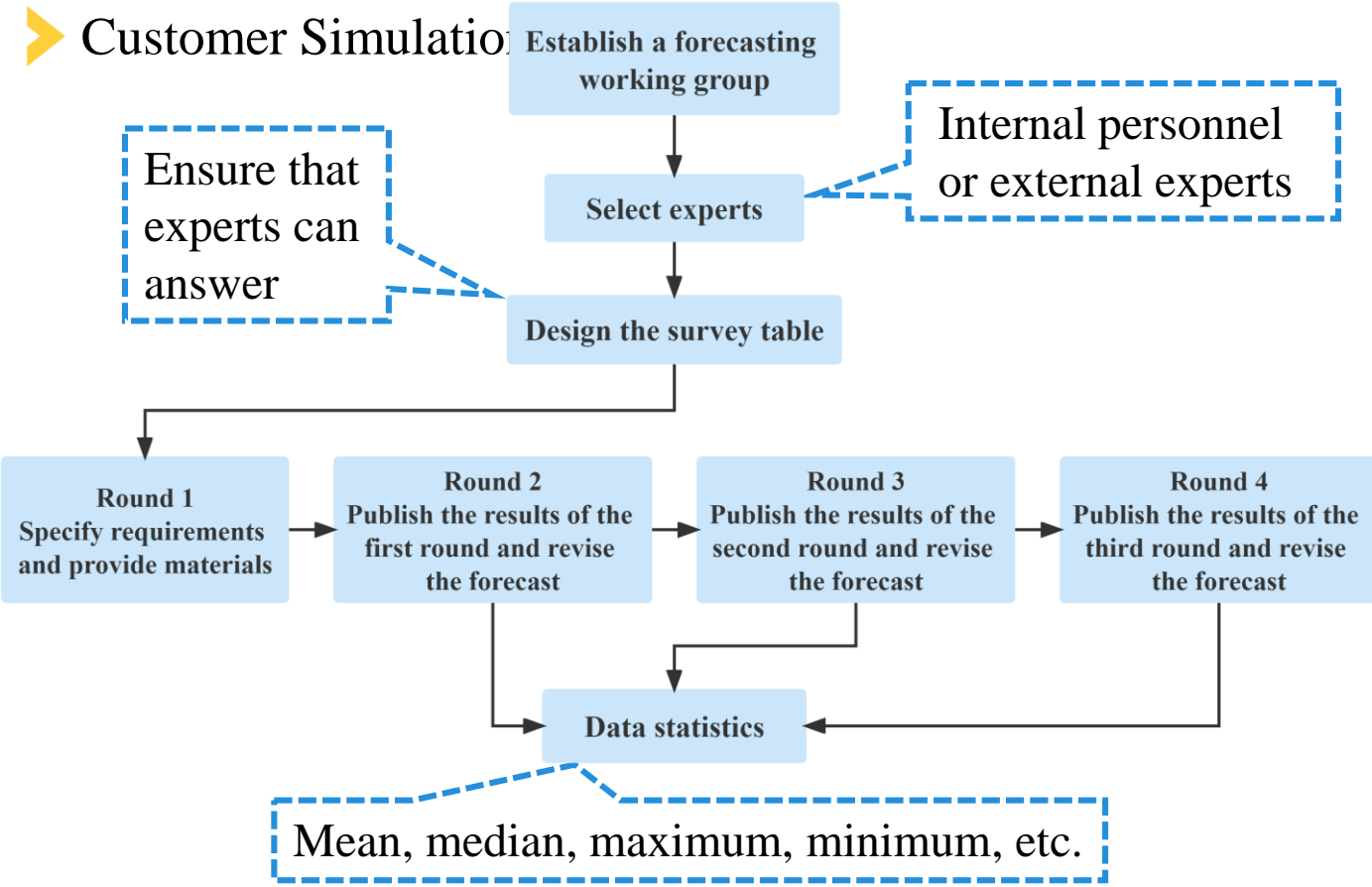
Establish a forecasting working group

Internal personnel or external experts

Ensure that experts can answer

Select experts

Design the survey table

Round 1
Specify requirements and provide materials

Round 2
Publish the results of the first round and revise the forecast

Round 3
Publish the results of the second round and revise the forecast

Round 4
Publish the results of the third round and revise the forecast

Data statistics

Mean, median, maximum, minimum, etc.

Optimize Sales Forecasts: Start With Data, End With Judgement

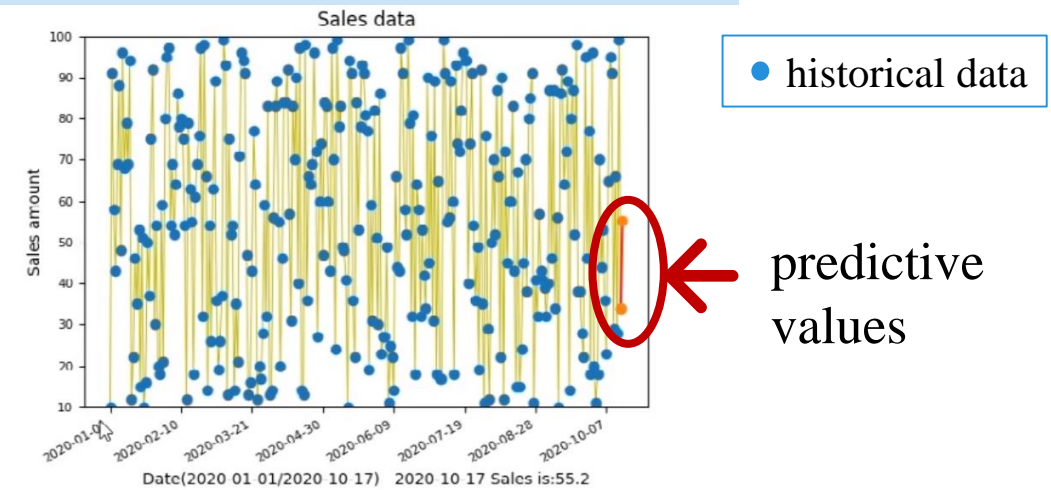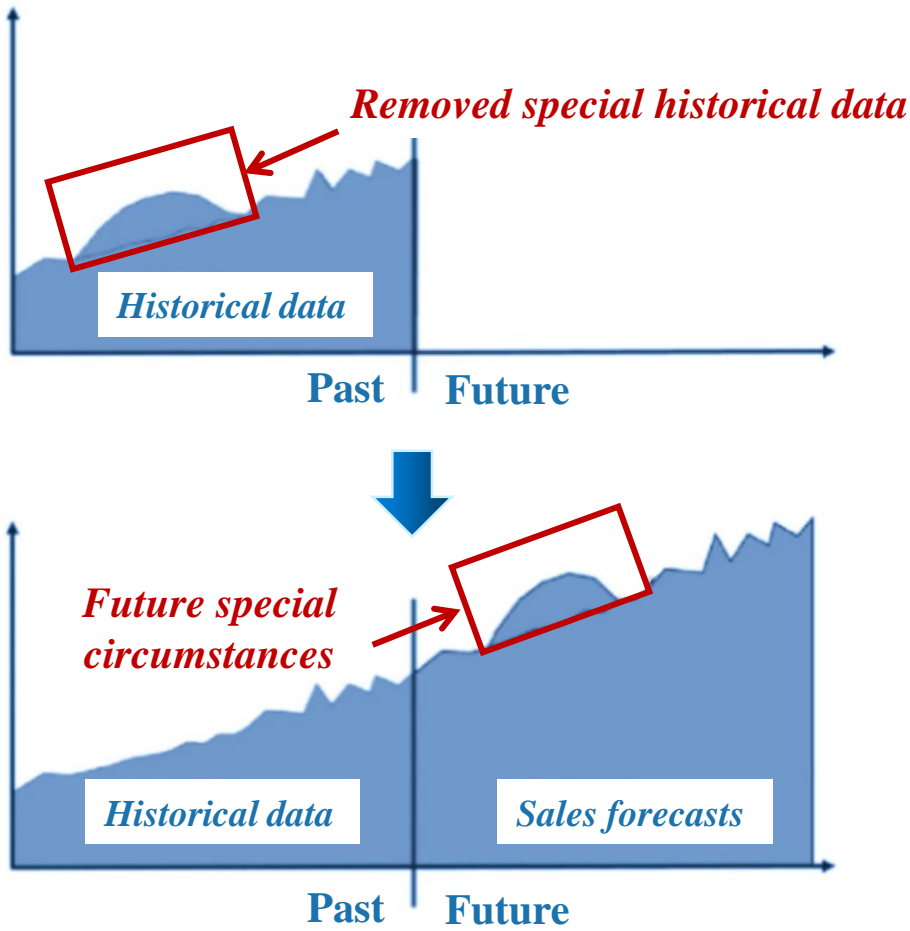| *Data collection*	*Data pre-processing*	*Regression modeling*	*Machine learning*	*Judgement and adjustment*	*Final results*

Work summary of sales forecasts

Internal data
External data

Data collection

1. *Deal with data missing values*
2. *Sort out historical data*
3. *Correlation analysis*

Data pre-processing

✔ *Multiple Regression Forecast Method*
✔ *Three types of products*

Regression modeling

Neural networks

Machine learning

✔ *The importance of judgement*
✔ *Multisectoral collaboration*
✔ *Available qualitative analysis methods*

Judgement and adjustment

Final results

Key to addressing the restocking problem

n : order quantity

s_i : sales forecast of each month $(i = 1, 2, ..., 12)$

x : average monthly sales volume of the previous year

y : current inventory quantity

Small-sized products

▶ If **y<2x**, place an order.

$$n = \sum_{1}^{12} s_i \quad or \quad n = \frac{1}{2}\sum_{1}^{12} s_i$$

Large-sized products

▶ **Offseason**

$$n_i = 80\% \cdot s_{i+1}, i = 1,2,3,4,6,7,8,9,11,12$$

▶ **Peak seasons**

$$n_i = 100\% \cdot s_{i+1}, i = 5,10$$

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5 problems of warehouse management

Fiveplus

Inbound	Repair	Stocktaking	Stagnation	System
☐ Unstandardized warehouse operations	☐ Nonstandard return and repair process	☐ Neglect of on the spot stocktaking	☐ Long been left unattended stagnated products	☐ Defective corporation system
· *Improper placement* · *Lack quality inspection*	· *Improper fix* · *Untimely record*	· *Lack of stocktaking policies* · *Lack of on-site investigation*	· *Cost control* · *Inventory turnover rate*	· *AIS system* · *Employee appraisal system*

5 Problems and consequences of warehouse management

Repair	Stocktaking	Stagnation	System

- ☐ Nonstandard return and repair process
- ☐ Neglect of on the spot stocktaking
- ☐ Long been left unattended stagnated products
- ☐ Defective corporation system

Unstandardized Inbound

Problems

1. Improper placement

2. Lack quality inspection

Negative impacts

1. Chaotic warehouse reduces *efficiency*
2. Affect the *statistics* and *update* of inventory

1. Increase in *return rate*
2. Reduced customer *stickiness*

Fiveplus

5 Problems and consequences of warehouse management

Fiveplus

| **Inbound** | **Stocktaking** | **Stagnation** | **System** |

☐ Unstandardized warehouse operations

☐ Neglect of on the spot stocktaking

☐ Long been left unattended stagnated products

☐ Defective corporation system

Return and Repair Process

| **Problems** | **Negative impacts** |

1. Improper fix

2. Untimely record

1. Increase in *return rate*

1. Inconsistent with platforms (*oversold*)
2. Inconsistent *actual inventory* and financial data
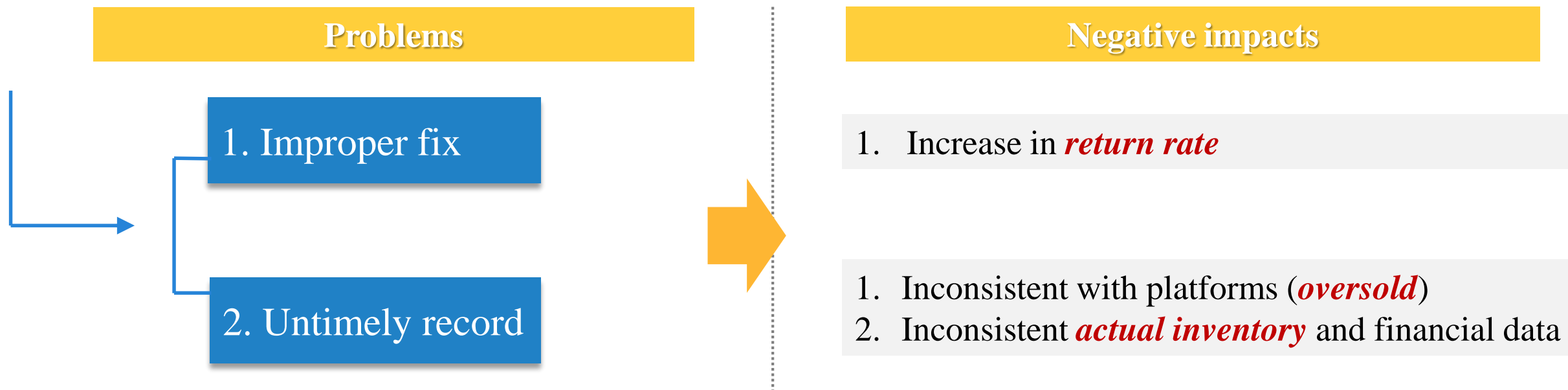
5 Problems and consequences of warehouse management

Inbound	Repair

- ☐ Unstandardized warehouse operations
- ☐ Nonstandard return and repair process

Stagnation	System

- ☐ Long been left unattended stagnated products
- ☐ Defective corporation system

Stocktaking

Problems	Negative impacts
1. Lack of stocktaking policies	1. Hard to find *loopholes* in warehouse management
2. Lack of on-site investigation	2. Hard to make timely *adjustments*
	3. Hard to make *preventive* measures

Fiveplus

5 Problems and consequences of warehouse management

| Inbound | Repair | Stocktaking | | System |

- ☐ Unstandardized warehouse operations
- ☐ Nonstandard return and repair process
- ☐ Neglect of on the spot stocktaking

- ☐ Defective corporation system

Stagnated Products

Problems

Long been left unattended stagnated products

Negative impacts

1. Low inventory *turnover* rate

2. Stagnation of *funds*

3. Illiquidity of enterprise *cash*

4. Reduce *profit* margin

5 Problems and consequences of warehouse management

Inbound	Repair	Stocktaking	Stagnation

- ☐ Unstandardized warehouse operations
- ☐ Nonstandard return and repair process
- ☐ Neglect of on the spot stocktaking
- ☐ Long been left unattended stagnated products

Defective system

Problems

1. No responsible person
2. No employee appraisal
3. No process optimization

Negative impacts

Workload

Efficiency

Quality
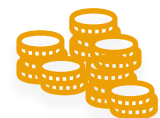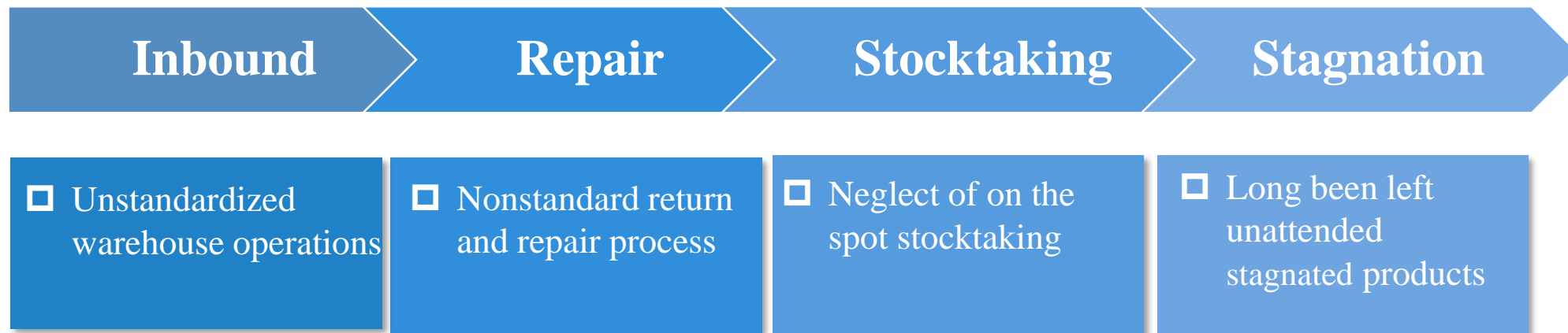
Defective corporation system

Recommendations: systems & processes

Fiveplus

| **Inbound** | **Repair** | **Stocktaking** | **Stagnation** | **System** |
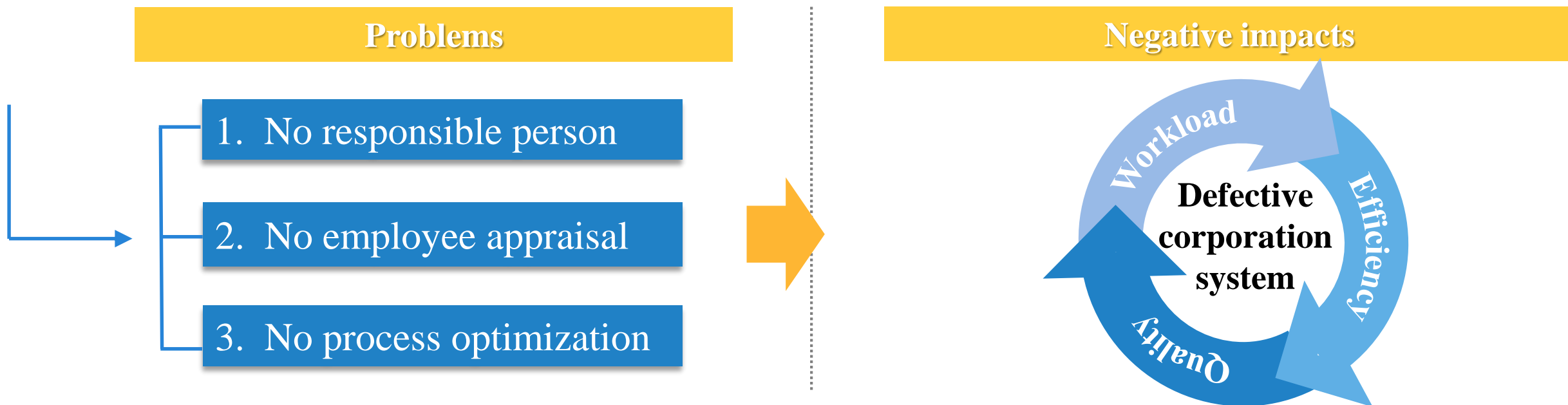
Placement of Products

1.Warehousing

warehousing information →Input→ system →Generate→ location information

2.Precise placement

Positioning by → **Area** ▶ **Row** ▶ **Shelf** ▶ **Position**

3.Daily correction

Daily inventory of frequently changing inventory

Correct material and storage inconsistency in time
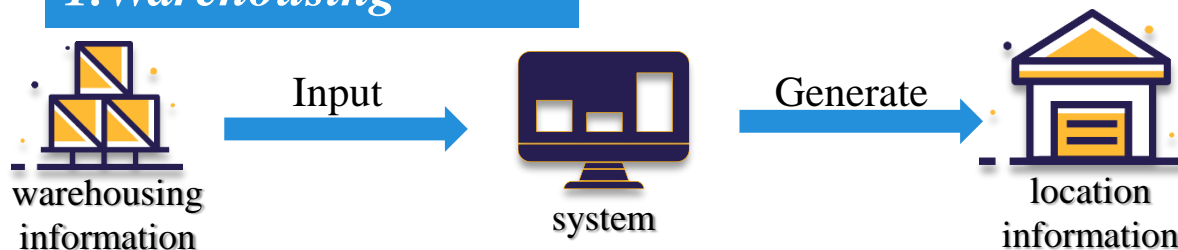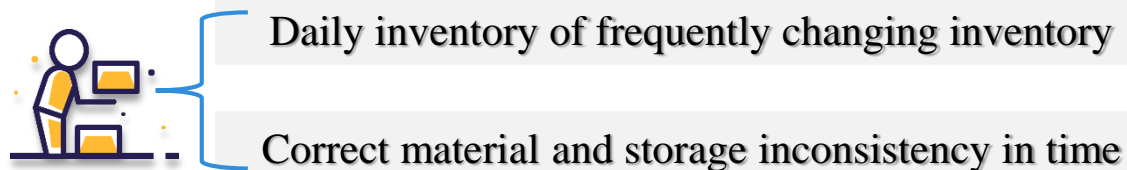
Accounts Matches Facts

1. Accounts Match Facts Evaluation

$$\text{Entry accuracy} = \frac{\text{Sum(exact n of entries)}}{\text{Sum (n of all checked objects)}} * 100\%$$

2. Incentive Mechanism

Conformity Rate of the Account & the Inventory Integrity

↓

Bonus of Warehouse Supervisor

Recommendations: systems & processes

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Inbound	Repair	Stocktaking	Stagnation	System

Standardized repair process

Written report

OEM

R&D

Front control

Reduce repair rate

Cause of defect

Defective products ★*Begin*

Warehouse

Normal product

Count &Record → *Record in book* → *Quality inspection*

Register

Repair control

Pass

Quality inspection ← *Repair* ← *Material department*

Fail

Recommendations: systems & processes

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Inbound	Repair	Stocktaking	Stagnation	System
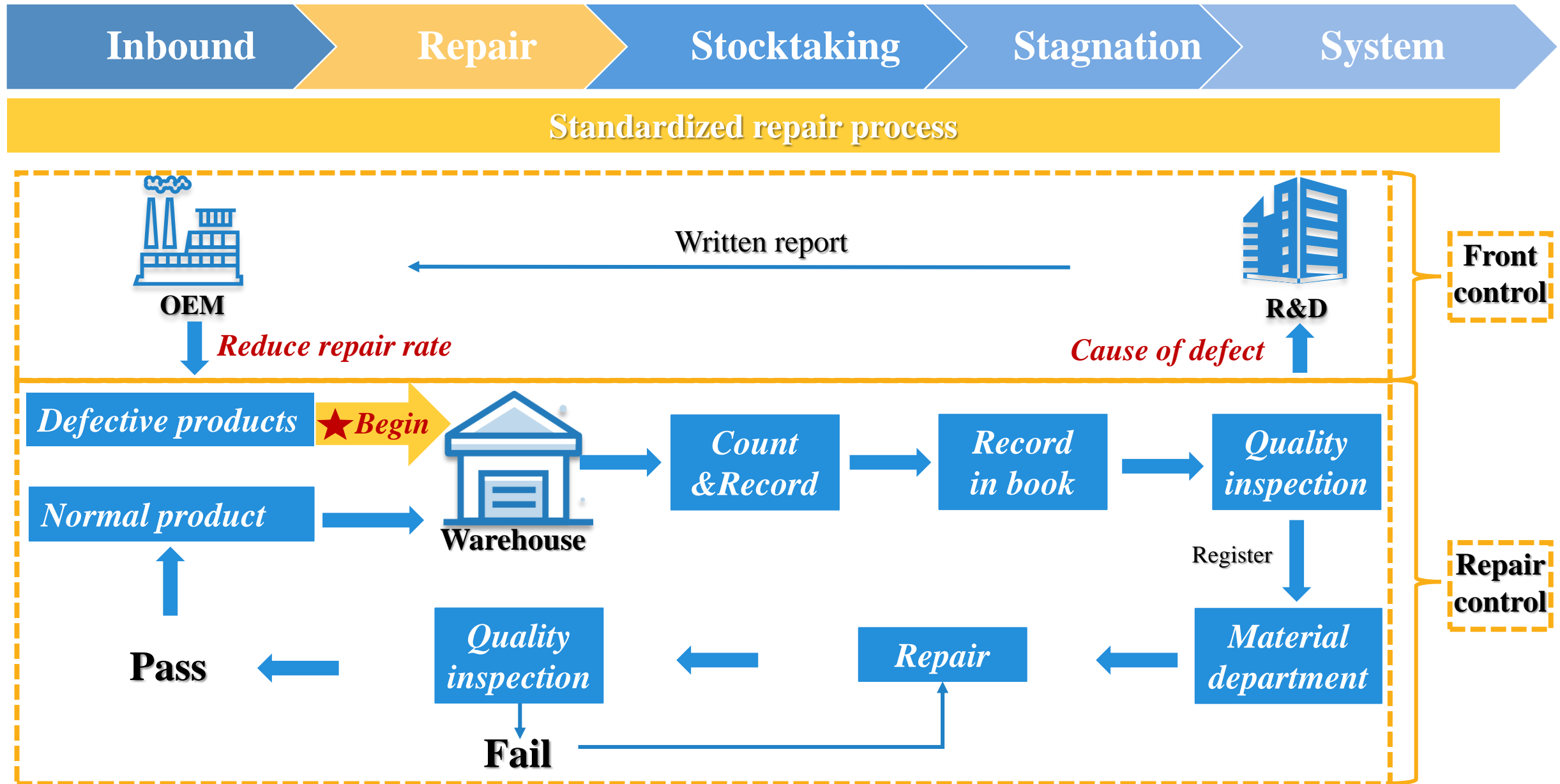
Stocktaking processes

Details of stocktaking processes

Preparation for stocktaking

Stocktaking frequency

OEMs: At the end of each month

FS: Decide by ABC analysis
Class A: 15 days
Class B: 30 days
Class C: 90 days

Conduct the stocktaking

Quantity of the stocks

Accounts ?= Facts

Quality of the stocks

Change of stocks' quality?

Storage conditions

Stacking? Temperature? Etc.

Safety of the stocks

Is facility in a safe condition?

Recommendations: systems & processes

Fiveplus

Inbound	Repair	Stocktaking	Stagnation	System

Measures for handling stagnated products

1. Special treatment

Promotion ➡ **Reducing the selling price**

2. Combination treatment

Stagnated products ➡ **Presented& Exchanged** ➡ **Normal products**

3. Member gifts

Some products ➡ **Membership gifts**

Employee birthday gifts

4. Loss reporting treatment

Reported for loss ➡ **Unsalable goods**

Damaged goods

Recommendations: systems & processes

Fiveplus

Inbound	Repair	Stocktaking	Stagnation	System

Establish performance appraisal system

Attitude
100 × 15%

+

Ability
100 × 35%

+

Performance
100 × 50%

=

Total Score
100

1. Reward

Maintain
80 points or above
in each month

- *Promotion*
- *Long-term incentive*

2. Punishment

Below 60 for two months
and no improvement
after reminding

- *Salary reduction*
- *Dismissal*

Optimizing process with AIS

1. Connecting warehouses

OEM Warehouse   AIS system   FS Warehouse

2. Information tracing

24h

There are 3 major problems with OEMs

Capacity Constraints & Weak Flexibility

☐ FS' restocking quantity has been constrained by the agreed capacity.

☐ Impossible for OEMs to adapt if uncertainties occurred to FS.

Imperfect Quality Control

☐ No standard quality control for OEMs on the returns and defective products.

Information Asymmetry

☐ Inconsistency between accounts and facts.

☐ Price gouging due to the hiding of process costs.

Source: Case information

Use the outsourcing supplier Kraljic segmentation model to distinguish the suppliers

Bottleneck suppliers

- ☐ *Low purchasing amount，high supply risk*

- ☐ *Points：Lower the risk and ensure the supply*

Strategic suppliers

- ☐ *High purchasing amount，high supply risk*

- ☐ *Points：Build partnerships to ensure stability of supply and reasonable prices*

Tactical suppliers

- ☐ *Low purchasing amount，low supply risk*

- ☐ *Points：Streamlining the procurement process and reducing overhead costs*

Leverage suppliers

- ☐ *High purchasing amount，low supply risk*

- ☐ *Points：Compare the price and choose whoever offers the lowest price (All else being equal)*

Supply Risk

Purchasing Value

Make trade-offs for different suppliers (OEMs)！

FS needs to renegotiate from the 3 major aspects in the short term

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Overall renegotiation needed

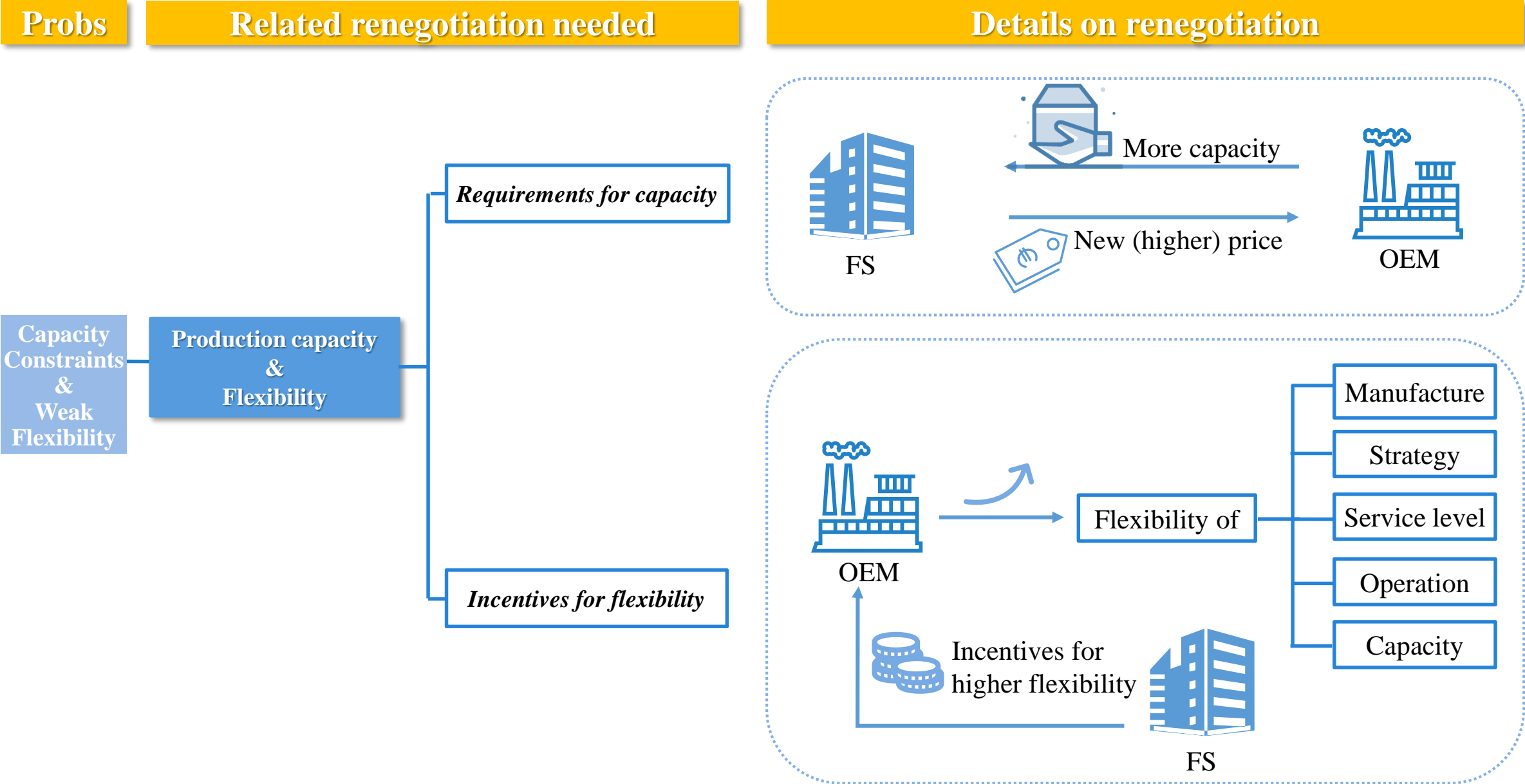|		
1.0	**PURPOSE**	
2.0	**SCOPE**	
3.0	**DEFINITIONS AND ACRONYMNS**	
	3.1	Definitions
	3.2	Acronyms
4.0	**SUPPLIER QUALITY MANAGEMENT REQUIREMENTS**	
	4.1	Quality Management System
	4.2	Quality Plan
	4.3	Supplier Qualification
	4.4	Information Management
	4.5	Design and Engineering Controls
	4.6	Supplier Organisation and Resources
	4.7	Procedures
	4.8	Quality Records
	4.9	Quality Audits
5.0	**NON-CONFORMING PRODUCTS, DEVIATIONS & QUERIES**	
	5.1	Control of Non-conforming Products
	5.2	Supplier Deviations Requests and Queries (SDRQ)
6.0	**MATERIAL CERTIFICATION AND TRACEABILITY**	
	6.1	Welding
	6.2	Material Certificates for Compliance and Traceability
	6.3	Positive Material Identification
	6.4	Traceability
7.0	**INSPECTION & TESTING**	
	7.1	Supplier Inspection and Test Plan (ITP)
	7.2	Inspection Level
	7.3	Inspection Communications
	7.4	Access and Provision of Facilities
	7.5	Costs for Delays and/or Rework
	7.6	Kick-Off Meeting (KOM)
	7.7	Pre-Inspection Meeting (PIM)
	7.8	Inspection, Measuring & Test Equipment (M&TE)
	7.9	Non-destructive Examination
	7.10	Inspection Waiver/Deferred Inspection
	7.11	Inspection Release
8.0	**HANDLING, STORAGE, PACKING AND DELIVERY**	
	8.1	Shipping Documents
9.0	**REFERENCES**	
	9.1	Company Reference Documents
	9.2	Regulations, Codes and Standards

Problems

Related renegotiation needed

Capacity Constraints & Weak Flexibility → **Production capacity & Flexibility**
- *Requirements for capacity*
- *Incentives for flexibility*

Imperfect Quality Control → **OEMs' quality control**
- *Feed forward control*
- *Synchronous control*
- *Feed backward control*

Information Asymmetry → **Information sharing**
- *Production information*
- *Financial information*

Source: Australasia Business Unit – West Operations

Renegotiation for capacity and flexibility

Probs

Related renegotiation needed
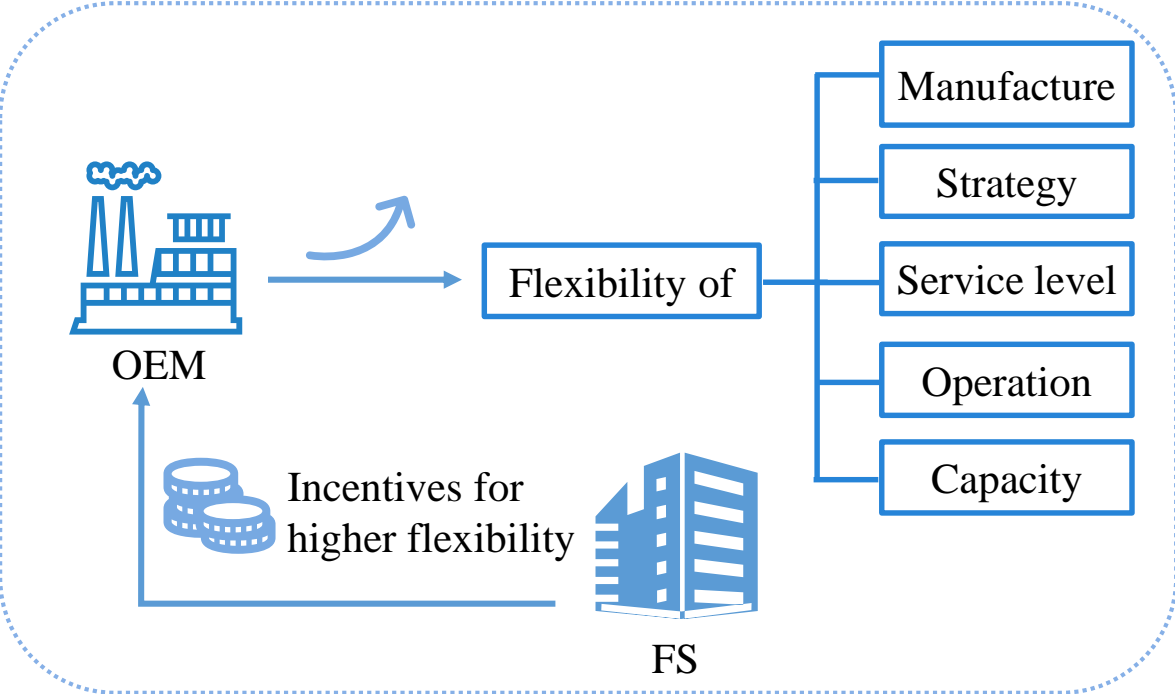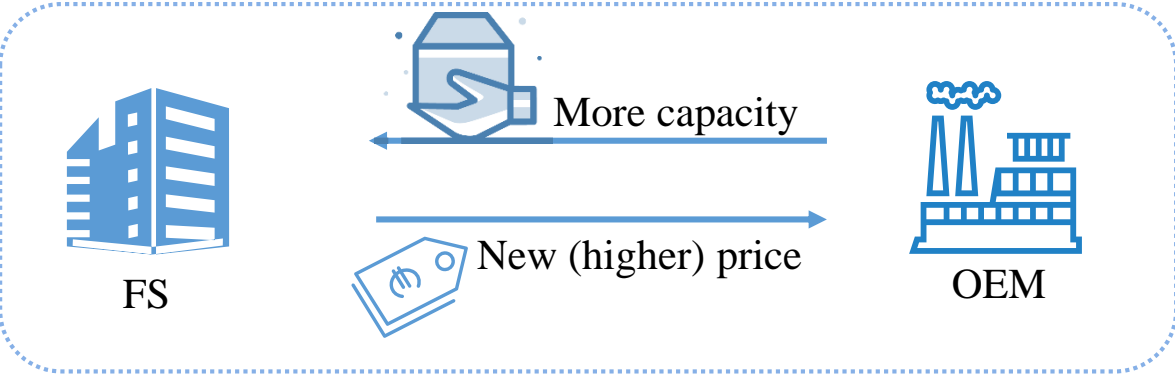
Details on renegotiation

Capacity Constraints & Weak Flexibility

Production capacity & Flexibility

Requirements for capacity

Incentives for flexibility

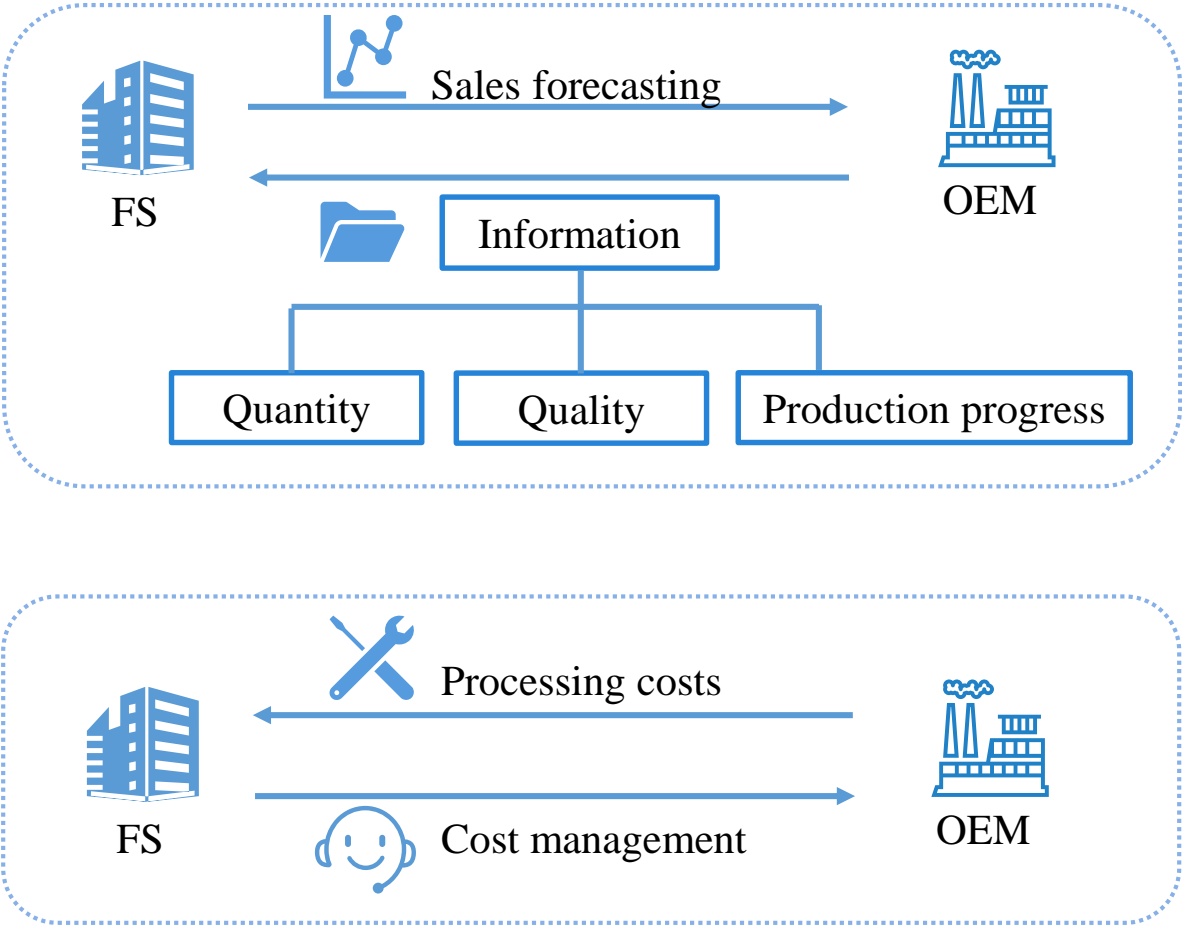FS → More capacity → OEM

New (higher) price

OEM → Flexibility of

- Manufacture
- Strategy
- Service level
- Operation
- Capacity

Incentives for higher flexibility

FS

Renegotiation for OEMs' quality control

Probs	Related renegotiation needed	Details on renegotiation

Feed forward control

(Plan)

Samples to be reviewed

FS   Reviewed standard samples   OEM

Imperfect Quality Control → **OEMs' quality control**

Synchronous control

(Do)

1. On-site review

FS   2. Regular assessments   OEM

Feed backward control

(Learn)

1. Notification of defects

FS   2. (S)CAR for correction   OEM
(Correcting tools include: 5E1M, 8D report, etc.)

Note1: CAR-Corrective Action Reports

Renegotiation for OEMs' quality control

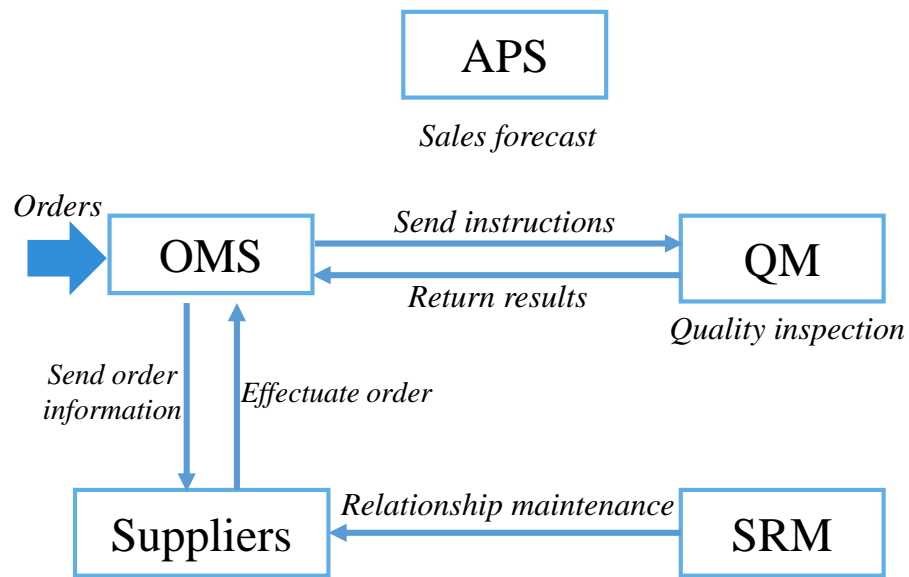| Probs	Related renegotiation needed	Details on renegotiation

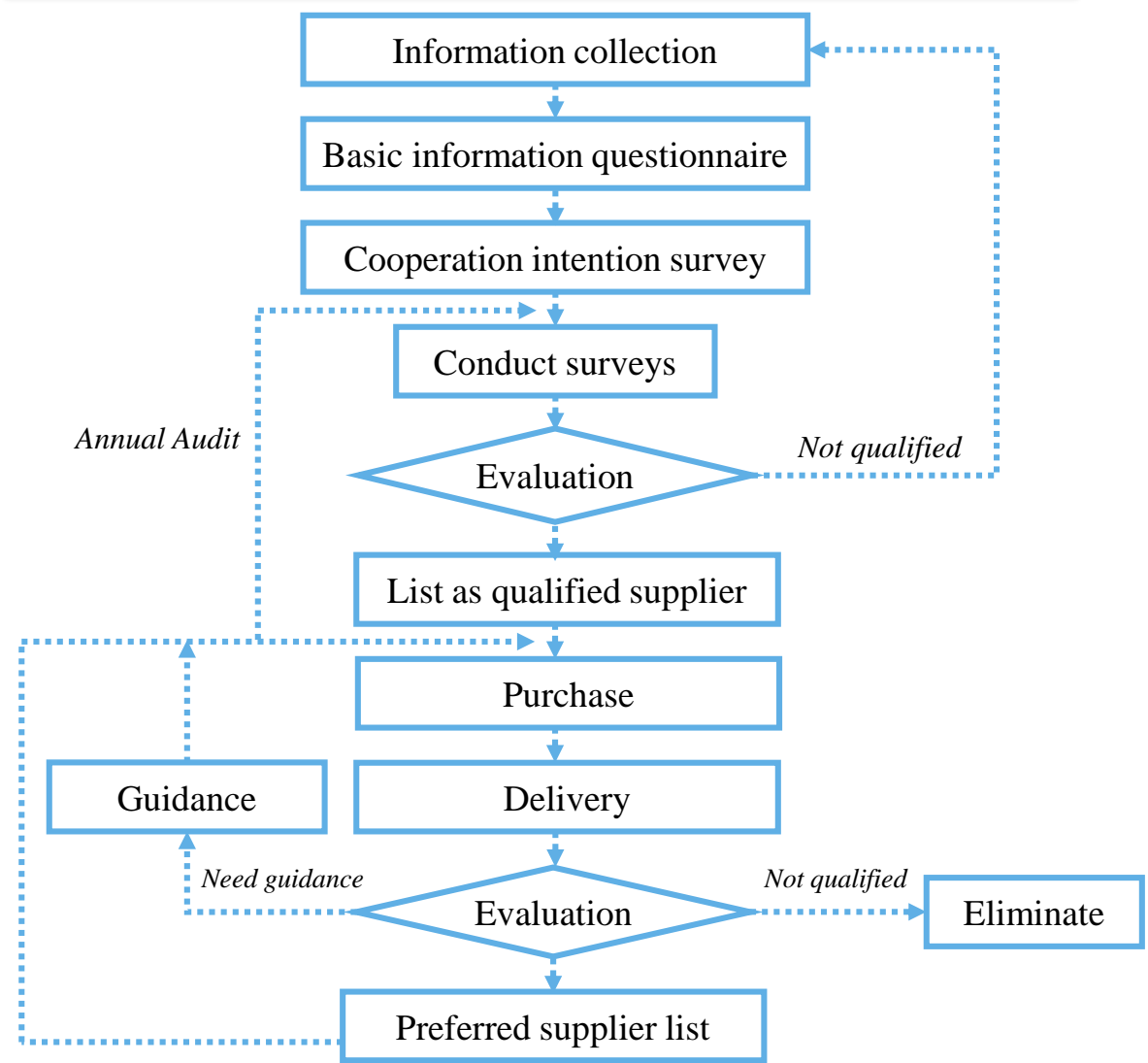# Long-term Production Outsourcing Planning——Internal Improvement

Fiveplus

Stage 1

Information System Optimization

☐ *Order Management System (OMS)*

☐ *Advanced Planning and Scheduling System (APS)*

☐ *Supplier Relationship Management System (SRM)*

☐ *Quality Management System (QM)*

APS

Sales forecast

Orders

OMS → *Send instructions* → QM

QM → *Return results* → OMS

Quality inspection

Send order information

Effectuate order

Suppliers ← *Relationship maintenance* ← SRM

Supplier Management Process Optimization

Information collection

↓

Basic information questionnaire

↓

Cooperation intention survey

↓

Conduct surveys

↓

Evaluation

Annual Audit

Not qualified

↓

List as qualified supplier

↓

Purchase

↓

Guidance   Delivery

Need guidance

Evaluation → *Not qualified* → Eliminate

↓

Preferred supplier list

Long-term Production Outsourcing Planning——Internal Improvement

Stage 1

Information System Optimization

| APS | OMS | QM | SRM |

Supplier Management Process Optimization

Information collection

↓

Basic information questionnaire

↓

Cooperation intention survey

↓

Conduct surveys

↓

Evaluation —— Not qualified

Annual Audit

↓

List as qualified supplier

↓

Purchase

↓

Delivery

Guidance ← Need guidance

Evaluation —— Not qualified —→ Eliminate

↓

Preferred supplier list

Stage 2

Organizational Structure Optimization

Purchasing

↓

Supply Management

↓

Strategic Procurement

Purchasing / Production / Product Development

Strategic Procurement

Fiveplus

Long-term Production Outsourcing Planning——Internal Improvement

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Stage 1

Information System Optimization

| APS | OMS | QM | SRM |

Supplier Management Process Optimization

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Need guidance — Evaluation — Not qualified — Eliminate

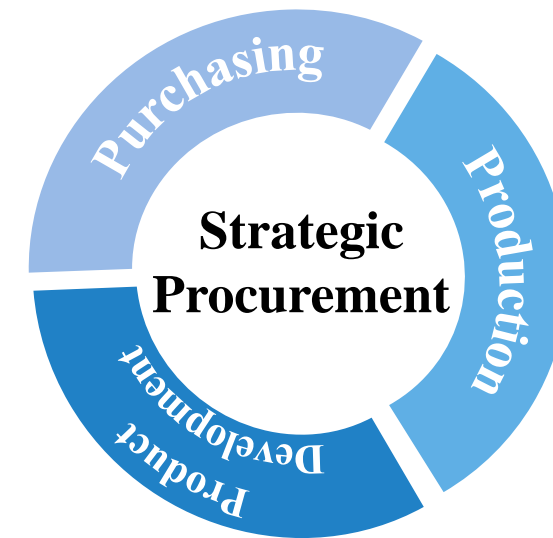Preferred supplier list

Stage 2

Organizational Structure Optimization

Purchasing

Supply Management

Strategic Procurement

- ☐ *Order-driven purchasing*
- ☐ *Order handler , not business partner*
- ☐ *Keep suppliers at a distance*

Purchasing

Production

Product Development

Strategic Procurement

Long-term Production Outsourcing Planning——Internal Improvement

Fiveplus

Stage 1

Stage 2

Information System Optimization

| APS | OMS | QM | SRM |

Supplier Management Process Optimization

Information collection

Basic information questionnaire

Cooperation intention survey

Conduct surveys

Evaluation → Not qualified

Annual Audit

List as qualified supplier

Purchase

Guidance ← Delivery

Need guidance → Evaluation → Not qualified → Eliminate

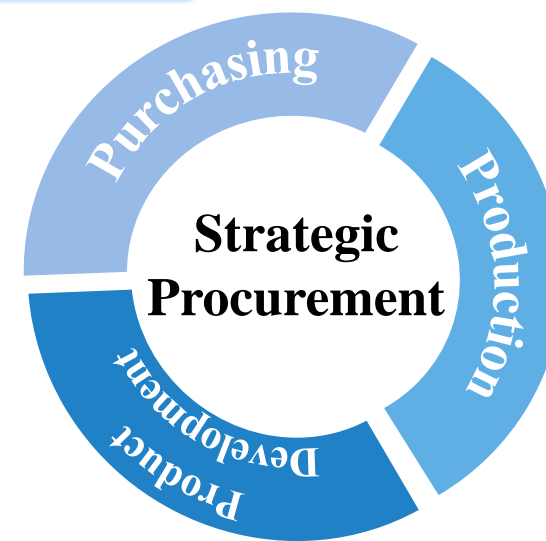Preferred supplier list

Organizational Structure Optimization

Purchasing

↓
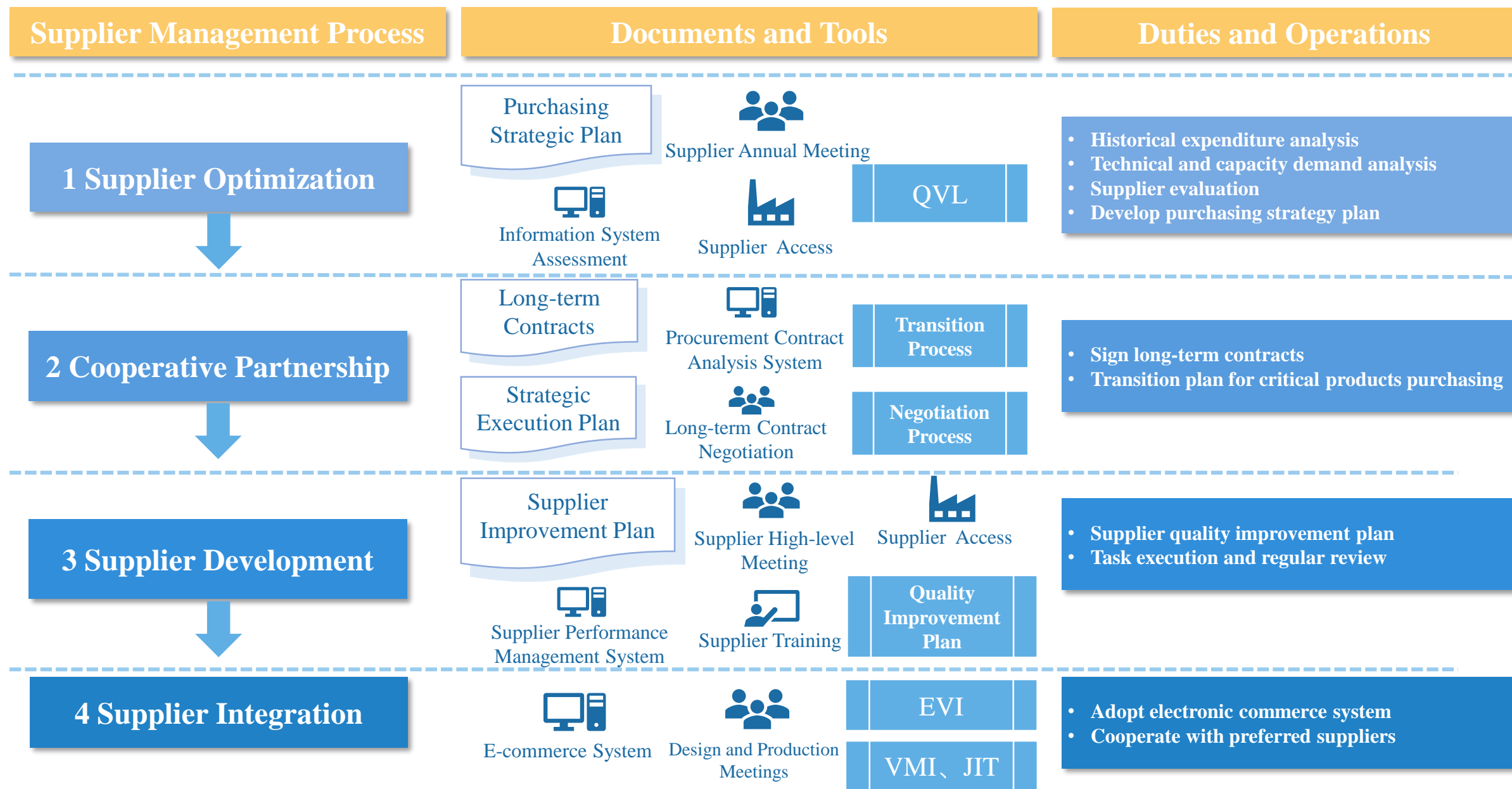
Supply Management

↓

Strategic Procurement

- ☐ *Long-term cooperative relationship*
- ☐ *Business partners*
- ☐ *Complex relationships：JV、ESI etc.*

Purchasing

Production

Product Development

Strategic Procurement

Long-term Production Outsourcing Planning——External Improvement

Fiveplus

Supplier Management Process	Documents and Tools	Duties and Operations
1 Supplier Optimization	Purchasing Strategic Plan · Supplier Annual Meeting · QVL · Information System Assessment · Supplier Access	• Historical expenditure analysis • Technical and capacity demand analysis • Supplier evaluation • Develop purchasing strategy plan
2 Cooperative Partnership	Long-term Contracts · Procurement Contract Analysis System · Transition Process · Strategic Execution Plan · Long-term Contract Negotiation · Negotiation Process	• Sign long-term contracts • Transition plan for critical products purchasing
3 Supplier Development	Supplier Improvement Plan · Supplier High-level Meeting · Supplier Access · Supplier Performance Management System · Supplier Training · Quality Improvement Plan	• Supplier quality improvement plan • Task execution and regular review
4 Supplier Integration	E-commerce System · Design and Production Meetings · EVI · VMI、JIT	• Adopt electronic commerce system • Cooperate with preferred suppliers

Long-term Production Outsourcing Planning——External Improvement

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1. Supplier Optimization

- ☐ Quality
- ☐ Cost
- ☐ On-time delivery rate
- ☐ Service
- ☐ Technology
- ☐ Assets Management
- ☐ Staff & Process

- ☐ Historical expenditure analysis
- ☐ Supplier self-assessment
- ☐ Site inspection

2. Cooperative Partnership

Qualified Suppliers List

Strategic Suppliers

Preferred Suppliers

Provisional Suppliers

Undetermined Suppliers

Long-term Production Outsourcing Planning——External Improvement

Fiveplus

1. Supplier Optimization

- ☐ Quality
- ☐ Cost
- ☐ On-time delivery rate
- ☐ Service
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- ☐ Historical expenditure analysis
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Qualified Suppliers List

Strategic Suppliers

Preferred Suppliers

Provisional Suppliers

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2. Cooperative Partnership

Strategic Suppliers

Preferred Suppliers

Long-term Agreement
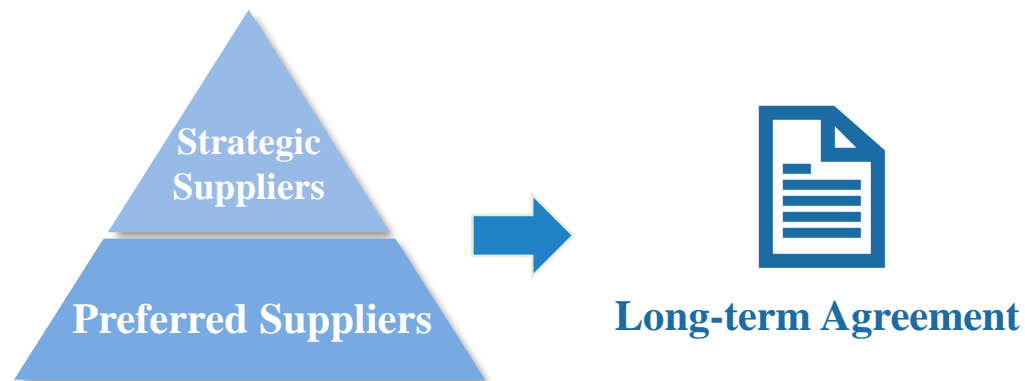
Privileges

1	Higher down-payment rate
2	Exemption from inventory inspection
3	Cost control guidance
4	… …

Long-term Production Outsourcing Planning——External Improvement

3. Supplier Development

4. Supplier Integration

Using Analytic Hierarchy Process:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ a_{21} & & a_{2n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$$

Number	Importance hierarchy	Explanation	a_{ij} assignment
1	I and J are equally important	Both activities contribute equally to the target value	1
2	The I element is slightly more important than the j element	Experience and judgment are slightly on the side of the I element	3
3	The I element is obviously more important than the j element	Experience and judgment clearly side with the I element	5
4	The I element is stronger than the j element	Experience and judgment are very much on the side of the I element	7
5	The I element is more important than the j element	Experience and judgment definitely side with the I element	9
6	The I element is slightly less important than the j element	Experience and judgment side slightly with the J element	1/3
7	The I element is significantly less important than the j element	Experience and judgment clearly side with the J element	1/5
8	The I element is strongly less important than the j element	Experience and judgment clearly side with the J element	1/7
9	The I element is extremely less important than element J	Experience and judgment definitely side with the J element	1/9

The larger a_{ij} value is, the higher the importance of index I is.

Long-term Production Outsourcing Planning——External Improvement

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3. Supplier Development

Using Analytic Hierarchy Process:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1n} \\ a_{21} & & a_{2n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$$
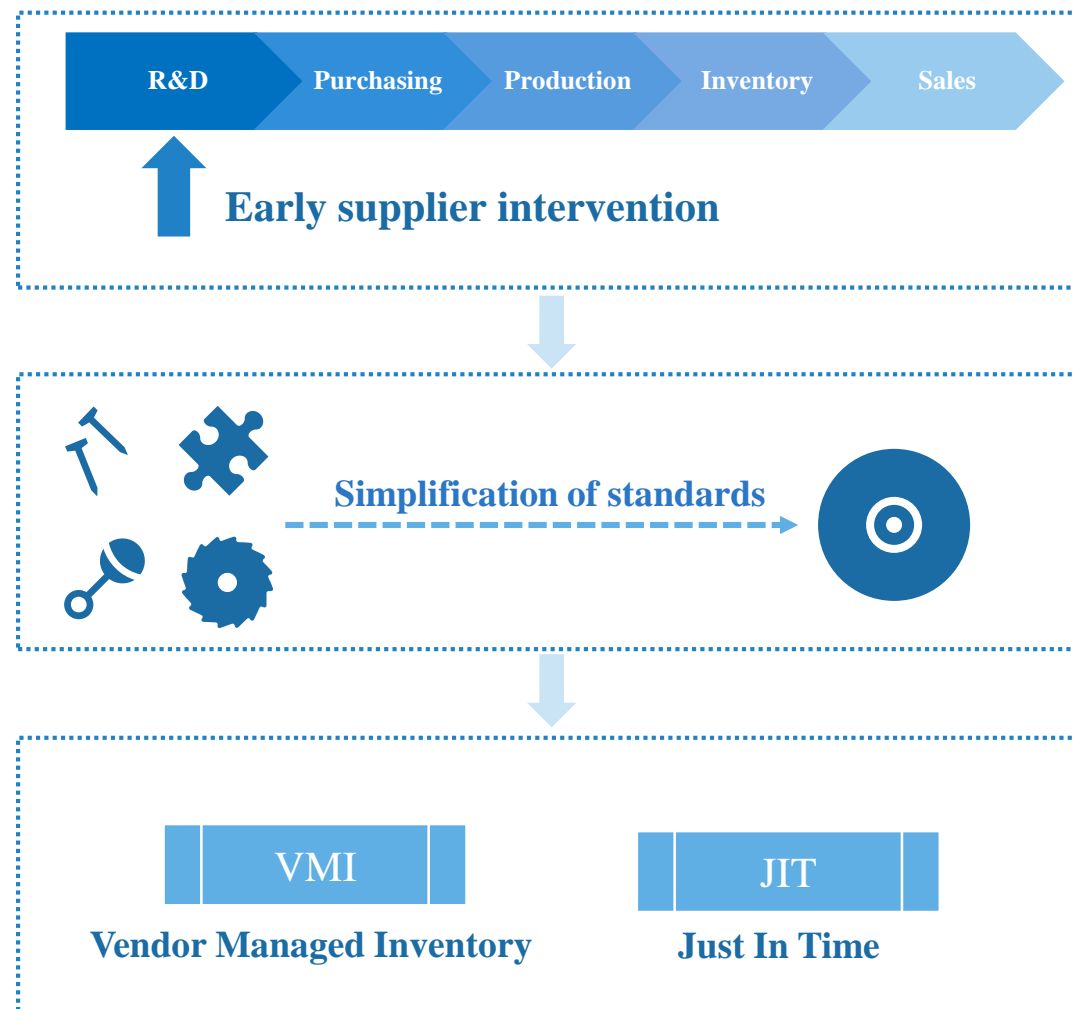
Comparison matrices	Quality	Price	production capacity	Delivery date and service	Financial condition	Environmental factor
Quality	1	1/2	3	2	3	2
Price	2	1	3	5	5	3
production capacity	1/3	1/3	1	2	1/2	1/2
Delivery date and service	1/2	1/5	1/2	1	1/2	1/3
Financial condition	1/3	1/5	2	2	1	1/2
Environmental factor	1/2	1/3	2	3	2	1

1 Key factors that affect Fun Sports' satisfaction

2 Maximize overall satisfaction

Key Processes

1 Provide regular feedback through meetings

2 Solve problems through training and process optimization

4. Supplier Integration

R&D → Purchasing → Production → Inventory → Sales

Early supplier intervention

Simplification of standards

VMI

Vendor Managed Inventory

JIT

Just In Time

Inventory Management Practice of Fun Sports

IMA Business Case Competition
XN20211498

Detailed Product Classification

Types	Long tail	Middle tail	Short tail
Distribution map			
Frequency			
Stability			
Prediction difficulty			
Approximate distribution	*Poisson distribution*	*Normal distribution*	*Uniform distribution*
Model		*Different*	

Corrective Action Report

Supplier Corrective Action Report

Issued date: Issued by:

SCAR No. :	
Report Construct Item:	
Step1 **Internal Team**	**DATE**
Step2 **Describe The Issue**	**DATE**
Step3 **Containment Plan**	**DATE**
Step4 **Root Cause Analysis (Use problem solving tools)**	**DATE**
Step5 **Corrective Action Plan**	**DATE**
Step6 **Preventive Action**	**DATE**
Step7 **Verification**	**DATE**
Step8 **Standardization**	**DATE**

Correcting Tool:
- ☐ 5E1M
- ☐ Fishbone diagram
- ☐ ……

1. 5E1M- Factors contributing to quality fluctuations

Man
- ☐ Operator's awareness of quality
- ☐ Technical proficiency
- ☐ Physical condition

Machine
- ☐ Accuracy and maintenance of:
- ☐ Machinery and equipment;
- ☐ Jigs and fixtures

Material
- ☐ Composition, physical and chemical properties of materials

Method
- ☐ Machining processes, tooling selection, operating procedures
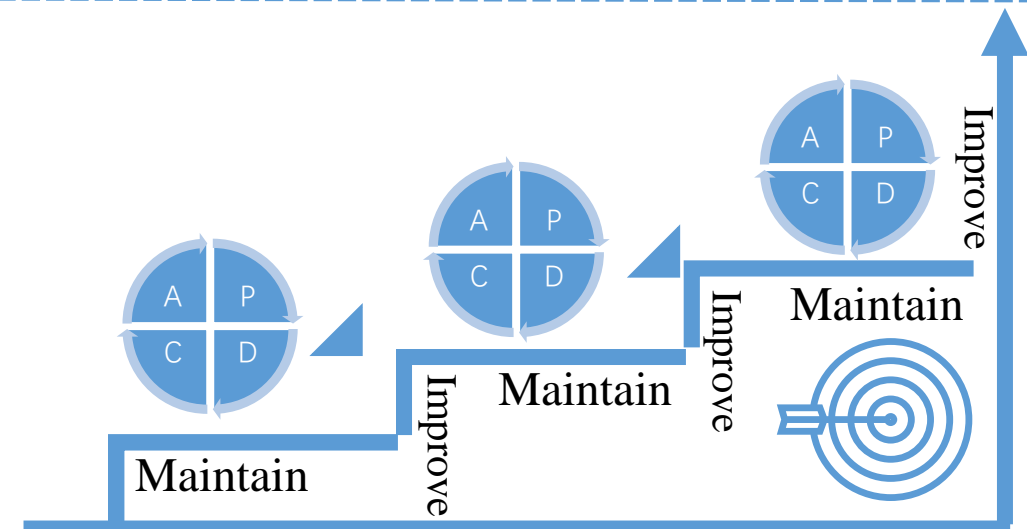
Measurement
- ☐ Appropriateness of the tools selection and the method of measurement

Environment
- ☐ 6s in the workplace, lighting, air circulation, temperature, etc.

P	Goal, Plan and Budget
D	Design solutions and layouts
C	4C: Check, Communicate, Clean, Control
A	2A: Act, Aim

Improve

Maintain

Improve

Maintain

Improve

Maintain

Maintain

2. 8D reports- A way to handle and solve problems

Fiveplus

8D Corrective and Preventive Action Report				
D1 Problem Desription	What:		When:	
	Who:		Where:	
	How much:		Remark:	
	Problem Description:			
D2 Team	Name	Division	Name	Division
D3 Emergency Response Action	Emergency Response Action		Responsible	
	Effectiveness		Responsible	
D4 Failure Analysis	Escape Cause Investigation		Responsible	
	Root Cause Analysis		Responsible	
	Systematic Cause Analysis		Responsible	

D5 Corrective Action	Corrective Action	Responsible
D6 Preventive Action	Preventive Action	Responsible
D7 Verification/ Validation	Effectiveness	Responsible
D8 Problem Close	Standardization	Responsible
Prepared By/Date:		**Approved By/Date:**