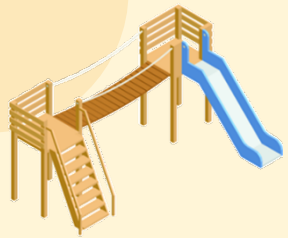
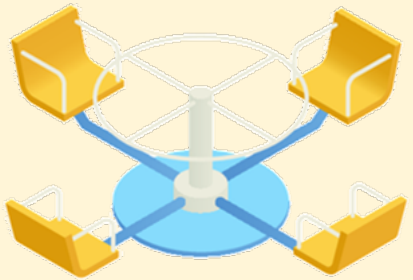


Optimization comes in
Confusion goes out



——Research on analysis and optimization of Fun Sports management problems

Team Name：Gryffindor

01 **Problem Identification：**

Case background

02 **Problem Analysis：**

FS management problem analysis

03 **Problem Solved：**

FS management optimization scheme

- Introduction of information systems
- Procurement management optimization
- Inventory management optimization
- Outsourcing production management optimization
- Internal personnel management system

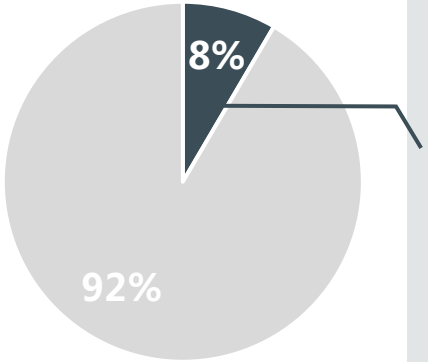
1 Case background——Event introduction

Troubled internal management

Unreasonable purchasing volume

Irregular process / Missing system → **Confusion** of inventory information

Large fines in "Double 11"



Fines from Tmall

- **¥193,300** in fines
- **8.45%** of net profit of the month

2015

The founding of Fun Sports

Production mode : OEM

Storage mode :

Large items → OEMs

Small items → FS

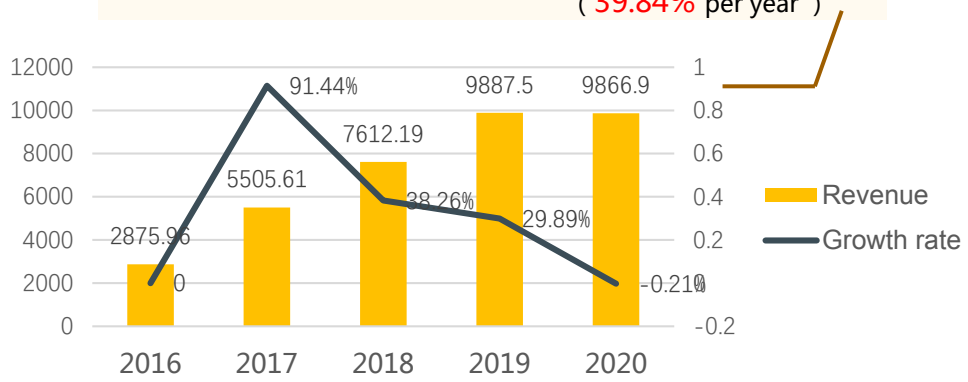
stored & shipped

Limited outsourcing capacity

November 2020

OEMs capacity ✕ Sales growth

(39.84% per year)



1 Case background——Event analysis

Event Large fines in "Double 11"

Reason for fine

Delayed shipment

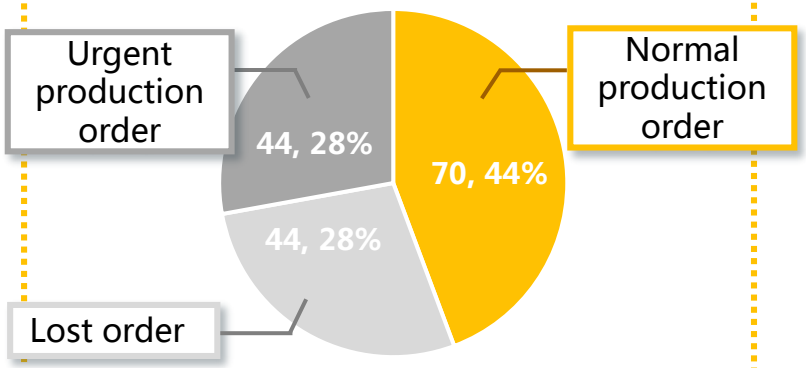
Overstock sales

Stock

Emergency stock

Order demand

Demand for "Double 11"



Deeper reasons

Overstock sales → 1 **Chaotic inventory management**

Virtual inventory

Unshared updates

set

record

Book inventory ← Actual inventory

Inaccurate records

Chaotic management

Insufficient quantity of stock → 2 **Unreasonable purchasing volume**

Insufficient quantity of emergency stock → 3 **Insufficient OEMs cooperation mechanism**

1 Case background——Event analysis

Summary Fun Sports management problems identification

Large fines in "Double 11"

Inventory management issues

- **Chaotic inventory management**
  - Unshared updates of virtual inventory
    - Out-sync sales platform inventory information
  - Inaccurate records of book inventory
    - Doubtful authenticity of the accounting basis
    - Lack of regular physical inventory system
    - Missing record of returned products
  - Chaotic management of actual inventory
    - Unresolved products backlog issues
    - Lack of storage management system
    - Chaotic process of warehousing and repairing returned products

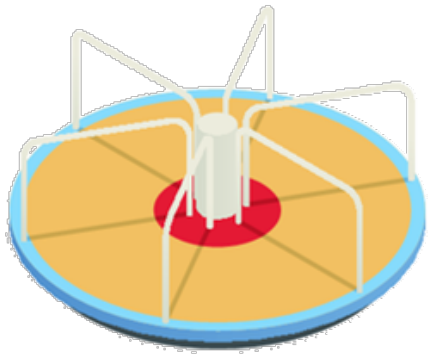
Outsourcing production management issues

- **Insufficient OEMs cooperation mechanism**
  - Low frequency of OEMs cooperation
  - Lack of OEMs competition

Procurement management issues

- **Unreasonable purchasing volume**
  - Inaccurate sales forecasts

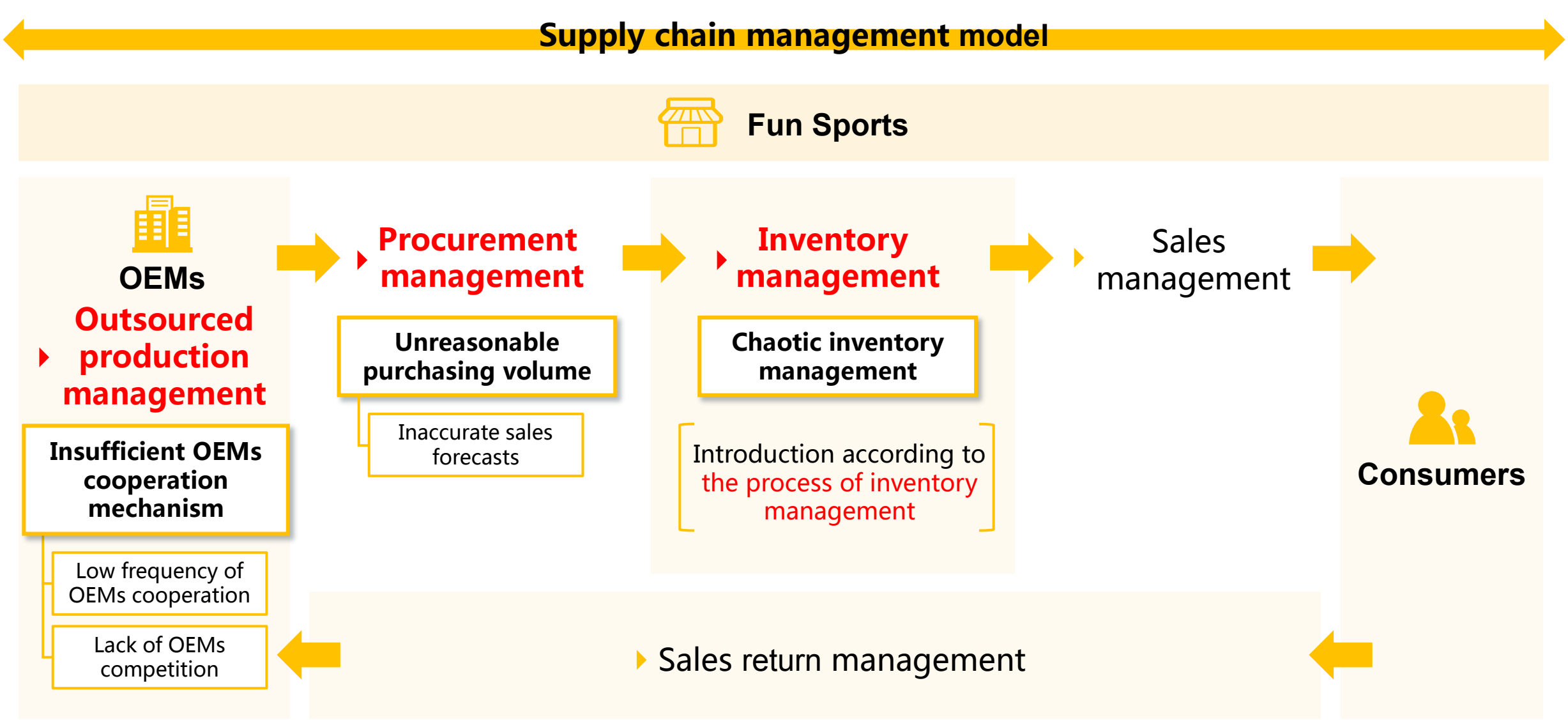
PART
2



Fun Sports management problem analysis

- Overview
- Procurement management problem analysis
- Inventory management problem analysis
- Outsourced production management problem analysis

2 Fun Sports management problem analysis

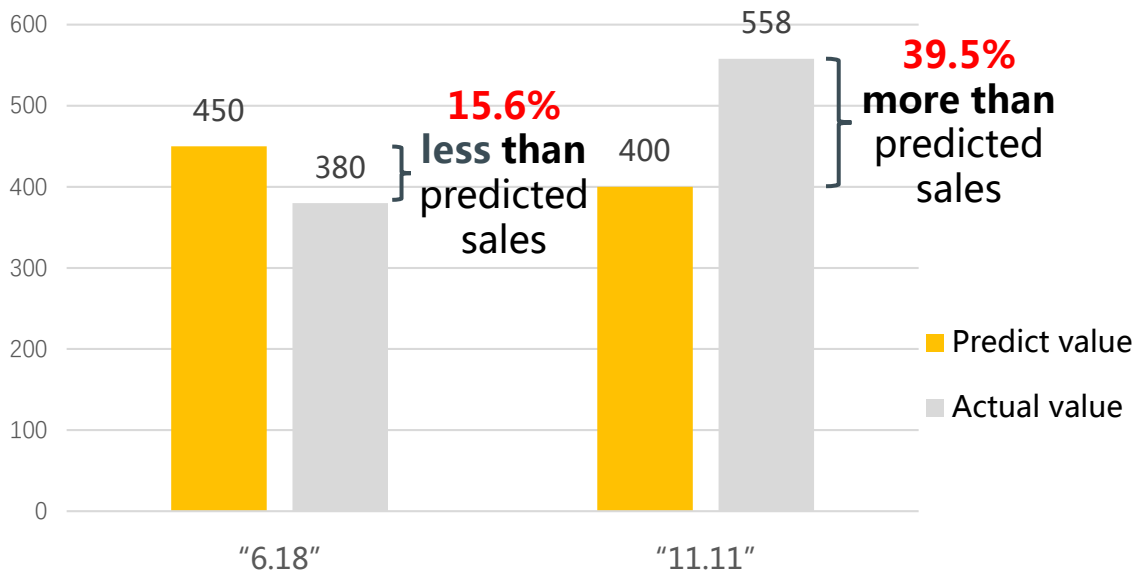


2.1 Procurement management problem analysis

Inaccurate sales forecasts

Inaccurate predictions

Unreasonable forecasting method



Unreasonable purchase volume

——Large products ordering

Sales forecast volume × 100% — **Peak season**

Sales forecast volume × 80% — **Slack season**

Inventory Purchase Quantity in Current Period = **Inventory Budget Quantity** - Beginning Inventory Quantity

Unreasonable current purchase volume

2.2 Inventory management problem analysis

Warehouse of OEMs

Large products warehouse management

Warehouse of Fun Sports

Small products warehouse management

Products inbound

Doubtful authenticity of the accounting basis

Products in stock

- Lack of regular physical inventory system
- Lack of storage management system
- Unresolved products backlog issues

Products outbound

Out-sync sales platform inventory information

Returned products inbound

- Missing inventory record of returned products
- Chaotic process of warehousing and repairing returned products

2.2 Inventory management problem analysis

Inventory link	Specific analysis of the problem	Summary analysis of the problem
Products in stock	Unresolved products backlog issues	(Small portion of products) **Quantity** problem : **Backlog** problem
Products inbound	Doubtful authenticity of the accounting basis	(Large portion of products) **Quantity** problem : **Out of stock** problem
Products in stock	Lack of regular physical inventory system	
	Lack of storage management system	
Products outbound	Out-sync sales platform inventory information	
Returned products inbound	Missing inventory record of returned products	**Quality** problem
	Chaotic process of warehousing and repairing returned products	

2.2 Inventory management problem analysis

1 Management perspective

Inventory problems

Quantity problem

	Out of stock problem	**Backlog** problem	**Quality** problem
Sales	Oversold products Increase after-sales workload	Unsalable products Increase marketing effort	Returned products
Production Self-R&D Outsourced production	Insufficient production of products Hard to mobilize more emergency capacity **in time**	Overproduction of products slow product flow Hard to track & assess & optimize technological capabilities of OEMs **in time**	Unable to obtain products 'repair data Design problem **or** OEMs problem Hard to improve structure design & material selection

2.2 Inventory management problem analysis

2 Financial perspective

(Take climbing frames as an example)

Inventory problems

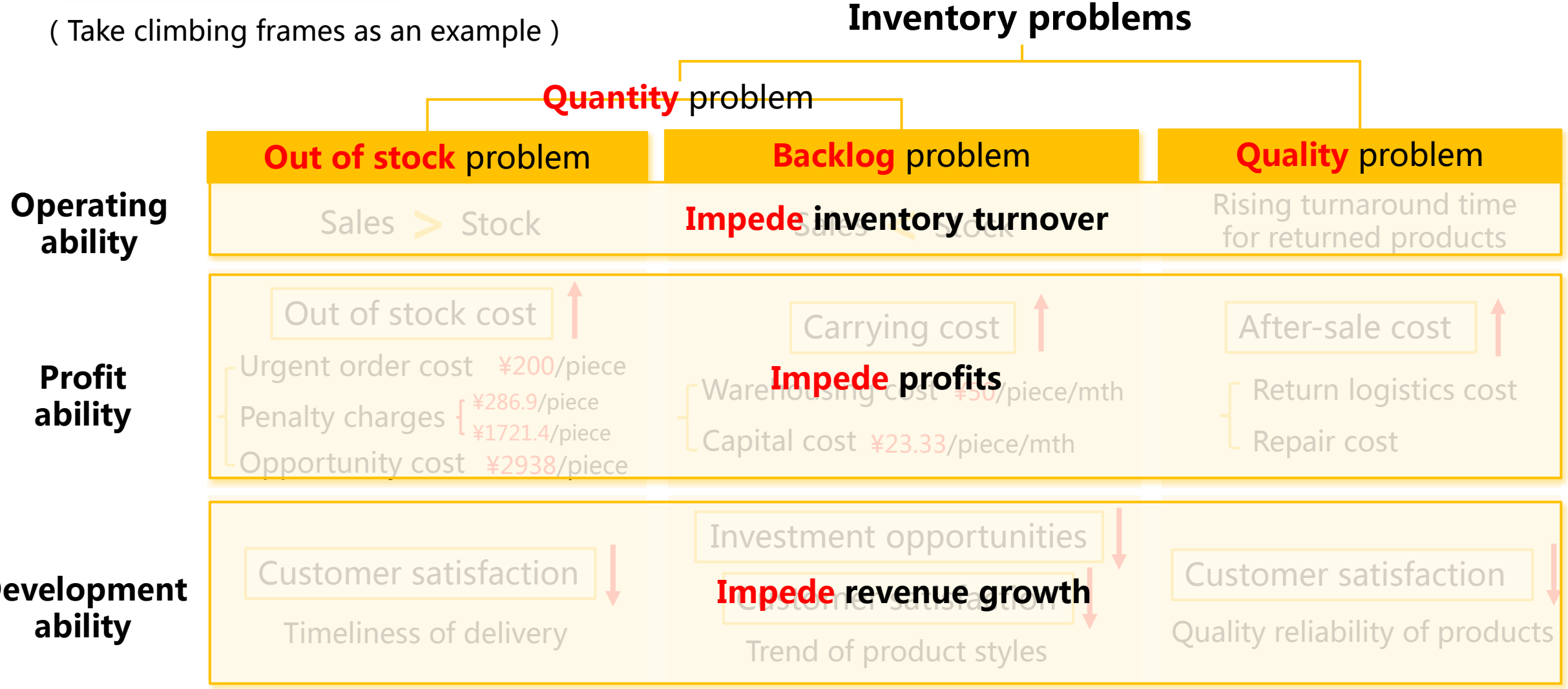
Quantity problem

	Out of stock problem	**Backlog** problem	**Quality** problem
Operating ability	Sales > Stock	Sales < Stock	Rising turnaround time for returned products
Profit ability	Out of stock cost ↑ Urgent order cost ¥200/piece Penalty charges { ¥286.9/piece ¥1721.4/piece Opportunity cost ¥2938/piece	Carrying cost ↑ Warehousing cost ¥50/piece/mth Capital cost ¥23.33/piece/mth	After-sale cost ↑ Return logistics cost Repair cost
Development ability	Customer satisfaction ↓ Timeliness of delivery	Investment opportunities ↓ Customer satisfaction ↓ Trend of product styles	Customer satisfaction ↓ Quality reliability of products

2.2 Inventory management problem analysis

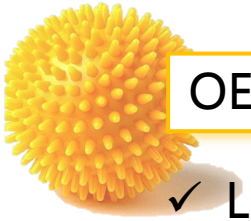
2 Financial perspective

(Take climbing frames as an example)



2.3 Outsourced production management problem analysis

Low frequency of OEMs cooperation



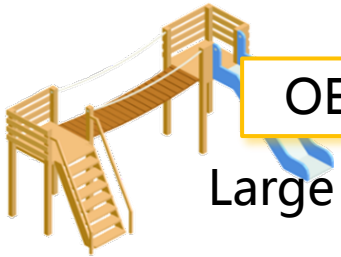
OEMs of small products

✓ Large orders per batch

&

✓ Low order frequency

Lack of OEMs competition



OEMs of large products

Large products of a category

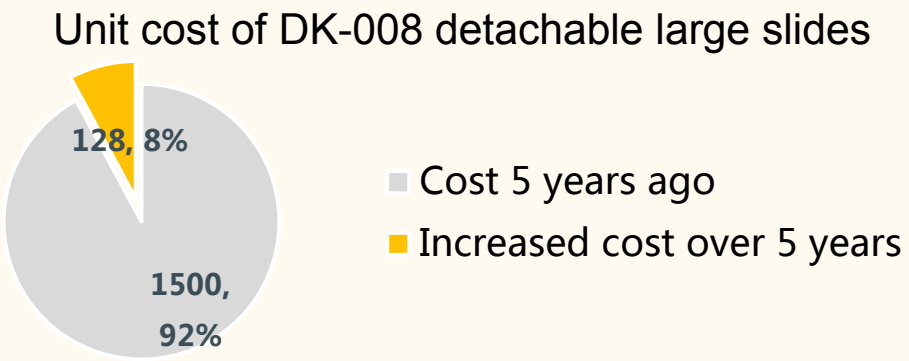
Lack of competition

- **Single** corresponding OEM
- Lack of OEMs evaluation

Consequences

1. Limited outsourcing capacity
2. Poor bargaining power of OEMs

Year-by-year price increase



PART
3

Fun Sports management optimization scheme

- Introduction of information systems
- Procurement management optimization
- Inventory management optimization
- Outsourcing production management optimization
- Internal personnel management system

3 Fun Sports management optimization scheme

Procurement management problem

- ✓ Unreasonable purchasing volume

Inventory management problem

- ✓ Chaotic inventory management

Outsourcing production problem

- ✓ Insufficient OEMs cooperation mechanism

Information system — Optimization ideas

Procurement management optimization

- ✓ Sales forecast method optimization

Inventory management optimization

- ✓ Digital inventory management process
- ✓ Third-party warehouse management system

Outsourcing production management optimization

- ✓ Renegotiate outsourcing cooperation agreement
- ✓ long-term outsourced production plan

Internal personnel management system — Guarantee measures

The order of introduction of the optimization scheme :

1. Introduction of **information systems**
2. **Procurement** management optimization
3. **Inventory** management optimization
4. **Outsourcing production** management optimization
5. Introduction of **Internal personnel management system**

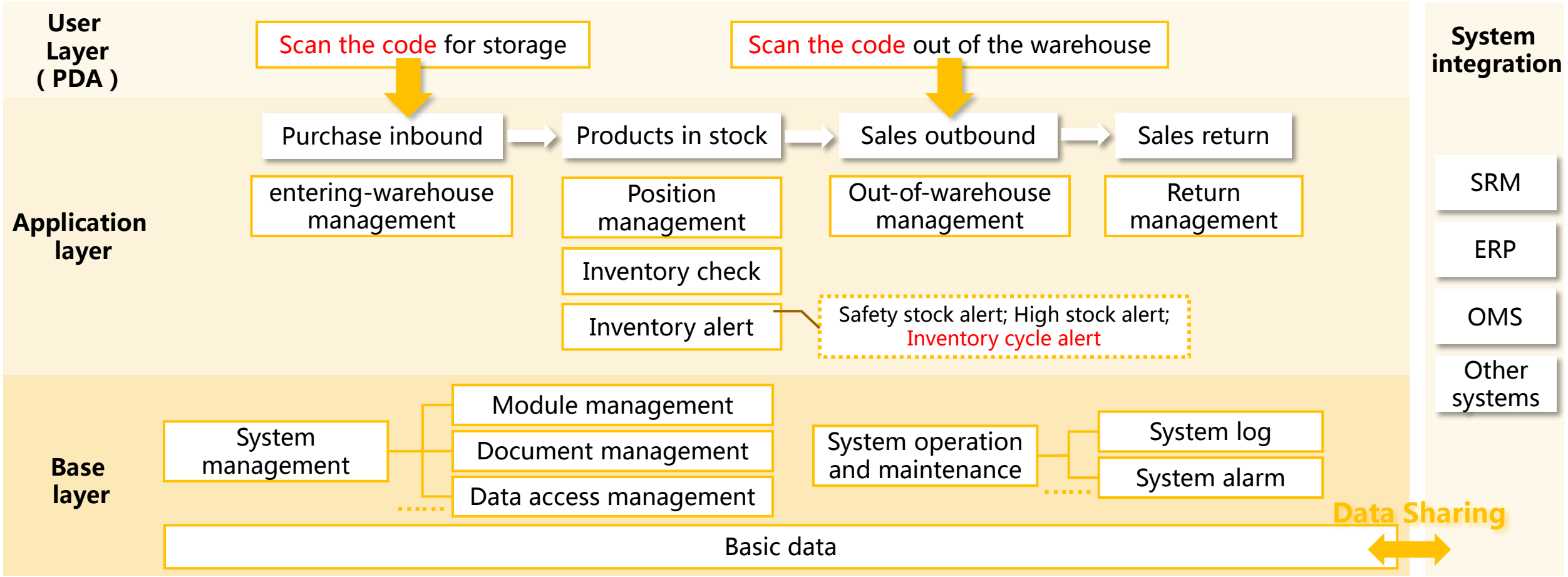
3.1 Introduction of information systems

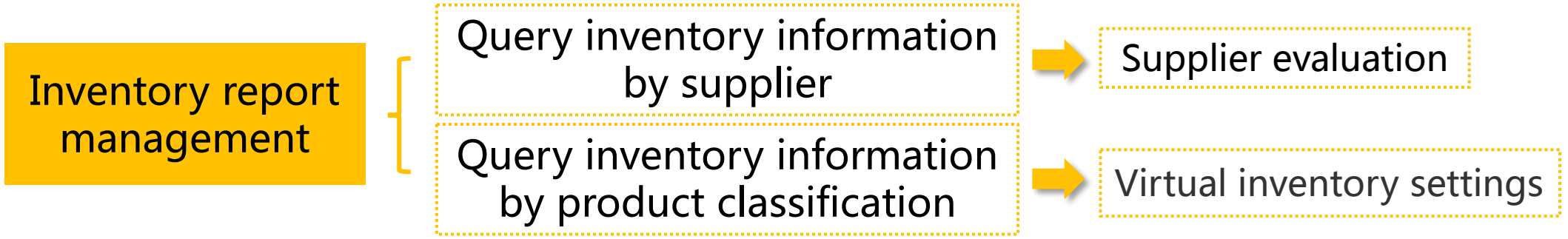
Main functional requirements to systems

Third-party Warehouse

WMS

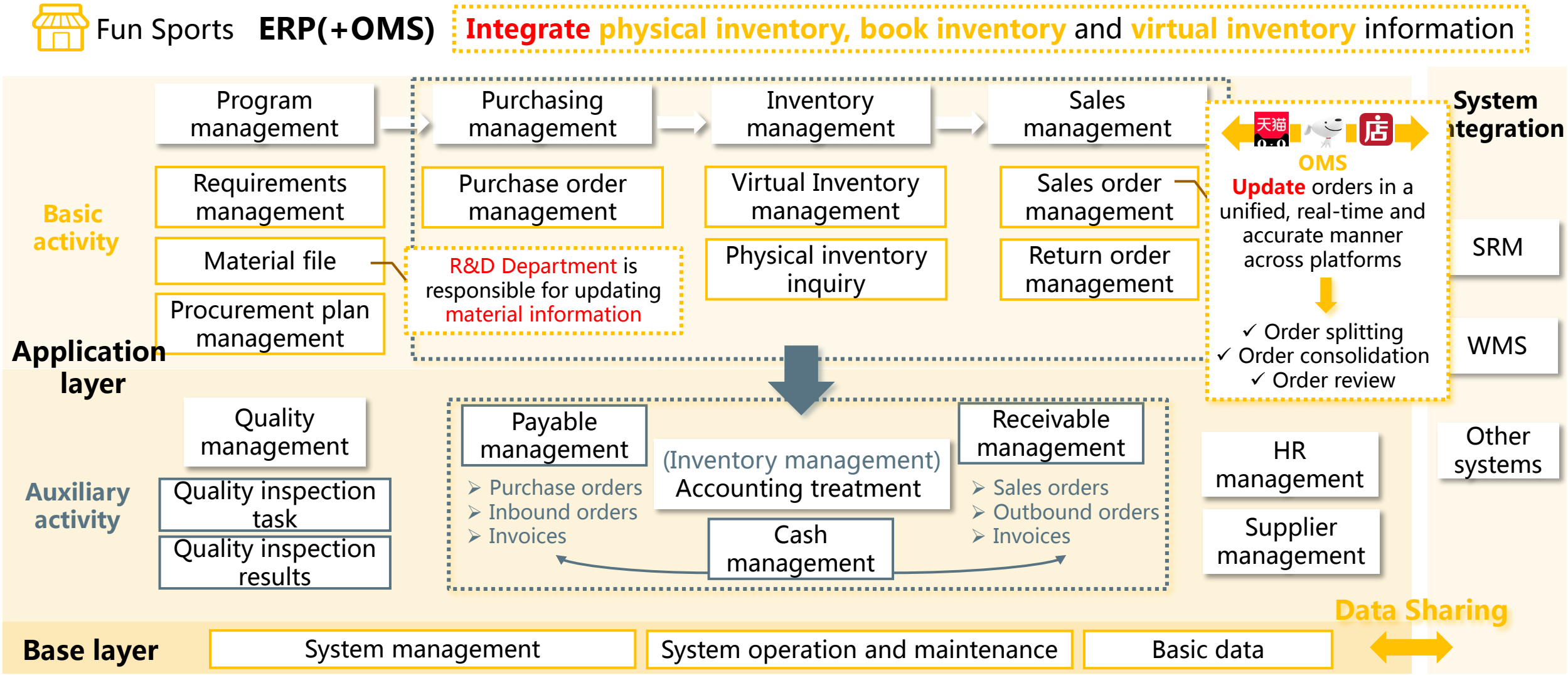
Accurately **synchronize** **physical inventory** information

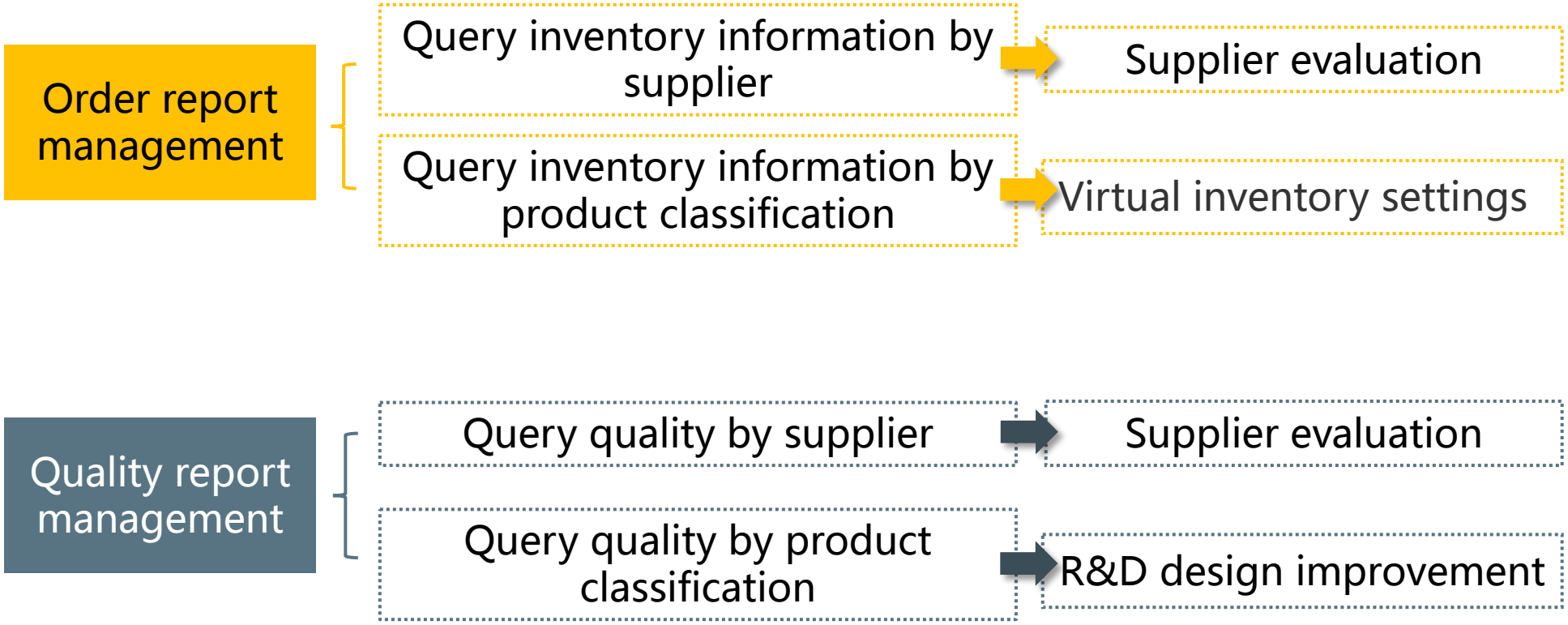



Inventory report management
Query inventory information by supplier
Supplier evaluation
Query inventory information by product classification
Virtual inventory settings

3.1 Introduction of information systems

Main functional requirements to systems




Order report management
Query inventory information by supplier
Supplier evaluation
Query inventory information by product classification
Virtual inventory settings
Quality report management
Query quality by supplier
Supplier evaluation
Query quality by product classification
R&D design improvement

3.1 Introduction of information systems

Main functional requirements to systems

Fun Sports **SRM** **Collaborate** with suppliers to manage procurement information and quality information

Application layer

Order collaboration	Quality collaboration	Financial collaboration
Purchase plan management	Quality standard management	Invoice management
Purchase order collaboration	Inspection management	Payment management
Purchase contract management		Account reconciliation
Delivery collaboration		

System integration

- ERP
- OMS
- WMS
- Other systems

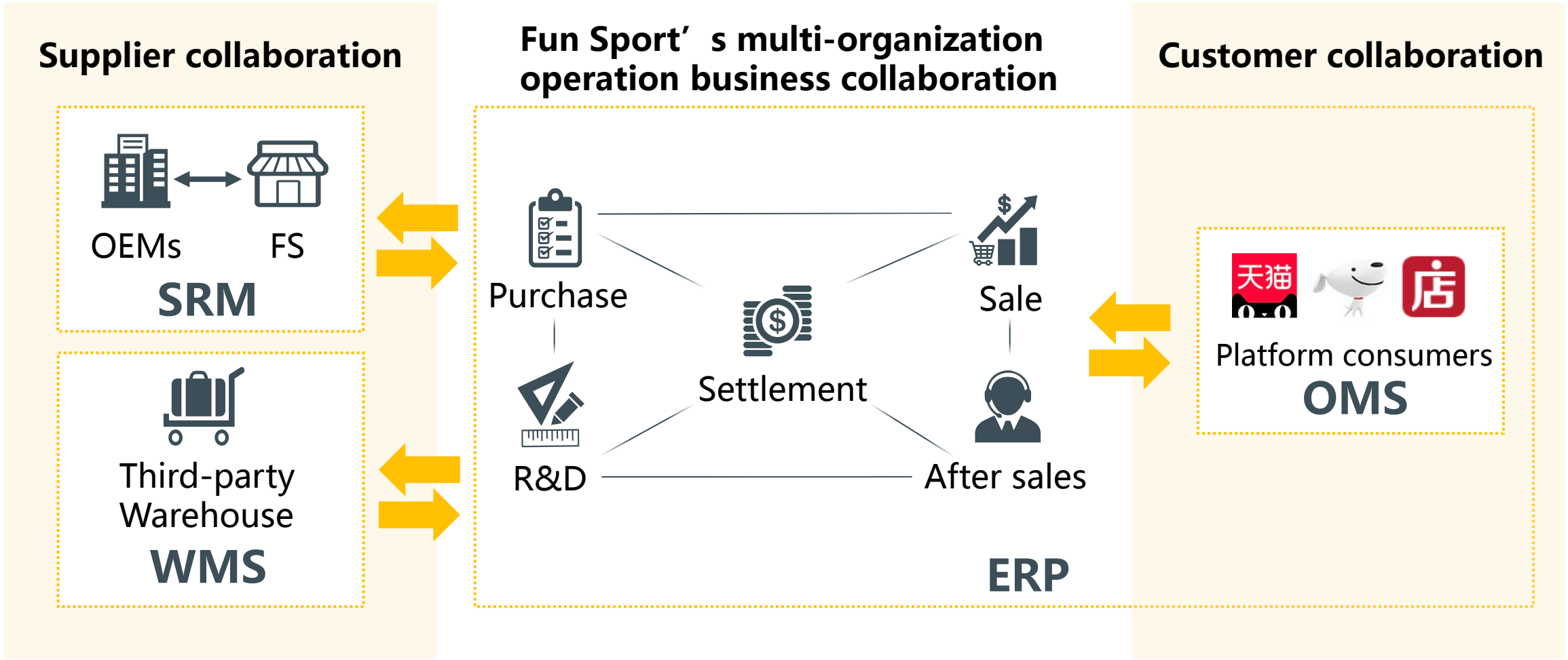
Base layer

System management | System operation and maintenance | Basic data

Data Sharing

3.1 Introduction of information systems

Main functional requirements to systems



3.1 Introduction of information systems

Information system implementation recommendations

Current Plan

Third-party warehouse

WMS

Fun Sports

ERP (+OMS)

Current Situation

1. Insufficient depth of cooperation with OEMs
2. Uneven informatization level of OEMs

Future Plan

OEMs ↔ Fun Sports

SRM

Unattainable SRM main capabilities

Process and institutional supplements

Products inbound optimization

OEMs management system

SRM main capabilities

SRM

Order collaboration/Financial collaboration

Quality collaboration/Supplier management

3.1 Introduction of information systems

Information system implementation recommendations

ERP system comparison

ERP used by general enterprises

	Applicable enterprises	Estimated price
SAP	Large enterprises	Over ten million yuan
用友 yonyou (U8)	SMEs	88,600yuan/year
Kingdee 金蝶	SMEs	67,500yuan/year

ERP suitable for small-scale online stores

System	Main functional requirements	Outstanding function	Price (RMB/year)
Jack yun	√	One stop digitization	55,780
Ju shui tan	√	Intelligent procurement	30,000
Wang dian tong	√	Intelligent warehouse division	29,000

Conclusion： **ERP selecting advice** → Jackyun
- Functional highlights
- Integrated management
- Rich development experience

3.1 Introduction of information systems

Information system implementation recommendations

ERP system comparison

ERP used by general enterprises

- High price
- For large enterprises

Not suitable for Fun Sports

ERP suitable for small-scale online stores

System	Main functional requirements	Outstanding function	Price (RMB/year)
Jack yun	√	One stop digitization	55,780
Ju shui tan	√	Intelligent procurement	30,000
Wang dian tong	√	Intelligent warehouse division	29,000

Conclusion： **ERP selecting advice** → **Jackyun**

- Functional highlights
- Integrated management
- Rich development experience

3.2 Procurement management optimization

Prediction method

Qualitative analysis

Salesman judgment method

Comprehensive judgment method

Expert judgment method

- Expert opinion collection method
- Expert group method
- Delphi method

Disadvantage

Personnel's subjective judgment ability

Influence

Unaccurate results

Combined use

- ✓ **Complement**
- ✓ **Accuracy**

Quantitative analysis

Trend extrapolation analysis

- Average method
  (Moving & Weighted & Arithmetic)
- Smoothing index method
- Modified time series regression analysis

Causal prediction analysis

- Time series regression analysis method

Disadvantage

Require: Large amount & complete data

Missing data → Unpredictable

3.2 Procurement management optimization

Correlation Factors

Qualitative factors

Interest	Psychological expectations
	Consumer preferences
Policy	Relevant national policies
	National three-child policy
Economy	Growth of residents' income
	Changes in the economic situation
Culture	Production concept and culture

Quantitative factors

——From e-commerce platform

Historical sales volume	
Browse & purchase	Store Visitors
	Store Collection
	People Concerned
	Bookmarked goods
Search&Click	Search&Click Number
Transaction conversion	Transaction order volume index
Store goods	High praise rate of goods
	Number of industry stores

3.2 Procurement management optimization

Current Plan

Historical sales data

+

Time series seasonal index method

Future Plan

Historical sales data + E-commerce platform data

Multidimensional grey GM (1, N) model

Prophet method

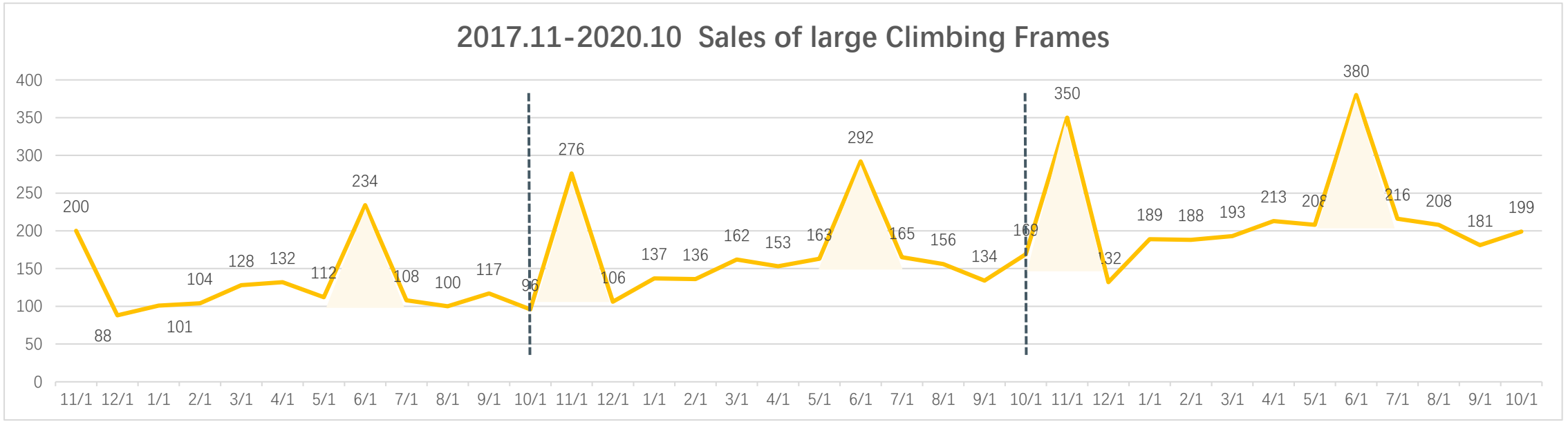
Make **adjustments** with due consideration of qualitative factors

Current Situation

- ✓ Relatively low sales volume & low frequency of sales forecasts
- ✓ Insufficient professional quality of forecasters
- ✓ Insufficient level of information

3.2.1 Current Plan： Time series seasonal index method

Sales data generation (Take large climbing frames as an example)



1. “the off-season stocking volume” is 180-220 → randomly generate off-season sales in 2020
2. “sales growth has averaged nearly 30%" → 2019 off-season stocking volume is 133-173
3. calculate the sales volume in 2018 and 2019 ← 2018 off-season stocking volume is 96-136

3.2.1 Current Plan： Time series seasonal index method

Calculation process

Step 1 12-month moving average of sales

$$X_i^{(1)} = \frac{\sum_i^{i+11} X_i^{(0)}}{12} \quad (i = 1,2,\dots\dots,31)$$

✗ Correspond to a specific month

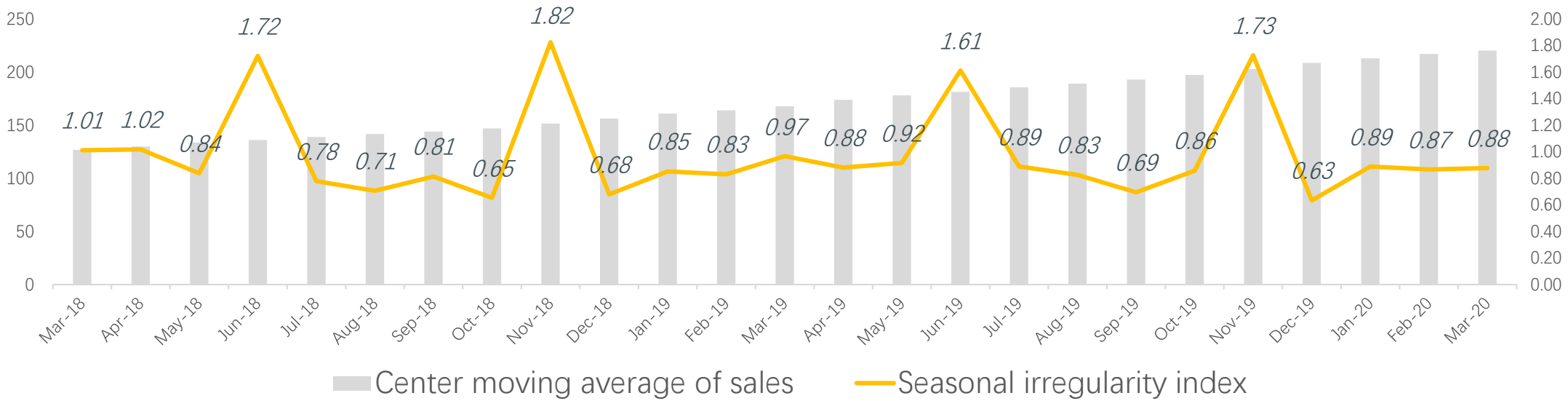
✓ Between months

Centralize the calculation results

Step 2 Center moving average of sales

$$X_i^{(2)} = \frac{\overline{X_i} + \overline{X_{i+1}}}{2} \quad (i = 1,2,\dots\dots,30)$$

The calculation results are shown in Fig.



3.2.1 Current Plan： Time series seasonal index method

Calculation process

Step 3 Seasonal irregularity index

reflects the size of the value of a certain month in the average value of the whole year

$$\delta_m^{(0)} = \frac{X_{i+5}^{(0)}}{X_i^{(2)}} \quad (i = 1,2,\dots\dots,25)$$

The calculation results are shown in Fig on the previous slide.

Mean of seasonal irregularity index	**0.97**

not equal to 100%

Step 4 Center moving average of seasonal index

$$\overline{\delta_m^{(1)}} = \frac{\delta_m + \delta_{m+12}}{2} \quad (m = 1,2,\dots\dots,12)$$

Step 5 Seasonal index mean adjustment

$$\delta_m^{(1)} = \overline{\delta_m^{(0)}} * 12 \Big/ \sum_{m=1}^{12} \overline{\delta_m^{(0)}} \quad (m = 1,2,\dots\dots,12)$$

The calculation results are shown in Fig.

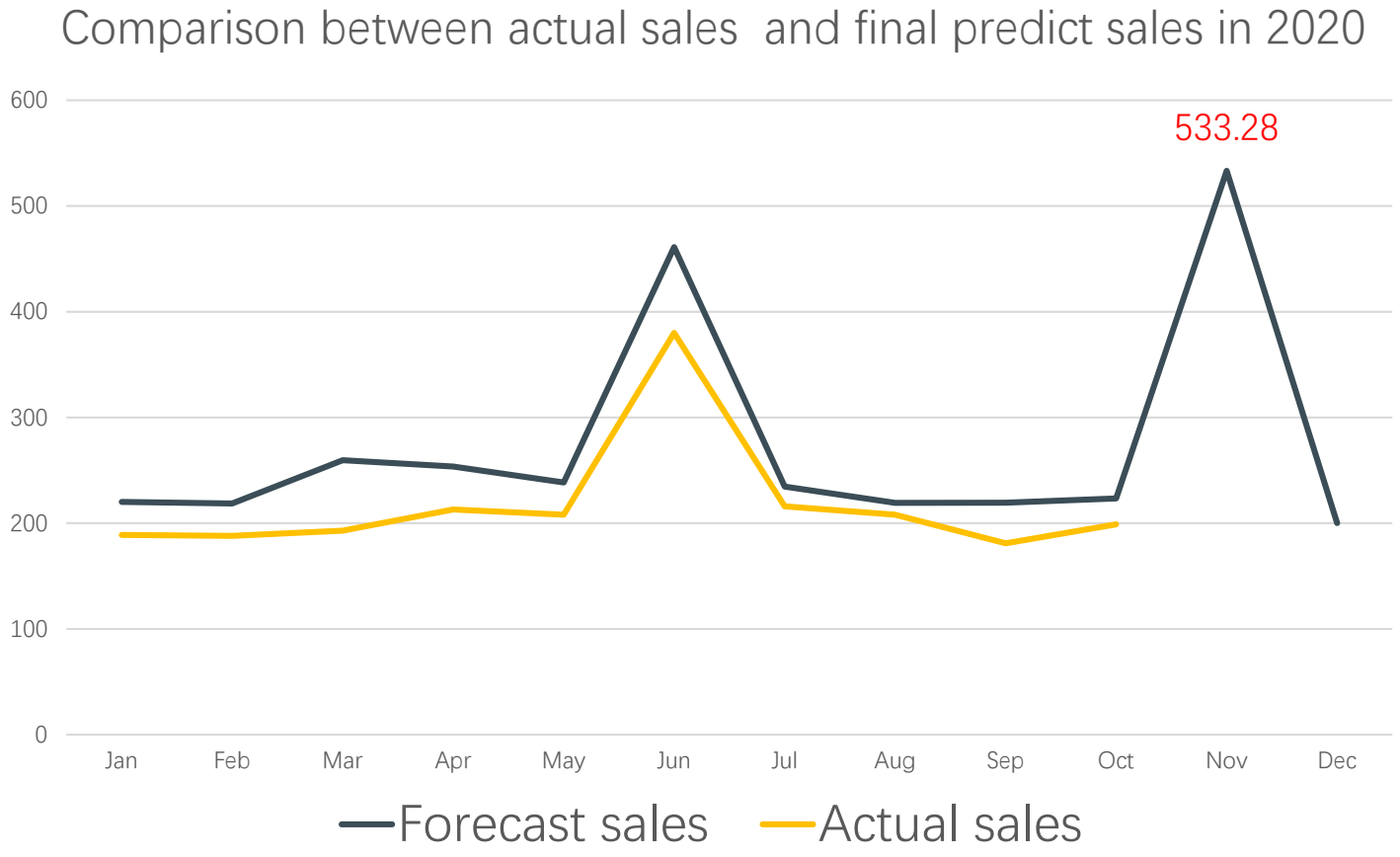
The seasonal index in June and November

Significantly **higher** than other months

Month	Adjusted seasonal indicator
1	0.89
2	0.87
3	1.01
4	0.97
5	0.90
6	**1.70**
7	0.85
8	0.78
9	0.77
10	0.77
11	**1.81**
12	0.67
Mean	1.00

3.2.1 Current Plan： Time series seasonal index method

Prediction results



FS predict sales 400 — INACCURATE! → Actual sales 558 ← MUCH CLOSER! — Predict sales 533

Step 6 **Sales after eliminating the influence of seasonal factors**

$$X_i^{(2)} = X_i^{(1)} / \delta_m^{(1)}$$

Step 7 **Build predictive models**

Linear trend equation after separating seasonal factors :

$$X_i = 242.97 + 4.63 * t$$

Step 8 **2020 sales forecast**

The calculation results are shown in Fig.

3.2.2 Future Plan： Multidimensional grey GM (1, N) model

Determine influencing factors

Step 1 Determine the analysis sequence

Sales volume ⟶ $Y = \{Y(k) \mid k = 1, 2 \cdots n\}$

Influence factor ⟶ $X_i = \{Y(k) \mid k = 1,2 \cdots n\}, i = 1,2 \cdots m$

Step2 Data standardization processing

$$X_i = \frac{X_i(k) - \min X_i(k)}{\max X_i(k) - \min X_i(k)}, i = 0,1,2 \cdots m$$

Step3 Calculate correlation coefficient

ρ : Resolution coefficient

ρ =0.5

Δi (k) =| y(k) − xi (k) |

$$\xi_i(k) = \frac{\min\limits_i \min\limits_k \Delta_i(k) + \rho \max\limits_i \max\limits_k \Delta_i(k)}{\Delta_i(k) + \rho \max\limits_i \max\limits_k \Delta_i(k)}, i = 1,2 \cdots m$$

Step4 Calculate correlation degree

$$\gamma_i = \frac{1}{n} \sum_{k=1}^{n} \xi_i(k)$$

Influence factor	Correlation degree
industry stores	0.7036
bookmarked goods	0.6587
high praise rate of goods	0.6551
Store Visitors	0.6183
Store Collection	0.5913
People Concerned	0.5766
Search & Click Number	0.575
Transaction order volume index	0.5555

Conclusion： **GM(1 ， 4) Model**——Select the influencing factors with grey correlation coefficient **greater than 0.60**
Sales volume——Number of **industry stores、bookmarked goods、 high praise rate of goods and store visitors**

3.2.2 Future Plan： Multidimensional grey GM (1, 4) model

1 Prediction process

Build the original series according to the sales volume of previous years

$$X^{(0)}=(X^{(0)}(1),X^{(0)}(2),X^{(0)}(3),\cdots,X^{(0)}(n)),\ X^{(0)}(k)\geqslant 0,k=1,2,\cdots,n$$

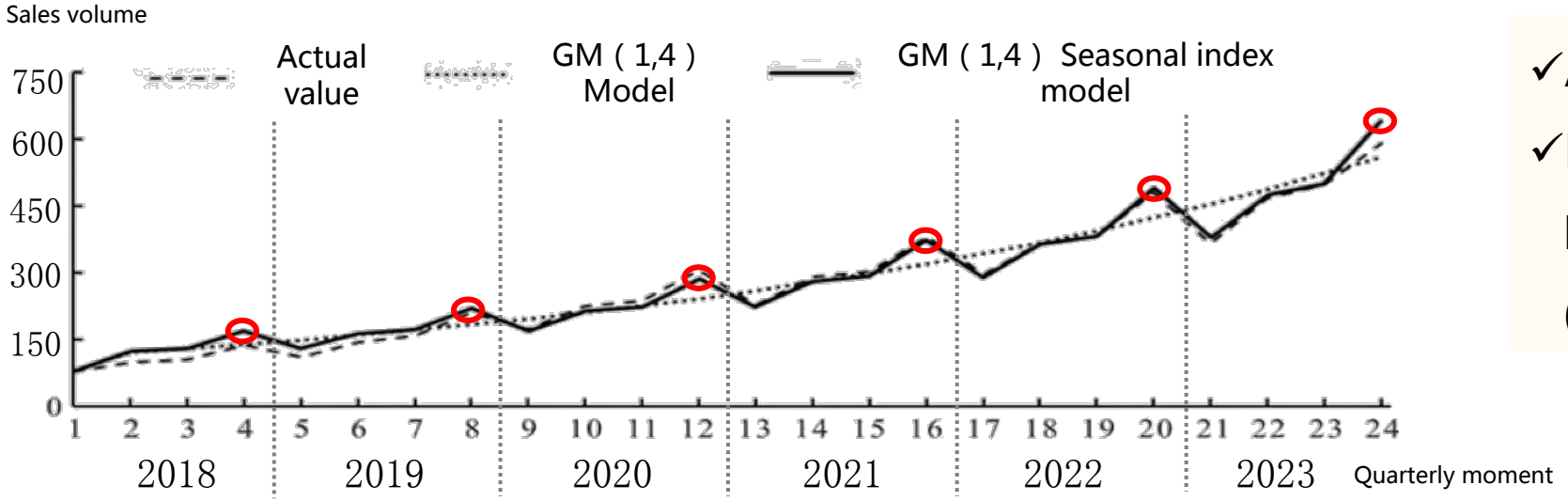
Normalized primitive sequence

$$z^{(1)}(k)=\sum_{i=1}^{k}x^{(0)}(i)=\frac{1}{2}(x^{(1)}(k)+x^{(1)}(k-1)),k=1,2,\cdots,n$$

Calculated predicted value through the model

$$x^{(0)}(k)=a^{(1)}x^{(1)}(k)=x^{(1)}(k)-x^{(1)}(k-1),k=1,2,3,\cdots,n$$

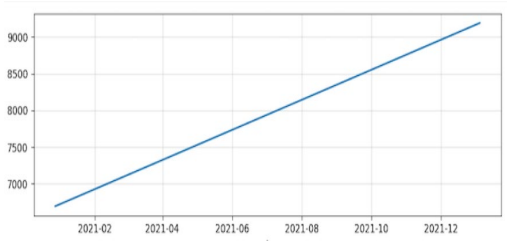
2 Prediction results



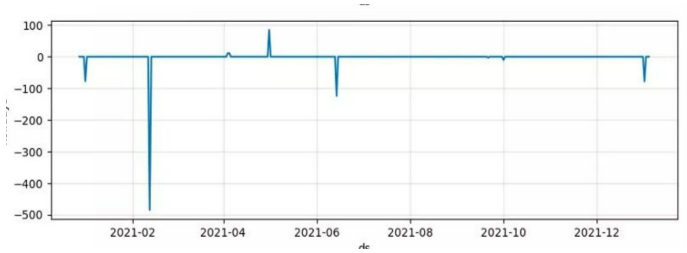
- ✓Annual sales continued to **rise**
- ✓**High sales volume** in the **Fourth quarter** of each year (**Double 11 period**)

3.2.2 Future Plan： Prophet method

Prophet Forecasting Model

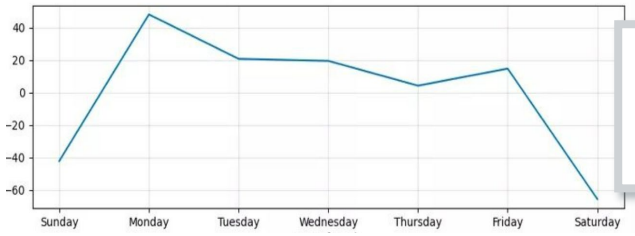


Trend:
Aperiodic change



Holidays and Events:
Potential jump point

$$y(t) = g(t) + s(t) + h(t) + \varepsilon$$

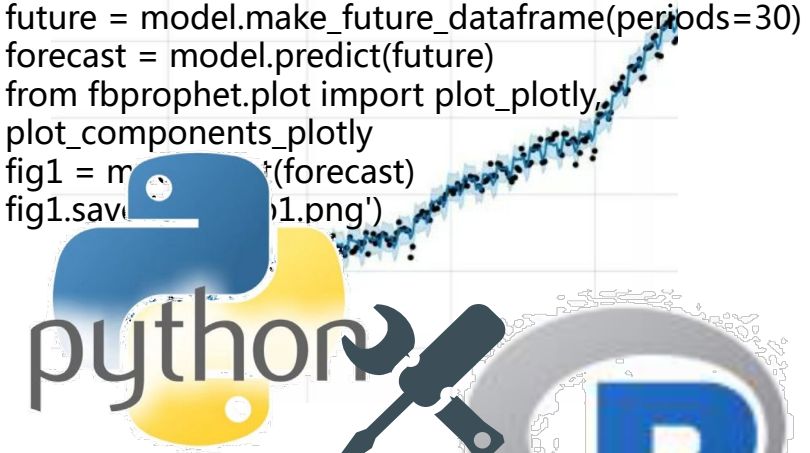


Seasonality:
Cyclical trend

Residual:
Random fluctuation

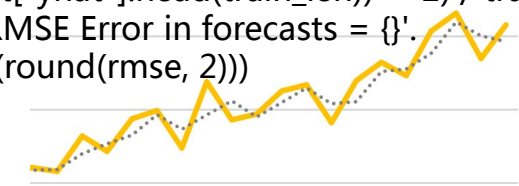
Model Prediction

```
future = model.make_future_dataframe(periods=30)
forecast = model.predict(future)
from fbprophet.plot import plot_plotly,
plot_components_plotly
fig1 = m          t(forecast)
fig1.sav          1.png')
```



Evaluation

```
train_len = len(data["y"])
rmse = np.sqrt(sum((data["y"] -
forecast["yhat"].head(train_len)) ** 2) / train_len)
print('RMSE Error in forecasts = {}'.
format(round(rmse, 2)))
```



3.2.2 Future Plan： Prophet method

Input Value

1. Known value & Forecast duration
+
2. Change point & Number
+
3. Holidays & Impact duration
+
4. Seasonality mode & Prior scale
=

Prediction Results

Adventages

1. Open-source library

Code is free to anyone!

2. Seasonality & Holiday

Considering :

- Zhitongche Service
- Fluctuation in Double 11

3. High Accuracy !

3.3 Inventory management optimization

Information System

Accurately synchronize **physical inventory** information

Integrate **physical inventory, book inventory** and **virtual inventory** information

Business Process

Products inbound → Products in stock → Products outbound → Returned products inbound

Unified management of business processes with the help of third-party warehouses

Management System

Third-party warehouse management system

Inventory management system recommendations

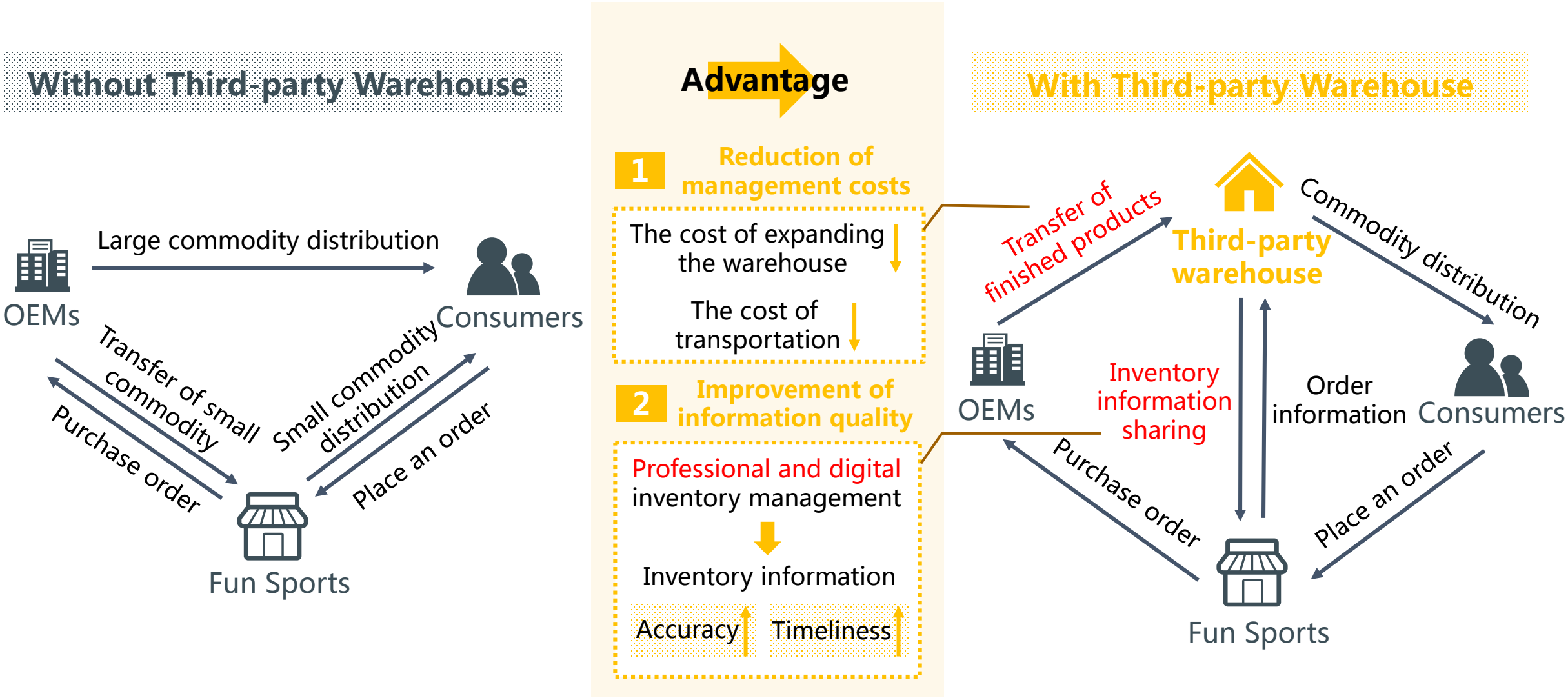
● ● ● ● ● Five points

Third-party warehouse supervision system

▲ ▲ ▲ Three aspects

3.3.1 Introduction of third-party warehouses

Optimization of the inventory process by third-party warehouses

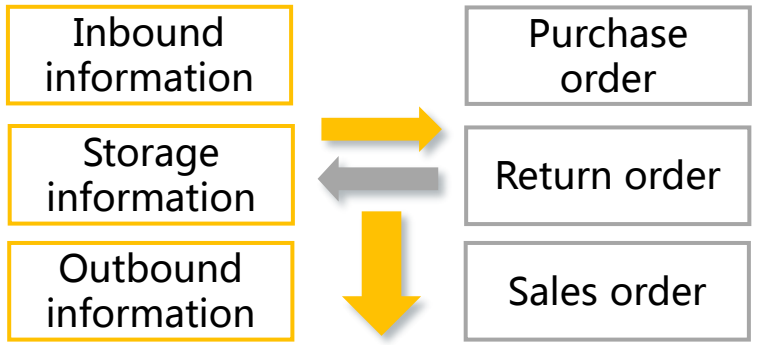


3.3.1 Introduction of third-party warehouses

Basic requirements

1 Technical capability

Information system docking



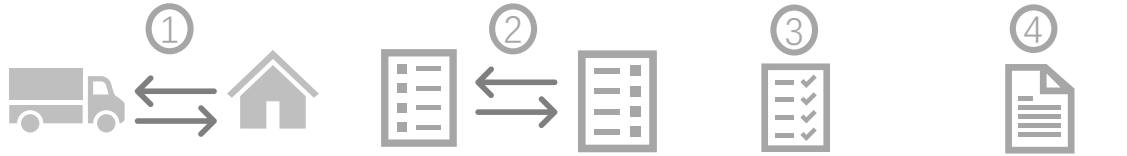
Real time sharing of inventory and order information

2 Business ability

Reputation	Certain industry popularity
Strategic partnership	Cooperate with logistics companies and e-commerce platforms
Cases of similar projects	E-commerce project

3 Management level

Information management system



Warehouse entry and exit supervision | Regular reconciliation | Inventory system | Inventory account

4 Service capability

Insurance services	**Emergency handling** and **insurance compensation** capacity for damage and loss of goods after they arrive at the warehouse
Warehousing service	Provide enough storage space
Value added services	Provide installation, distribution or other services

5 Price level

Compare the price level in the industry

3.3.2 Products inbound optimization

OEMs

Small-size products

OEMs

Large-size products

certificates of quality inspection and receipt documents

certificates of quality inspection and receipt documents

Third-party warehouse

Unified warehousing

Data return

Fun Sports

Accounting Treatment

Arrival

Arrival of goods

Inbound

DP00720211109033

Material receipt notice

Distribution reservoir area

- Scanning by PDA
- Paste product barcode
- A product corresponds to a barcode

Partition storage

Third-party WMS system

Purchase

Receive and launch

Launch on platform

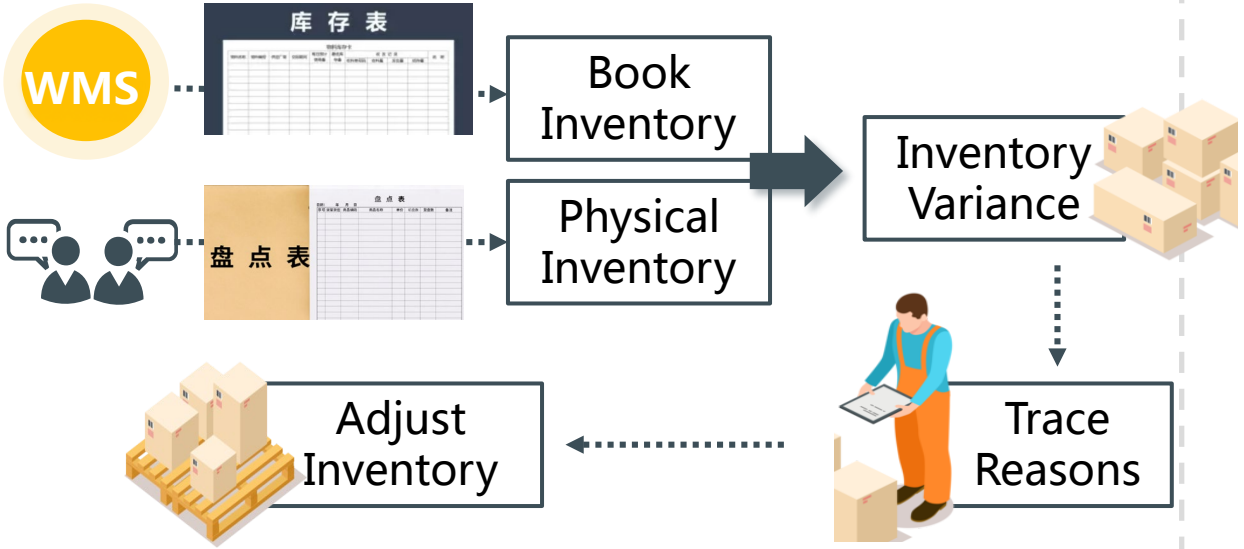
FS ERP system

3.3.3 Products in stock optimization

Product Inventory

1 Product in / out—scanning code

2 Regular inventory

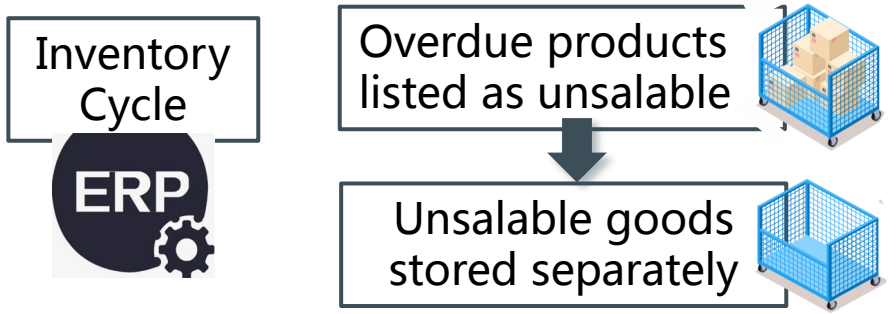


3 Periodic Flight Inventory

4 Cooperative Inventory Per Year

Slow Seller

1 Barcode Tracking Inventory Cycle



2 Promotion Processing

Cut price / Tie-in promotion

Warehouse Stacking Management

1 Normal products / Returned products stacked separately

2 Different batches of products are stacked in different areas

3.3.4 Products outbound optimization

E-commerce Platform | **Fun Sports** | **Third-party Warehouse**

Place Order → Receiving order → Delivery

Order Detail

Delivery information

-1-1-1

For Delivery / Delivered

For Delivery / Delivered

Update of delivery status and logistics information

Delivery Notice

Total storage

322

321

发货通知单

型号	数量	地址
CF001-S slide	1	…
CF001-S slide	1	…
…		

Generate delivery notice

出库单

型号	条码	库区	出库时间
CF001-S slide	CF0012108111	FS231	2022/4/17 16:44
CF001-S slide	CF0012108112	FS231	2022/4/17 16:44

Receive delivery order

Ex-warehouse

货物出库明细

型号	条码	库区
CF001-S slide	CF0012108111	FS231
CF001-S slide	CF0012108112	FS231
CR005-18 swing	CR0052110090	FS075
CR005-18 swing	CR0052110091	FS075

Goods detail data in PDA

PDA: Scan, store delivery records

Staff: deliver goods

FS ERP System

Third-party WMS system

3.3.5 Returned products inbound optimization

Fun Sports

Return and exchange products

Return notice

Transfer back information

Third-party warehouse

Products inbound

Check information

Inbound

First-time returns

OEMs

Return to repair

Third-party organization

Second-time returns

Respective quality-examination

Return order

Scanning by PDA

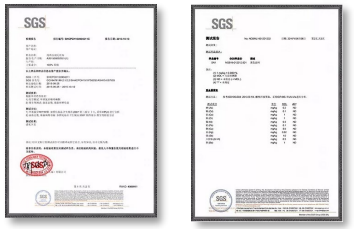
Get the corresponding product information

First-time

Second-time

Maintenance

Quality inspection agency



Quality inspection report

FS ERP system

Third-party WMS system

3.3.5 Returned products inbound optimization

1 First-time returns

Reinspection by OEMS

Record maintenance data
Summarize and regularly report to FS

Reinspection record sheet			
Product	DK-008 detachable large slide	Batch	2022/01/12
Date	2022/1/17	Quantity	10
The re-inspection reason ：sales return			
The inspection items and results			
Bar code	Date	Test	Result
DK008211109033	2022/1/17 18:26	Instrument test	No quality defects
……	……	……	……

Repackaging

Send to third party warehouse

check

Return note by Consumer ☹

2 Second-time returns

Quality inspection by a third party organization

Issue quality inspection report

Quality problems?

OEMs → Impose a fine

Design problems?

R&D department → Optimal design

Transportation problem?

logistics company → Claim demage

3.3.6 Third-party warehouse management system

Inventory Management System Recommendations

1 Warehousing

Appearance	Unloading	Information return
Quantity	Confirmation	
Damage& pollution		Reception
Shortage& loss		

2 Outbound

Delivery notice

FIFO → ✕ → Penalty

Damage& pollution — Full compensation

3 Storage and inventory

- ✓ Paste barcode
- ✓ Partition storage
- ✓ Monthly inventory
- ✓ Spot-check

Consistent — Signature confirmation

Inconsistent — Responsibility determination & Loss coordination

4 Cost settlement

Monthly accounting → End of year settlement

Third-party	Beginning of the month Details	FS : check 3 days	Invoice
Fun Sports	Receipt of invoice	15 days	Remittance

5 Default

Full refunds	Damaged, short or loss	No reason	Penalty: 10% of fee
Penalty: 5% of fee	Unqualified storage environment	Extreme weather& peak season	Negotiation& improvement

Delayed shipment

3.3.6 Third-party warehouse management system

Third-party warehouse supervision System

1 Periodic inventory

Goods in and out	→	Scanning code
Accountant & warehouse principa.	→	Inventory per month sign & upload into system
Depreciation & scrapping	→	Trace reasons and responsible party

2 Irregular flight inspection

- **Storage**: Scientific storage of goods
- **Environment**: Clean & safe warehouse
- **System**: Complete monitoring & Alarm system
- **Order**: Work in an orderly & effectively manner
- **Safety**: Regular safety inspection by supervisors

3 Systems docking between OEMs and third-party warehouse

OEMs **without** ERP wishes

—Strengthen inventory quantity & quality management

OEMs management system | Procurement inbound optimization

OEMs **with** ERP wishes & capacity

—Assist ERP build & connect with third-party warehouse

Delivery collaboration | Rapid collaboration based on receipt and delivery

3.4 Outsourcing production management optimization

Short term

Renegotiate outsourcing cooperation agreement

Five points

- ✓ Products pricing and customizing
- ✓ Product inspection
- ✓ Packaging and transportation
- ✓ Quality responsibility agreement
- ✓ Product delivery period

Long term

Implement lifecycle-based long-term outsourced production plan

Three aspects

- ✓ OEMs performance evaluation
- ✓ OEMs classification management
- ✓ Joint operation with suppliers

Growth period | **Mature period** | **Recessionary period**

3.4.1 Short term: Renegotiate agreement

1 Products pricing and customising

Capacity: Increasing agreed capacity

Seasonal emergency capacity

Price: Step pricing based on capacity

2 Products inspection

Delivery inspection	Inspection standard
	Providing inspection report

3 Packaging and transportation

Package

One product one barcode

Transportation

To the third party warehouse on schedule

4 Quality responsibility agreement

Quality requirement	Limit lower limit of return rate
	Compensate corresponding quality loss
	Cooperate with quality sampling inspection
	Quality inspection of purchased materials
Warranty	Return for repair
	Compensate loss
Quality incentive	Quality indicators — Profit sharing

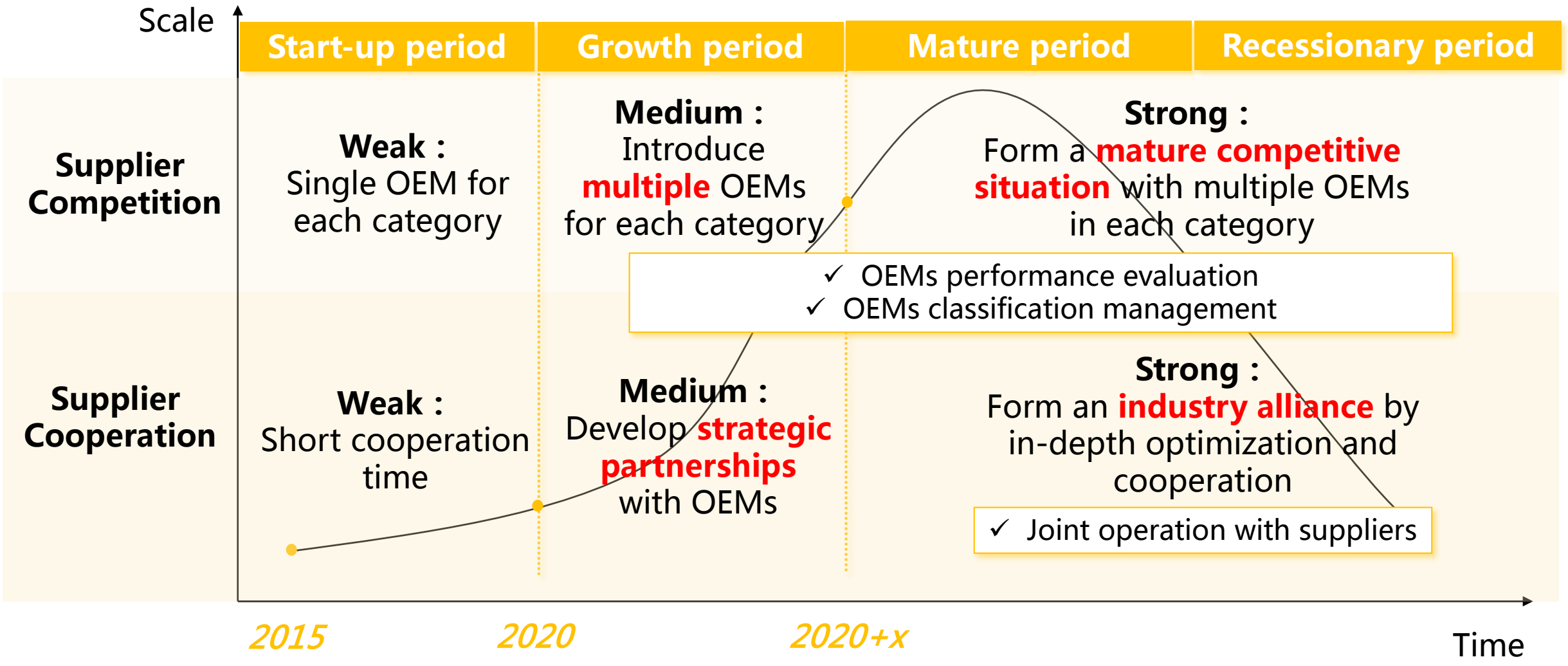
5 Product delivery period

On Time

The products: reserve 7 days for delivery

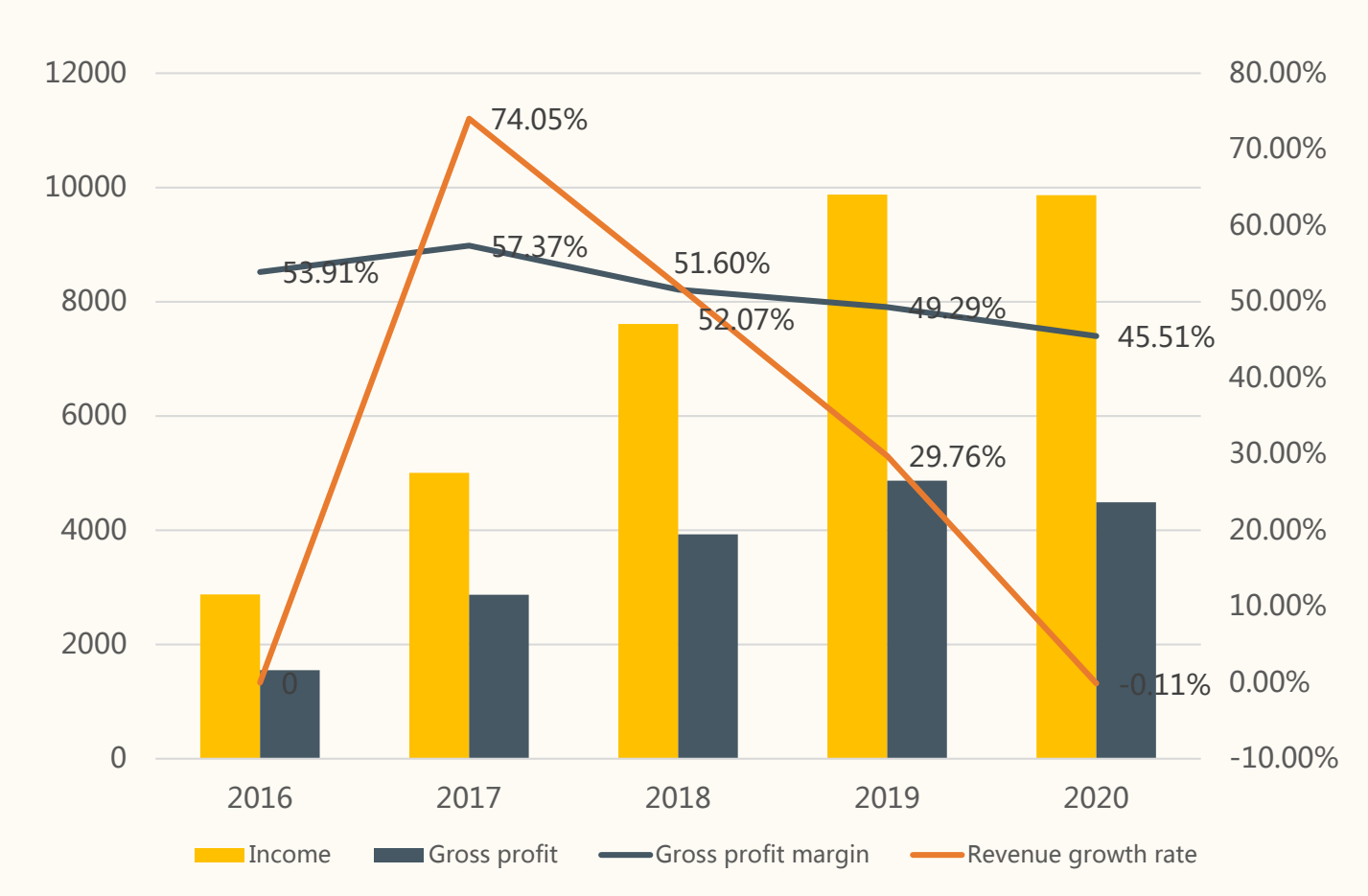
Submit production plan regularly

3.4.2 Long term: Implement outsourced production plan



3.4.2 Long term: Implement outsourced production plan

Changes in sales and gross profit of FS in the past 5 years



Current target : Growth period

- ✓ **Gross profit margin** :
  Five-year average **51.54%**
- ✓ **Revenue growth rate** :
  Four-year average **38.94%**

Current target

- ✓ OEMs performance evaluation
- ✓ OEMs classification management

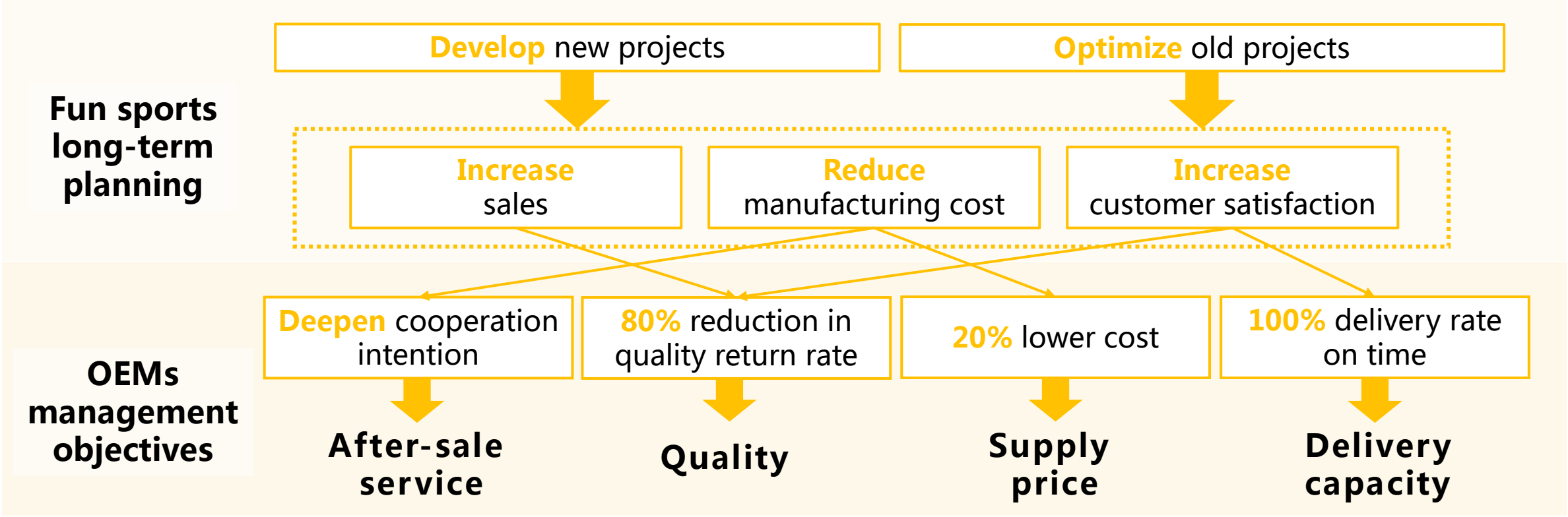
Future target

- ✓ Joint operation with suppliers

3.4.2 Long term: Implement outsourced production plan

1 Performance evaluation： indicators determination

Separately disassembled Long-term mission objectives → Design management objectives according to the requirements of OEMs → Divide the objectives into multi-layer indicators for weight scoring



3.4.2 Long term: Implement outsourced production plan

1 Performance evaluation： indicators evaluation

Qualitative assignment
Excellent 95/good 85/mean 70/
passed 60/failed 40

Establish inspection team

Design/Supply/
Administration
Department

Score summary chart

Calculate each score
according to weight

Sort by score

Provide basis for
supplier classification
management

Design Department

Supply Department

Administration Department

Supply Department

OEMs comprehensive evaluation index and weight table

Primary index	weight	Secondary index	weight	Total weight
Quality	0.4	Qualified rate	0.7	0.28
		Maintenance rate	0.3	0.12
Delivery capacity	0.2	**Delivery rate**	**0.8**	**0.16**
		Order quantity	0.2	0.04
Supply price	0.2	Price advantage	0.7	0.14
		Price reduction ability	0.3	0.06
After-sale service	0.2	**Action ability**	**0.6**	**0.12**
		Training ability	**0.4**	**0.08**

3.4.2 Long term: Implement outsourced production plan

1 Performance evaluation： indicators evaluation

Establish inspection team

Design/Supply/ Administration Department

Score summary chart

Calculate each score according to weight

Sort by score

Provide basis for supplier classification management

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Delivery capacity	0.2	Delivery rate		
		Order quantity	0.2	
Supply price	0.2	Price advantage	0.7	0.14
		Price reduction ability	0.3	
		Action ability		
		Training ability	0.4	0.08

Design Department

Supply Department

Administration Department

Supply Department

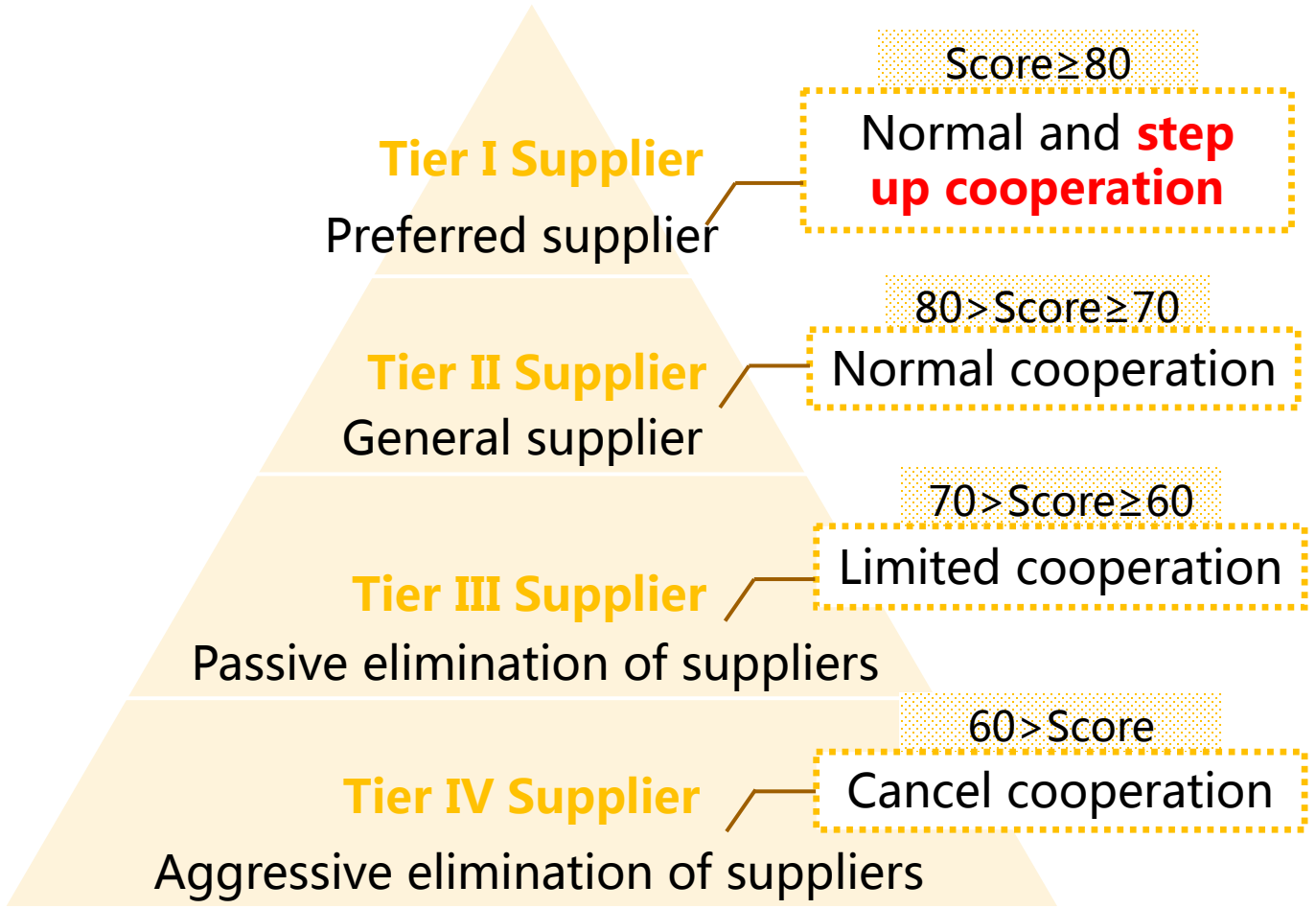
Delivery rate：
Delivery type of small products

Action ability ：
Repair speed and secondary repair rate

Training ability ：
Provide technical and training services

3.4.2 Long term: Implement outsourced production plan

2 Classification management → **Boost cooperation**



Flight spot-check

On-site visits to OEMs from time to time

Problem communication

Send rectification notice → Track rectification results

Meet the requirements → Re-evaluate

Does not meet requirements → Keep track / Cancel cooperation

Reward and punishment measures

- ✓ Defective rate
- ✓ Secondary return rate
- ✓ Evaluation score

→

- ✓ Profit sharing
- ✓ Fine

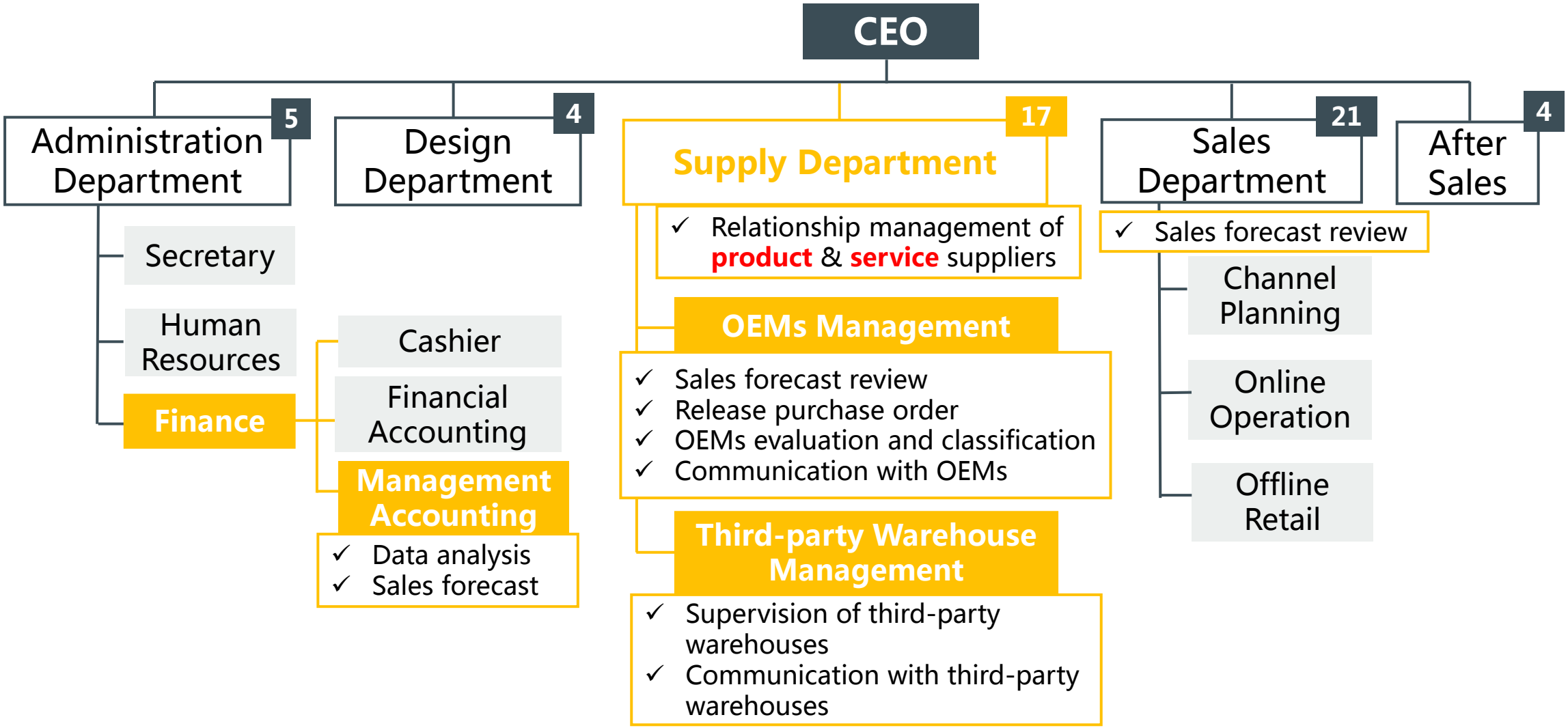
3.4.2 Long term: Implement outsourced production plan

3 Joint operation with suppliers

Strategic cooperation stage	Scope	Effect
Stage 1	✓ Product production + ✓ Product R&D ✓ ERP system connection : SRM +	**Increase** capacity + **Improve** quality +
Stage 2		
Stage 3 Industry alliance	**FS** — Invest **Provide infrastructure support** ✓ Product R&D ✓ Financial support ✓ Human services **Joint factory** **Establish a digital platform** Invest — **OEMs** **Settled in production** ✓ Product R&D ✓ Product production ✓ Quality inspection	**Increase** productivity **Reduce** product cost **Shorten** the **response time** from market insight to product launch

3.5 Internal personnel management system

Optimization of the organizational structure



3.5 Internal personnel management system

Internal Control and Supervision Optimization

Daily Management

- **Attendance management**
  - Clock in and leave — ERP ☑
- **Regular job rotation**
  - Period — Quarterly
  - Scope — Within department

Internal Audit

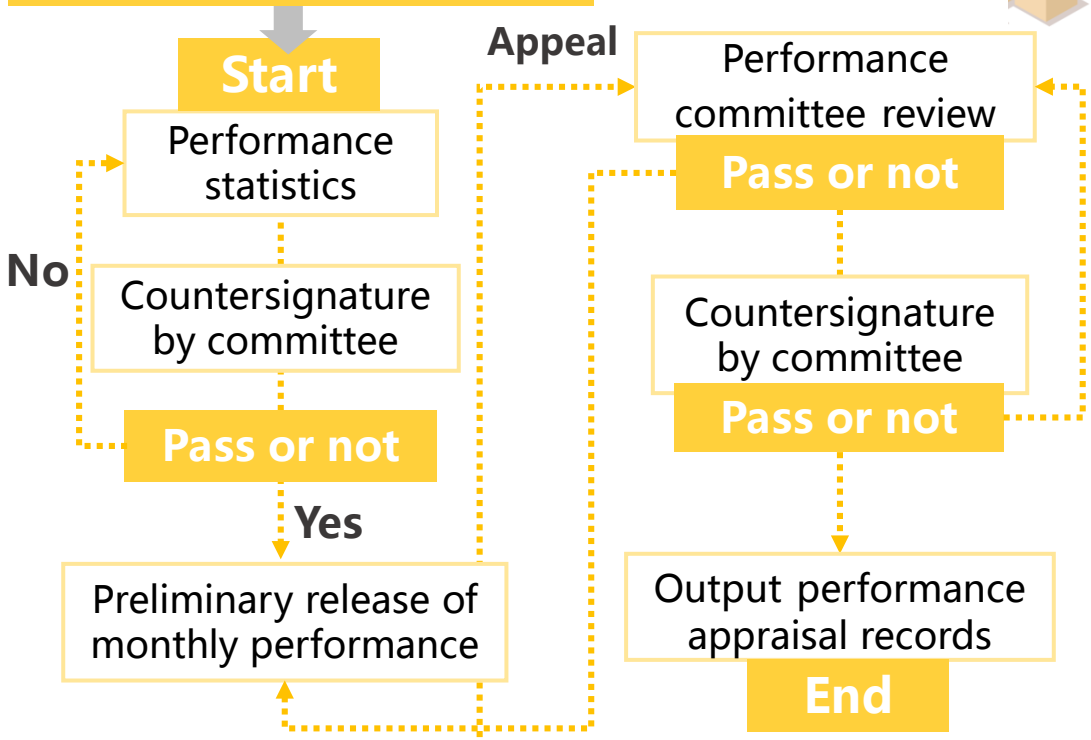
Periodical

- Confirm — Bank account details
- Verify — Implementation of contracts
- Track — Consistency of purchase plan and flow

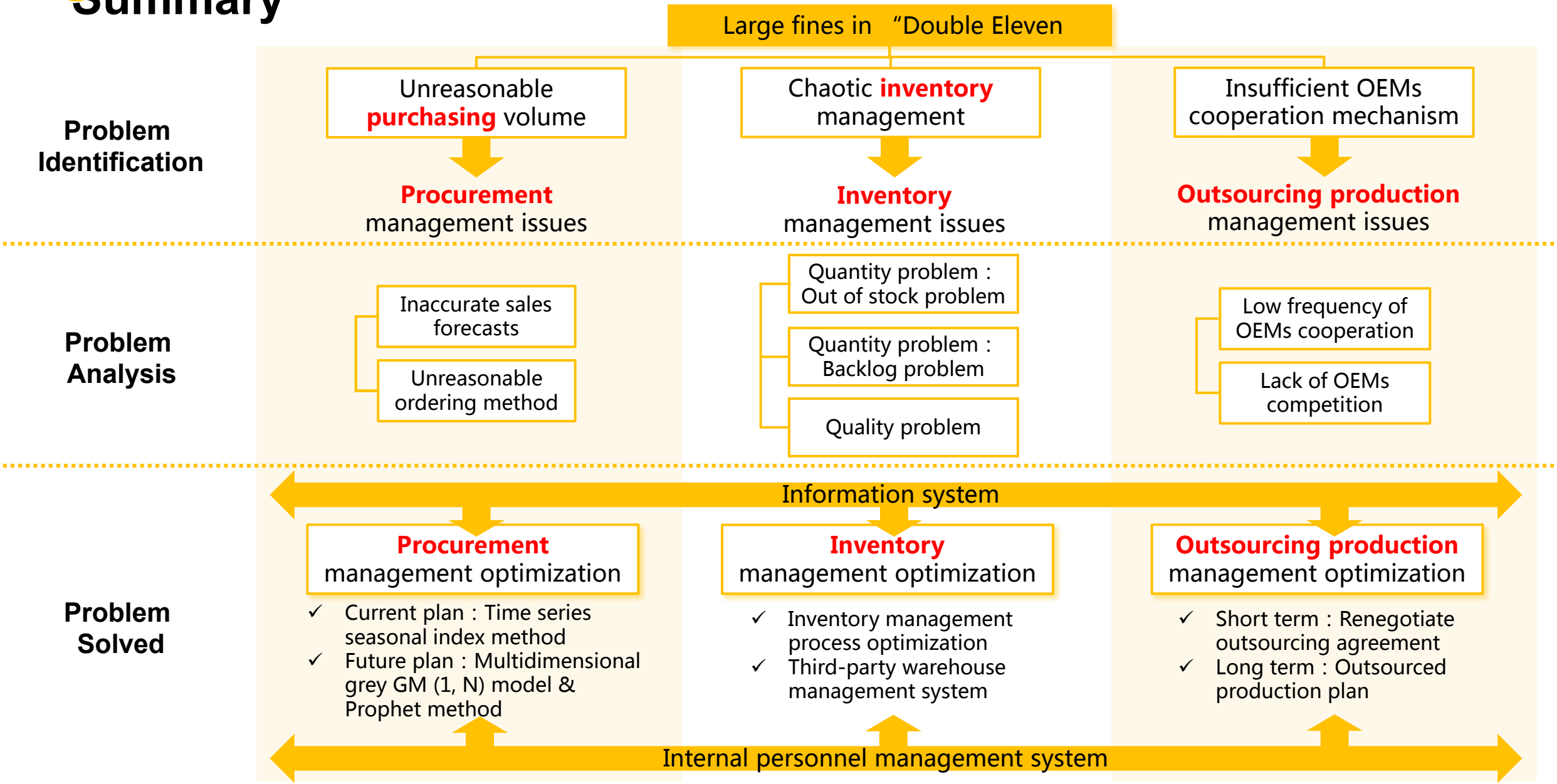
Personnel performance assessment

Separation of working responsibility and audit

Authority control



Summary


Large fines in "Double Eleven
Problem Identification
Unreasonable purchasing volume
Chaotic inventory management
Insufficient OEMs cooperation mechanism
Procurement management issues
Inventory management issues
Outsourcing production management issues
Problem Analysis
Inaccurate sales forecasts
Unreasonable ordering method
Quantity problem : Out of stock problem
Quantity problem : Backlog problem
Quality problem
Low frequency of OEMs cooperation
Lack of OEMs competition
Problem Solved
Information system
Procurement management optimization
✓ Current plan : Time series seasonal index method
✓ Future plan : Multidimensional grey GM (1, N) model & Prophet method
Inventory management optimization
✓ Inventory management process optimization
✓ Third-party warehouse management system
Outsourcing production management optimization
✓ Short term : Renegotiate outsourcing agreement
✓ Long term : Outsourced production plan
Internal personnel management system