



The Chartered
Institute of Logistics
and Transport

Question 5

How should **e-commerce 3PLs and DC operators** evaluate and select optimal combinations of **warehouse automation technologies** (AMRs, AS/RS, goods-to-person systems, layer picking) to **optimize lead time, picker productivity, and labor retention while scaling for peak-season throughput**? What **TCO trade-offs, SLAs** should guide these decisions?

Team D

Members:

- 1) Chen Xinyi, Yuki
- 2) Tan Huiya, Miya
- 3) He Jiani, Jenny
- 4) Ho Tung Lung, Tony
- 5) Feng Shihan, Judy



AGENDA

- 01 Industry Background & Core Problem Definition
- 02 Stakeholder Decoding: Who Drives Automation Goals?
- 03 Technology Characteristics & Contribution Analysis
- 04 Technology Combination Design (Case Examples)
- 05 TCO & SLA Quantification Framework
- 06 Solution Comparison & Conclusion

**VISION AND MISSION
STATEMENT**

A background image featuring a central globe with a blue and white grid pattern, surrounded by a dense field of brown cardboard boxes. The boxes are scattered and overlapping, creating a sense of a large volume of shipping or logistics. The globe is positioned in the upper left quadrant, and the boxes fill the rest of the frame. A semi-transparent white rectangular box is overlaid on the center, containing the word 'Background' in a bold, dark blue font.

Background

Transformation of the traditional logistics in E-commerce

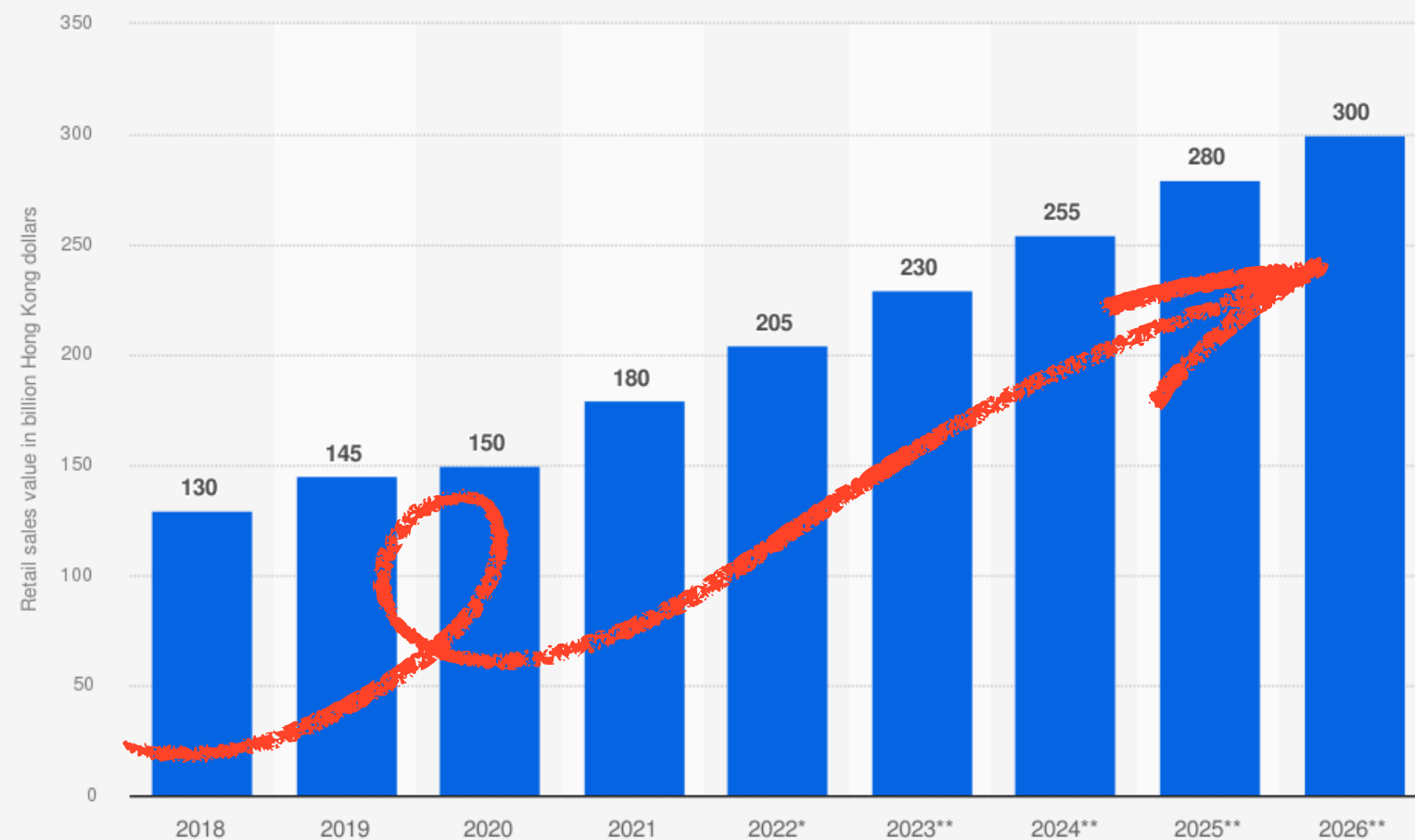
E-commerce sales for **consecutive 9 years**

Great Government Support

From The Chief Executive's 2025 Policy Address:

- Programme "Creativity • E-commerce – Beyond Limits"
- One-stop business matching and referral services

E-commerce sales value in Hong Kong from 2018 to 2021 with an estimate for 2022 and forecasts until 2026 (in billion Hong Kong dollars)



Sources
GlobalData; Statista estimates
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Additional Information:
Hong Kong; GlobalData; Statista estimates; 2018 to 2021

statista

(x) Strengthen training and information services through the four SME centres, the Mentorship Programme of the Trade and Industry Department and the E-Commerce Express under the HKTDC. We will also implement the "Creativity • E-commerce – Beyond Limits" programme and provide one-stop business matching and referral services to strengthen the interface between Hong Kong enterprises and e-commerce service providers, enhancing the competitiveness of Hong Kong products on cross-border e-commerce platforms.



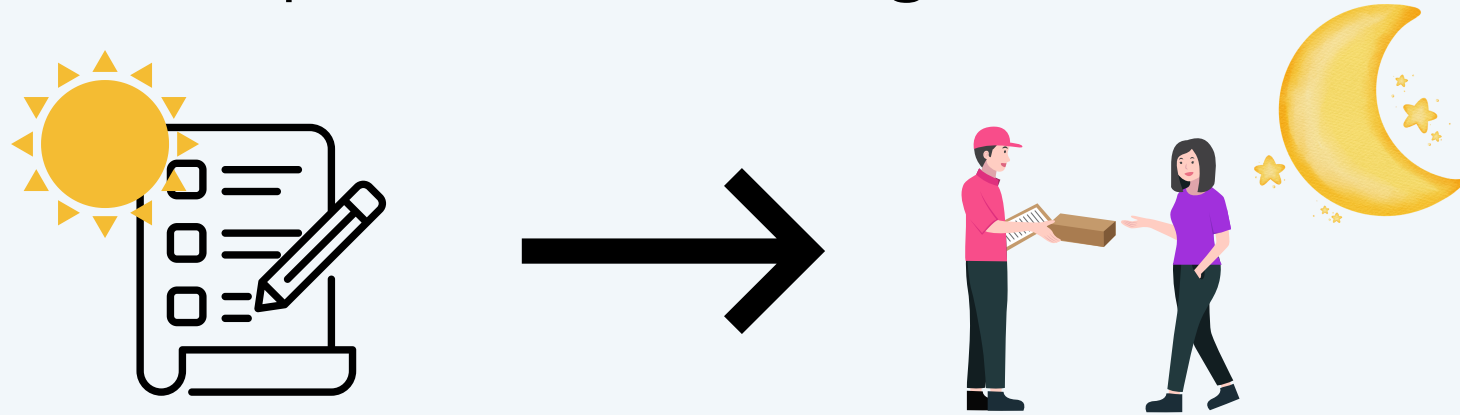
This surge in sales and government support **creates higher requirements on 3PL warehousing operations**, forcing a **critical evaluation of automation to meet new, higher service expectations**

Case studies: Improvements of 3PL companies in Hong Kong

HKTVMall

Target "12-Hour Delivery" under 364-day operation

- Orders placed this morning delivered same evening
- Orders placed this evening delivered next morning



e+solutions

Target 3,000+ daily order capacity during peak seasons

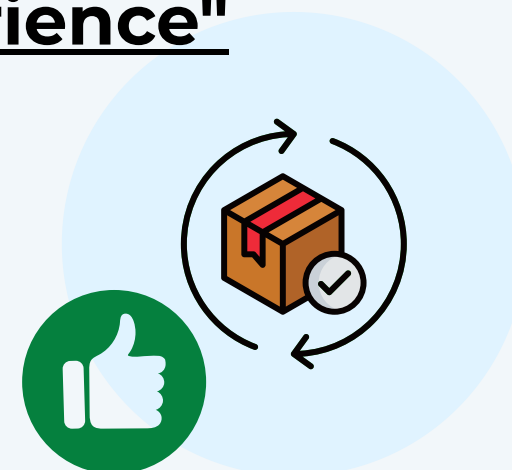
- 99.9% order accuracy
- 40% operational efficiency gain



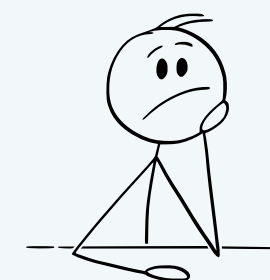
CAI
NIAO 菜鸟

Ensure a "seamless, close-to-local shopping experience"

- Enabling timely restocking
- Transport despite sharp order spikes



To achieve these SLAs at scale during peak seasons, how should 3PL/DC evolve their warehouse automation strategy?



Clients (3PL Companies) B2B & B2C

Target: Optimize Lead Time

Interests:

- **Speed & Accuracy**

Min. order cycle time

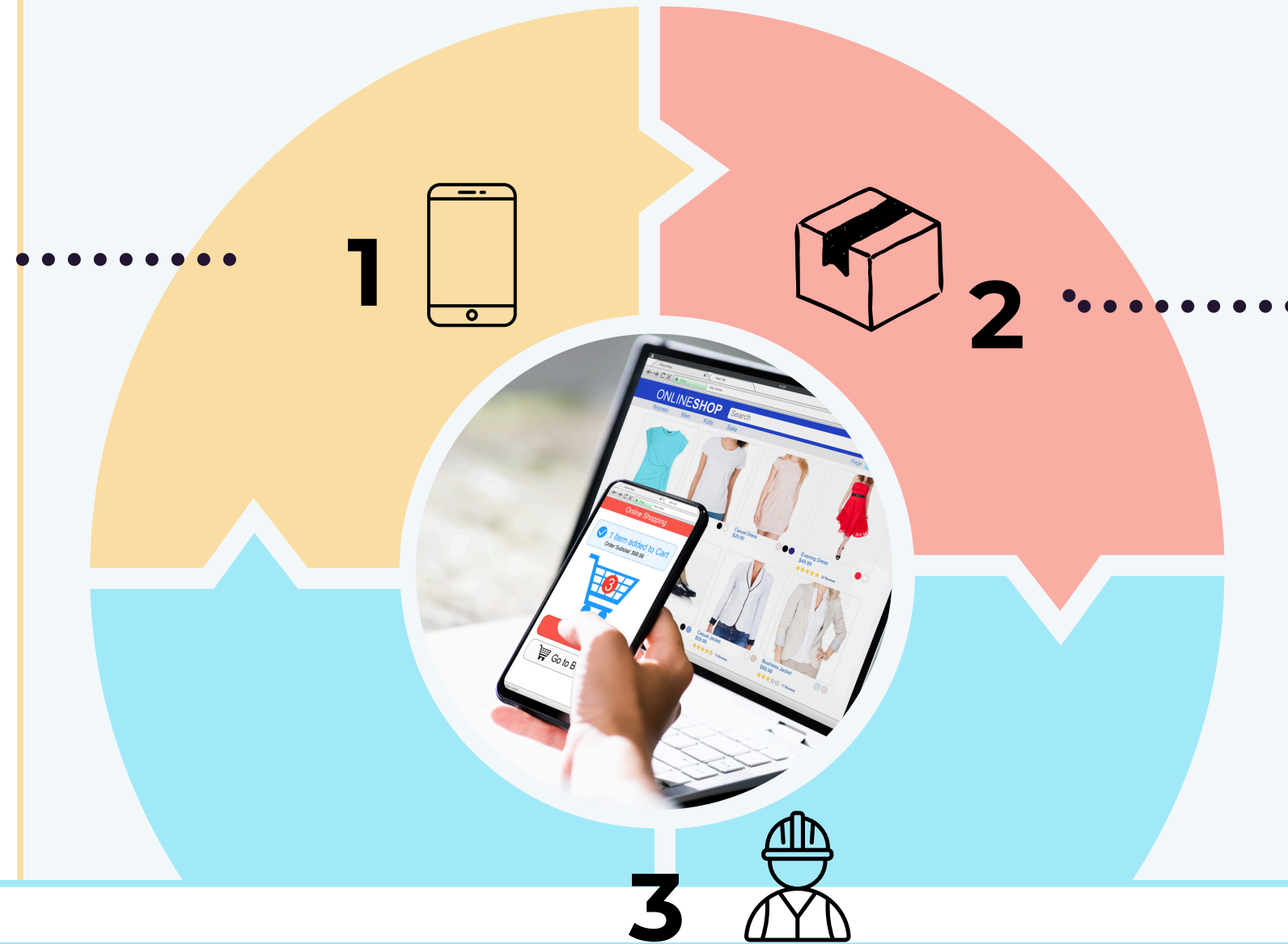
- **Transparency**

Require real-time tracking system



Manage customers' expectations

3 core stakeholders & their interest demands



3PL Companies & DC Operator

Target: Picker Productivity

Interests:

- **Throughput & Utilization**

Max. picks per hour

- **Scalability**

Require systems that can handle peak-season spikes



Degrading performance

Workers in 3PL Companies

Interests:

Target: Labor Retention

- **Safety & Ergonomics**

Reduce physical strain

- **Skill Training**

Preference for easy tech

Fear of job displacement

Analysis



4 Technologies

AMRs



Flexible

Crane and rack system that **puts away and fetches** pallets or totes

AS/RS



High-density storage

Dedicated cranes to **rapidly retrieve and deliver individual totes or cartons**

GTP



Optimize pick rates

Robots that **automatically bring** entire shelves, pods, or totes of inventory **to a stationary operator**

Layer Picking



High sorting efficiency

A robotic tool **retrieves, lifts, and moves an entire horizontal layer** of products in a single operation

4 Technologies



- High flexibility
- Fast deployment
- High scalability



- Limited carrying capacity
- Demanding site conditions

1. AMRs



- High space efficiency
- Unmanned storage



- High investment
- Long cycle
- Low flexibility

2. AS/RS



- Improve picking efficiency significantly
- Reduce labor costs



- High investment
- High requirement for layout

3. GTP

Goods-To-Person systems



- High sorting efficiency
- Suitable for large items



- Limited adaptability
- Unable to handle individual orders

4. Layer Picking



3PL CURRENT APPLICATIONS

Suitable for **high-volume pallets**

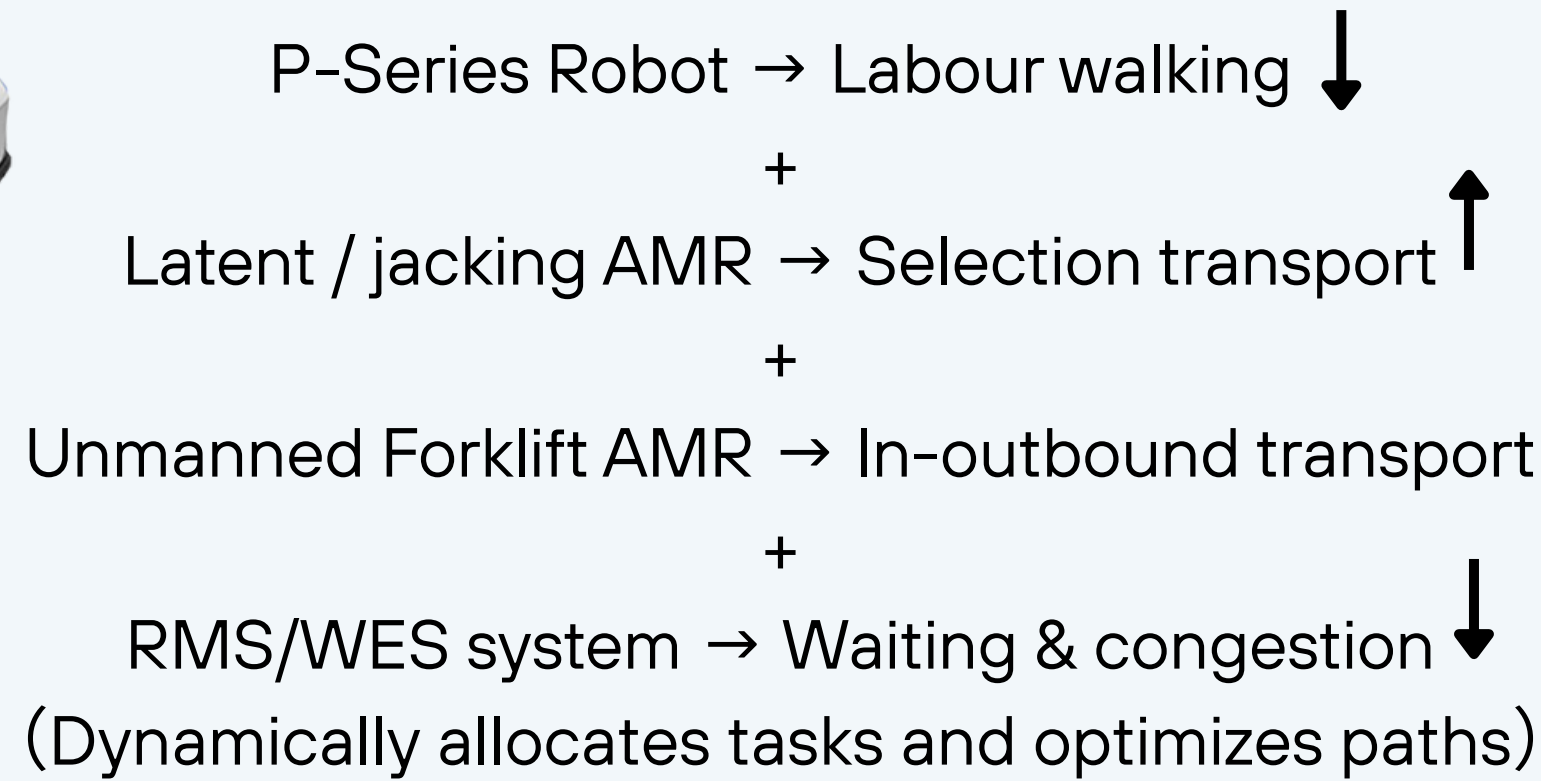
e.g. FMCG(Fast Moving Consumer Goods), Fitness Equipment

U-Freight (UFL Group)

Multi-type AMRs + Layer picking



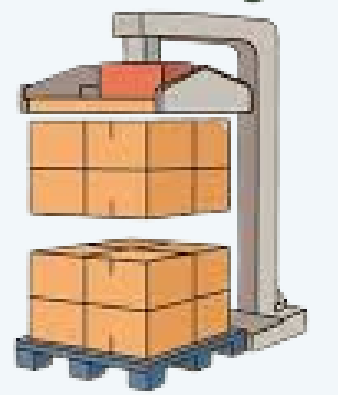
Geek+ P-Series Robot



Manual Layer Picking

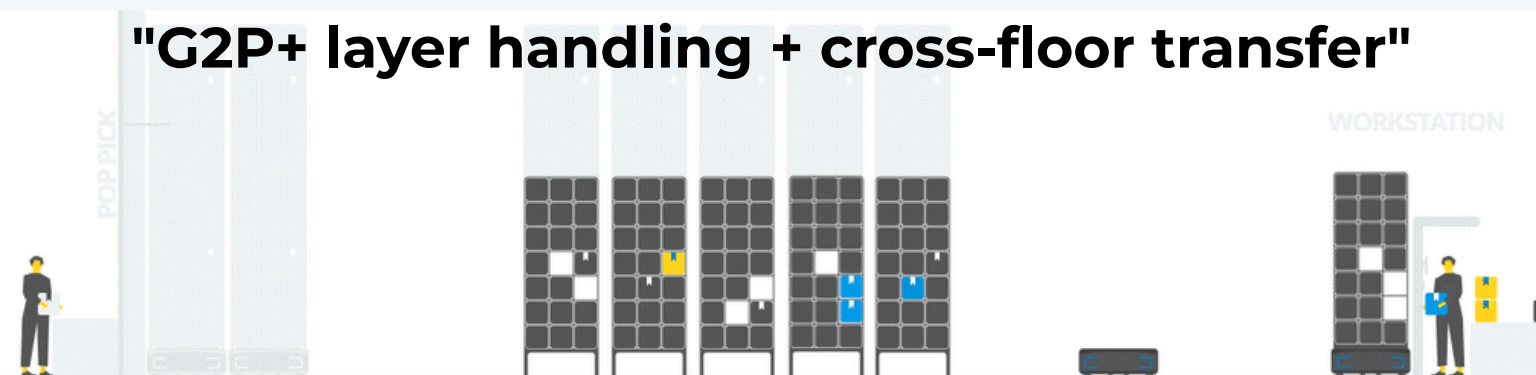


Safe Layer Picking



Automation Chain

"G2P+ layer handling + cross-floor transfer"



OUTCOME

- ↓ 80% labour walking
- ↑ 2-4x picking efficiency
- ↑ 5x storage capabilities
- 99.9% picking accuracy



Optimize Lead Time

↓ 30-50%

3PL CURRENT APPLICATIONS

Suitable for **small/middle-sized parcels**

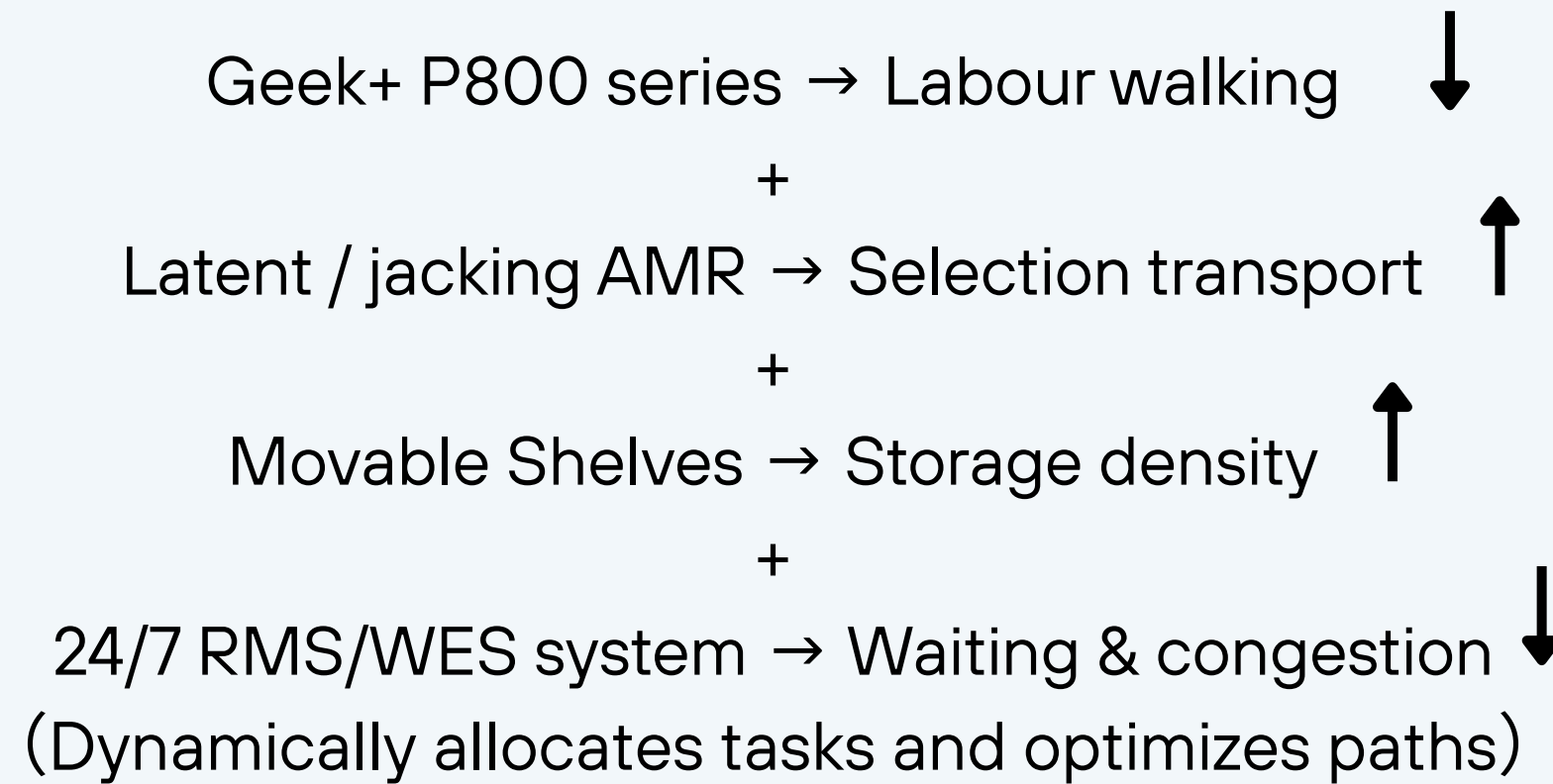
e.g. Body care, health product, clothing, footwear, shoulder bag



Multi-type AMRs + G2P



Geek+ P800 Series Robot



Automation Chain

P2G → G2P



Person-to-Goods



Goods-to-Person

OUTCOME

- 0 invalid labour walking
- ↓ 30%+ order cycle
- ↑ 30%+ storage density
- 99.9% picking accuracy



Optimize picker productivity

↑ 4-5x

3PL CURRENT APPLICATIONS

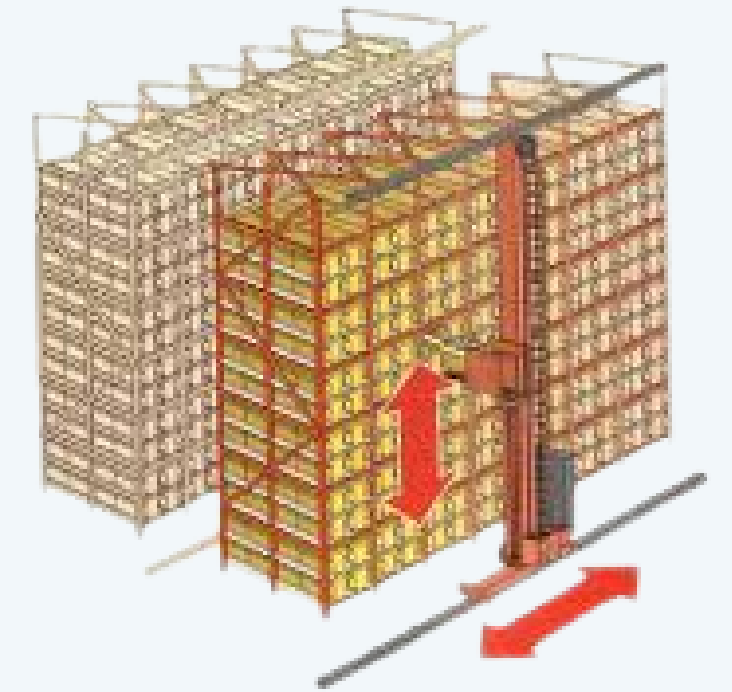
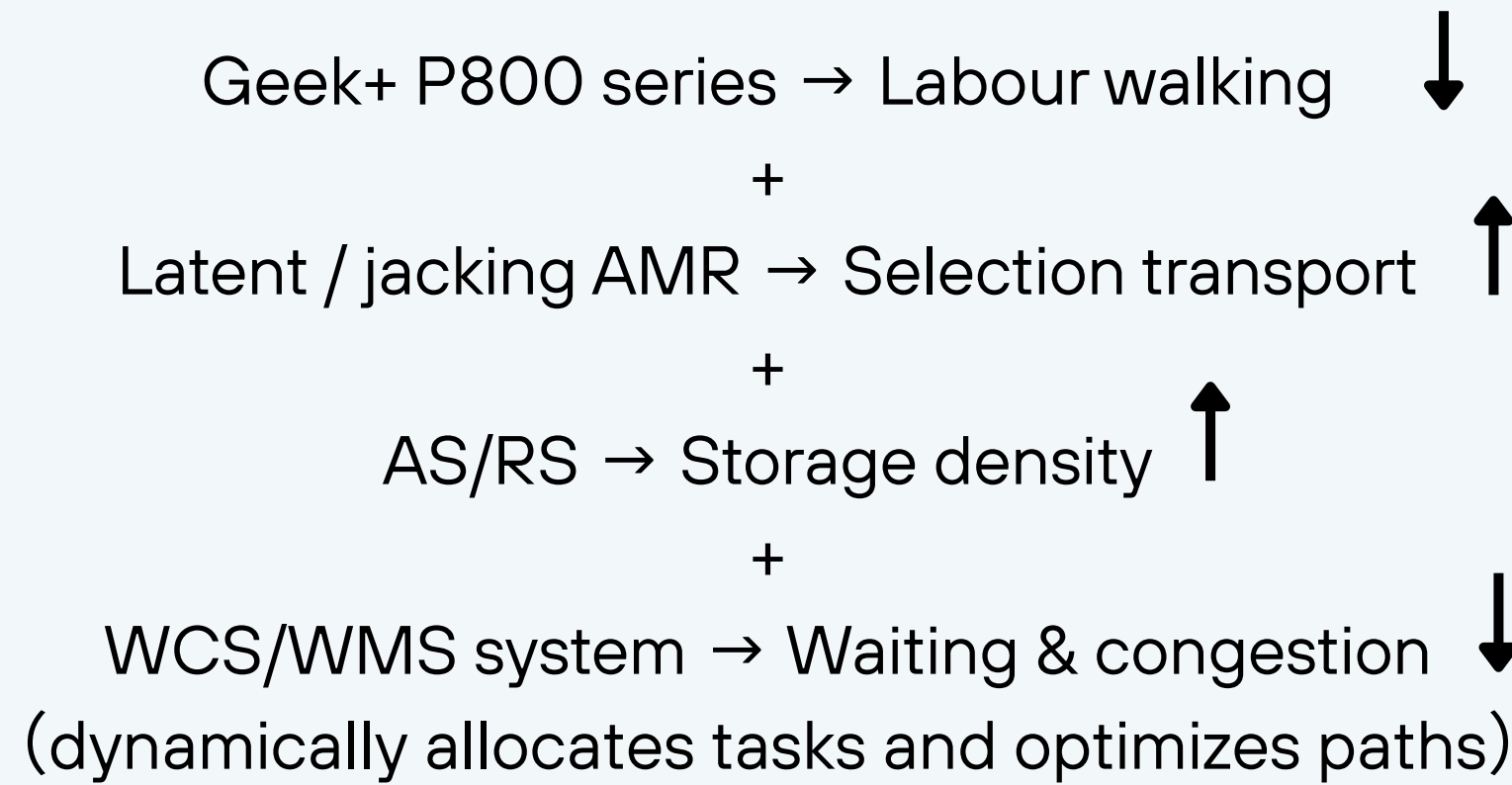
Suitable for fragmented orders, fluctuating, expensive storage and labour
e.g. cold chain, medicine



Multi-type AMR + AS/RS



Geek+ P800 Series Robot



Automation Chain

G2P + safty



Goods-to-Person



Goods-to-Person

OUTCOME

- ↓ 25% dangerous labour work
- ↓ 75% training period
- ↑ job satisfaction
- 99.99% picking accuracy



Optimize labor retention

↑ 3.3x hold longtern position

Total Cost of Ownership (TCO) Trade-offs --Cost to 3PL/DC operators

TCO Component	(AMR + Layer picking)	(Multi-AMR + G2P)	(AMR + AS/RS)
Acquisition (Per combination)	~\$0.1M-\$0.2M	~\$0.04M-\$0.235M	~\$1.1M - \$4.5M+
Operating (Per pick)	~\$0.05 - \$0.20	~\$0.25-\$0.35	~\$0.11
Maintenance (per year)	~\$8000 - \$15000	~\$1200 - \$18800	~\$165000-\$900000

How to choose combination?

Low budget → **Exclude** AMR+AS/RS
(Reason: Too expensive)

Prioritize picking productivity



Choose AMR + Layer picking

(Reason: Comply with the target)

High budget → **Prioritize** AMR+AS/RS
(Reason: Care about long-term efficiencies)

Prioritize several targets



Choose AMR+AS/RS

(Reason: AMR + AS/RS provides long-term benefits compared to other two combinations)

Service Level Agreement: Promises to Clients

SLA Metric	AMR + Layer picking	Multi-AMR + G2P	AMR + AS/RS
Order Accuracy	99.5% Guaranteed	99.7% Guaranteed	99.2% Guaranteed
Throughput Improvement (Peak Season Capacity)	2.25x	2.5x	3.0x
Order Lead Time	55% faster	60% faster	66% faster

How to choose combination?

Low budget / **Quick win**



Choose AMR + Layer picking

Reason: Lowest entry cost (\$0.1M–\$0.2M); 2.25x throughput; 55% faster lead time – immediate ROI

Highest accuracy required



Multi-AMR + G2P

Reason: 99.7% accuracy – best for error-sensitive clients; 2.5x peak capacity; 60% faster lead time

High budget / **Long-term efficiency**



AMR + AS/RS

Reason: Best peak capacity (3.0x); fastest lead time (66%); ideal for space-constrained urban logistics despite higher CapEx

Who are turning SLAs into possible?

--Enhance labor retention for **warehouse workers**

Benefits to 3PL/DC

- Increased efficiency
- Lower error rates
- Handle peak season surges
- More organized environment
- Reduced physical strain
-



Concerns to employees

37% of workers concerned about replacement
(Unipro Asia, 2025)

- Job replacement
- Skills become obsolete
- Work becomes boring
- Being left out
- Causes different fatigue
-

Action is needed
to relieve workers' worries and
improve their involvement in
warehouse automation

Recommendation



Recommendation

Scenario 1: 'Elasticity-focused' Strategy ~ unpredictable peak sales

How?



What?

Example:
Because of the unintentional advertising of content creators, its uplifting scrunchies **goes viral surprisingly**.

Solution:

- Deploy a standardized **AMR** fleet across its leased DC network in Canada, the US, and Australia;
- Lululemon achieves **real-time load balancing** while maintaining the flexibility to scale capacity.



Effect:

- **Normal days:** no equipment, only pay base service fee;
- **Peak times:** deploy enough (e.g. 100+) AMRs within 48 hours;
- **After peak:** return them, no idle equipment.

Fixed Cost → Variable Cost

Recommendation

Scenario 2: 'Elasticity+Efficiency' Strategy~predictable seasonal peak

How?

Solution:

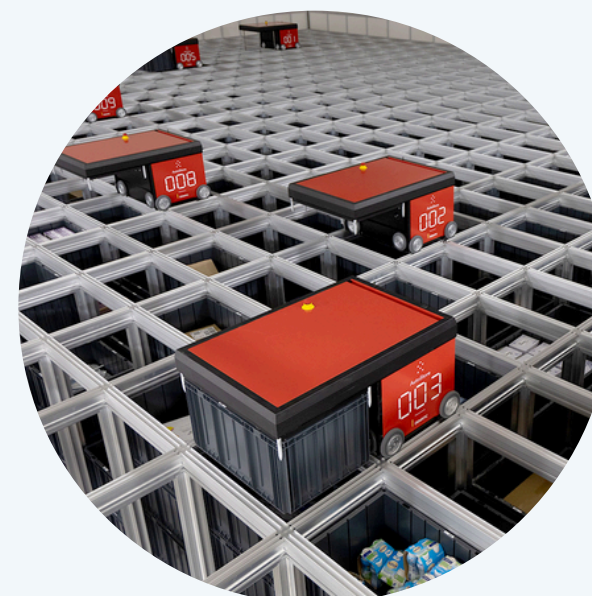
- Deploy a **hybrid automation network** combining **AS/RS** for high-density storage, hundreds of **AMRs** for flexible picking, and high-speed sorting lines;
- Greatly improve **inventory handling capacity & efficiency.**



Effect:

- Greatly reduce **picker walking distance;**
- Enable **24/7 operations** throughout the long peak season.

**Fixed capacity +
Variable elasticity**



What?



Example:

Double Eleven, Black Friday, together with New Year Sales bring order volumes 3-5 times higher than daily average, even can handle 1.5 million parcels a day.

Recommendation

Scenario 3: 'Scalability-focused' Strategy~high growth reaches peak

How?



What?

Example:

- Emerging E-commerce Giant(self_operated+3PL)
- Shein launches thousands of new style daily, orders grow 30%+ YoY

Solution:

- Deploy a technology combination: **GTP**, modular design and phased investment
- System scales alongside the business and is able to **handle large and ever-increasing orders**



Effect:

- Each investment matches current business
- **no waste, no shortage**

**Scalability >
Current Efficiency**

Recommendation

General Consideration:

Enhance labour retention simultaneously

Inform



Train



Involve



Empower



CONCLUSION

Balance efficiency, cost,
labor for 3PLs/DC-
workers-clients win-win

No **universal** automation mix

- Compliance with scenarios, TCO, SLAs

Goals: lead time, productivity, labor retention, peak scalability

3 peak strategies:

- Elasticity (AMR fleets)
- Elasticity+Efficiency (AS/RS+AMR+sorting)
- Scalability (GTP+modular)

THANK YOU Q & A SESSION

GROUP D

14th Mar 2026
CILTHK

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