

Chapter 12, 13 Warehouse Cost and Performance

Cost

The cost of operating a warehouse can average between 1 and 5 % of total sales depending on the type of company and the value of its goods. 佔營業額比例

Warehousing also makes up around **22 %** of a company's total logistics costs with inventory carrying costs at a further **23 %**. 營運成本與持有成本

Performance

3PL, fulfilment center: An increase of 5 % in customer retention can increase profits by 25 to 95 %. It costs six to seven times more to gain a new customer than to keep an existing one.

From a warehouse perspective this means that you have to ensure accuracy, quality, timeliness and cost effectiveness within the processes you control.

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12. Warehouse Costs

Space: 租金、建物保險、土地稅、水電、折舊、維護

Direct Labour: 薪資、保險、安全防護、訓練

Indirect Labour : 薪資、保險、訓練

Variable Labour: 加班、兼職

Equipment: 租金、折舊、燃料、保養、包材

Overhead: 辦公家具、水電、資訊設備、行銷費用(3PL)

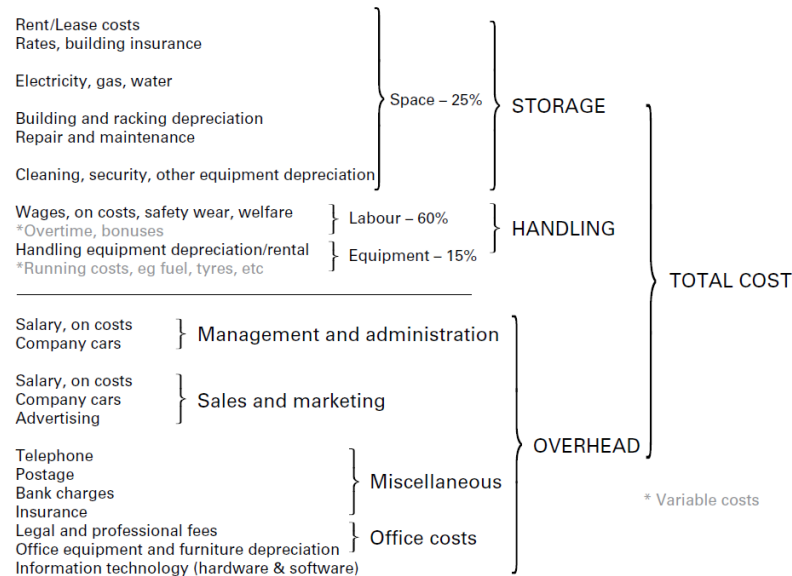
Miscellaneous: 通信、貸款利息、法律顧問、認證費用



Third-party logistics companies can add an element of profit in order to produce a costing model to charge clients.

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Warehouse Cost Tree figure 12.1



Return On Investment

$$ROI = \frac{\text{Gain (savings) from Investment} - \text{Investment}}{\text{Investment}} \times 100$$

A company switches from barcode scan picking to voice picking

(1) pick productivity savings: £ 52,800

(2) increased accuracy: £ 33,600

- (1)+(2) = (annual) total savings = **£ 86,400**
- investment in voice: **£ 68,900** 未計入訓練成本與導入初期的額外成本
- ROI報酬率=淨利/投資=(£ 86,400 – £ 68,900) / £ 68,900 = 0.254
- payback period = £ 68,900 ÷ £ 86,400 = 0.797 year = 9.6 months.

Cost Analysis (3PL)

- Not only identifying the costs that result from providing customer services ... and revenue analyses to be made by customer type and by market segment or distribution channel. (p.281)
- The 80 % of customers generating 20% of the revenue tend to be the more demanding. 小客戶的服務成本偏高
- Managers need to be able to calculate the cost to serve for each customer and the warehousing cost for each product.
每種產品、每個客戶、每個市場的分析
- 企業自身倉儲的成本分析著重於效率提升

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Traditional Costing Methods

TABLE 12.1 Warehouse cost structure

1	Space cost	£1,677,000	1,677,000/10,000= 167.7 per location
	Space as percentage of total warehouse cost	54%	
2	Labour cost	£1,200,000	
	Labour as percentage of total warehouse cost	39%	
3	Equipment cost	£215,000	
	Equipment as percentage of total warehouse cost	7%	
1+2+3	Total direct cost	£3,092,000	
	Overhead cost	£742,000	=3,092,000 × 0.24
	Total cost	£3,834,000	
	Overhead as percentage of cost	24%	167.7 × (1+0.24) =207.95

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Activity Based Costing

$$\begin{aligned}\text{全年總成本} &= \text{人工成本} + \text{空間成本} + \text{設備成本} + \text{管理成本} \\ &= \$1,000,000 + \$5,000,000 + \$2,000,000 + \$1,500,000\end{aligned}$$

ABC: The cost of each activity flows to the product(s) (or service) ... based on their respective consumption of that activity.

	人工	空間	設備	管理	
activities {	進貨	\$200,000	\$800,000	\$600,000	\$400,000
	儲存	\$300,000	\$3,200,000	\$900,000	\$600,000
	出貨	\$500,000	\$1,000,000	\$500,000	\$500,000

全年進貨2,500次 ⇒ 每次進貨平均耗費\$80的人工成本

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Key Issues of Activity Based Costing

- Need to have a comprehensive knowledge of the company, its operations and the roles of each of the staff members.
- Selecting the **cost drivers** that most accurately reflect the cost of performing an activity...
- Once all the operational and overhead costs have been calculated companies can calculate the **profitability** of each client and see how they affect the cost structure of the business.
- The disadvantages of using ABC include the amount of work involved and difficulty in collecting **accurate data**.

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Main Warehouse Activities and Cost Drivers

Activities	Cost drivers
Order receipt	Order volume and order source (EDI, fax, phone or post)
Unload incoming goods	<u>Quantity and unit load (pallets or cartons)</u>
Palletize	Quantity of cartons
Check incoming goods	<u>Quantity and quality of supplier (including returns)</u>
Put away incoming goods	Quantity, cubic volume
Picking	Number of visits to pick location, number of lines, number of units
Packaging and labelling	Number of orders picked
Replenishment	Unit load quantity
Load outgoing goods	Unit load quantity

A good guideline for selecting the cost drivers ... what would increase or decrease the time and effort required to do their job. (283)

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Example of Activity Based Costing (3PL)

	Space (no of pallets)	Labour (no of hours)	MHE No. of hours	Administration hours	Overhead A Management hours	Overhead B Other costs
Total capacity	10,000 pallets	120,000 hours	30,000 hours	10,000 hours	20,000 hours	100%
Customer A	2,000	20,000	5,000	500	1,000	5%
Customer B	200	200	100	1,000	2,000	10%
Customer C	1,400	25,000	8,000	2,000	3,500	20%
Customer D	900	18,000	4,500	2,500	5,000	25%
Customer E	2,300	21,800	3,000	1,500	1,000	15%
Customer F	1,000	12,000	1,900	1,000	500	10%
Operational leeway/ unproductive hours	1,500	18,000	5,000	1,000	4,000	0
Unused capacity	700	5,000	2,500	500	3,000	15%

The above hours can be further broken down into the individual activities These costs can then be compared to the actual charges levied to the customer and

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Charging for Warehousing Service (3PL)

Storage charge examples:

- rate per pallet per week;
- rate per item per week;
- rate per square foot per week;
- rate per cubic foot per week;
- rate per tonne per week;
- rate per shelf location per week; and
- fixed rental cost per week/month.



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Handling Charges

- **Labour – time**
 - collection of order;
 - travel time to each location; pick time at each location; travel time to despatch area;
 - labelling and packing time;
 - checking time (if necessary);
 - loading time.
- **Equipment – time**
 - use of powered pallet truck;
 - contribution to voice technology;
- other;
 - packing and labelling materials;
 - supervisory and administration costs;
- overhead;
- profit.

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13. Performance Measurement

Why do we need to measure?

- ensure customer satisfaction;
- ensure that there is a culture of continuous improvement within the operation; 優點要繼續精進
- discover potential issues before they become major problems; 發現問題 避免惡化
- train staff in the right areas; and
- reward staff where appropriate.



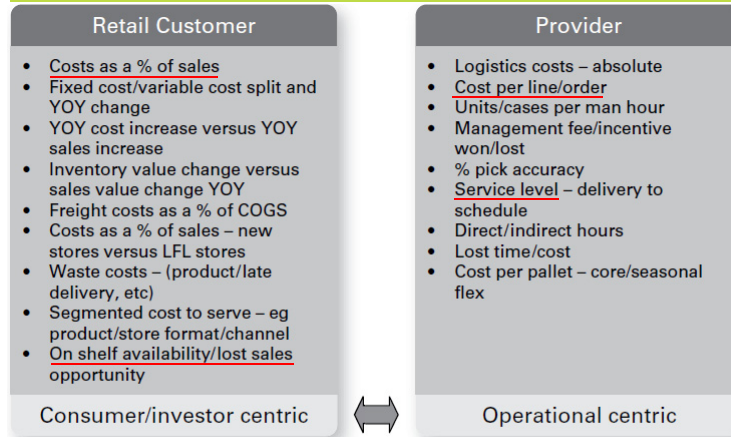
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What should We be Measuring?

- **Reliability:** on-time delivery, fill rates, accuracy
- **Flexibility:** order cycle time (why?)
- **Cost:** cost as a percentage of sales, productivity against labour hours
- **Asset utilization:** effective use of space, equipment, and labour
 - Monitor performance against the criteria that are important to your customers (delivery of the perfect order);
 - Monitor performance against the criteria that are important to you (costs).

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What are important to Different Players



Key
YOY – Year on year
LFL – Like for like
COGS – Cost of goods sold

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Choose the Right Performance Measures

Each company will have different priorities, a different customer base and a different method of operation:

- Understand your business and its strategy.
- Decide on the objectives.
- **Understand which KPIs are likely to assist in meeting the objectives.**
- Align the KPIs to others within the company.
- Ensure that everyone works towards achieving the targets – nominate KPI owners.
- If targets aren't achieved, analyse the reasons why and introduce processes to enable achievement.
- If the target isn't realistic, replace it.

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Define Measures that are SMART.

Specific. Objectives should specify what they want to achieve. Are they clear and unambiguous? 目標明確 (兩年內通過N1)

Measurable. Can we put a value on the KPI? eg How much, how long, how many?

Achievable. Are the targets you set achievable and attainable?

Relevant. Are the measures relevant to the overall goal and strategy of the company? (有助於工作?)

Timely. Are the timescales realistic and how often do you measure? (何時先考N3?)

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Traditional Productivity Measures

- Labour hours utilization
- Warehouse area utilization
- MHE utilization
- Cost of a percentage of sales
- Cost per order despatched
- Units picked per hour
- **Dock to stock time**
- Order accuracy
- On-time shipments



- order cycle time
- lines picked and shipped per hour
- lines received and put-away per hour
- order fill rate

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New Performance Metrics 1/2

- On-time delivery = 97%
- In full delivery = 98.5%
- Damage free = 99.5%
- Accurate documentation, labelling and invoicing = 98%

- **Perfect Order Metric** = $97\% \times 98.5\% \times 99.5\% \times 98\% = 93.2\%$
- **OTIF** (on time and in full) = $97\% \times 98.5\% = 95.5\%$

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New Performance Metrics 2/2

Stock cover in days (days of supply)

- Calculated by dividing the current level of stock by the total annual sales and multiplying by 365. This tells us how many days' cover we have of stock. Table 13.3

Stock Turn (inventory turnover)

Stock/Inventory Accuracy

- Location stock accuracy: number of correct locations
- Stock line accuracy: number of correct lines

Hard and soft measures

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Integrated Performance Measure

Category	Target rating	Weight	Target score	Rating	Actual score
Perfect order completion	5	50	250	1 2 3 4 5	150 (R)
Inventory accuracy	5	40	200	1 2 3 4 5	200 (G)
Housekeeping/safety	5	40	200	1 2 3 4 5	160 (A)
Labour productivity	5	30	150	1 2 3 4 5	120 (A)
Space utilization	4	30	120	1 2 3 4 5	90 (A)
Labour utilization	4	30	120	1 2 3 4 5	90 (A)
Damaged items	5	30	150	1 2 3 4 5	90 (A)
Warehouse layout	4	20	80	1 2 3 4 5	100 (G)
Equipment utilization	4	10	40	1 2 3 4 5	50 (G)
Staff training	5	10	50	1 2 3 4 5	50 (G)
Environmental	4	10	40	1 2 3 4 5	20 (R)
TOTAL		300	1400		1120 (R)
Performance index					80%

Balanced Scorecard

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Warehouse Benchmarking

Benchmarking 標竿學習 enables us to:

- understand our own performance;
- identify any shortcomings;
- discover what others are doing better;
- **understand what is best practice.**
- identify performance targets that can be demonstrated to be achievable;
- accelerate and manage change;
- **improve processes;**

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Internal Benchmarking

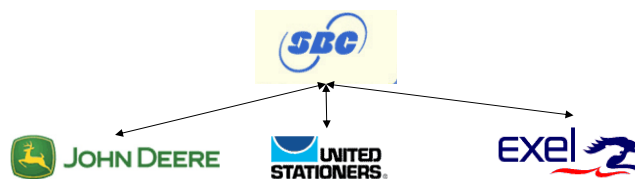
Gillette: 12國分公司的績效競賽與經驗分享

- 每年每一家分公司的物流經理會同時被12個主要物流績效指標來衡量
出貨準確度、存貨準確度、存貨週轉率、供應比率、物流中心生產力、物流中心儲存密度、訂單週期時間、完美訂單比率等
- 針對每項指標及總體績效選出績效最佳的經理人
- 得獎人必須分享其成功的秘訣，各分公司可吸收最佳營運的訣竅，了解如何改善與提升績效



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External Benchmarking



SBC電訊服務公司為降低物流成本並維持服務水準，邀請物流績效優異的公司分享經驗

- John Deere: 工作績效評量與工作安全
- SBC: 顧客服務
- United Stationers: 如何提高生產力
- Exel: 品質管理

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Principles of Benchmarking

- collaboration;
- confidentiality;
- value;
- flexibility;
- honesty;
- openness; and
- reputation.

There is always likely to be a **reluctance to share** information with competitors....method of ensuring confidentiality and anonymity is to utilize a third party such as a benchmarking group, a consultancy or a university. (310)

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WERC Performance Metrics

Metrics	Lowest 20% of responses	Typical	Top 20% of responses	median
Perfect order index	< 81.4%	≥ 90% and < 96%	≥ 99%	95%
Order cycle time	> 72 hours	≥ 24 – < 36	< 8 hours	24 hours
Cost as a % of sales	> 10.04%	≥ 3 – < 5%	< 1.7%	3.9%
Order-picking accuracy	< 98%	≥ 99% and < 99.8%	≥ 99.9%	99.5%
On-time ready to ship	< 95.9%	≥ 98.6% and < 99.5%	> 99.9%	99%
Average warehouse capacity used	< 71.5%	≥ 80% and < 85%	> 92.2%	85%
Annual workforce turnover	> 12.2%	≥ 2.5% and < 8%	< 0.1%	5%
Labour productive hours to total hours	< 74.4%	≥ 85% and < 88%	≥ 92%	85.1%

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Summary

- A comprehensive understanding of the costs is not only to contribute to the company budget but also to charge for the services provided. 預算與收入 (貢獻)
- It can also identify loss-making customers or products if we delve deeply enough into the figures.
- Measuring performance is key to running an efficient operation.
- Measure those areas which are important to your customers and to your company. 兼顧客戶服務與營運效率

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