Logistic Performance, Cost, and Value Measures

Manajemen Logistik

Teknik Industri – Fakultas Teknik

Universitas Brawijaya

IMPLEMENTING A SET OF WORLD-CLASS LOGISTICS PERFORMANCE INDICATORS IS A PRE-REQUISITE TO ANY ORGANIZATION BEING ABLE TO ACHIEVE WORLD-CLASS LOGISTICS

World-class measures lead to world-class behaviours.
Cost reduction focus measurement, followed by cost reduction practices
Service measurement orientation, the practises will be service-oriented
If the measures are balaced between service and cost, the practices will follow

If there are no measures, there will be no performance.
What gets measured gets improved

People behave based on the way they measure

Logistics

- Includes five interdependent processes:
  - Customer Response
  - Inventory Planning and Management
  - Supply
  - Transportation and Distribution
  - Warehouse or DC operations

➢ Logistics Scoreboard Framework

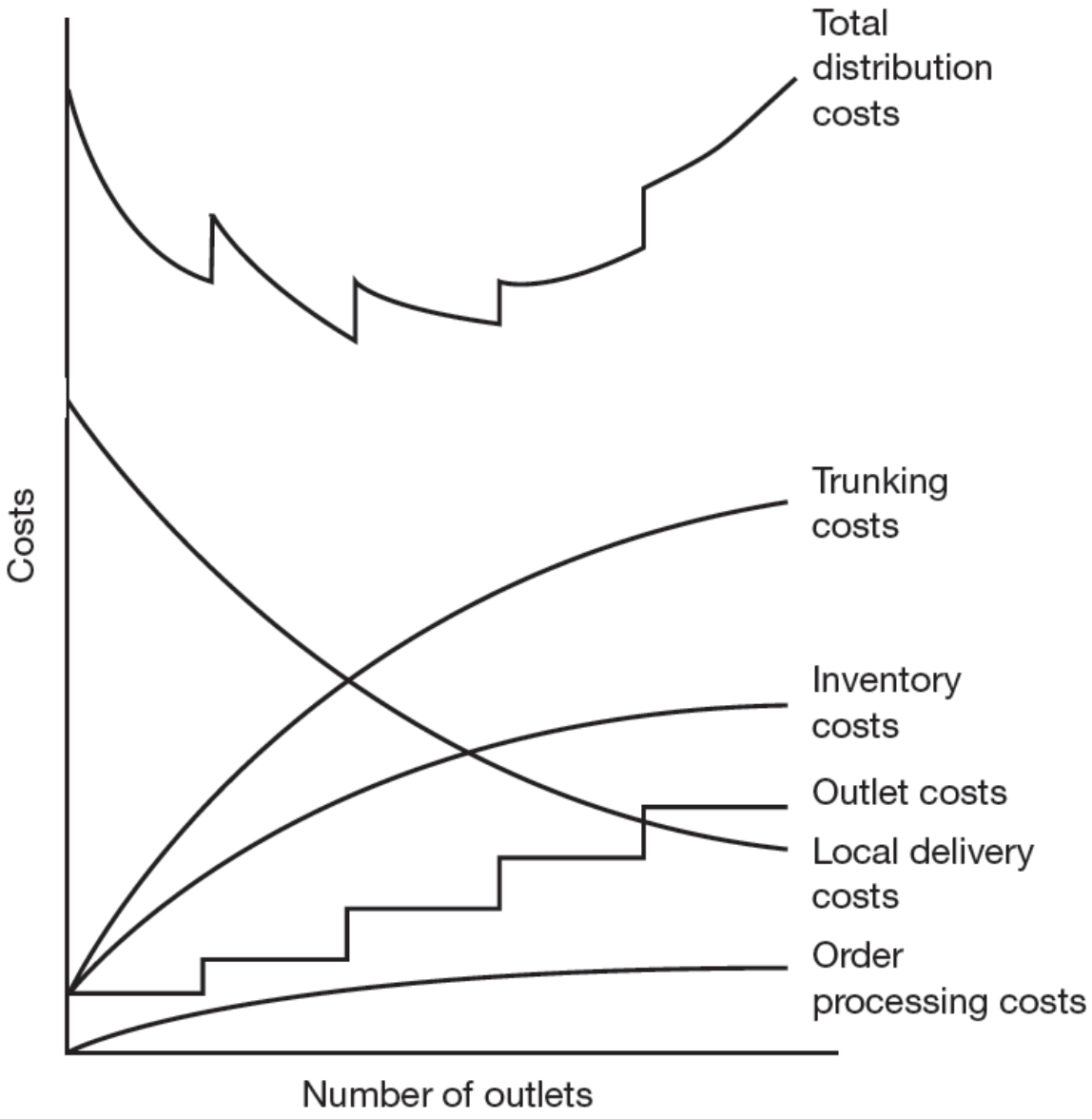
Logistics Performance Measures Matrix

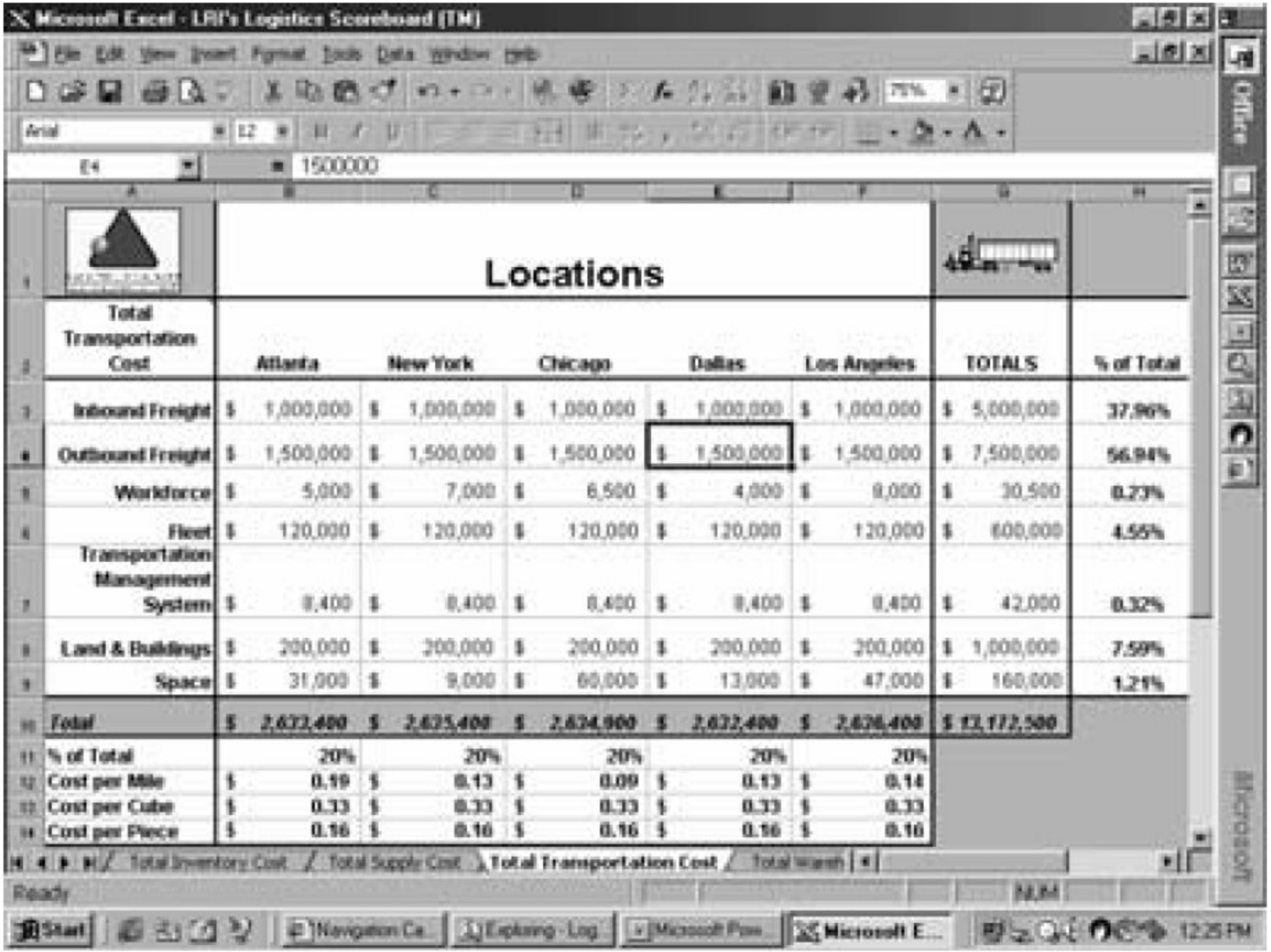
	Financial Indicators	Productivity Indicators	Quality Indicators	Response Time Indicators
Customer Response	Total response cost Response cost per customer order	Customer orders per person hour	Order entry accuracy Status communication accuracy Invoice accuracy	Order entry time Order processing time
Inventory Planning & Management	Total inventory cost Inventory cost per SKU	Inventory turns SKUs per planner	Fill rate Forecast accuracy	
Supply	Total supply cost Supply cost per PO	POs per person-hour SKUs per nuyer	Perfect PO percentage	Purchase order cycle time
Transportation	Total transportation cost Transportation cost per mile	Stops per route Fleet yield Container capacity utilization	On-time arrival percentage Damage percentage Miles between accidents	In-transit time
Warehousing	Total warehousing cost Warehousing cost per piece Warehousing cost per square foot	Units per person hour Storage density	Inventory accuracy Picking accuracy Shipping accuracy Damage percentage Hours between accidents	Warehouse order cycle time
TOTAL LOGISTICS	**Logistics expenses** **Logistics profit** **Logistics asset value** **Logistics asset turnover** **Logistics capital charges** **Total logistics cost** **Logistics cost-sales ratio** **Return on logistics assets** **Logistics value added**	**Perfect orders per logistics FTE**	**Perfect order percentage**	**Total logistics cycle time**

Financial Measures of Logistics Performance

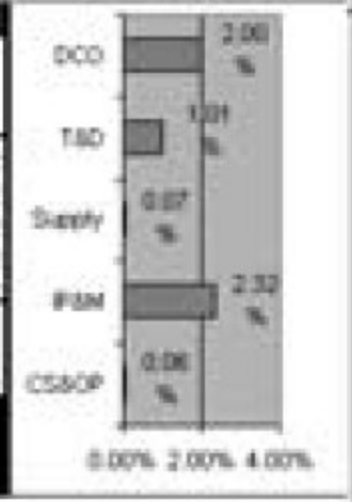
Logistic Financial Measures

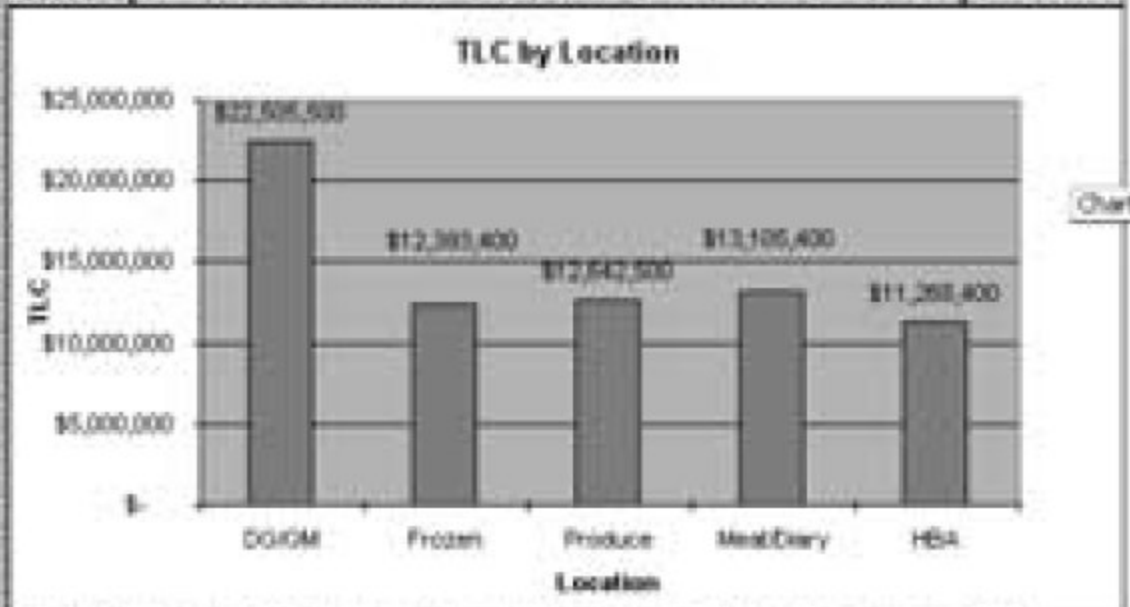
Corporate Financial Measures	Notation	Logistics Financial Measures	Notation
Revenue	R		
Expenses	E	Logistics expenses	LE
Profit	P = R − E		
Asset value	AV	Logistics asset value	LAV
Asset turnover	AT = R/AV	Logistics asset turnover	LAT = R/LAV
Asset carrying rate	ACR		
Corporate capital charges	CCC	Logistics capital charges	LCC = LAV × ACR
Total corporate cost	TCC = E + CCC	Total logistics cost (TLC)	TLC = LE + LCC
Cost-sales ratio	CSR = (E+CCC)/R	Logistics cost-sales ratio	LCSR = TLC/R
Return on assets	ROA = P/AV	Return on logistics assets	ROLA = LP/LAV
Economic value added	EVA = P − (AV × ACR)	Logistics value added	LVA = P − (LAV × ACR)

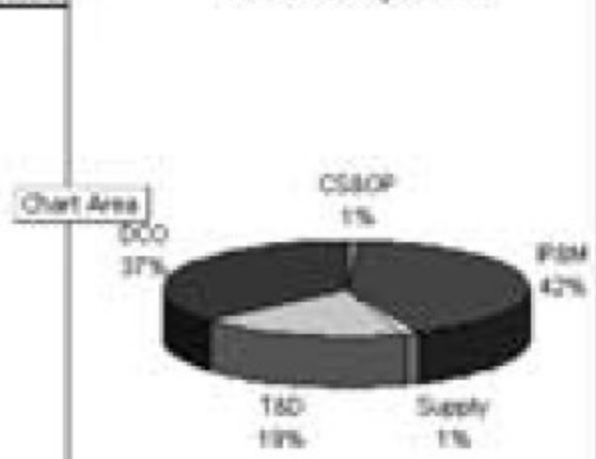

Total distribution costs
Trunking costs
Inventory costs
Outlet costs
Local delivery costs
Order processing costs
Costs
Number of outlets


Microsoft Excel - LRI's Logistics Scoreboard (TM)
E4
1500000
Locations
Total Transportation Cost
Atlanta
New York
Chicago
Dallas
Los Angeles
TOTALS
% of Total
Inbound Freight $ 1,000,000 $ 1,000,000 $ 1,000,000 $ 1,000,000 $ 1,000,000 $ 5,000,000 37.96%
Outbound Freight $ 1,500,000 $ 1,500,000 $ 1,500,000 $ 1,500,000 $ 1,500,000 $ 7,500,000 56.94%
Workforce $ 5,000 $ 7,000 $ 6,500 $ 4,000 $ 8,000 $ 30,500 0.23%
Fleet $ 120,000 $ 120,000 $ 120,000 $ 120,000 $ 120,000 $ 600,000 4.55%
Transportation Management System $ 8,400 $ 8,400 $ 8,400 $ 8,400 $ 8,400 $ 42,000 0.32%
Land & Buildings $ 200,000 $ 200,000 $ 200,000 $ 200,000 $ 200,000 $ 1,000,000 7.59%
Space $ 31,000 $ 9,000 $ 60,000 $ 13,000 $ 47,000 $ 160,000 1.21%
Total $ 2,872,400 $ 2,825,400 $ 2,834,900 $ 2,872,400 $ 2,826,400 $ 13,172,500
% of Total 20% 20% 20% 20% 20%
Cost per Mile $ 0.19 $ 0.13 $ 0.09 $ 0.13 $ 0.14
Cost per Cube $ 0.33 $ 0.33 $ 0.33 $ 0.33 $ 0.33
Cost per Piece $ 0.16 $ 0.16 $ 0.16 $ 0.16 $ 0.16
Total Inventory Cost
Total Supply Cost
Total Transportation Cost
Total Warehouse
Ready
Start
Navigation Ca...
Exploring - Log...
Microsoft Powe...
Microsoft E...
12:25 PM

	A	B	C	D	E	F	G	H	I
1		Locations							
2	Total Logistics Cost	DG/GM	Frozen	Produce	Meat/Diary	HBA	Totals	% of Total	% of Sales
3	CS&OP	$ 175,000	$ 169,000	$ 167,000	$ 162,000	$ 167,000	$ 840,000	1%	0.06%
4	IP&M	$ 6,117,500	$ 6,064,600	$ 6,089,000	$ 6,121,600	$ 6,110,600	$ 30,503,300	42%	2.32%
5	Supply	$ 210,500	$ 107,300	$ 150,500	$ 227,300	$ 197,300	$ 892,900	1%	0.07%
6	T&D	$ 2,666,500	$ 2,667,500	$ 2,667,000	$ 2,664,500	$ 2,668,500	$ 13,333,000	19%	1.01%
7	DCO	$ 13,337,000	$ 3,365,000	$ 3,569,000	$ 3,930,000	$ 2,125,000	$ 26,346,000	37%	2.00%
8	Total Logistics Cost	$22,505,500	$12,393,400	$ 12,642,500	$ 13,105,400	$ 11,268,400	$71,915,200	100%	5.47%
9	% of Total	31%	17%	18%	18%	16%	100%		
10	Cost/Sales	3.74%	16.98%	9.73%	3.16%	11.50%	5.47%		
11	Cost/Order	$ 641.16	$ 354.10	$ 337.13	$ 374.44	$ 321.04	$ 404.70		
12	Cost/Line								
13	Cost/SKU	$ 3,060.95	$ 6,291.07	$ 24,548.64	$ 5,139.37	$ 5,634.20	$ 5,016.76		



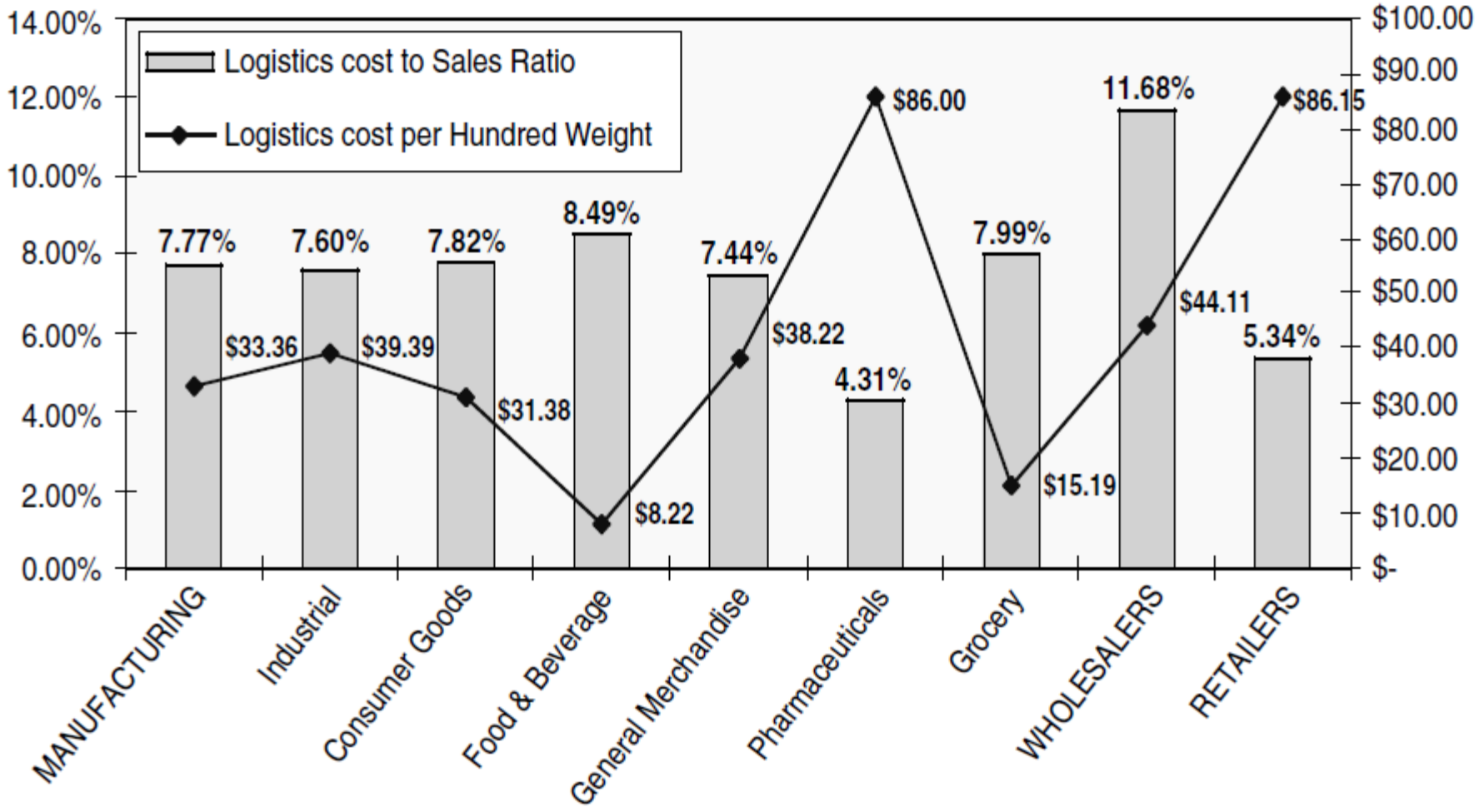




Asset Cost / CS&OP / IP&M / Supply / T&D / Wtrhsg / TLC / Productivity

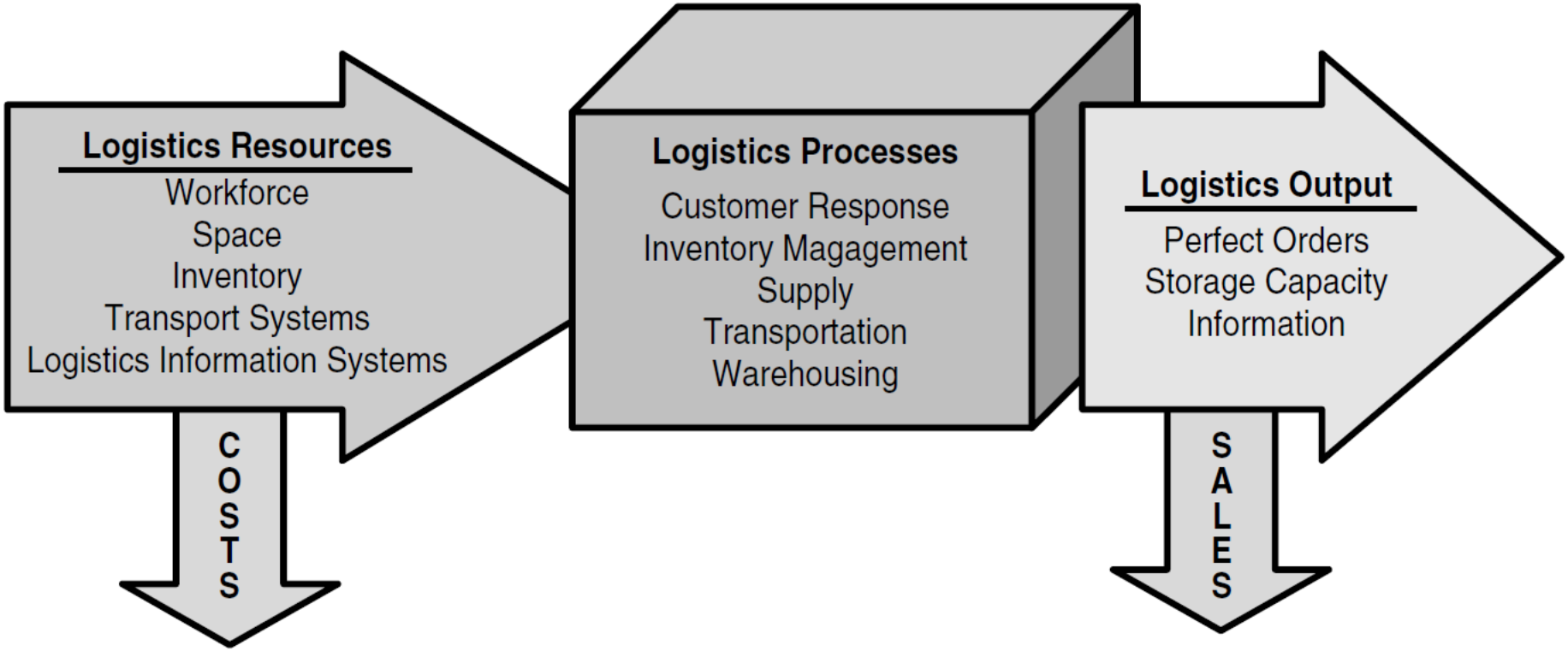
Financial Measures of Logistics Performance

Logistics costs as a percentage of sales for various industries



Source: Herb Davis & Associates

Productivity Measures of Logistics Performance



$$\text{Productivity}_r = \text{Output}_r / \text{Consumption}_r$$

$$\text{Utilization}_r = \text{Output}_r / \text{Capacity}_r$$

Productivity Measures of Logistics Performance

Logistic Productivity Indicators

Process	Output	Resource	Productivity Indicator
Customer response	Customer orders processed	Person-hours	Customer orders per person-hour
Inventory planning and management	Sales	Investment in inventory	Inventory turnover
	SKUs	IP&M headcount	SKUs per head
Supply	Purchase orders placed	Person-hours	Purchase orders per person-hour
	SKUs	SUPPLY headcount	SKUS per head
Transportation	Volume occupied	Volume availability	Vehicle utilization
	Sales shipped	Fleet investment	Fleet yield
Warehousing	Inventory on hand	Square footage	Storage density = inventory per square foot
	Units shipped	Person-hours	Units per person-hour

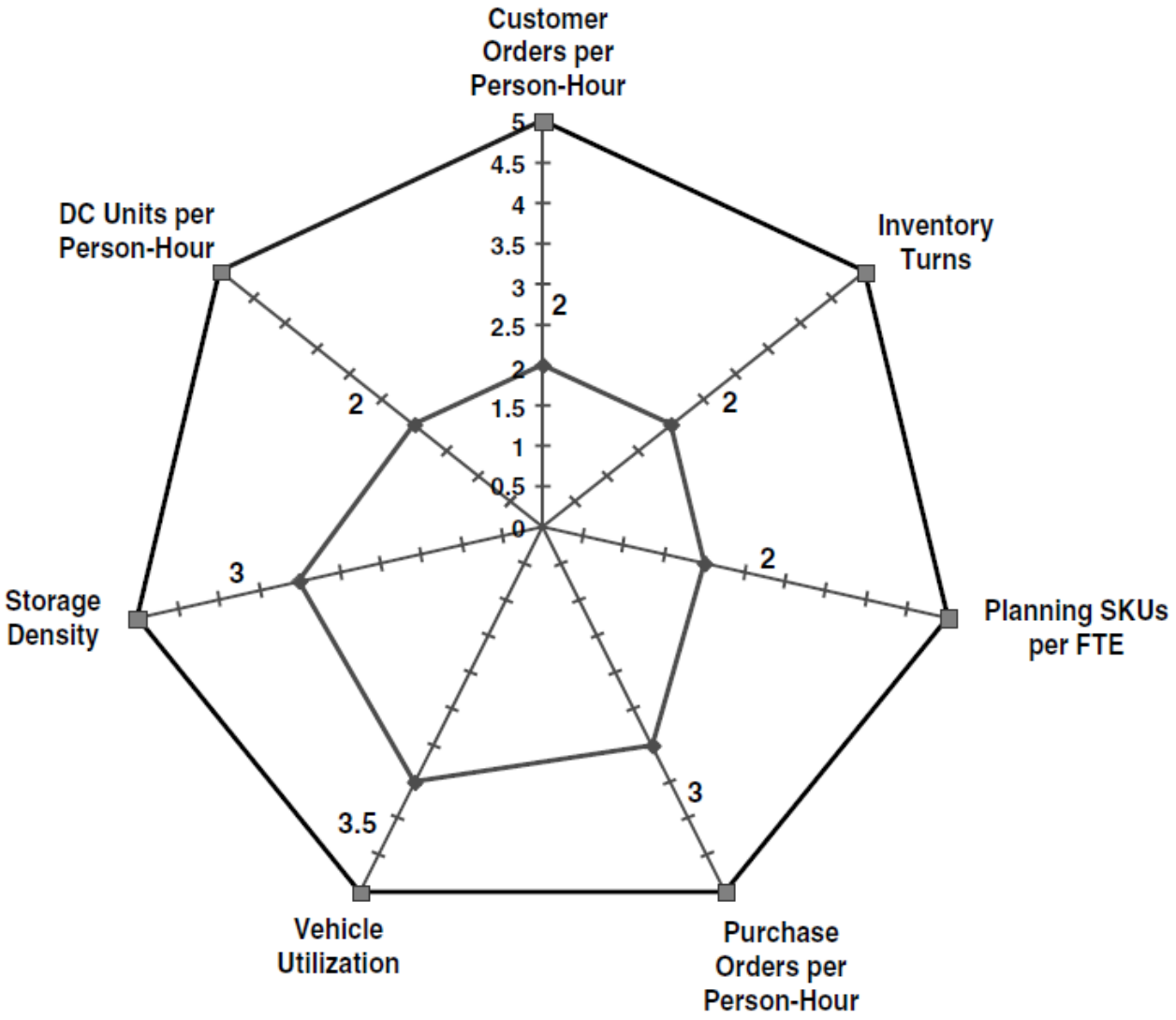
Productivity Measures of Logistics Performance

Transportation Productivity Ratios

Resource	Input	Output	Productivity Ratio	Utilization Indicator
Vehicle operators	Operating hours	Delivered dollars, orders, pounds, cube	Dollars per hour, orders per hour, pounds per hour, cube per hour	Percent of time in value-added activities
Vehicles	Operating hours	Delivered dollars, orders, pounds, cube	Dollars per hour, orders per hour, pounds per hour, cube per hour	Percent of time in value-added activities
Containers	Weight capacity, cube capacity	Delivered dollars, orders, pounds, cube	Dollars per available lb. or CF, orders per available lb. or CF	Weight capacity utilization, Cube capacity utilization
Fuel	Gallons	Delivered dollars, orders, pounds, cube	Dollars per gallon, orders per gallon, pounds per gallon, CF per gallon	Percent of empty miles, percent of idle time

Productivity Measures of Logistics Performance

Logistics Productivity Gap Analysis



Quality Measures of Logistics Performance

- Perfect Order Percentage (POP)
  - Perfectly *entered* (the entry is exactly what the customer wants) by the means (telephone or direct entry) the customer desired in a single entry
  - Perfectly *fillable* with the exact quantity of each item available for delivery within the customer-specified delivery window
  - Perfectly *picked* with the correct quantities of the correct items
  - Perfectly *packaged* with the customer-designated packaging and labelling
  - Perfectly *shipped* without damage
  - Perfectly *delivered* in the customer-designated time window and to the customer-designated location
  - Perfectly *communicated* with order status reports available 24 hours a day
  - Perfectly *billed* with on-time payment
  - Perfectly *documented* with customer-specified documentation means, including paper, fax, EDI, and/or Internet

Quality Measures of Logistics Performance

- Customer Response Quality Measures

The principal indicators of quality in *customer response* (CR) are

$$\text{Order entry accuracy (OEA)} = \frac{\text{Orders entered exactly as specified by the customer}}{\text{Total orders entered}}$$

$$\text{Order status communication cccuracy} = \frac{\text{Orders for which order status is communicated correctly}}{\text{Total orders with status communication requests}}$$

$$\text{Invoice accuracy} = \frac{\text{Invoices with perfect match of items, quantities, prices, and totals}}{\text{Total invoices}}$$

Quality Measures of Logistics Performance

- Inventory Management Quality Measures
  - Fill rate

Measure	Definition	Conversion
Unit fill rate (UFR)	Units shipped/ Units requested	
Line fill rate (LFR)	Lines shipped complete/ Lines requested	$LFR = UFR^{upl}$
Order fill rate (OFR)	Orders shipped complete/ Orders requested	$OFR = LFR^{lpo}$

  - Forecast Accuracy
  - Supply Quality Indicators
  - Transportation Quality Indicators

Quality Measures of Logistics Performance

- Warehouse Operations Quality Measures

$$\text{Inventory accuracy} = \frac{\text{Number of warehouse locations without discrepancies}}{\text{Total number of warehouse locations}}$$

$$\text{Picking accuracy} = \frac{\text{Number of lines picked without errors}}{\text{Total number of lines picked}}$$

$$\text{Shipping accuracy} = \frac{\text{Number of lines shipped without errors}}{\text{Total number of lines shipped}}$$

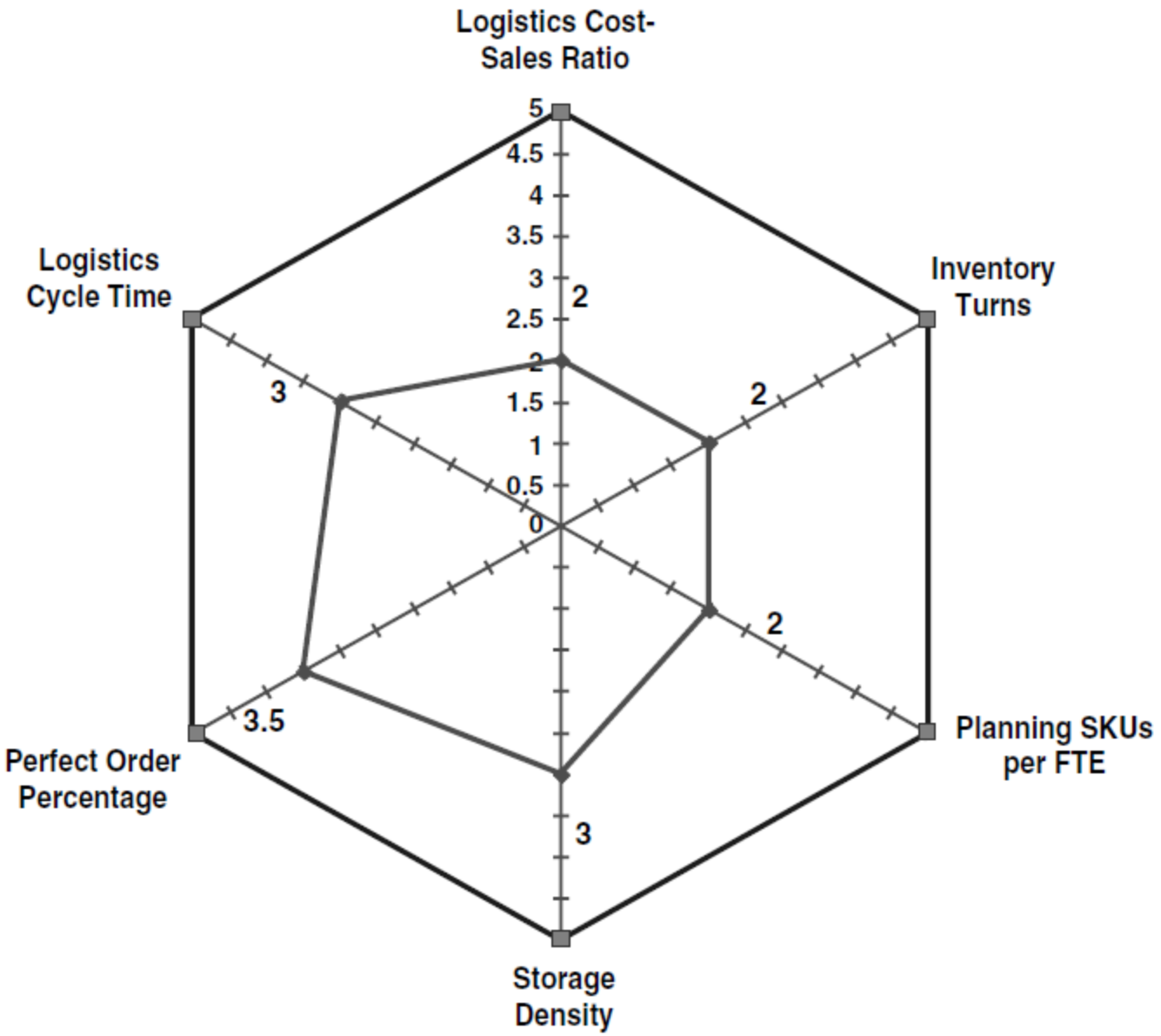
$$\text{Warehouse damage percentage} = \frac{\text{\$ Value of warehouse damages per year}}{\text{\$ Value shipped per year}}$$

Cycle Time Measures of Logistics Performance

The *total logistics cycle time* (TLCT) includes *order entry time* (OET), *order processing time* (OPT), *purchase order cycle time* (POCT), if the product is not available from stock), *warehouse order cycle time* (WOCT), and *in-transit time* (ITT).

$$TLCT = OET + OPT + [POCT \times (1\text{-}OFR)] + WOCT + ITT$$

Logistics Performance Gap Analysis

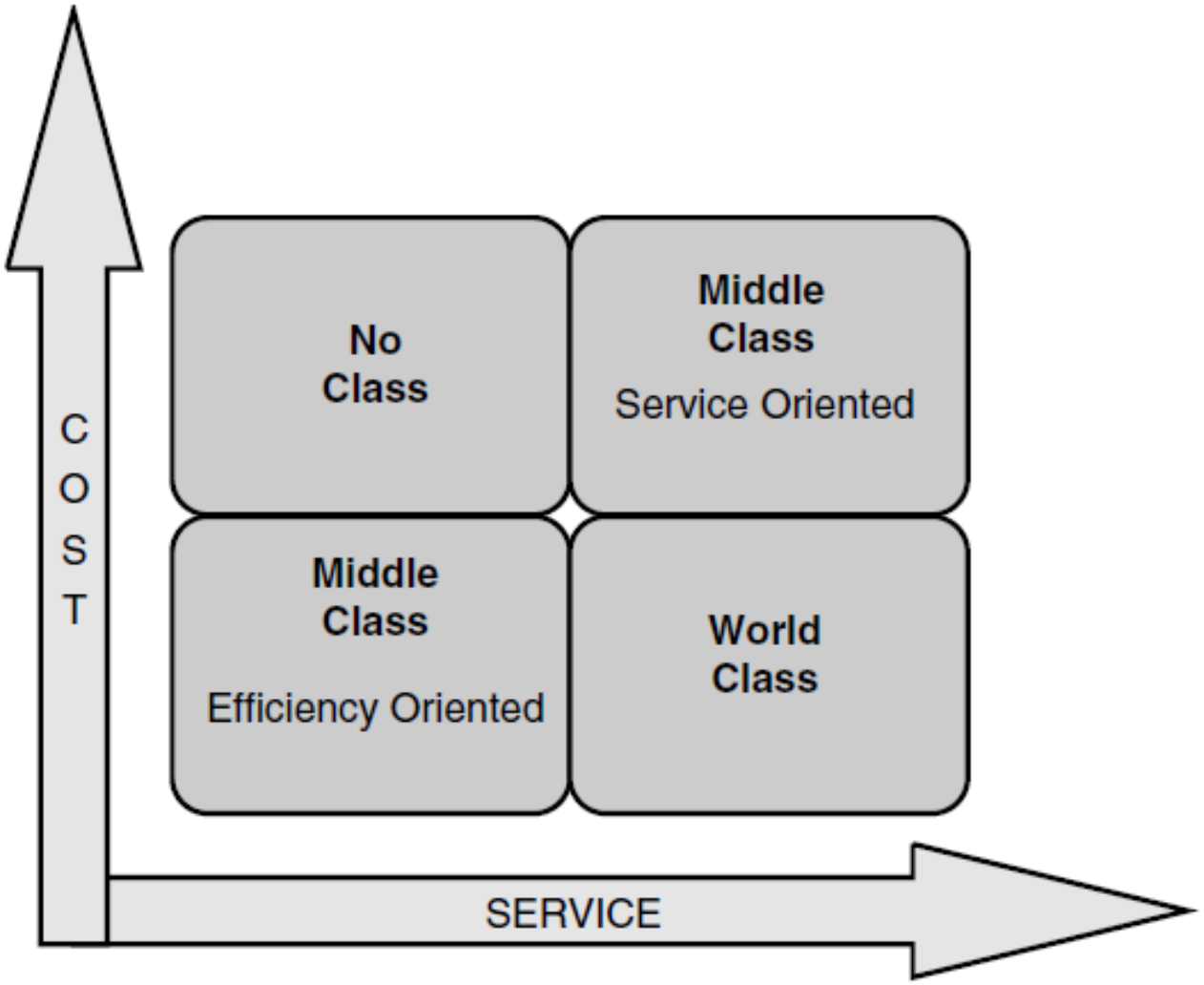


Logistics Performance Gap Analysis

Can be used to

1. Identify logistics strengths and weaknesses in logistics audits
2. Benchmark performance versus internal and external organizations
3. Select from among competing vendor proposals
4. Justify logistics projects

Logictics Organization Cost-Service Classification



Referensi

- Supply Chain Strategy – The Logistics of Supply Chain Management. Edward H. Frazelle. McGraw-Hill. 2002.

ASSIGNMENT

- Case study of logistic performance measurement.
- Group: 2 – 3 Students.
- Presentation: 30 April 2014