AUTOMOTIVE CLUSTER IN JAPAN: THE AICHI REGION

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OUTLINE

- Structure of automobile production
- Toyota vs. GM
- Economic foundation of hierarchical structure
- IT and Toyota production system
- Globalization and Toyota

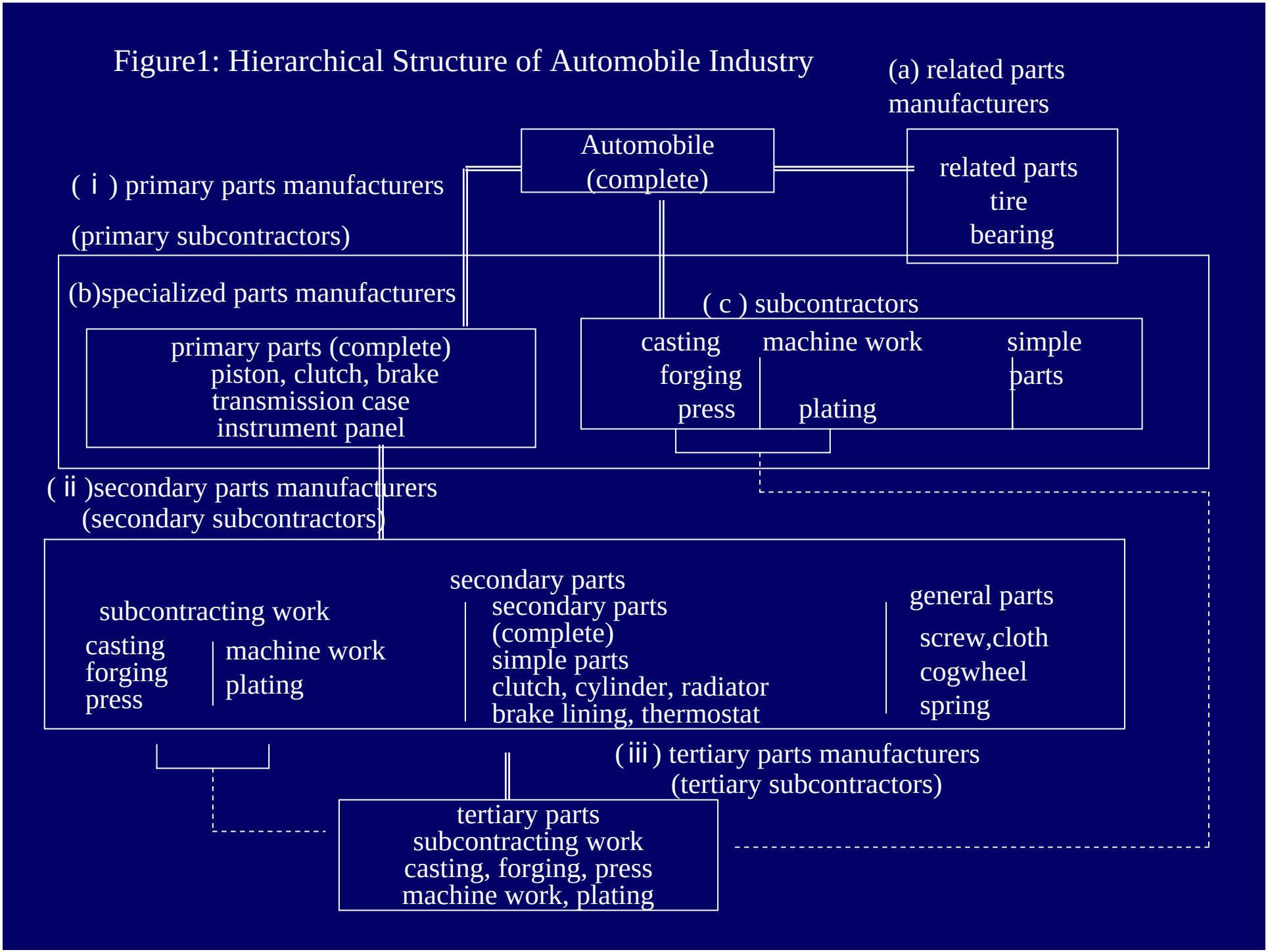
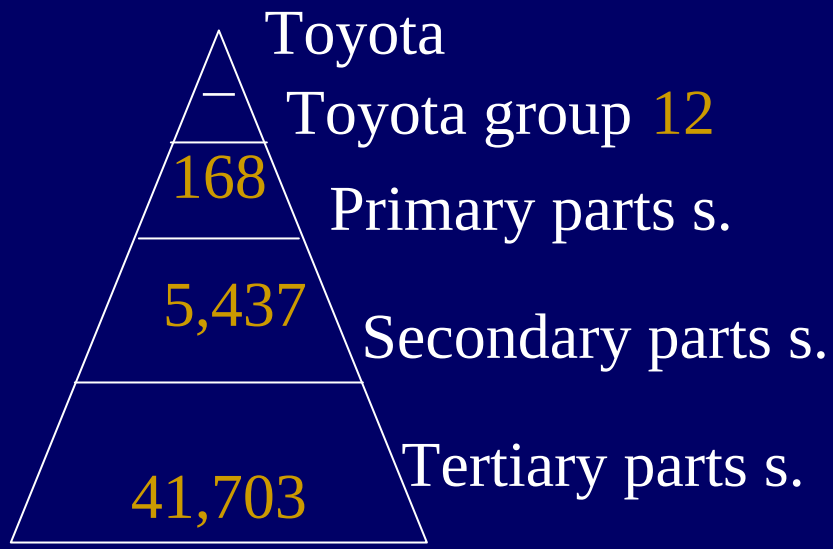


Figure1: Hierarchical Structure of Automobile Industry
(a) related parts manufacturers
Automobile (complete)
related parts
tire
bearing
(i) primary parts manufacturers
(primary subcontractors)
(b)specialized parts manufacturers
primary parts (complete)
piston, clutch, brake
transmission case
instrument panel
(c) subcontractors
casting
forging
press
machine work
plating
simple parts
(ii)secondary parts manufacturers
(secondary subcontractors)
subcontracting work
casting
forging
press
machine work
plating
secondary parts
secondary parts (complete)
simple parts
clutch, cylinder, radiator
brake lining, thermostat
general parts
screw,cloth
cogwheel
spring
(iii) tertiary parts manufacturers
(tertiary subcontractors)
tertiary parts
subcontracting work
casting, forging, press
machine work, plating

Production Structure: Toyota vs. GM I

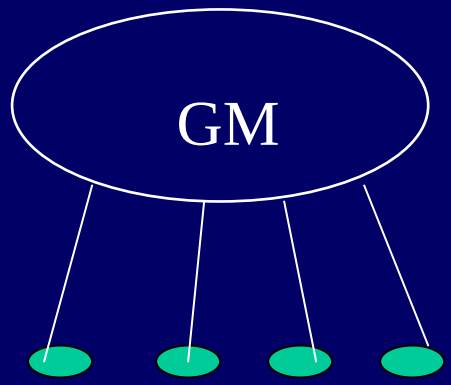
- hierarchical



36,000

Long-run contract relationship

non-hierarchical



Parts suppliers

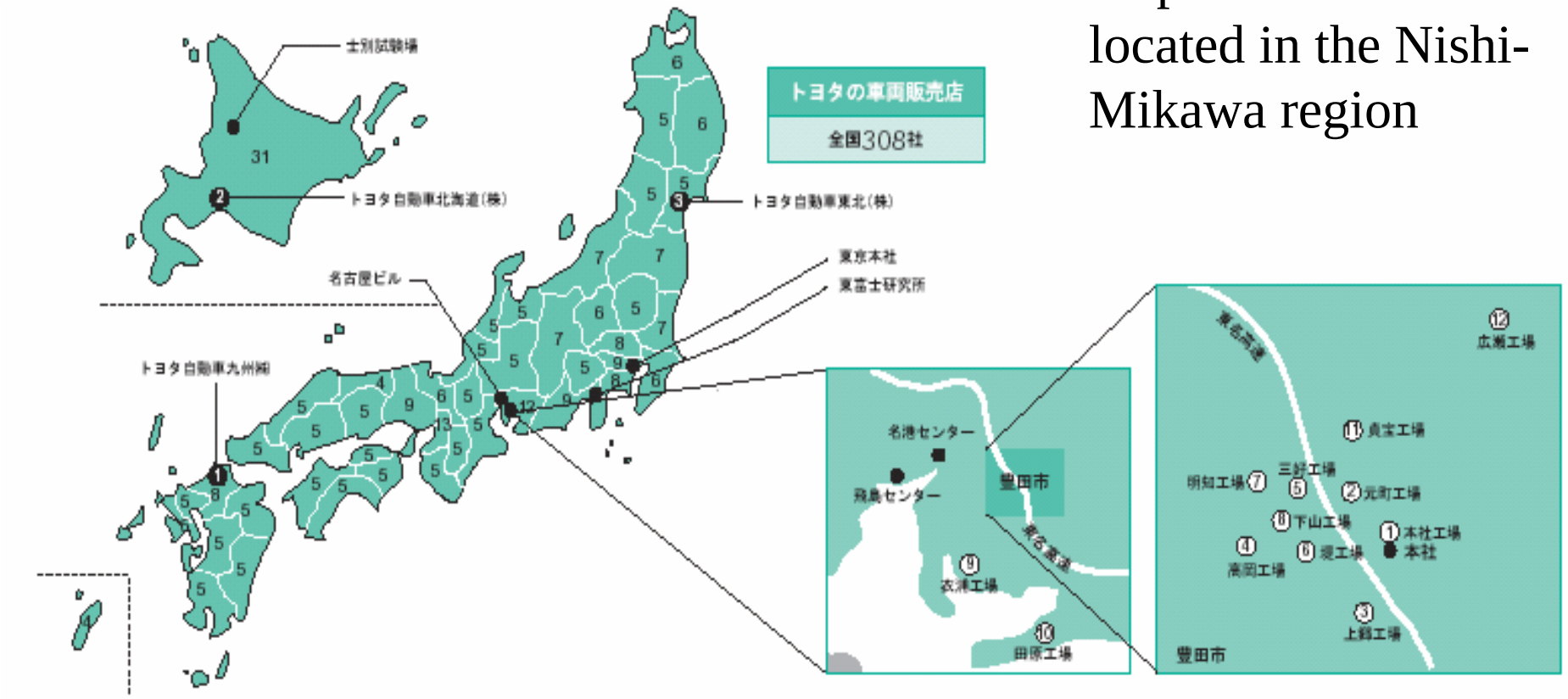
12,000

Short-run competitive

Toyota vs. GM: II

Toyota	GM
Low domestic production: 20-25%	High: 40-50%
400 trade partners	Many more
Toyota dominates	Equal partner
Long-term commitment to quality and price	Market-based relationship
Parts suppliers invest in specific equipment	General equipment

Centralization of Toyota Plants



11 plants are located in the Nishi-Mikawa region

Concentration of Toyota and its Parts Suppliers I

	Aichi Pref.			Gifu Pref.	Mie Pref.	Other
	Owari	Hishi-Mikawa	Higashi-Mikawa			
Toyota		11	1			3
Toyota Group	11	34	2	1	1	
Kyoho kai	33	80	3	10		20
%	22,6	54.8	3.4	6.8		13.71 3.7

Concentration of Parts Suppliers II

	Aichi Pref.			Gifu Pref.	Mie Pref.	Other
	Owari	Hishi-Mikawa	Higashi-Mikawa			
Denso	22	32	1		3	8
Toyota Gosei	54	4	6	7	3	8
Toyota Shatai	34	33	3	4		19
Aichi Seiko	38	4				

Reasons for Concentration

Coase=Williamson:

Save costs of transportation and information

Economies of scale

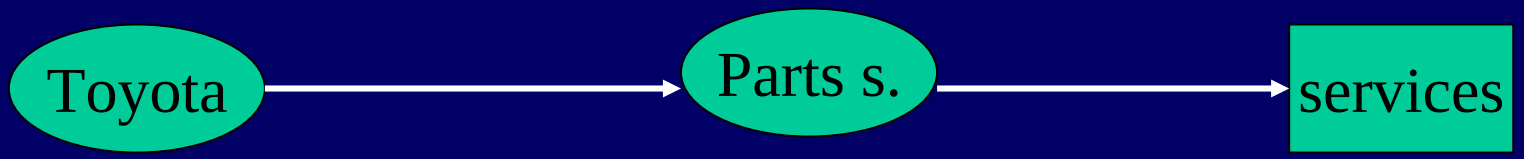
Synergy effect

Classical theory can apply

Economic Foundations

- GM vs. Toyota

Inefficiency of large organization



Principal agent

Saving of transaction and information costs

Principal-Agent Model

Basic Assumptions

(1) Monitoring

- Quality
- Price

(2) Incentive mechanism

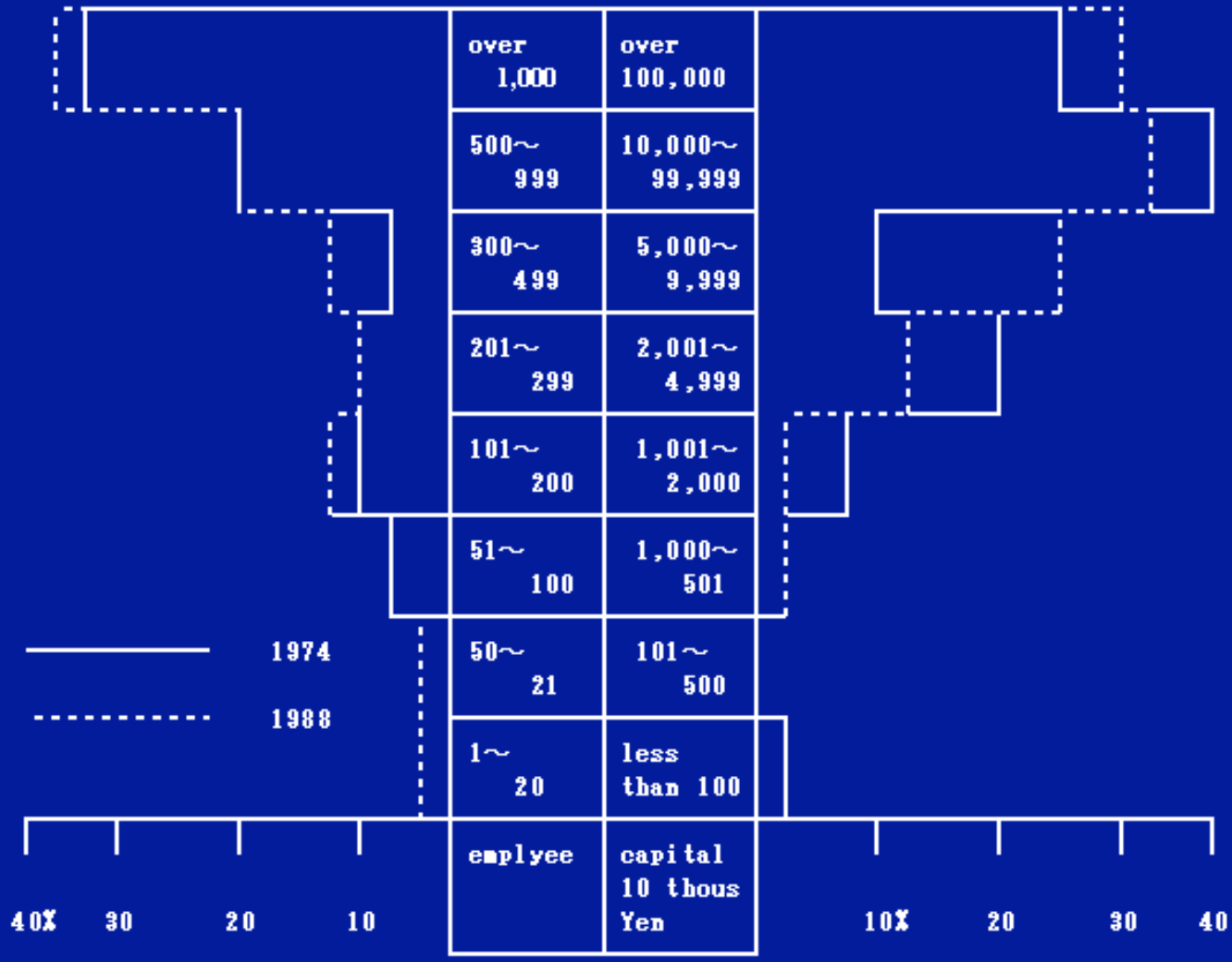
- Profit sharing
- Risk sharing

Why do parts suppliers stay in the hierarchical structure?

- Costs of delivery
- Quality management
- Forced collaboration with Toyota

Hypothesis : Growth Sharing

Table 3-7: Up-Grading of Primary Parts Manufacturers of Toyota Motor Co.



Source: Aichi Keizaijiho, No. 120 and Shiomi[1985] for 1974
Reality of Toyota Group 1988, for 1988

Transformation of the Japanese Economy

- Information Society (IT) ()
- Globalization

How do these affect the Toyota production structure and the location of Toyota and its parts suppliers?

Revival of U.S. Automobile Industry I

- Concurrent Engineering

Chrysler “Neon” in 1993

2000cc engine, $10,000

Comparison of development period and costs

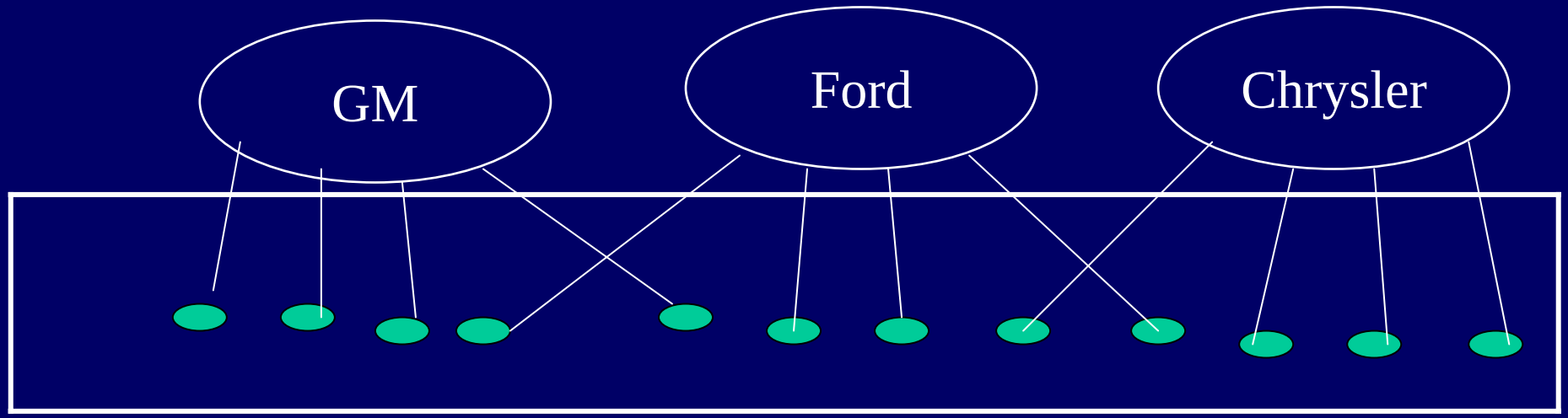
Neon	31 months	US$ 130,000
Saturn(GM)	7 years,	$ 350,000
Escort (Ford)	4 years	$ 200,000

Cf. Toyota was 37 months

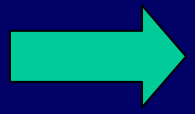
Revival of U.S. Automobile Industry II

- ANX (American Automotive Network Exchange)

e-marketplace



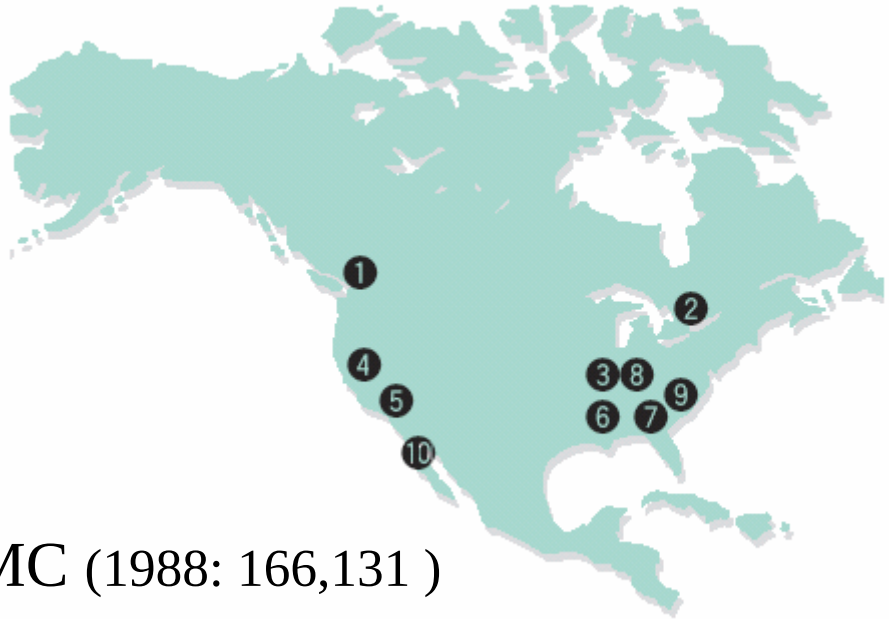
IT and Toyota Production System

- **Kanban Method**  **e-Kanban Method**

Lead time : 2 hours

Globalization and Toyota I

Manufacturing Plants in North America



② TMMC (1988: 166,131)

④ NUMMI (1984: 305,691)

⑦ TMMK (1988: 446.199)

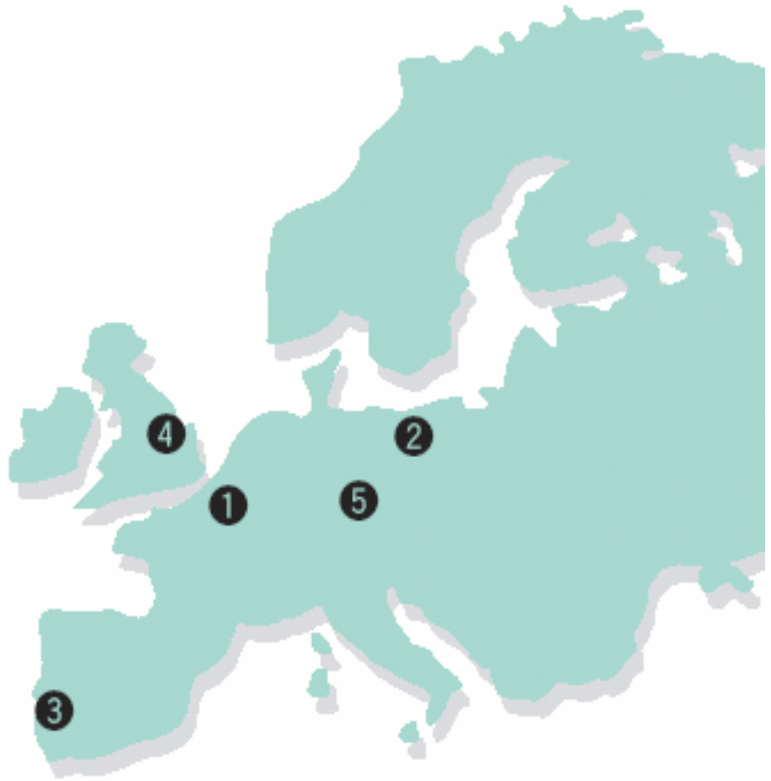
⑧ TMMI (1998: 170,442)

Globalization and Toyota II

Manufacturing Plants in Europe

① TMMF （2001：61,904）
③ Portugal (1968: 4086)

④ UK (1992: 153,415)



Manufacturing Plants in Asia

⑦ Indonesia (1970: 0,083)

⑧ Malaysia (1968: 22,115)

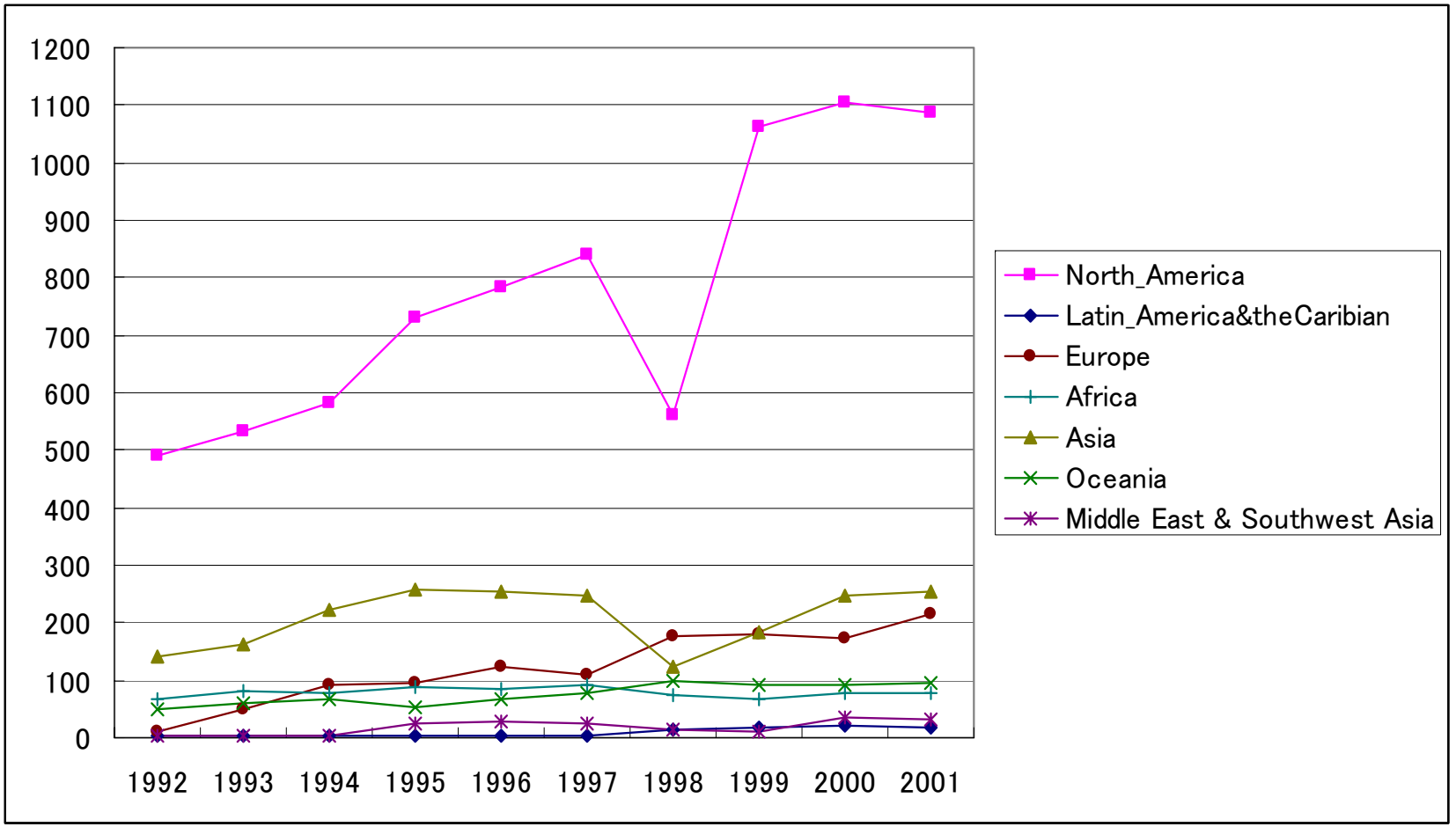
⑪ Philippines (1989: 15,873)

⑫ Taiwan (1986: 67,495)

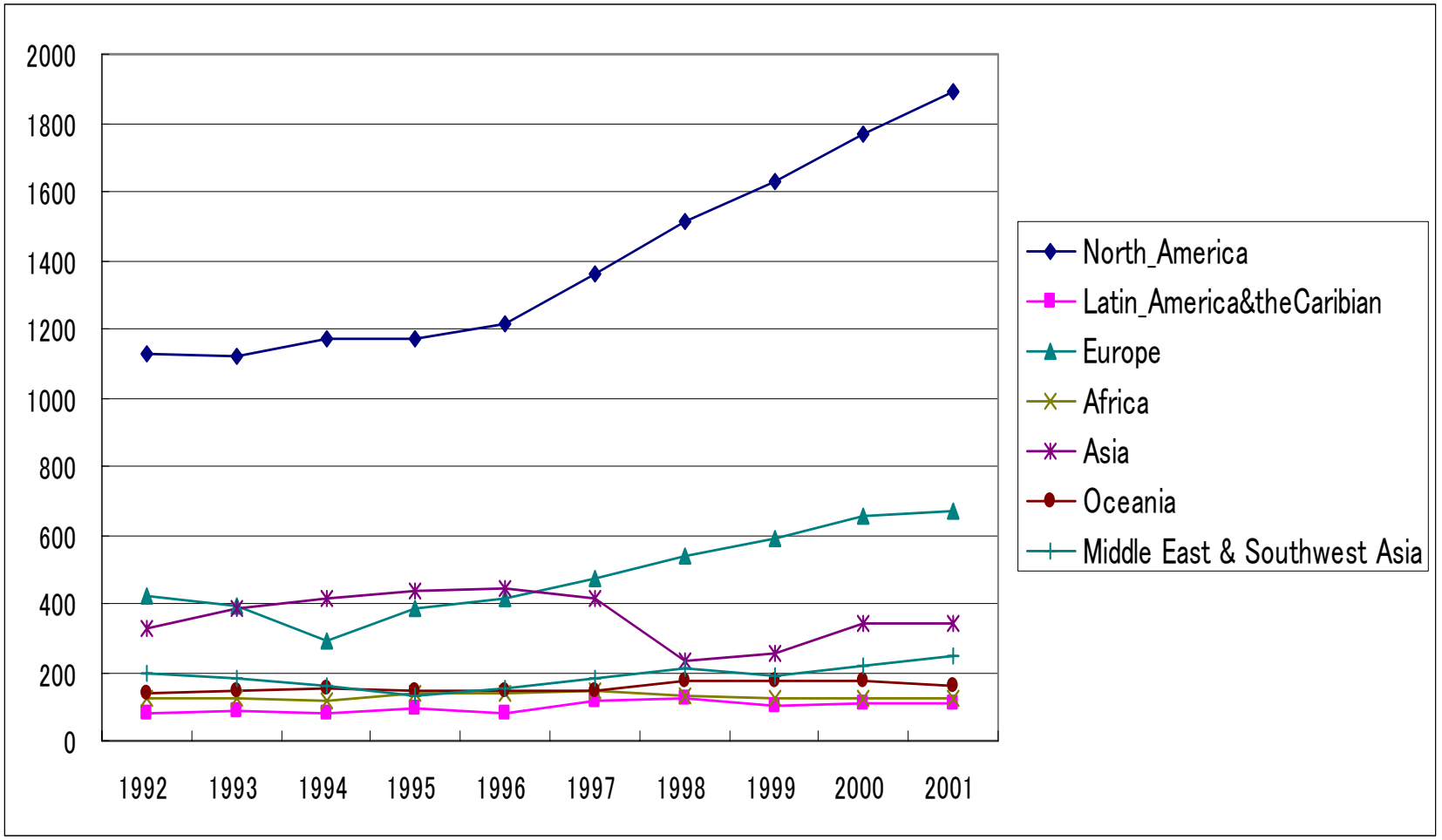
⑮ Thailand (1964: 90,708)

⑰ Vietnam (1996: 5,760)

Toyota's Overseas Production



Toyota's Overseas Sales



Plants of Toyota Parts Suppliers

	Calif.	IN ○	KY ○	MI	OH	IL	TN	CANADA	Others
Toyota Group	5	3	6	3		1	2	2	5
Kyohokai	1	2	6	2	2	1	1		1

Conclusion

Toyota's Strengths

- *Jidoka* (automation)
- *Kanban* Method (Just-in-time)
- QM and TQM (labor participation)

Dispersion due to globalization

- Negative and positive aspects

Toyota is behind in the IT revolution

- Above strengths still larger