Supply Chain Management: A Learning Perspective

On-Line Chapter 2 Learning and Learning Perspective

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1. HORIZONTAL VERSUS VERTICAL PERSPECTIVE ON CAPABILITIES

- Figure A2.22 shows where in the production process each of the capabilities is relevant, while Figure A2.23 depicts another “chain relationship” among the capabilities.
  - Firm must first develop its basic capability, which will support both control and system capability.
  - Supported by basic capability, control capability is associated with individual processes.
  - Company’s system capability is the one the market will observe and evaluate, and it can be forged only when the company is able to integrate control capabilities from the entire organization’s perspective.
- Regarding applicability, basic capability is the most open to generalization, since its knowledge and skills are so general as to be useful for a wide variety of processes.
- Regarding the decision time horizon, basic capability requires the longest perspective in that it takes time for the company’s employees to acquire basic knowledge and skills and also also because the basic capability needs the most comprehensive bases for individual learning.

2. THE DYNAMIC VIEW OF LEARNING PROCESS

- The dynamic view of operations learning based on and consistent with the principles of the dynamic approach to operations management (Figure A2.24)
  - First, the production system sets up its goal grounded on and bound by its current level of knowledge, incomplete and/or uncertain
  - Then, the production system starts manufacturing products through its processes.
  - But, its control over its production processes incomplete and the outcome uncertain.
  - There exists a gap between the realized outcome and the goal set up by the production system. The realized outcome is governed by the complete knowledge, whereas the goal is based on the firm's incomplete knowledge about the production processes.

2. THE DYNAMIC VIEW OF LEARNING PROCESS

- Direct learning
  - The gap plays an important role in operations learning ➔ enables the decision-maker (DM) to identify crucial contingencies in operations
    - The DM must define substantive problems in the production processes and try to solve them by using the system’s learning capability.
    - Once the problem-solving activity is completed, it contributes to enhancing the firm’s learning capability.
- Indirect learning
  - Production system can pro-act by designing an artificial problem in operations.
    - It reviews its past experience in operations – near-miss disasters – reconstructs the environment so that it mimics where the experience actually happened, and simulates it to do scenario analyses.
    - The firm, or the production system, can learn from its simulation results.

3. THE STAGES OF KNOWLEDGE

- Eight stages of knowledge development (Figure A2.25)
  - 1st stage: the firm is capable of recognizing the difference between good and bad output, although it might not have a clear idea of how it can recognize this
  - 2nd stage: the firm begins to recognize key dimensions – variables, of the output. At this stage, the firm becomes able to understand the basic factors that determine whether the output is good or bad
  - 3rd stage: the firm becomes capable of understanding the relevance of the variables to the output
  - 4th stage: the firm becomes able to measure the variables, i.e., it can quantify the key dimensions of the output

3. THE STAGES OF KNOWLEDGE

- Eight stages of knowledge development (Figure A2.25)
  - 5th stage: the firm must be able to adjust, or control, the variables
  - 6th stage: the firm now must be able to quantify the cause-and-effect relationship between the variables and the output
  - 7th stage: the firm gradually recognizes that the primary variable is not one-dimensional, it consists of secondary variables
  - 8th stage: the firm now has complete knowledge about its production processes; in reality, it is just an ideal condition that the firm can never reach. Now move to 1st/2nd stage.
- *Learning is a continuous process.*

3. THE STAGES OF KNOWLEDGE

- Relationship between knowledge stages and management approaches (Figure A2.26)
  - As the firm's knowledge stage advances, it accumulates more objective data and information about the production system's behavior.
  - At a higher stage of knowledge development, it is better for the firm to make use of the structured approaches of control and management.
  - On the contrary, when the knowledge stage is low, the firm probably would have to take up the more unstructured approach to problem-solving.

3. THE STAGES OF KNOWLEDGE

- How is our understanding of the knowledge stages related with SCM?
  - The core of effective SCM is coordination among supply chain partners is the core. Coordination is related with operations problem-solving that requires intensive attention from the supply chain partners.
  - Should the supply chain knowledge stage be low, the decision-maker probably has to utilize more unstructured approaches, which might have to be based on consensus among the supply chain partners.
  - On the other hand, if the supply chain knowledge level is relatively high due to an extended length of the supply chain relationship, the decision-maker had better take up more structured or formalized tools to control and manage the coordination process.

4. THE LEARNING ALGORITHM

- It is important for the firm to effectively manage the learning process since the learning in operations is critical to enhancing the firm’s overall capability and implementing coordination in the supply chain.
- “How can the firm learn?”
  - To postulate a learning model that consists of three building blocks: learning circumstance, learning preliminary, and learning algorithm (Figure A2.27)
- The primary objective of operations learning is to control the production process better – to enhance the firm’s process controllability.
  - To reduce the process deviation continuously over time

4. THE LEARNING ALGORITHM

- **Learning circumstance**, underpinning the entire learning process, designates the basic conditions for effective learning in operations.
  - The first element – the synchronous operations systems
    - Consistent with principles of the pull system – a process of the synchronous operations system produces a product only when its immediate downstream process demands the product.
    - In theory, all the processes in the synchronous operations system operate in exactly the same time intervals; that is, in perfect synchronization.
    - Then, it becomes possible to identify serious problems in the production system ➔ identifying the contingencies – significant operations problems – is the first step toward operations learning.

4. THE LEARNING ALGORITHM

- **Learning circumstance**
  - The second element – the contingent inventory system.
    - When the false alarms are mingled with legitimate signals about significant problems in operations, it becomes very difficult to learn efficiently.
    - As such, the contingent inventory system is better than the pure pull system when it comes to operations learning, acting as a mechanism to initiate the learning process.
  - The third element – the effective inspection resource allocation, which should support the firm's contingent inventory system
    - The contingent inventory system assumes 100% inspection throughout the production process ➔ how to allocate inspection resources appropriately is a relevant issue for the learning circumstance.

4. THE LEARNING ALGORITHM

- **Learning preliminary**, supported by the learning circumstance, enables the decision maker to figure out when to engage in the learning process.
  - There are two elements comprising this building block: a learning triggering scheme and an intelligent information system.
  - The learning triggering scheme is in essence the contingent inventory of the learning circumstance.
    - From the perspective of learning circumstance, the contingent inventory constitutes the overall learning environment.
    - On the other hand, from the perspective of learning preliminary, it is a tool, which the decision maker uses in finding out an appropriate moment to start the learning process.
  - The intelligent information system enables the firm to direct the operations activities and manage the learning process. It is also part of the learning circumstance.

4. THE LEARNING ALGORITHM

- **Learning algorithm** is a detailed learning process **(**Figure A2.28)
  - It starts after the firm knows that there indeed exist contingencies in the production process – the existential understanding, connected with the learning preliminary and also the learning circumstance at least indirectly.
  - It is triggered by the learning-triggering scheme in the learning preliminary, which in turn is based on the contingent inventory in the learning circumstance.

4. THE LEARNING ALGORITHM

- **Learning routine**
  - Once the decision maker clarifies whether the significant deviation is caused by contingent or underlying reasons, or fluctuates randomly around a certain value, the learning routine can start.
  - It mainly consists of procedural steps, through which the formalized learning process proceeds. It can be done either on site or off site.
  - Using the chosen learning method, the company needs to conduct physical analyses of the operations problem to understand the basic structure of the issue, i.e., to develop a proper experiment.
  - Once the experiment is done, its outcomes need to be recorded using the intelligent information systems in place and the data to be further analyzed moving up the stages of knowledge.
  - The learning outcomes from this activity must be stored in a way that they can be readily available for next rounds of learning.
- **Iteration of the learning algorithm** – Once the learning routine is completed, one full cycle of learning is finished. The learning process itself must go on or iterate continuously.

5. INTEGRATED LEARNING ALGORITHM

- The **integrated model** (Figure A2.31), a theoretical extension of the original one in Figure A2.28.
- The most important characteristics of the integrated model.
  - Separation of learning into continuous and current – the most important difference between the integrated and the original learning algorithm.
    - The integrated learning algorithm helps the firm engage in two different learning processes at the same time, one for the immediate problem solving and the other for the long-term improvement, i.e., it can solve the current managerial problems and enhance its capability at the same time.
    - Although the two learning processes are distinct, there are constant feedback and feed-forward between the current and continuous learning.
  - Designed for TQM – it is designed for TQM by focusing on both quality and capability improvement simultaneously.

Figure A2.22 Process and capability

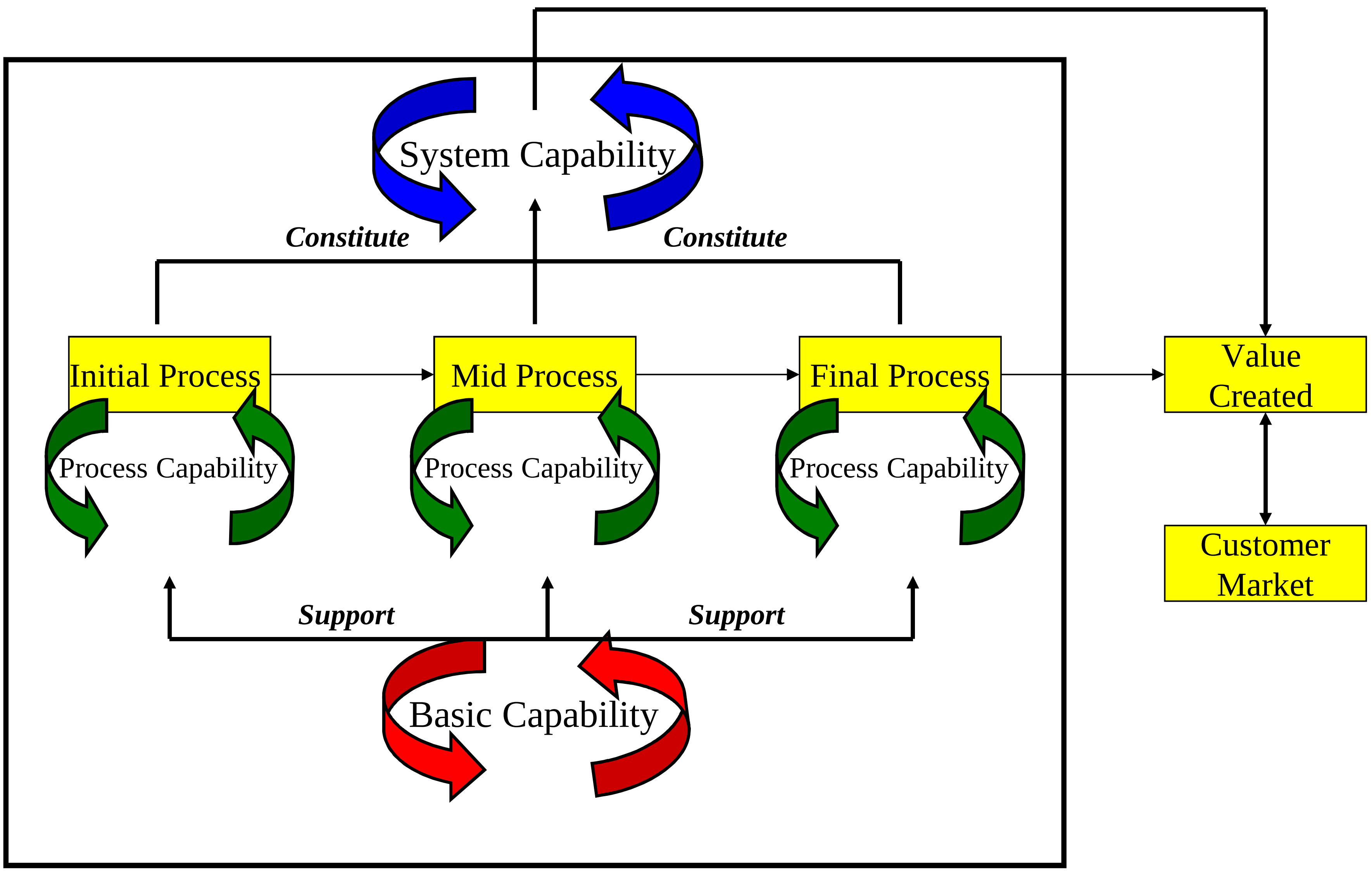


Figure A2.23 Basic capability supporting other capabilities

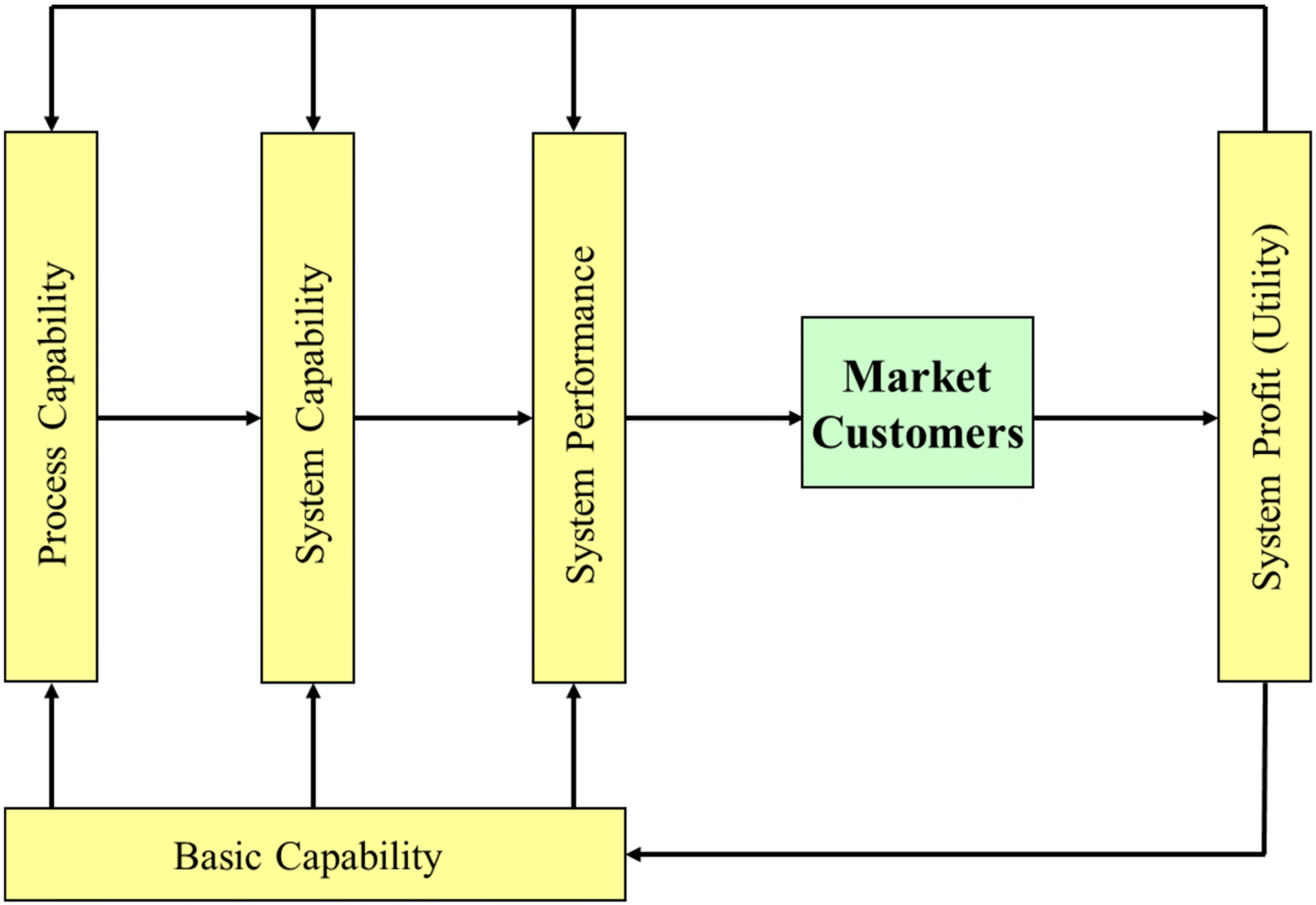


Figure A2.24 The dynamic view of learning in operations

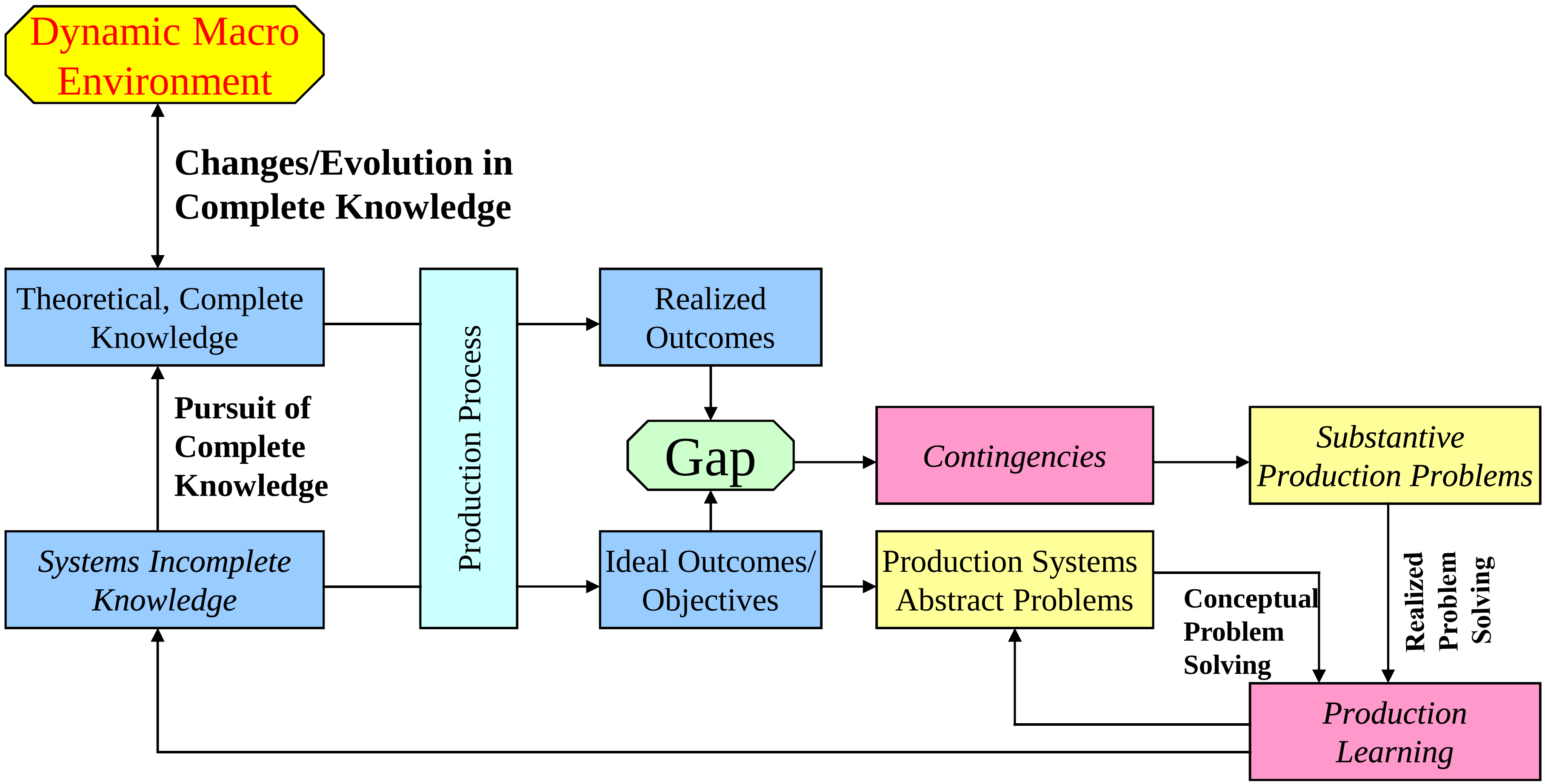
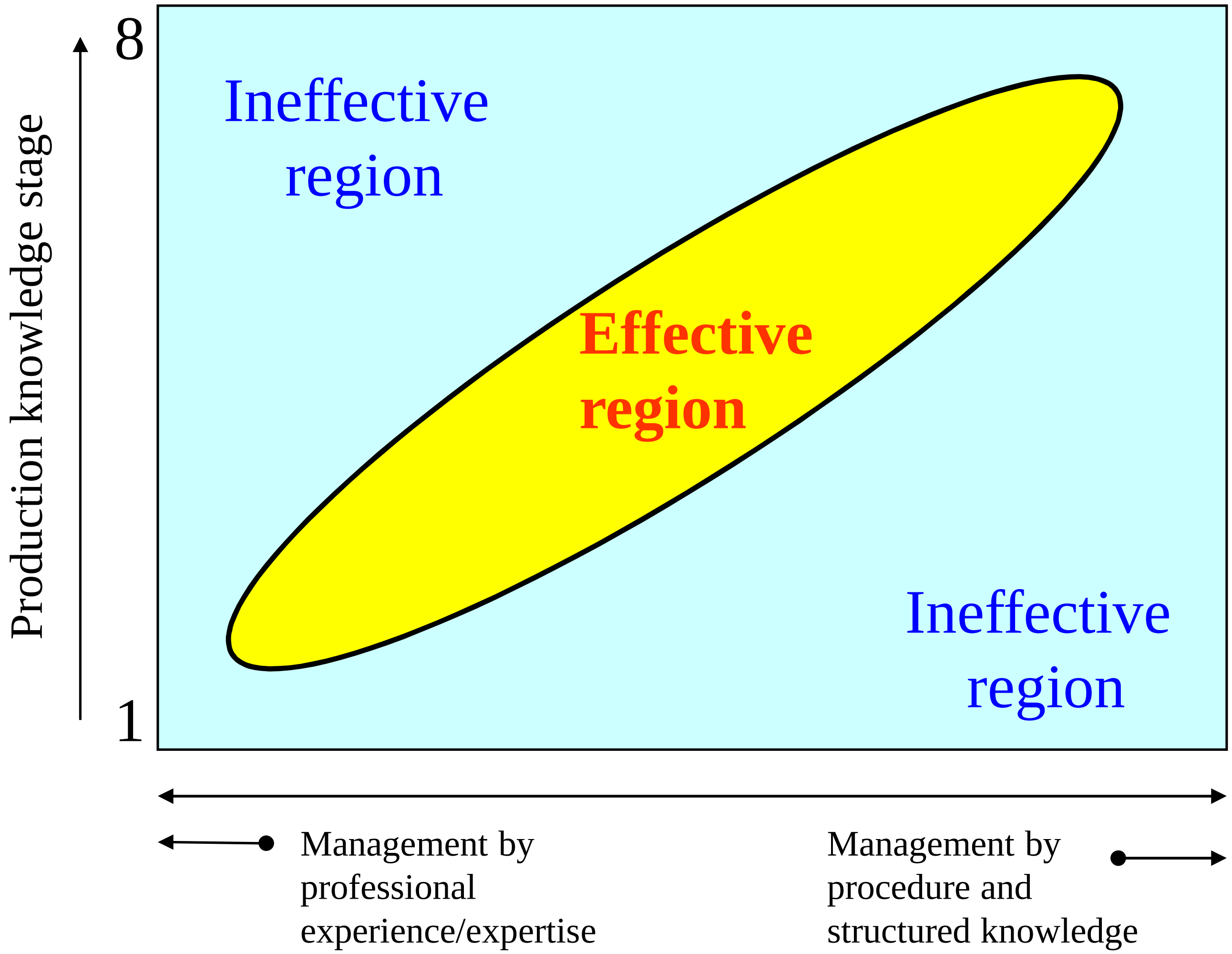


Figure A2.25 Knowledge stages*

- **Stages of Knowledge**
  1. **Capable of recognizing good output without any sense of how**
  2. **Begin to recognize variables (key dimensions)**
  3. **Perceive the relevance of variables**
  4. **Ability to measure the variables**
  5. **Local control over them (can control primary variables locally)**
  6. **How the local changes in a variable affect output**
  7. **Can control secondary variables**
  8. **Complete knowledge**

* Jaikumar, R. and R. E. Bohn (1992). A dynamic approach to operations management: An alternative to static optimization. International Journal of Production Economics, 27 (3), 265-282.

Figure A2.26 Knowledge development and management approaches*



* Jaikumar, R. and R. E. Bohn (1992). A dynamic approach to operations management: An alternative to static optimization. International Journal of Production Economics, 27 (3), 265-282.

Figure A2.27 A learning model

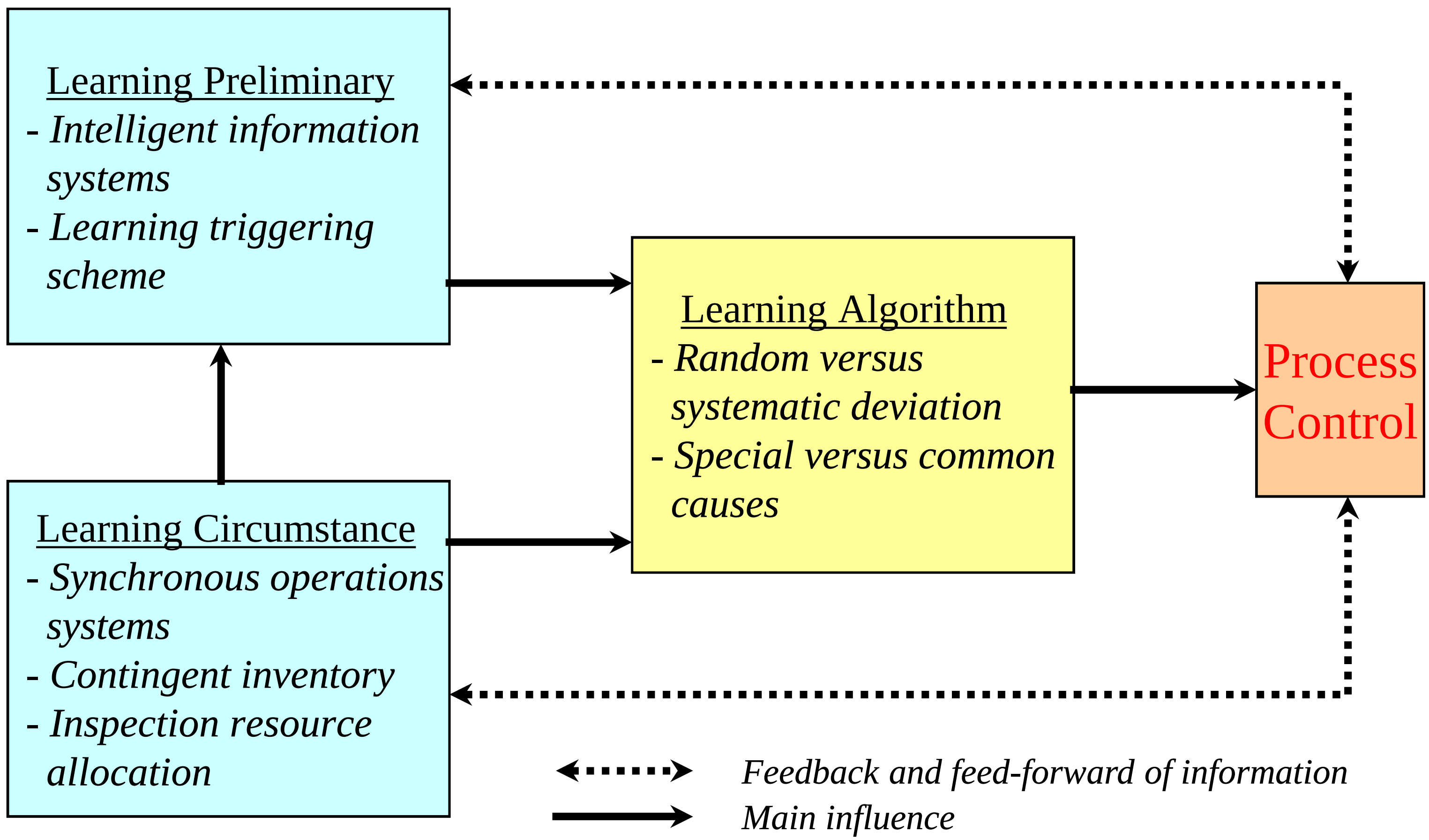


Figure A2.28 A learning algorithm

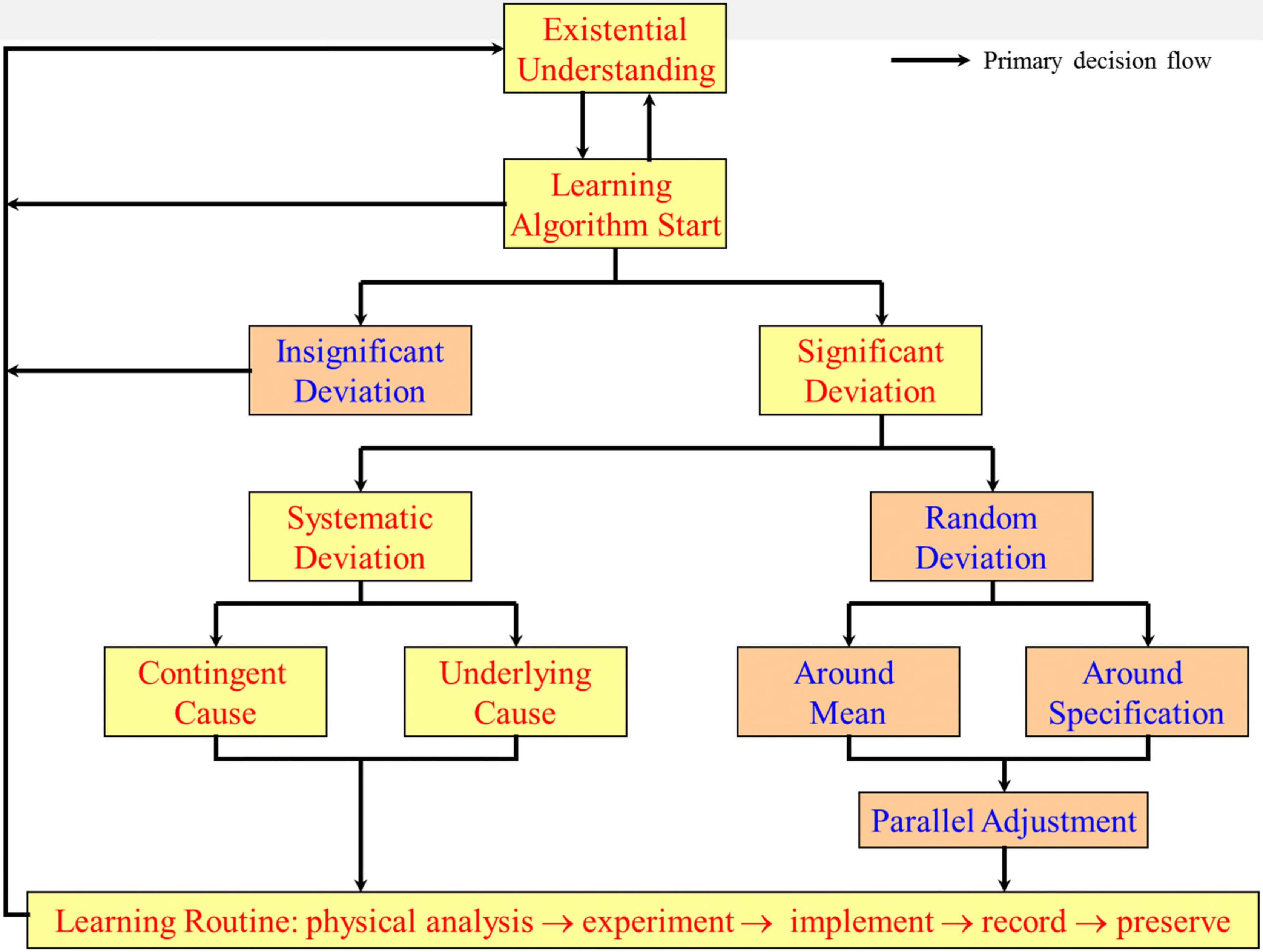


Figure A2.29 Contingent and underlying causes

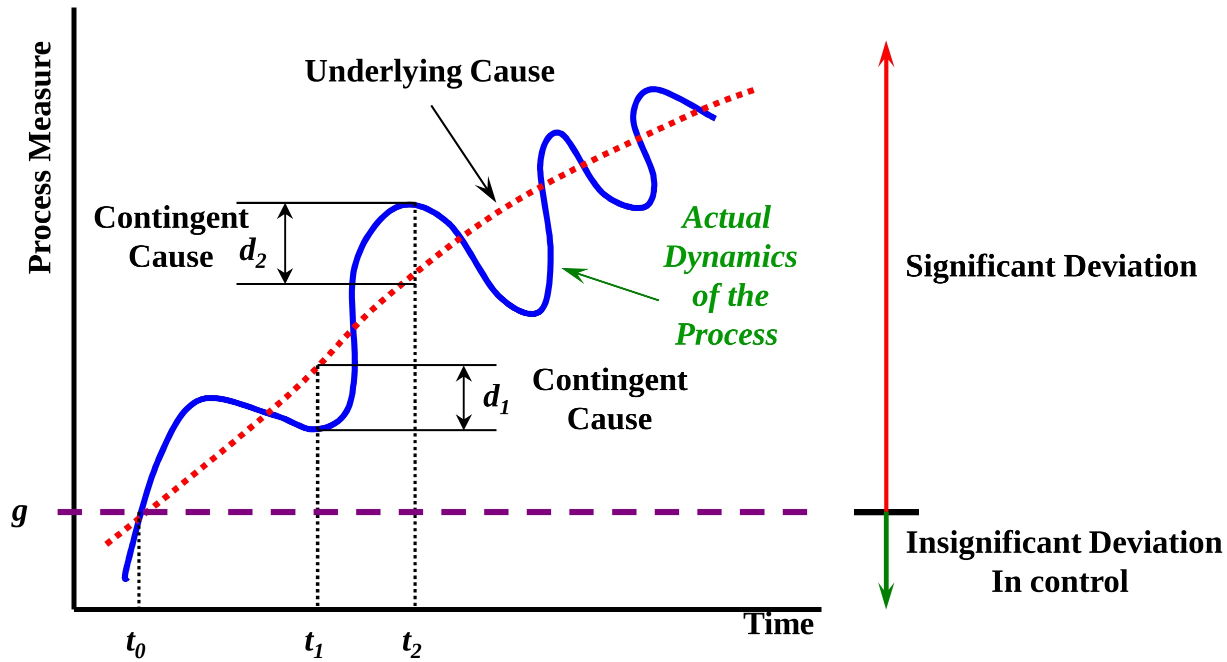


Figure A2.30 Random deviation

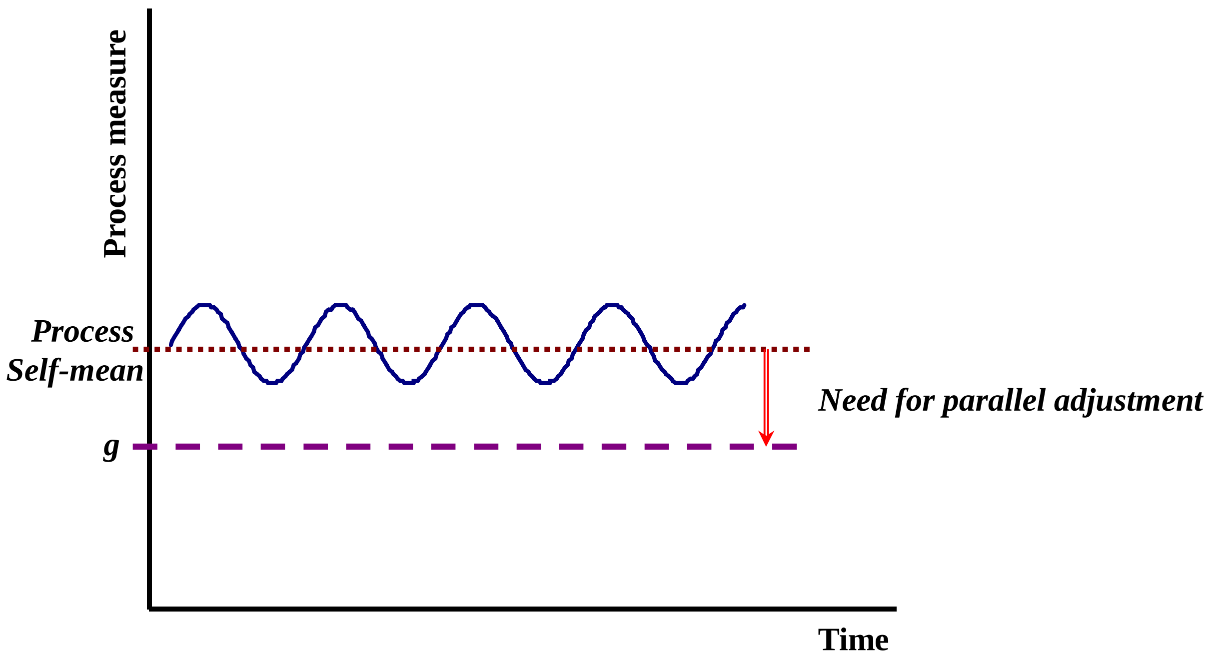


Figure A2.31 Integrated learning algorithm

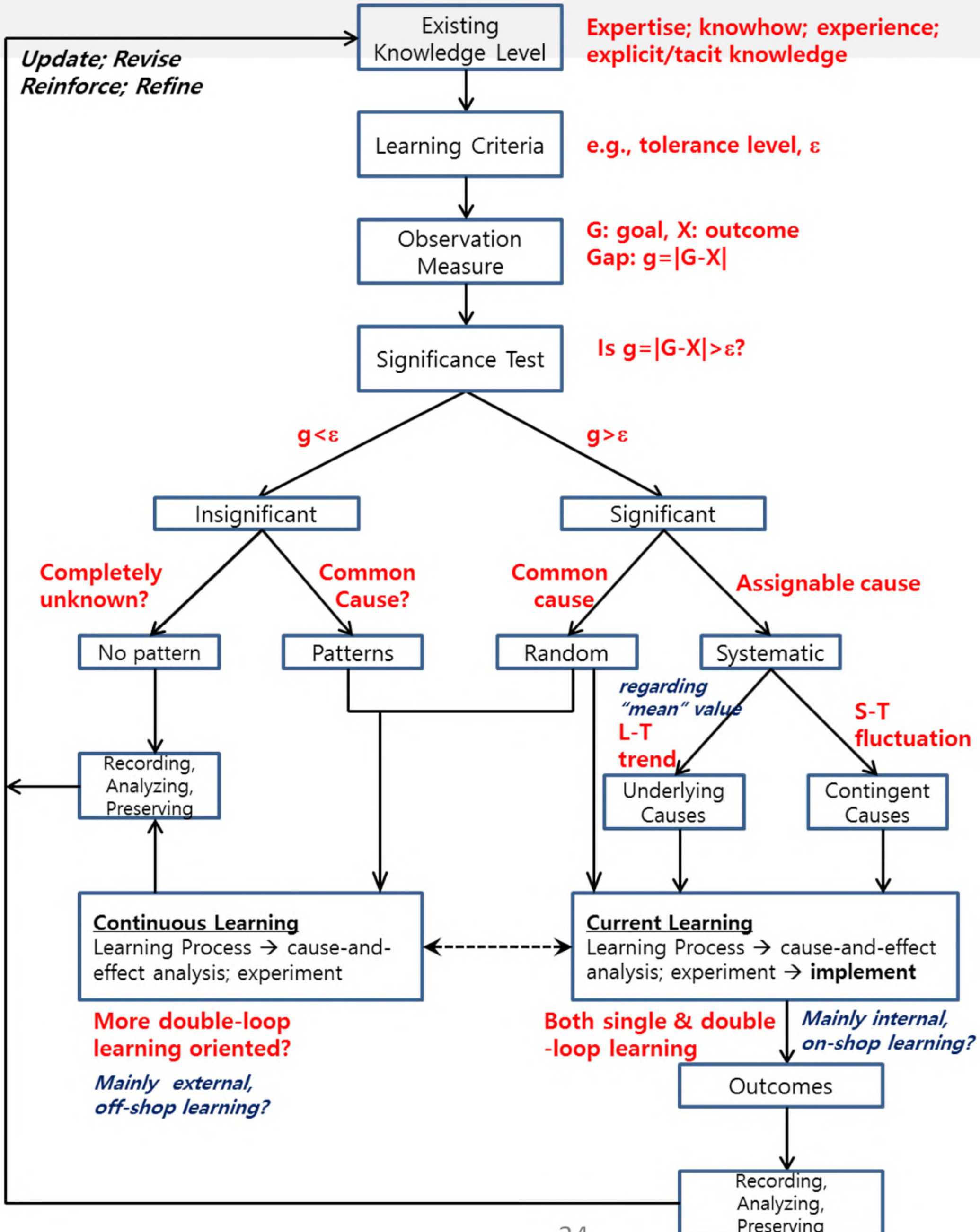


Figure A2.32 Daewoo's globalization

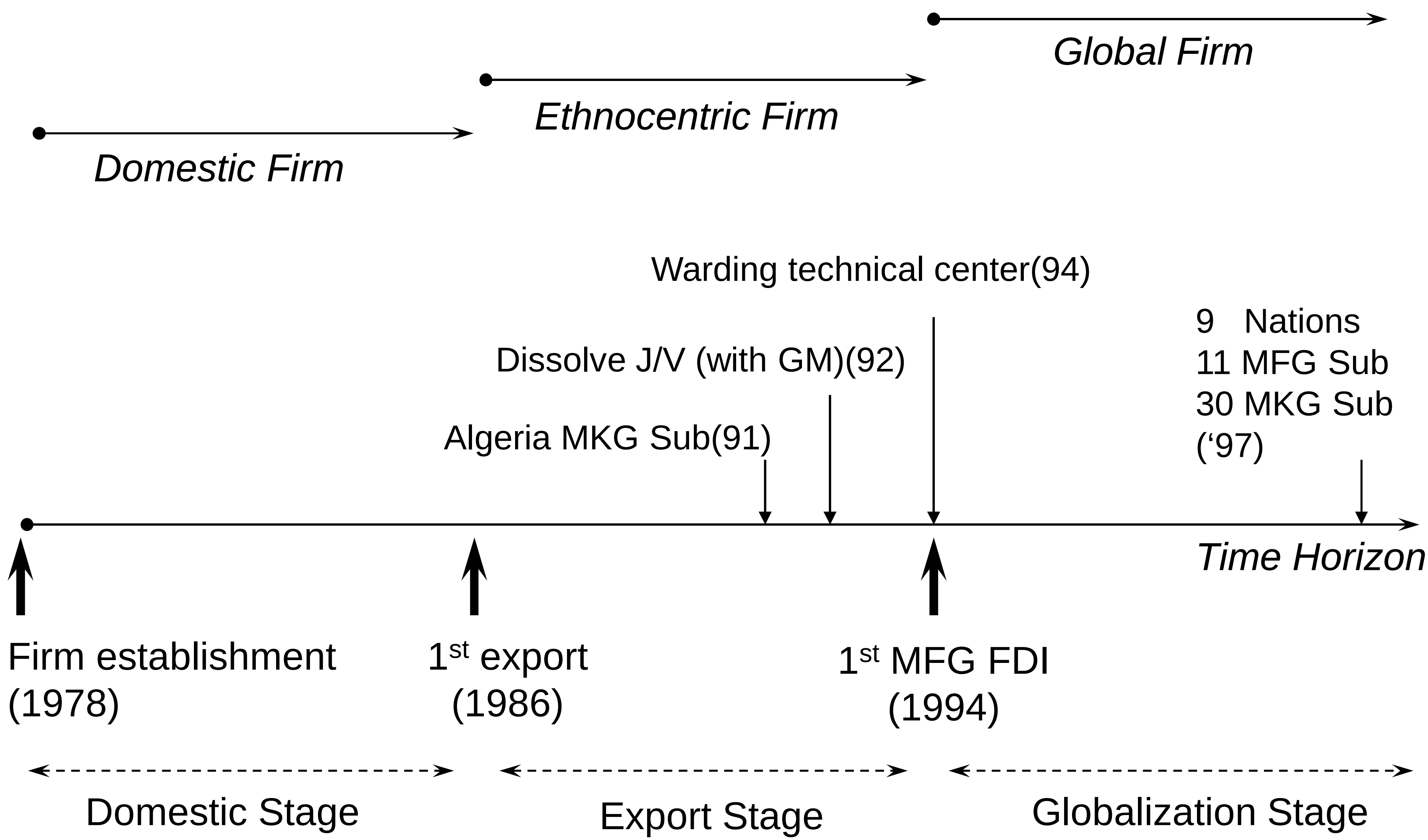


Figure A2.33a Daewoo's globalization by function

(a) Manufacturing

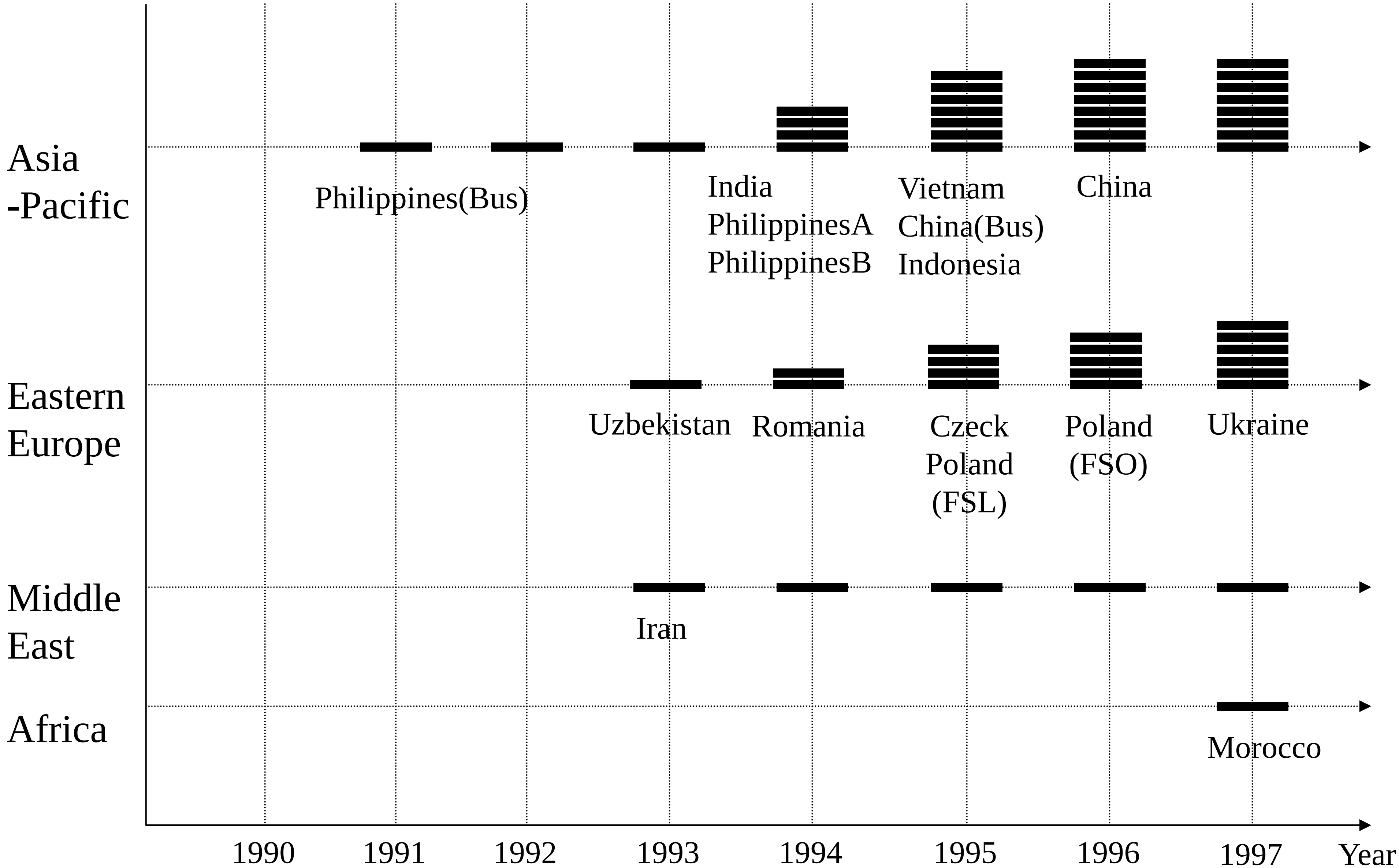


Figure A2.33b Daewoo's globalization by function

(b) Marketing

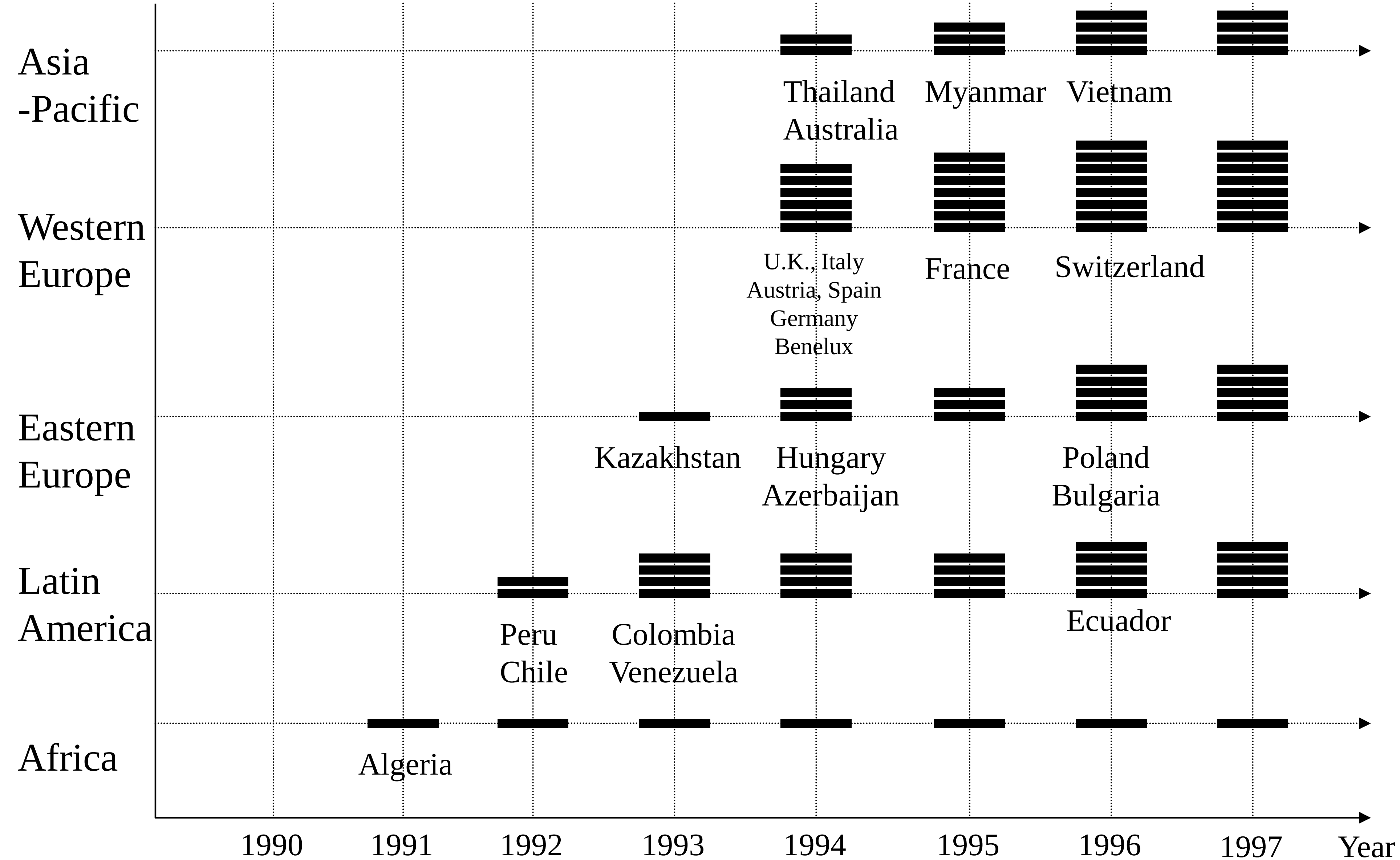


Figure A2.34a Daewoo's globalization by region

(a) Western Europe

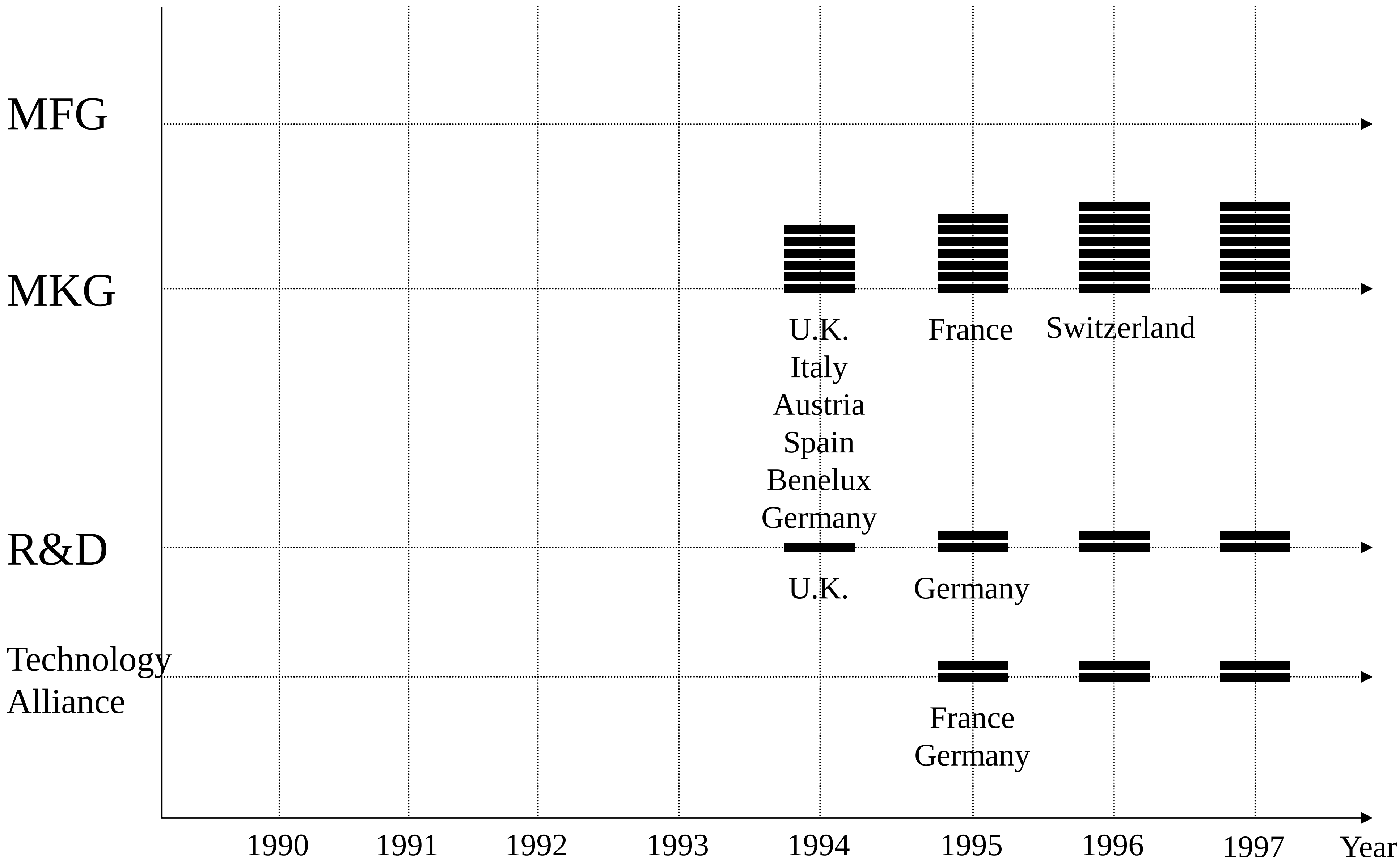


Figure A2.34b Daewoo's globalization by region

(b) Eastern Europe

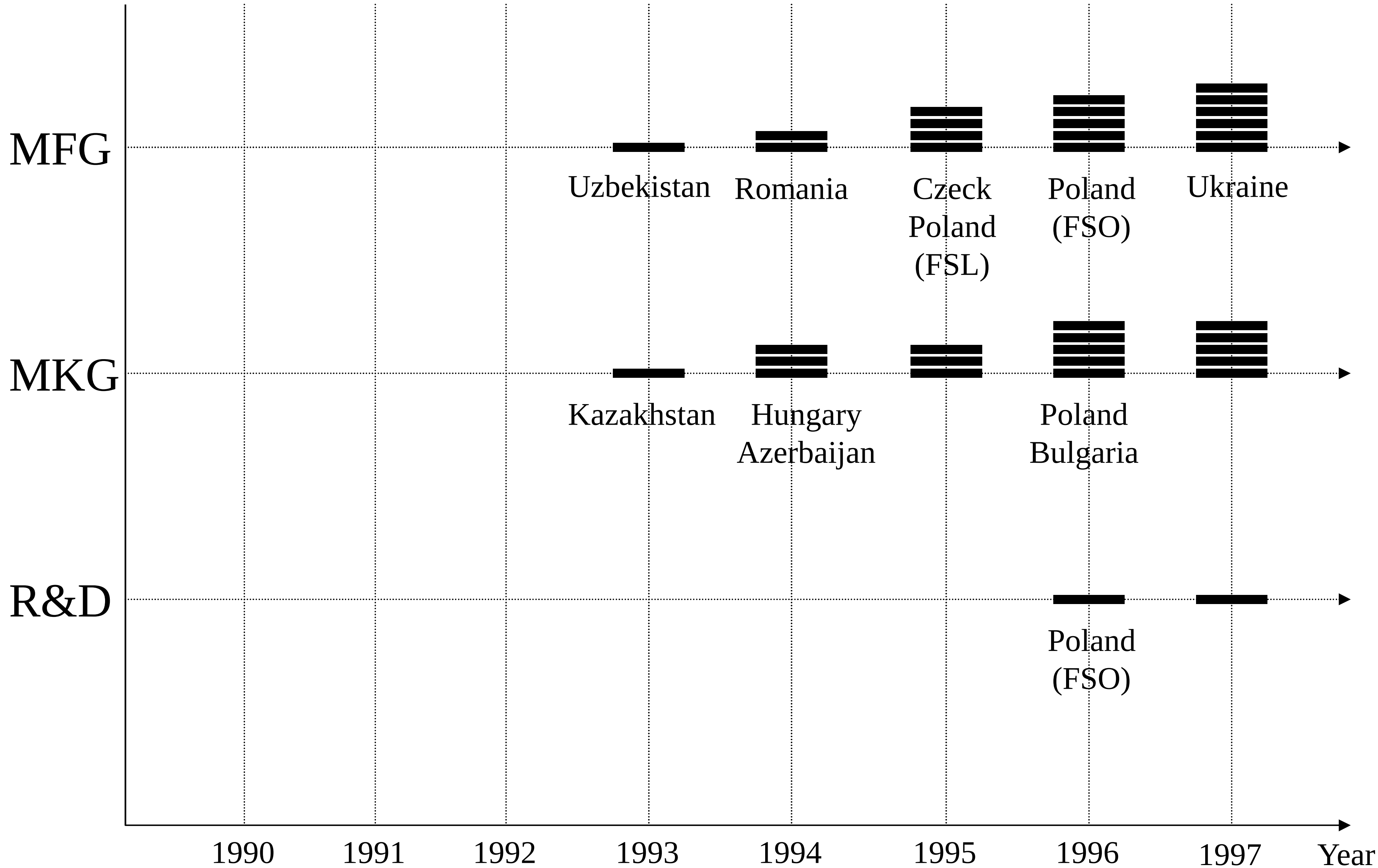


Figure A2.35 Hyundai's globalization

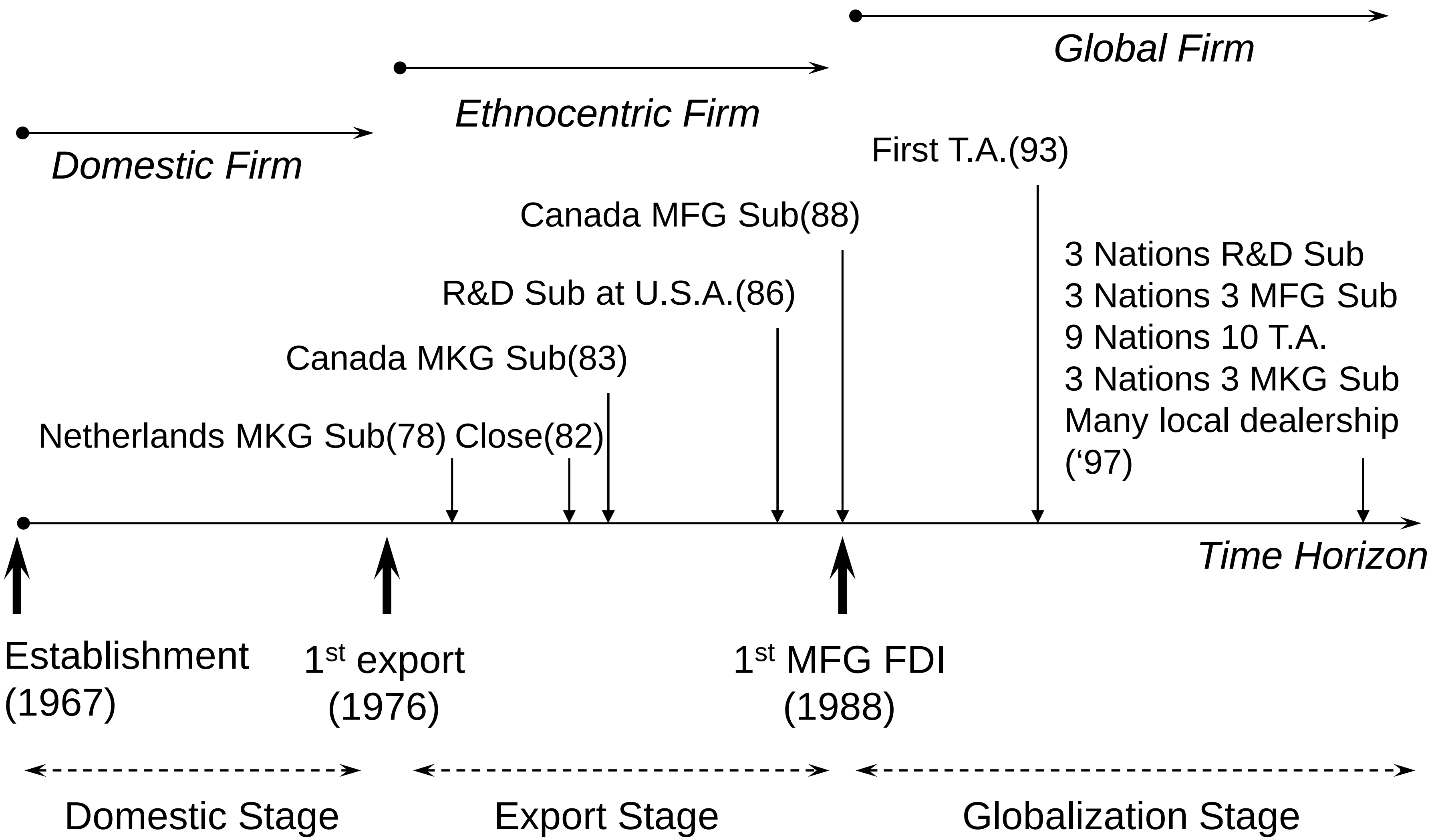
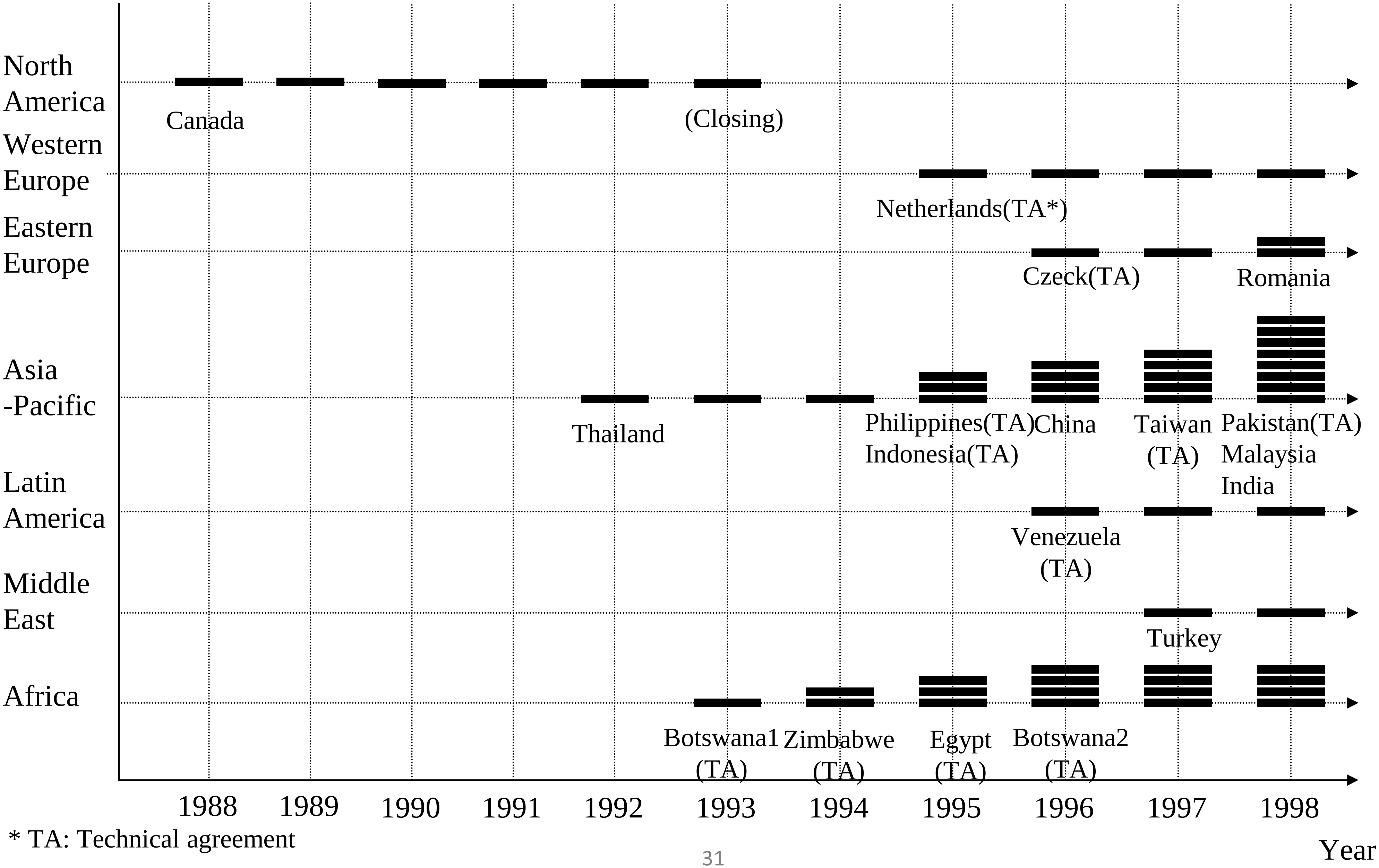


Figure A2.36a Hyundai's globalization by function

(a) Manufacturing



* TA: Technical agreement

Figure A2.36b Hyundai's globalization by function

(b) R&D

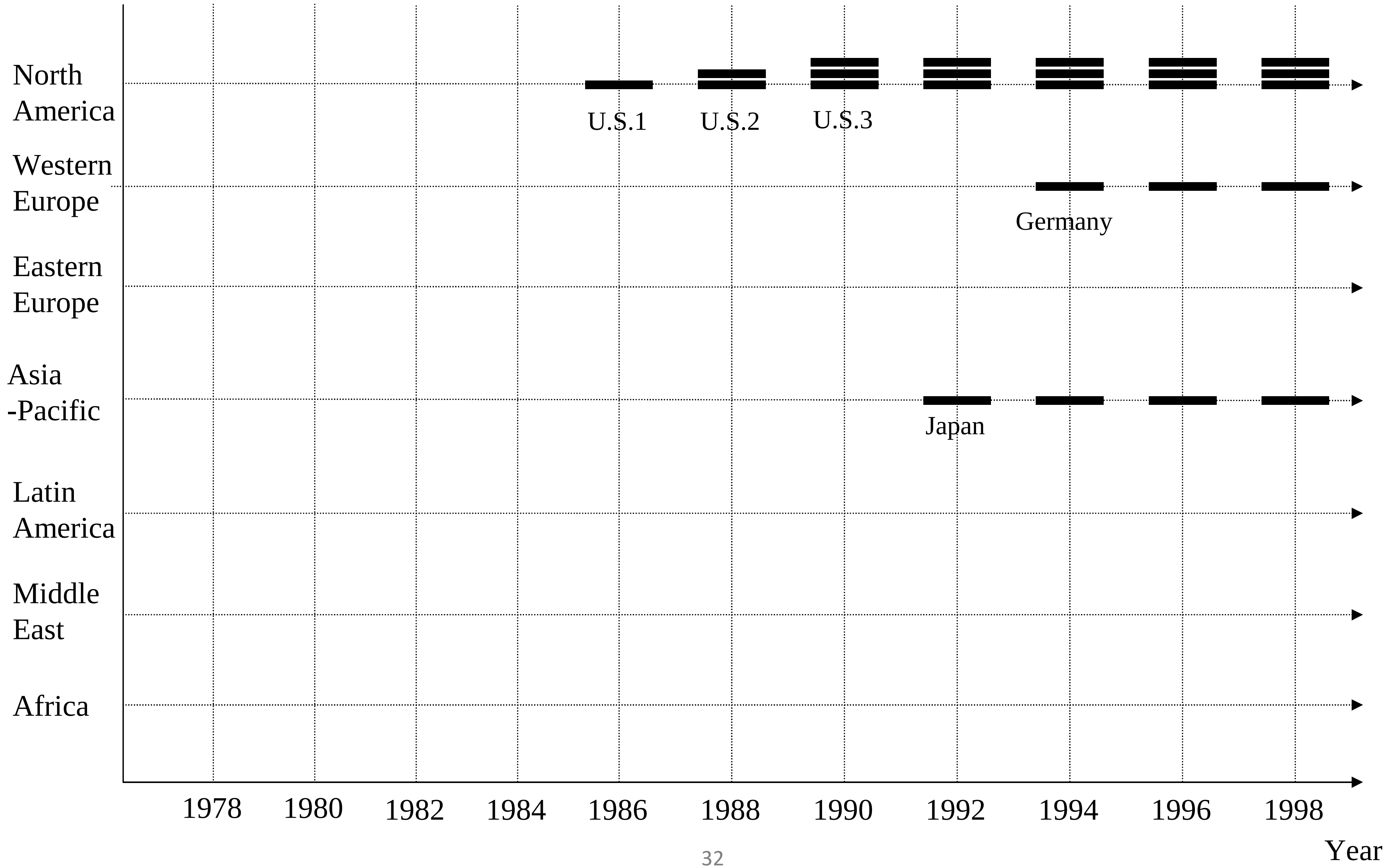


Figure A2.37 Hyundai's globalization by region

(a) North America

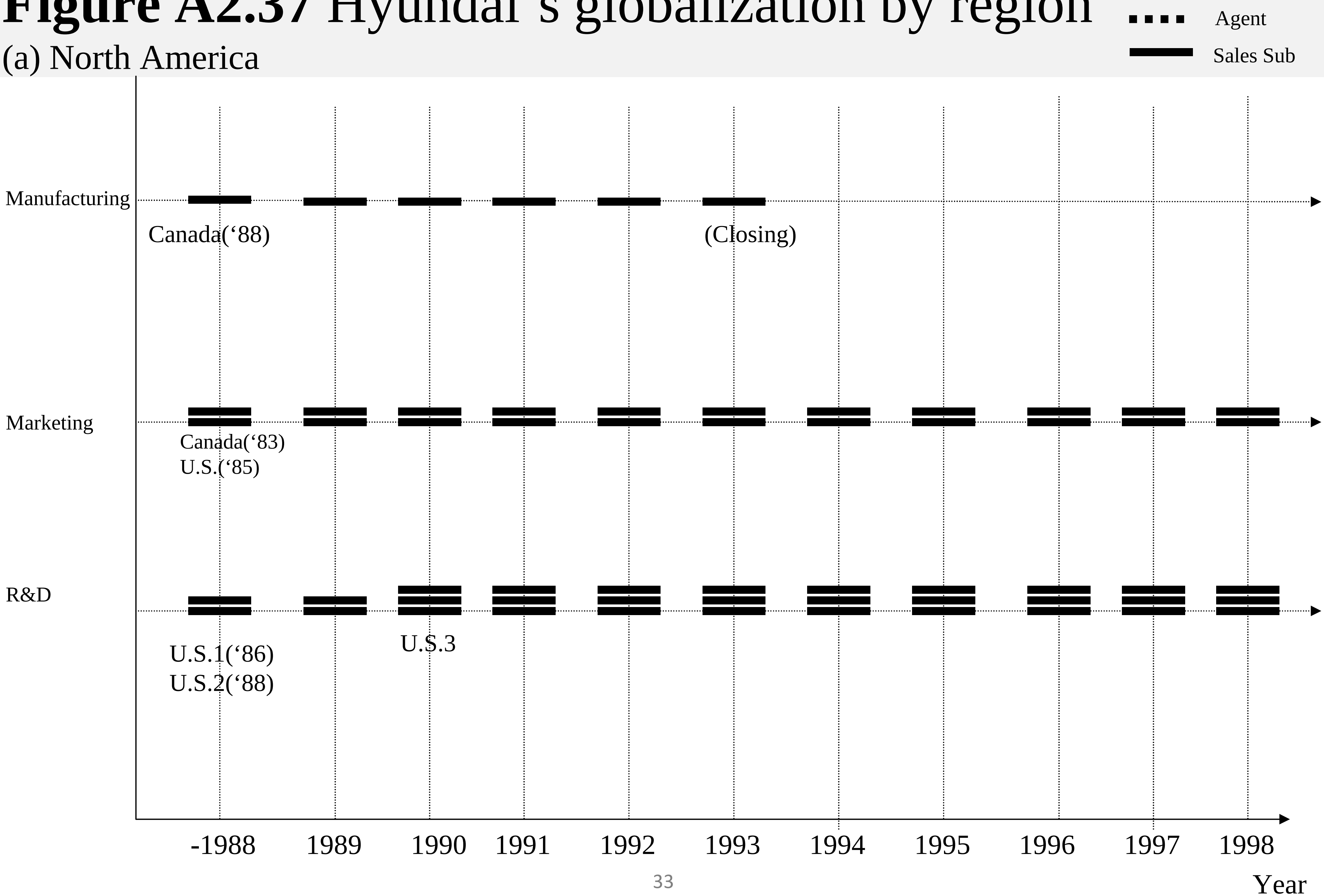


Figure A2.37 Hyundai's globalization by region

(b) Asia-Pacific

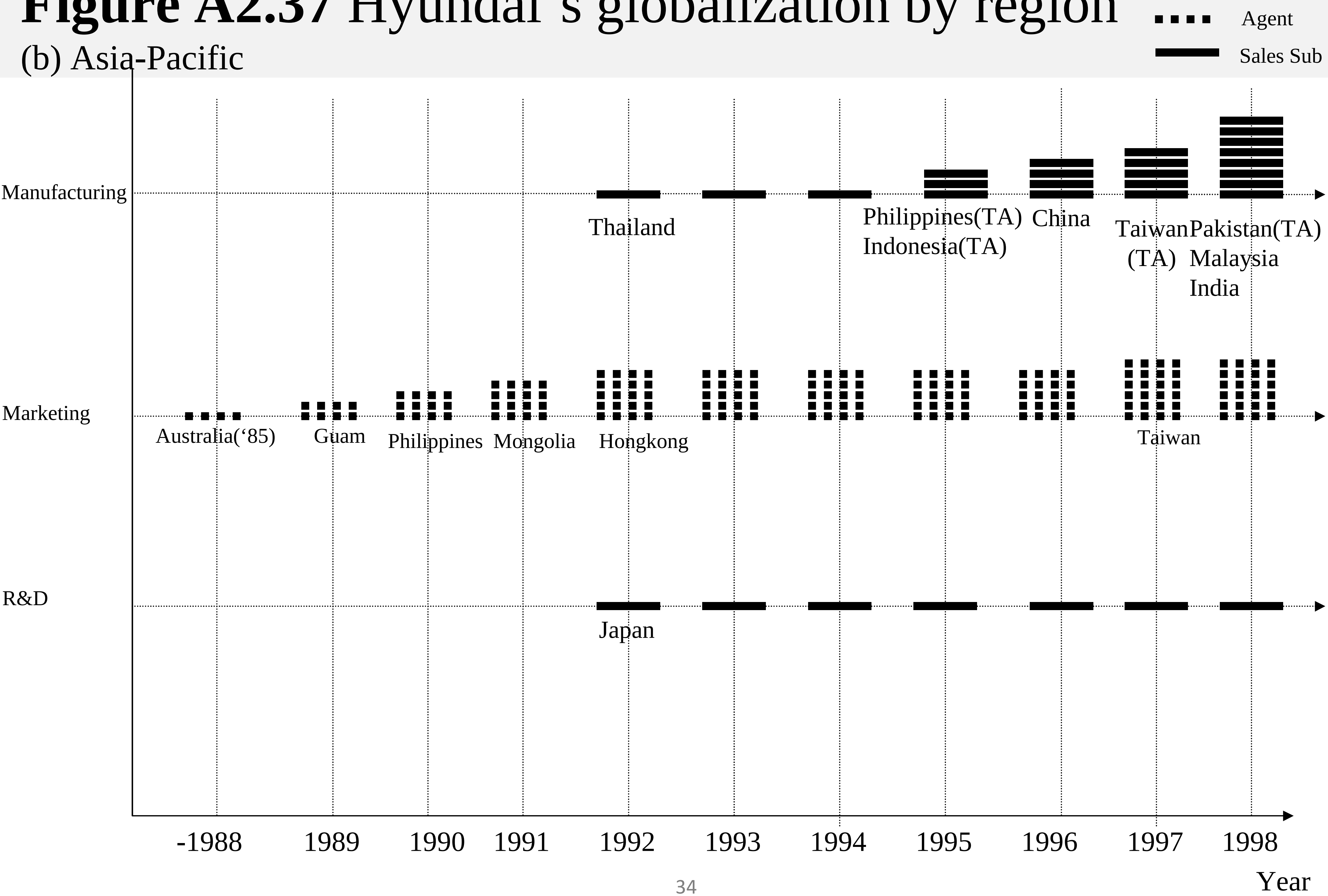


Table A2.2 Comparison of chaebols – Daewoo and Hyundai

Attributes	*Daewoo* Motor Co.	*Hyundai* Motor Co.
Market share in the Korean car market (in 1993)	About 20%	About 50%
Time (year) to enter the automobile industry	1978	1967
Total asset – business group as a whole (as of 1996)	US$39.1 billion	US$54.6 billion
Business portfolio (sales ratio) – business group as a whole (as of 1997)	– Automobile: 17% – Construction: 10% – Electronics: 16% – Heavy Industry: 10% – Petrochemical: - – **Textile/Trade: 42%** – Logistics/Shipping: - – Financial/Services: 5%	– **Automobile: 33%** – Construction: 14% – Electronics: 6% – Heavy Machinery: 15% – Petrochemical: 9% – Textile/Trade: 9% – Logistics/Shipping: 5% – Financial/Services: 9%

Figure A2.38 Manufacturing capacity expansion – Daewoo and Hyundai

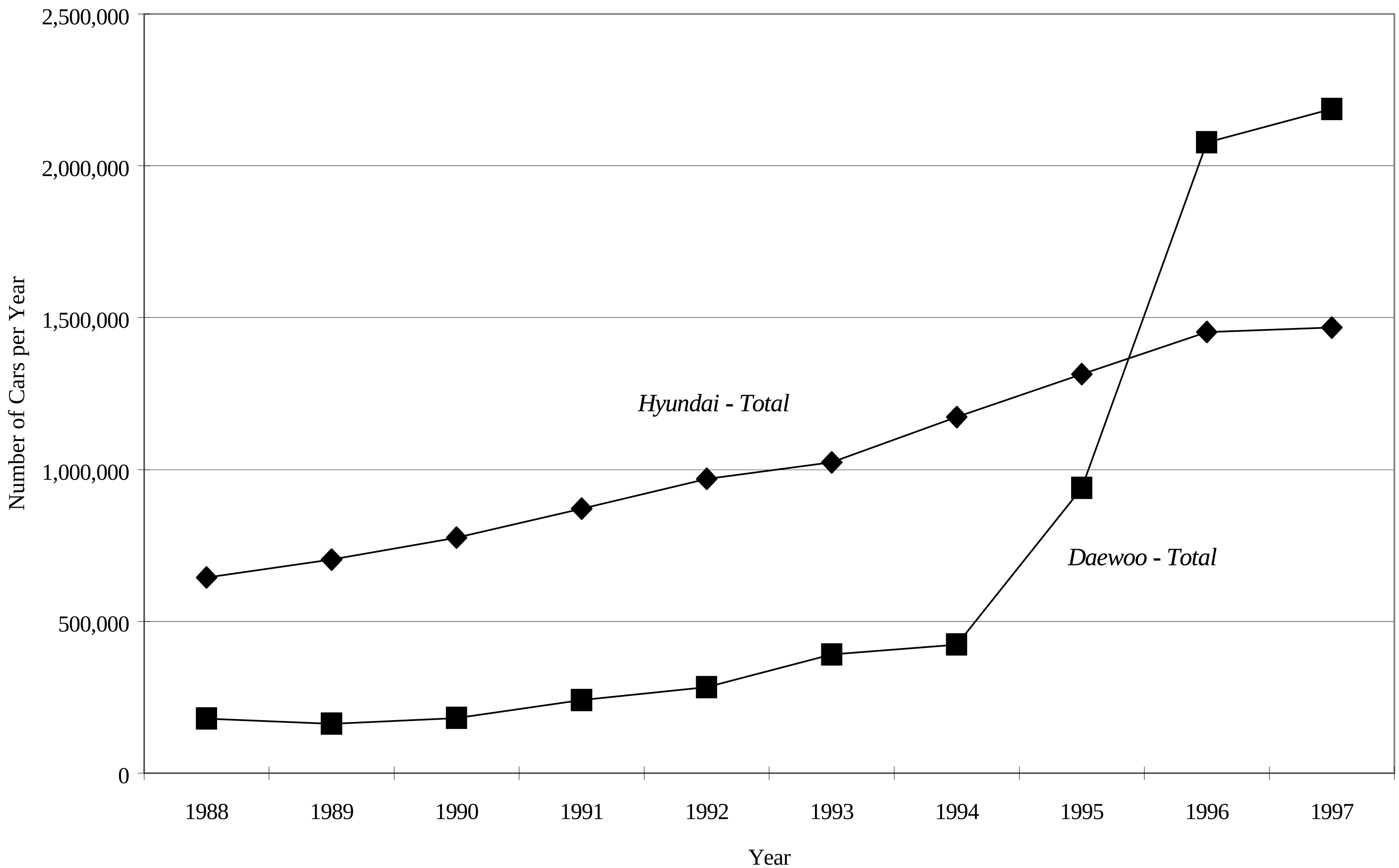


Figure A2.39 Domestic versus foreign manufacturing capacity expansion

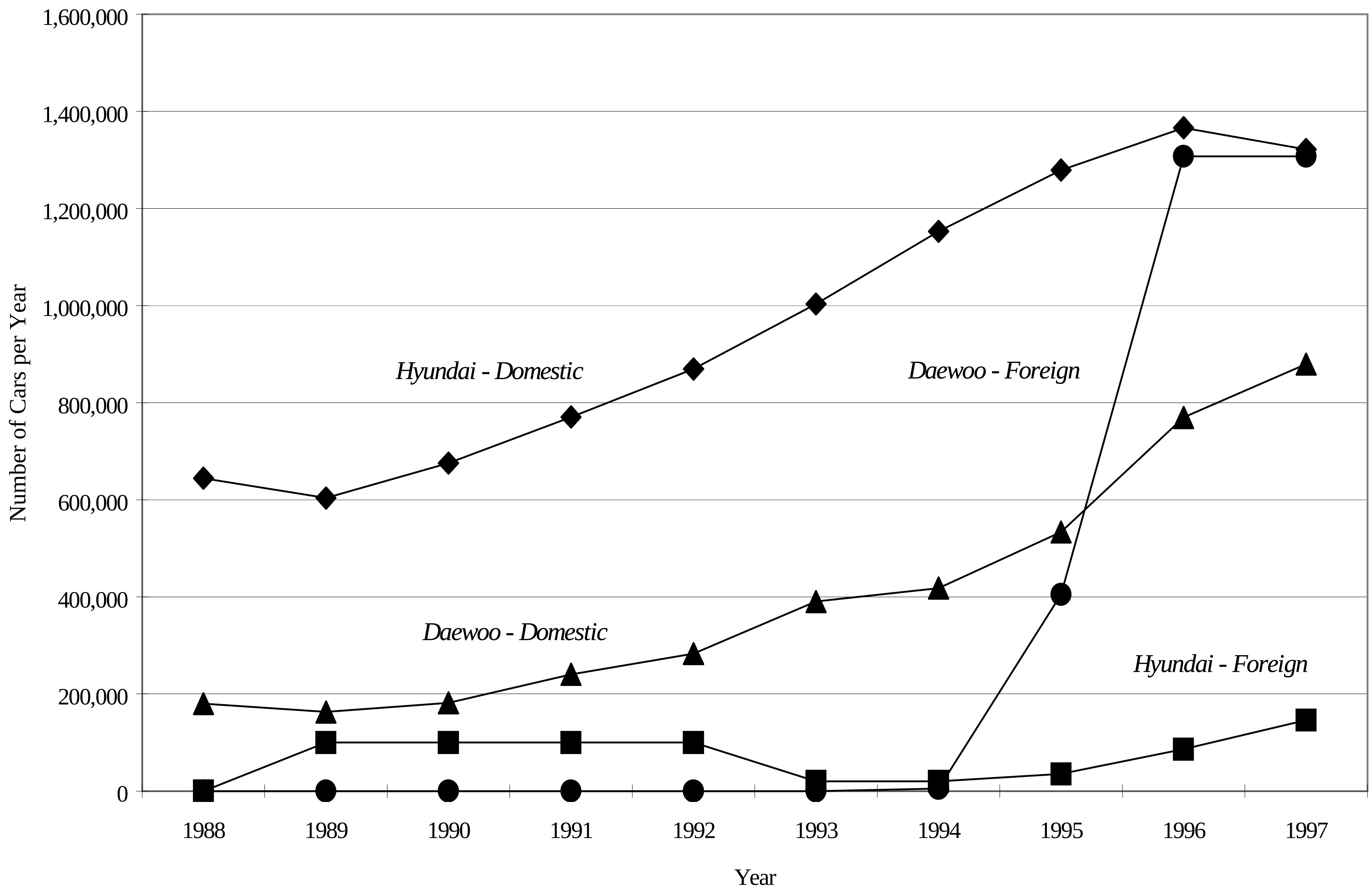


Figure A2.40 Global market-function strategy mix – Daewoo and Hyundai

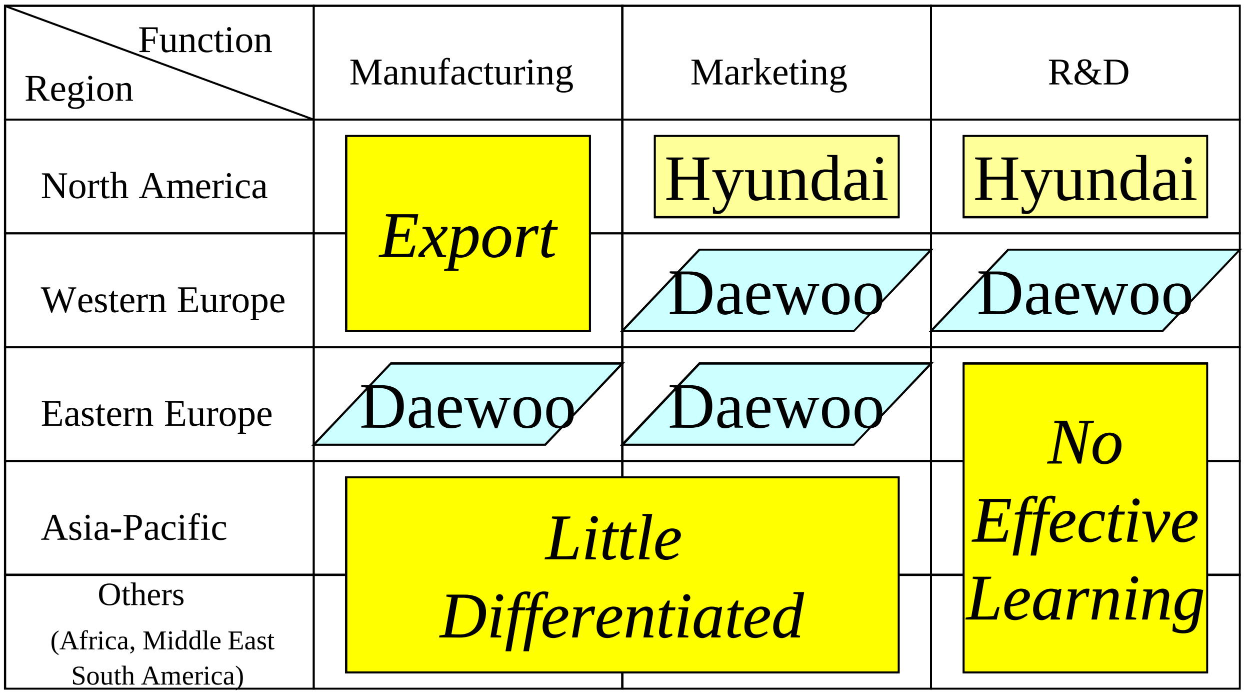


Figure A2.41 Global learning propensity dynamics – Daewoo

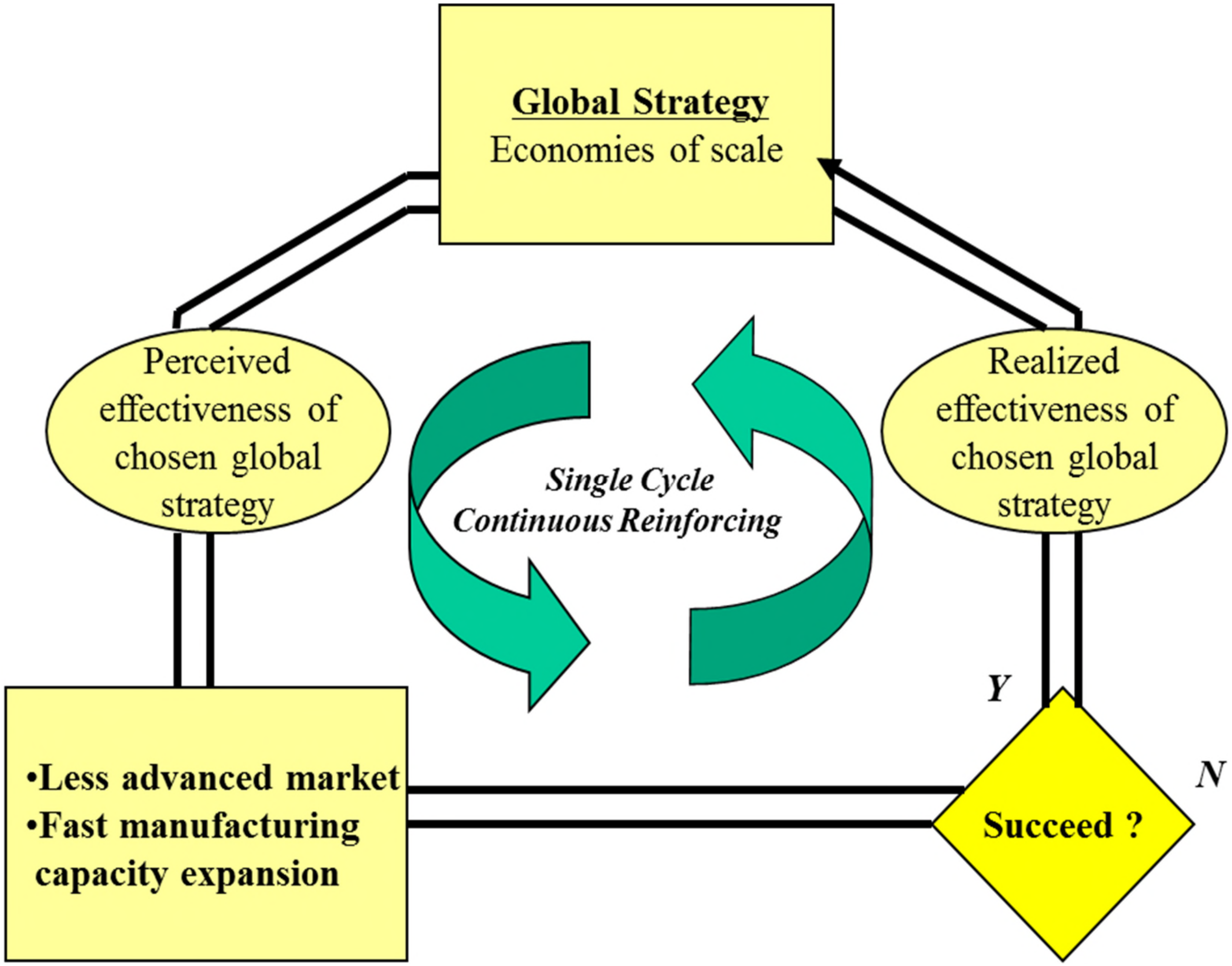


Figure A2.42 Global learning propensity dynamics – Hyundai