

## 9 Technology and Competitive Advantage

### 9-2 Model of Product Evolution

#### 1 Purchase Behavior of Consumers

- 1) Setting of the maximum acceptable price
- 2) Searching for information on products that are substitutable alternatives  
= Evaluation of price and function level
- 3-a) No product available at a price less than the maximum acceptable price  
⇒ Postponement of purchase
- b) One piece of product available at a price less than the maximum acceptable price  
⇒ Purchase of that product
- c) Plural products available at price less than the maximum acceptable price  
⇒ Selection based on the trade-off between price and function

$$\begin{aligned} \text{Max. } U &= \alpha Z - \beta P \\ \text{S.T. } P &\leq P_{\max} \\ \alpha, \beta &> 0 \end{aligned}$$

U: Utility obtained from the product

Z: Function level

P: Price       $P_{\max}$ : Maximum acceptable price

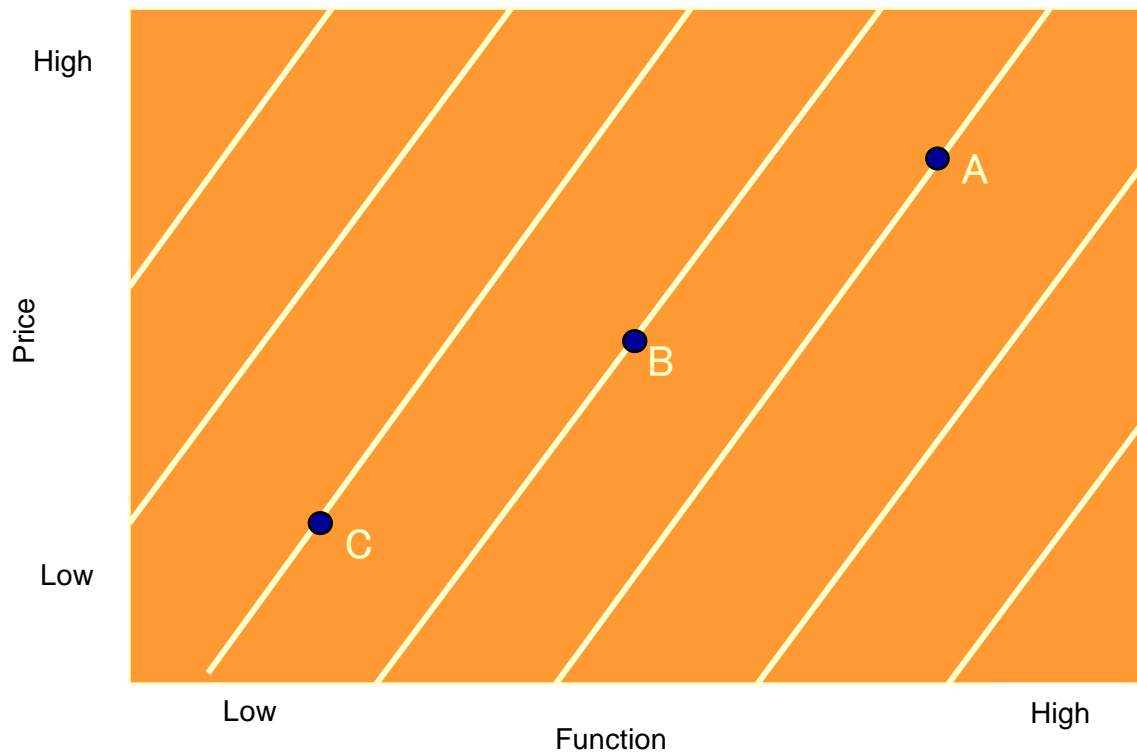
$\alpha$ : Weight of monetary utility perceived by the consumer

( $\alpha / \beta$ : Trade-off between price and function)

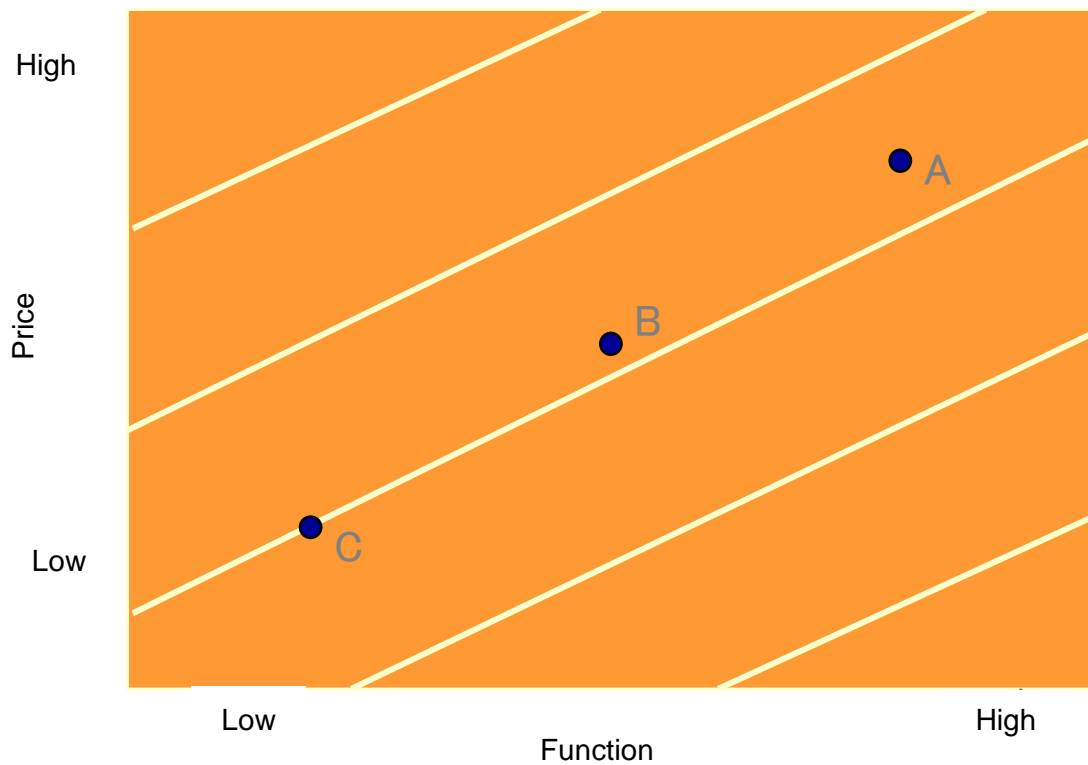
◆ Assumption: The higher the function, and the lower the price, the higher the purchaser's preference becomes.

◆ Indifference curve: The products on that curve are indifferent for the purchaser.

#### 1.2 Indifference Curve of Consumers (1) Function-Focus



### 1.3 Indifference Curve of Consumers (2) Price-Focus

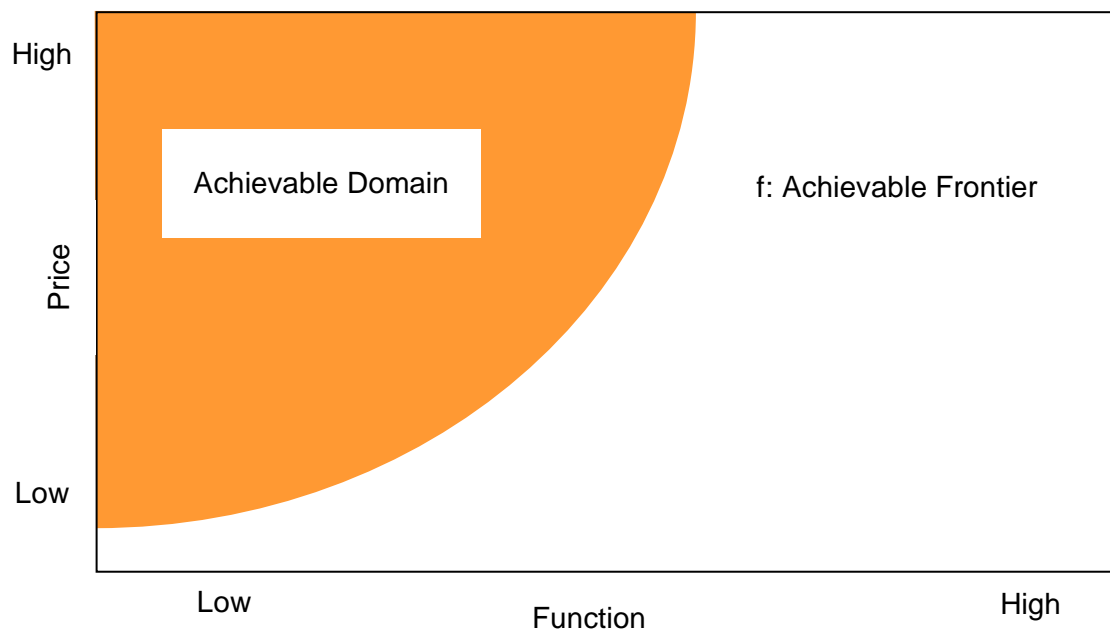


Origin: Shintaku, Junjiro, *Competitive Strategies of Japanese Companies*, Yuhikaku Publishing, 1994, chapter 4

## 2 Company, Technology

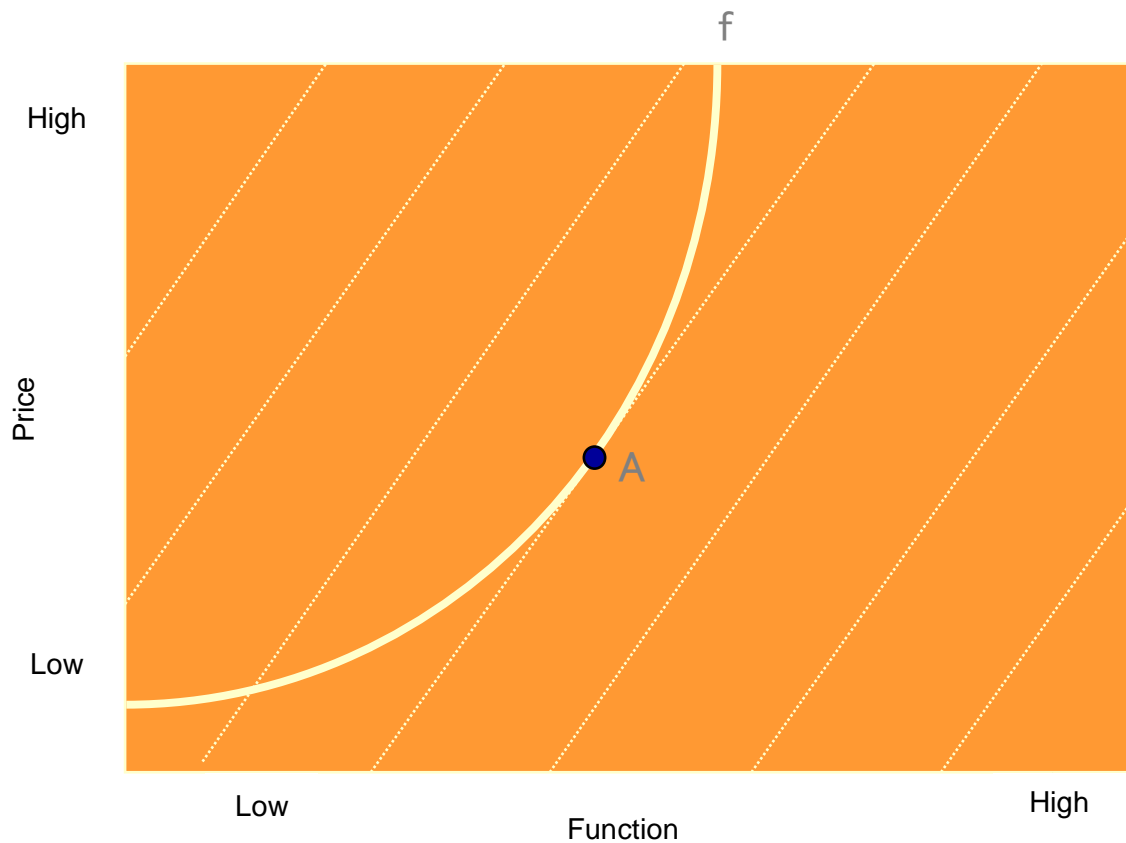
- ◆ Achievable Frontier: An assembly of products which have achieved the lowest cost for a given function and the highest function in a given cost at some point in time
  - To show the trade-off between the differentiation and low cost
- ◆ Achievable Domain: Upper-left section of Achievable Frontier

### Achievable Frontier



Origin: Shintaku, Junjiro, *Competitive Strategies of Japanese Companies*, Yuhikaku Publishing, 1994, chapter 4

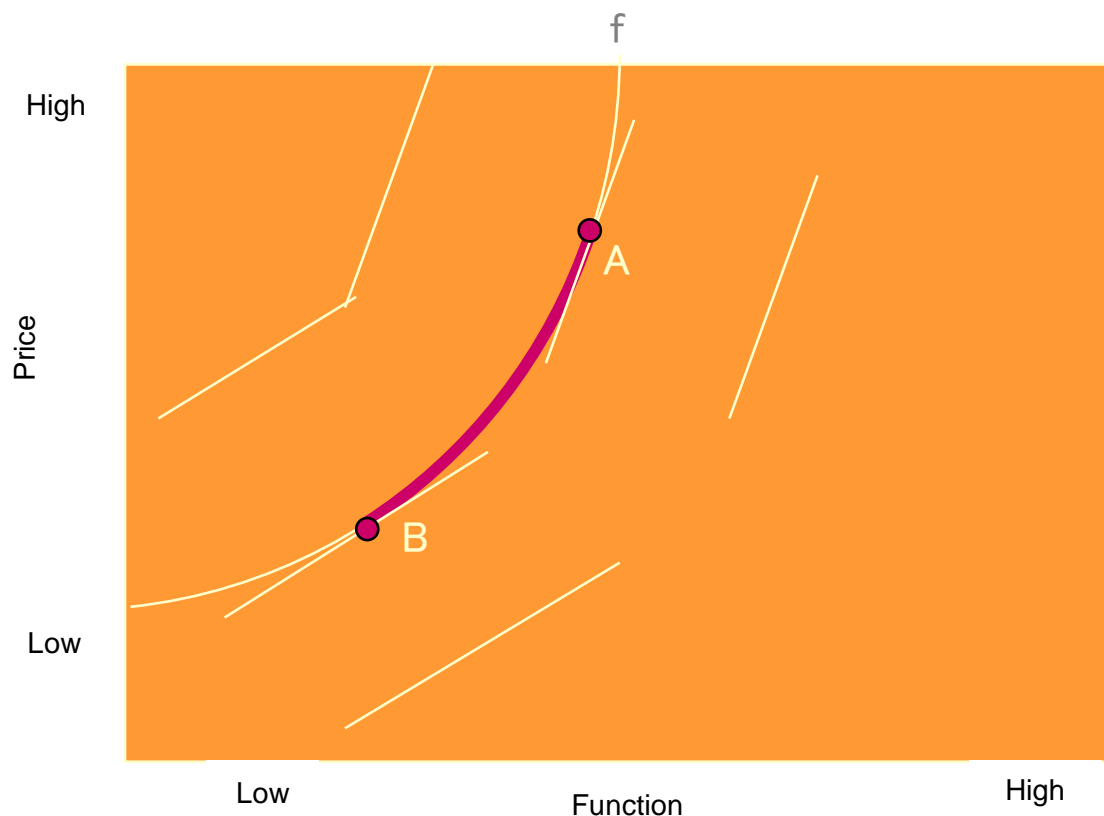
## 3 Consumers' Choice



Origin: Shintaku, Junjiro, *Competitive Strategies of Japanese Companies*, Yuhikaku Publishing, 1994, chapter 4

### 3.1 Market Frontier

- ◆ To the purchaser <a>, the product A on Achievable Frontier is most suitable.
- ◆ Likewise, to the purchaser <b>, the product B on Achievable Frontier is most suitable.
- ◆ As the market in totality, assuming there are the function-focused purchaser <a>, and the price-focused one <b>, and another purchaser with a preference in between these two, the assembly of the most suitable products to each purchaser, which is Market Frontier, is AB.



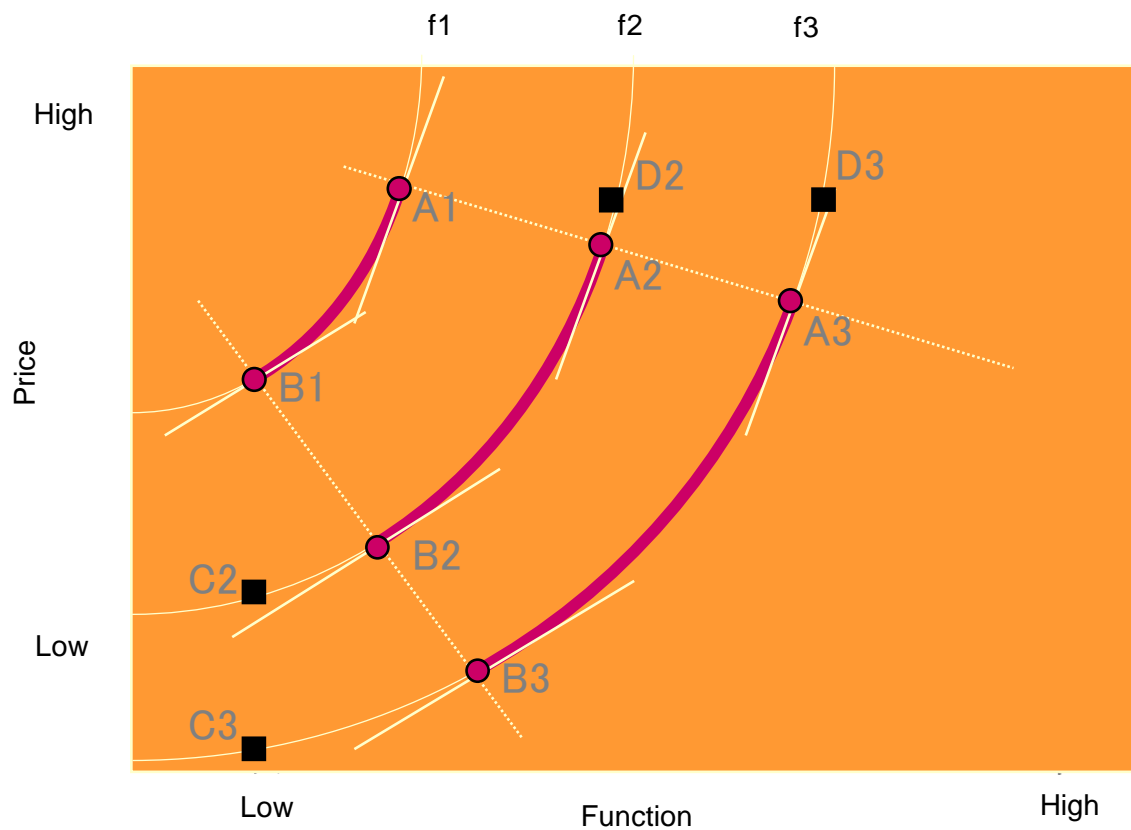
Origin: Shintaku, Junjiro, *Competitive Strategies of Japanese Companies*, Yuhikaku Publishing, 1994, chapter 4

- ◆ The choice between the differentiation strategy and the cost-leadership strategy, indicated in the fundamental formats of competitive strategies (Porter), can be treated as an expression of the choice on Marketing Frontier, which is the trade-off.
- ◆ With the introduction of an evolution of products, the modality of competitive strategies turns out different.

## 4 Patter of Product Evolution

### 4.1 Normal Innovation

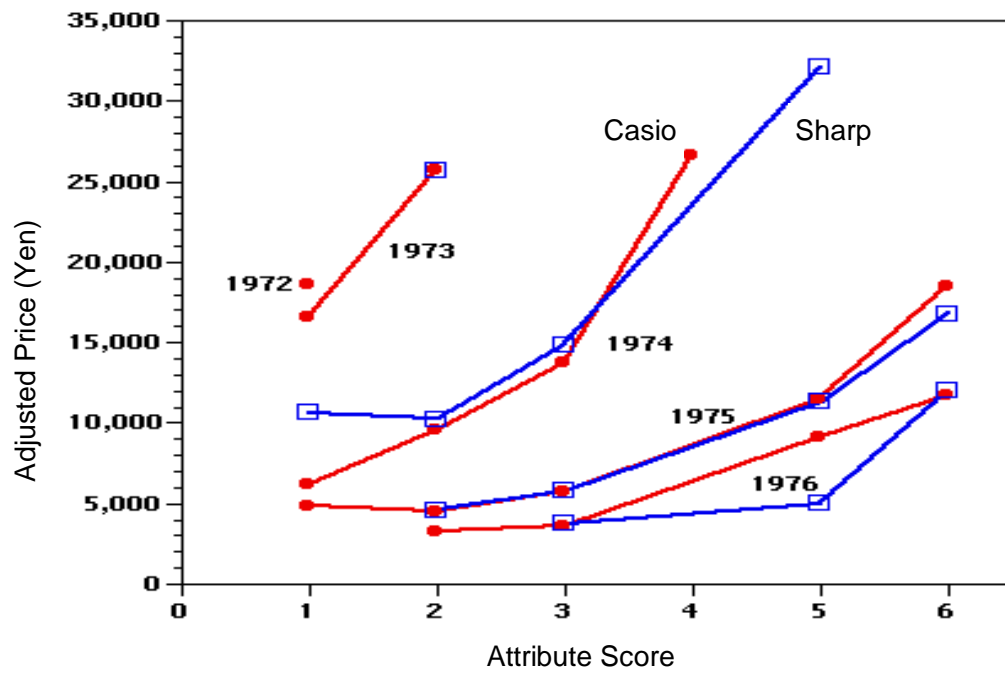
- ◆ Although effect of an individual innovation is small, its cumulative effect turns out enormous.
- ◆ A new product, positioned in slightly the lower-right from the current Achievable Frontier, comes into the picture, thereby Achievable Frontier shifts toward the lower-right.
- ◆ As there is no change in the purchaser's indifference curve and its distribution, Market Frontier likewise shifts down toward the lower-right.

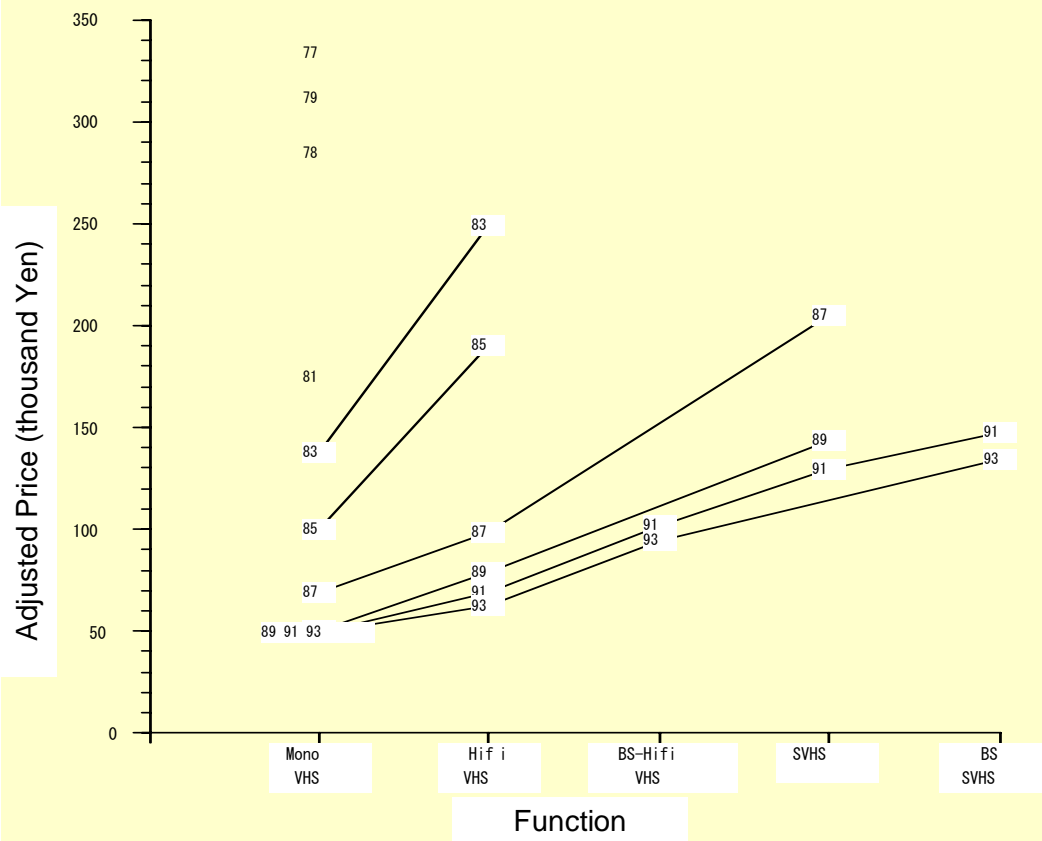


Origin: Shintaku, Junjiro, *Competitive Strategies of Japanese Companies*, Yuhikaku Publishing, 1994, chapter 4

- ◆ At this time, C2 and C3, the products only designed to be incrementally lower in price than low-priced products, are possible to lose their markets. (TI's digital watches, home computers)
- ◆ Casio's case

Diagram 4-16 Electronic Desktop Calculators of Casio and Sharp (1972-1976)

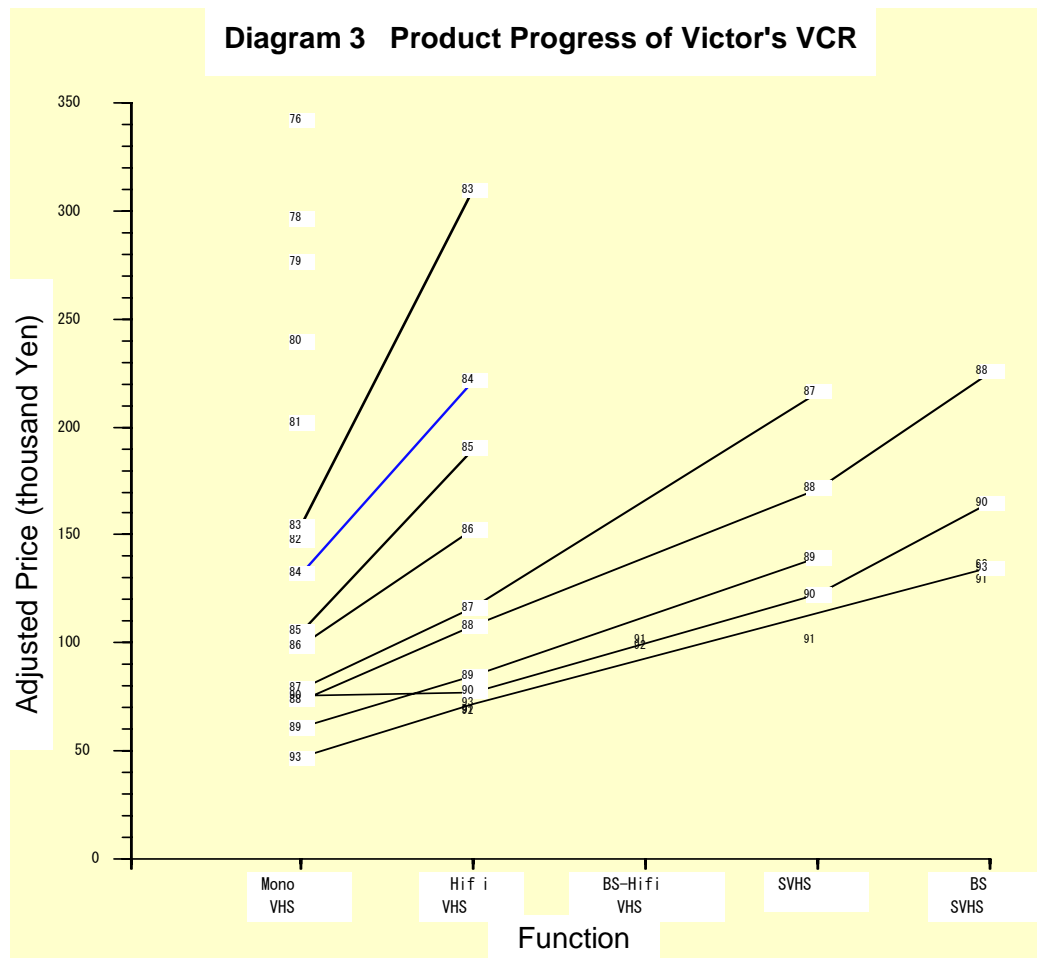


**Diagram 4 Product Progress of Matsushita's VCR**

Note: Adjusted with deflator for gross national expenditure setting 1985 as 100. Figures in the diagram indicate years of introductions. Of biennial new products, only ones in the same year and same type at lowest prices have been covered.

Drawn by Shintaku





Note: Adjusted with deflator for gross national expenditure setting 1985 as 100. Figures in the diagram indicate years of introductions. Of new products, only ones in the same year and same type at lowest prices have been covered.

Drawn by Shintaku

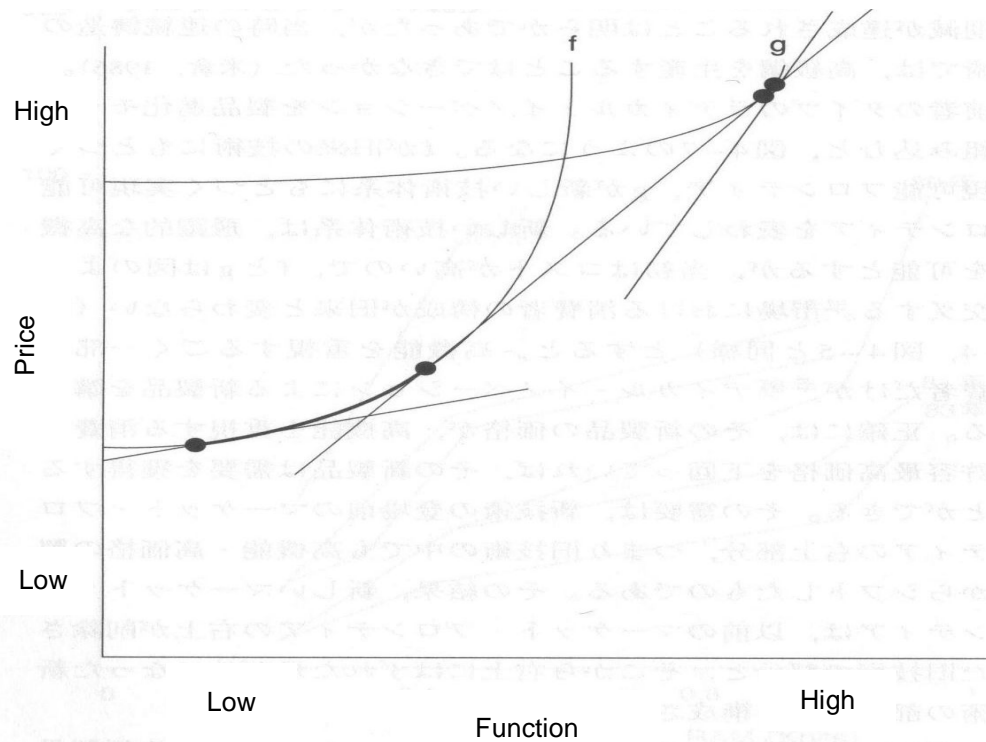
## 4.2 Revolutionary Innovation

### ▼Diagram 4-7

Emergence of New Product by Radical Innovation

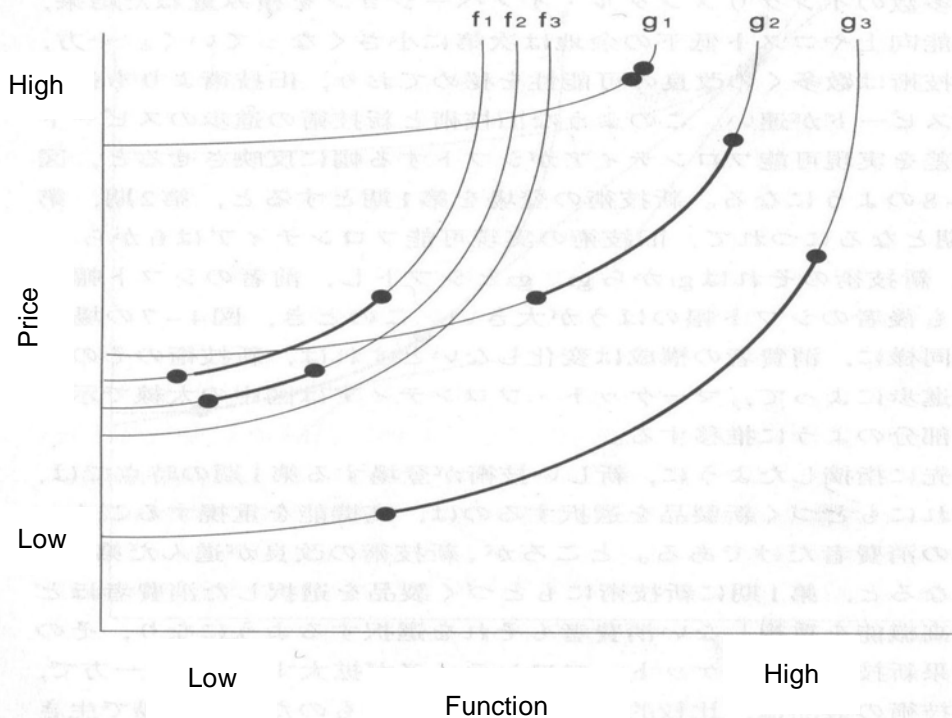
## ▲ Diagram 4-7

## Emergence of New Product by Radical Innovation



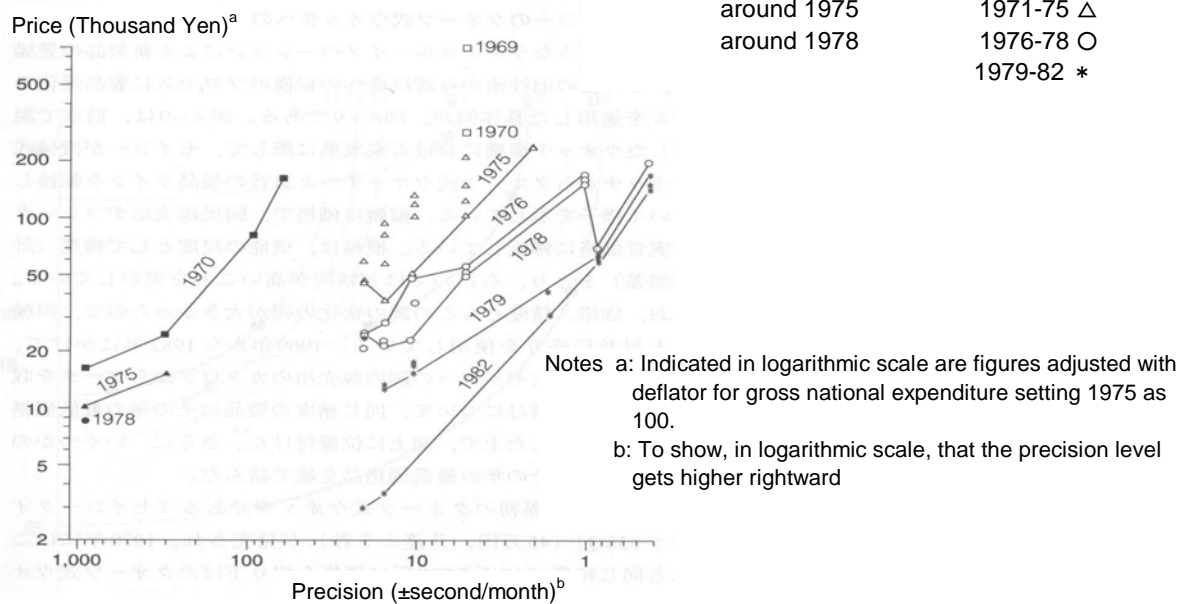
Drawn by Shintaku

▲Diagram 4-8  
Technological Shift from Old to New



Drawn by Shintaku

▲ Diagram 4-9  
Seiko's Shift to Quartz Watch (1969-1982)



Drawn by Shintaku

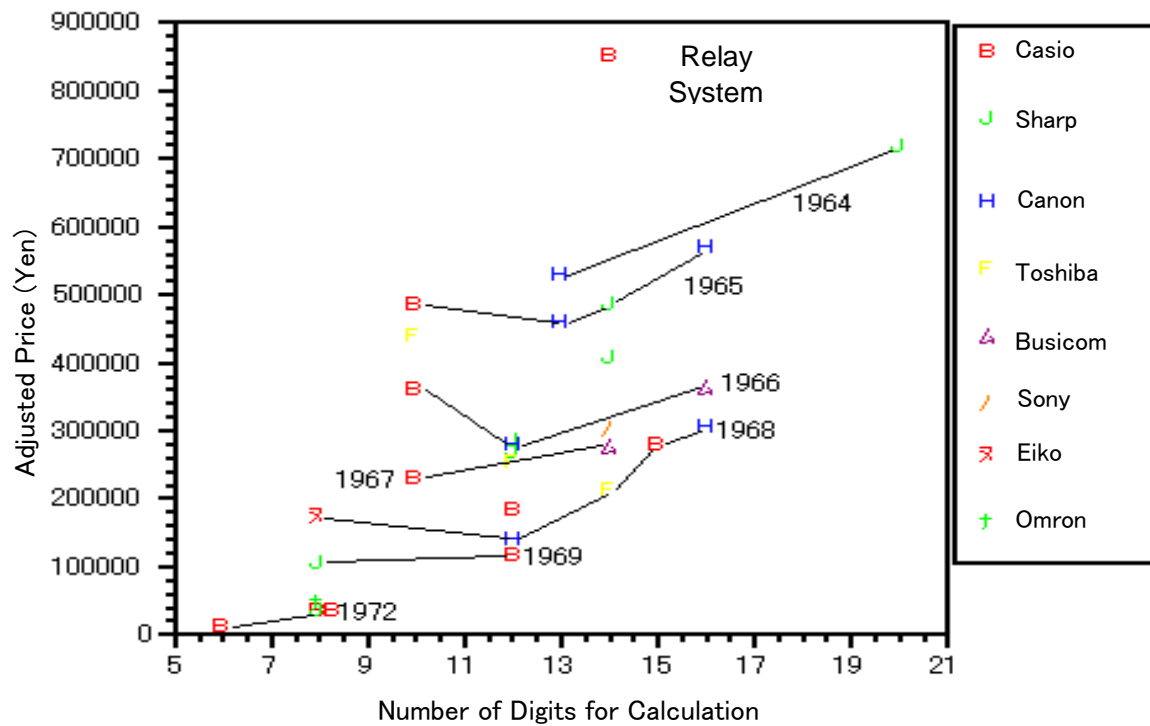
### 〈History of Electronic Desktop Calculator〉

- ◆ 1962: Electronic calculators with vacuum bulbs developed by SAMLOCK COMPTOMERTER
- ◆ 1964: Sharp and Canon introduced (desktop) calculators with transistors
  - Sharp's product at 535,000 Yen
  - Average price of mechanical calculators was 52,800 Yen.
- ◆ But it was by far superior in the calculation speed and calculating functions
- ◆ Initially it dealt with the demand from scientific/technological computations.
- ◆ Subsequently the office usage became its main constituent replacing mechanical models rapidly.
- ◆ Reversals: Production amount in 1967, production quantity in 1970, and price in 1974

### 4.3 Niche-Creating Innovation

- ◆ Demand for the personal usage started appearing little by little.
- ◆ But the two innovator companies lost their shares.
  - Sharp's monetary share: 25.5% in 1971 → 14.5% in 1975
  - Canon's monetary share: 14% in 1971 → 8.8% in 1975
- ◆ On the other hand, the share of Casio, follower, increased: 6.5% → 26.3%
- ◆ QT-8D by Sharp in 1969 was priced 99,800 Yen with 8 digits, i.e., 10,000 Yen per digit
  - Hardly salable, not enough digits for office works, too expensive to personal use
- ◆ Casio Mini in 1972: 12,800 Yen with 6 digits
  - Not that some new technology was employed. Closely focused (on housewives keeping household accounts), discarding functions, the firm aimed at reducing the cost by mass production.

Diagram 4-12 Product Progress in Early Phase of Electronic Calculators



Drawn by Shintaku

Sharp's Microwave

