

Competition, Compatibility, and Standards¹

Standardization and compatibility are extremely important in modern economies, especially in information processing industries. While standards provide benefits, there are often serious social costs.

Compatibility and Standardization

Compatibility is the result of coordinated product design, enabling the products to work together (wheels).

There are five classes of compatibility:

1. **Physical compatibility** – Physical objects are designed to fit together physically or electro-magnetically (the way that peripheral and CPU equipment communicate with a computer).
2. **A de facto standard** – One of a number of competing standards wins and followers begin to imitate the successful products (using Microsoft's Windows platform).
3. **A vendor may choose to give up proprietary control of a technology, or license it cheaply.** This is in order to make it more credible as a market standard (Sun's licensing of Java). With this form of compatibility, imitation enhances the value of the product and so the price may rise (IBM's Java software development). This contrasts the law of diminishing returns where with more imitation, the leader loses market share and thus the price is reduced.
4. **Direct government regulations** (FCC's mandatory choice of the CBS color television standard).
5. **The international standardization commissions** (CCITT, CCIR, ISO) that work to achieve international compatibility. There are two problems here: slow proceedings and adoption of a standard that is not the best choice.

Benefits of Compatibility

There are four types of benefit from compatibility:

1. **Network Externalities: Many products must be linked to physical or conceptual "networks" in order to create value.** Having a common language is one example, but communications and computer networks have become essential in today's information society.
2. **Competitive Effects: When competing products are compatible, companies tend to compete on price rather than design.** Standard products tend to become commodity markets, which enhances price competition and yields economic efficiency. At the same time, some aspects of compatibility encourage entry, allowing any firm to enter a market with a single product (i.e., introduce a single computer printer rather than a complete line of printers).
3. **Variety: While compatibility requirements sometimes limit variety, systems compatibility can also increase available variety by allowing "mix and match" purchase** (such as stereo components). The value of systems compatibility depends on (1) the value added by each component, and (2) the absence of fit between buyers' preferences and available components.
4. **Cost Savings: By allowing greater scale economies and by allowing the use of interchangeable parts, standardization reduces costs associated with production and assembly.** When more people have the original product, complementary products may be more readily and cheaply available (off the shelf software). Additionally, standardization also saves on the costs of learning to use the product (Windows-based programs).

How does standardization impact competition?

1. With standardization, competition will drive the prices for the replacement parts down, while the manufacturer still makes a profit. The purchase of proprietary systems locks a buyer into one manufacturer's replacements and parts. This allows the manufacturers to create natural monopolies and raise prices of "spare" parts.
2. Standardization avoids the problem of losing a technology (a bankrupt supplier cannot support its products) and thus enhances market growth and competition, since a seller need not be both financially secure and committed to the industry in order to sell a product.
3. Standardization can replace the need for regulations (i.e., Long distance telecommunications).

¹ Farrell, Joseph and Garth Saloner in **Product Standardization and Competitive Strategy**, ed. H. Landis Gable (Amsterdam: Elsevier Science Publishers B.V., 1987).

Compatibility may have adverse effects on competition.

1. The mix-and-match effect of compatibility can reduce individual company sales volumes and therefore raise costs and prices, making some buyers worse off.
2. If competing standards are proprietary, companies will compete fiercely to have their technology be adopted as the standard. This may be good competition for buyers at first, however when a standard is reached, it can lead to monopoly power.

Compatibility and Innovation

Because options and needs change so fast, and because the standardization process is imperfect, it is important that we should not be limited to old choices.

The optimal decision must depend on the gross benefits of switching standards: (1) the costs of switching, and (2) the extent to which a new technology will remain the best alternative. Since we do not have perfect information, many times this problem is left to the market. Sometimes the market does not respond to new technology correctly. Many times the market will not switch when it should (**excess inertia**) or abandons a technology when it should not (**excess momentum**). This is usually caused by problems of coordination or from the importance of the installed base.

Coordination Problems

An industry may get stuck on an old and inferior technology even when a new technology is preferred. This happens when a group is reluctant to sacrifice the benefits of being compatible. There is a risk that one might switch, but others will not follow. If all users have complete information and will be better off with the new technology, they will switch. However, the lack of complete information limits switching even when everyone prefers the new technology (symmetric excess inertia). Therefore, there has to be a user with a strong preference for the new technology that will be an early adopter. If there are no early adopters, the new standard will never be adopted.

Installed Base Problems

1. **There are new users entering the market, but old users do not switch to the new standard:** New users preferences, expectations, and choices determine market outcome. They may not choose the new standard because the incompatibility costs are borne by them, leaving a larger installed base of the old standard. If they decide to use the new standard, they can leave earlier users stranded with the old standard.
2. **There are no new users entering the market and users that adopt the new standard early are not immediately followed:** The fact that a new standard is not immediately followed makes each user reluctant to switch even if it would be beneficial to switch. However, if the old standard is undesirable, inertia will be reversed.

Timing of Standardization

The decision of when to standardize is just as important as whether to standardize and what standard to adopt. There are advantages to early standardization as well as for waiting.

Early Standardization advantages

- Yields a longer and earlier flow of benefits
- Hastens the growth of the market
- Vendors of incompatible products will not sink costs in developing their technology

Waiting to standardize

- When there is little information about which technology will be the new standard
- Waiting is valuable when the choice is highly irrevocable (physical and learning costs of switching)

Information required to make correct choice

- Know important attributes of standard and how they compare to users' preferences
- The scores of each possible standard on these attributes
- Costs, current and future need to be worked out