

Such moves are in response to demands from multi-vendor environment users. From the viewpoint of retailers, direct sales to users are being replaced by agent sales. VAR sales of general-purpose software products in the workstation market are expected to increase.

Personal computer (PC) software distribution channels are shown in Table 2. When a software developer concludes a sales contract with a distributor, its software is distributed through a single channel.

Although sales through distributors declined from 69.6 per cent in 1985 to 39.6 per cent in 1987, direct sales and sales through special retailers have increased. PC software is shifting away from games towards business application software, such as computer-aided design (CAD), word processing and special accounting software programs. Such software is being sold by special retail stores.

5 Development of New Technologies

Standardization

As the number of computer users increases, the number of non-specialist users grows. These users, not satisfied with computer incompatibility, have demanded that standards be established for personal computers.

Standardization of network architecture by Open System Interconnection (OSI) provides a framework for the next generation of information and communication network technologies. The

Interoperability Technology Association for Information Processing (INTAP) was created in July 1986 as part of MITI to establish OSI functional standards.

OS Competition in the PC Market

An important technical trend in the PC market is the development of operating systems. The new generation of OSs appeared in 1988. The OS/2, UNIX and TRON OSs have attracted the most attention. Japanese hardware manufacturers believe that OS/2 will be the next generation of OS.

According to a Japan Personal Computer Software Association (JPSA) survey on hardware manufacturers, OS/2 was selected because it is the operating system that IBM has adopted. Hardware manufacturers and software developers anticipate that OS/2 will become the standard for the software market.

A small computer used as a stand-alone can process only a small volume of data. For multiple applications, it must be connected to another data source on a real-time basis. This requires an OS with a network function. MS-DOS is likely to stay with terminals that are compact and inexpensive. Windows (software that acts like a sub-OS) are able to change an MS-DOS machine into a multi-task OS machine.

OS/2 provides a more advanced terminal environment, while UNIX is well-positioned to conduct network management at the back end of a network. Lap-top workstations running on a UNIX OS are indistinguishable from MS-DOS machines and stand a good chance of replacing them. In 1993, an entire PC motherboard will be integrated into a single IC chip.

TABLE 3

Popularity of Operating Systems

System	1987 (%)	1989 (%)
MS-DOS	62.4	13.3
UNIX	55.3	57.8
OS/2		75.9
TRON	38.9	3.6

Source: JPSA interview data.