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The Lotus 1-2-3 Book, , Harcourt Brace Jovanovich, 1989, 0155511904, 9780155511903, 217 pages. .

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Every lesson in this text-workbook template package reviews basic topics and permits hands-on experience with practical spreadsheet applications. By integrating foodservice concepts and spreadsheet applications, students will gain a better understanding of cost control and learn Lotus 1-2-3 at the same time. Contains an abundance of spreadsheet illustrations to facilitate comprehension.

[This book] contains a Guided Tour and ten tutorials that present hands-on instruction. In these tutorials students learn how to plan, build, test, and document 1-2-3 worksheets. Moreover, this book harnesses 1-2-3's power by emphasizing the SmartIcons and other Windows features for calculating, charting and managing data. [This book] assumes no prerequisite knowledge of computers, the Windows environment, or 1-2-3. -Pref.

Today's computer programmers take it for granted that the brass ring of programming is the "killer-app," the next application that will take the market by storm. There have been a number of killer-apps in the history of the software industry—they've come and they've gone—but none has had more staying-power than the oldest killer-app of them all: the spreadsheet. Spreadsheets are still one of the mainstays of computer applications.

Spreadsheets allow the manipulation of numbers and formulas, and their conversion to charts. A feature of spreadsheets that might tend to lock in consumers is their use of macros—programs within the spreadsheet that allow the spreadsheet to perform certain repetitive tasks. Many of these macros prompt the user to enter specific data, allowing even less-skilled data-entry personnel to update, maintain, and make sophisticated use of data. For this reason, many users, particularly business users, are loath to switch to a spreadsheet that disables their old macros. This dependence on macros makes spreadsheets, more than most other programs, very susceptible path dependence. Of course, the cost of converting macros is a real cost that ought to weigh in any consideration of whether a switch is efficient.[1]

Credit for the invention of the spreadsheet goes to Dan Bricklin and Bob Frankston, who created VisiCalc for the Apple II. VisiCalc required 32k of memory to run. A chart from a "roundup" of spreadsheets in the 1982 Personal Computing magazine[2] lists eighteen spreadsheets. Most ran on either the Apple II or on machines with the CP/M operating system. VisiCalc ran on both, as well

as the IBM PC, the Atari 800, the Commodore 8032, the Radio Shack TRS-80, and various HP hand calculators. VisiCalc had a list price of \$250. The most expensive spreadsheet in the roundup was M.B.A, from Context Management Systems, which combined database, graphics, word processing, and communications functions for \$695.

In January 1983, Lotus introduced Lotus 1-2-3 at a price of \$495. It was immediately acknowledged to be a better product than VisiCalc. In December 1982 Gregg Williams wrote in Byte that 1-2-3 had “many more functions and commands than VisiCalc” and that 1-2-3 was “revolutionary instead of evolutionary.”[3] PC World called it “state of the art.”

In October 1983 PC World reported that 1-2-3 was outselling VisiCalc.[4] VisiCalc was removed from the market in 1985 after being purchased by Lotus. Users of VisiCalc were offered upgrades to 1-2-3.[5] Lotus would maintain a dominant market share for almost a decade. Unfortunately, we do not have detailed data on this early market. But from what we have pieced together, it is clear that in the early 1980s a superior product, Lotus 1-2-3, was able to wrest market share away from VisiCalc—and to do it very quickly.

When Excel first appeared in 1985, it was offered only for the Macintosh. Jerry Pournelle, a well-known columnist for Byte (and science-fiction author), wrote (incorrectly but nonetheless prophetically): “Excel will make the Mac into a serious business machine.”[6] In late 1987 Microsoft ported Excel to the PC (running under Windows) and Borland introduced Quattro for DOS. Thus began a market struggle between Microsoft, Borland, and Lotus.

In the early and mid-1980s quality reviews rated 1-2-3's closest competitor to be SuperCalc. PC Magazine, in its “Best of 1986” review had this to say: “If market dominance were based on rational criteria, Computer Associates' SuperCalc 4 would certainly replace 1-2-3 as the leading spreadsheet program. After all, it can do anything that 1-2-3 can do and adds some notable features of its own.”[7]

But although various spreadsheets had attributes that were sometimes considered superior to 1-2-3's, there was no general consensus that any alternative was clearly the best. For example, in October 87 Michael Antonoff, in Personal Computing, said: “SuperCalc, VP-Planner, and Twin lack the elegance of 1-2-3 in links to applications.”[8]

By 1988 the spreadsheet market had developed into a three-way fight among Lotus's 1-2-3, Microsoft's Excel, and Borland's Quattro (Pro). Excel, created to run under a graphical operating system, was a late entry. It was ported from Macintosh only after an early version of Windows became available. Borland and Lotus, on the other hand, did not produce Windows versions of their programs until after Windows 3.0 had proven itself as a successful operating system.

According to reviewers, Lotus 1-2-3 was falling behind the competition in terms of functionality and usability. According to one reviewer, “Excel offers a lot in the form of tantalizing features missing from the current version of 1-2-3.”[10] Another review called Quattro “a powerful spreadsheet with more features than 1-2-3 Release 2.01, yet fully compatible and at a better price.”[11]

These were not isolated opinions. Reviewers in general had a very high opinion of Excel in the late 1980s, and almost as high an opinion of Quattro. Below is a list of review opinions for Excel. This list of reviews is not edited; it includes all the reviews in which the reviewer was willing to state an opinion. Clearly, Excel was thought to be the best spreadsheet.

The reviewers' main reservation about Excel was its need for powerful hardware, due to the memory requirements of its entirely graphical interface (see the December 87 review in PC Magazine). Microsoft's election not to produce a DOS version of the program was something of a gamble. Windows' success was far from assured until version 3.0, which was not available until 1990. To run Excel, DOS users had to load Windows, and then return to DOS for other applications. This had a dampening effect on sales. Also, many of Excel's features worked best with a mouse, and at the time it was rare for PCs to be equipped with a mouse. Furthermore, as is the case with virtually all

graphical software applications, Excel was slower at most tasks than the DOS competition, though it could show results that nongraphical (DOS) based applications could not. Some have guessed that reviewers preferred Excel only because they had modern and powerful equipment. In fact, though the reviews may have exhibited this bias to some degree, they nevertheless usually faulted Excel for its onerous hardware requirements.

Figure 8.1 shows the rankings of spreadsheets by readers of PC World. They were asked to pick the leading spreadsheet. We expect that readers will base their ratings on their experiences, the market shares of the products, and some idea of quality as indicated in magazine articles. These rankings, therefore, are indicators of neither market share, nor quality, but some combination of both.

The dominance of Lotus is clearly seen in the mid- to late 1980s, but in 1988, with the introduction of Excel and Quattro, Lotus's dominance began to erode. The introduction of Windows in 1990 accelerated this decline. By 1992 Excel had surpassed 1-2-3 and Quattro had reached parity. By the time PC World's reader rankings ended, in 1993, the die was cast: Lotus was doomed.

Lotus's fate is clear in Figure 8.2, which gives each spreadsheet's number of annual "wins" (the number of times a product wins a comparison review or is declared to be the best product). Over the ten-year period shown Excel was the clear winner, although Quattro also managed a fair share of wins between 1989 and 1994. The remarkable feature of this chart, however, is that over the entire ten-year period, Lotus 1-2-3 just barely avoids a shutout, managing but a single win.[12]

Figure 8.3, which presents results from reviews that numerically score the three spreadsheets, shows the relative performance more precisely. Lotus's poor performance is easily seen, as is Excel's dominance after two initial poor showings. Note that the horizontal axis is scaled in chronological order and not by date. In other words, the distance on the axis between any two (or more) points has no meaning.[13]

One seeming inconsistency is the poor initial showing of Excel in 1988 and 1989, years when (as shown in Table 8.1) Excel was garnering rave reviews. The reason for this inconsistency is buried in the two negative review of Excel that appeared in Personal Computing. The deciding factor in Personal Computing's quality ratings was speed. Weight on this criterion was common at the time (since background recalculation was not yet standard and the operator had to wait at the keyboard for the spreadsheet to finish calculating before entering more data). Excel, of course, was exclusively a GUI-based application. And as we noted above in our discussion of the Macintosh versus PC, graphical products are much slower than text-based products. Listen to the authors of the review (from the September 1988 issue):

Our weighted average tended to punish Microsoft Excel for its lethargic performance; it rated only 1.3 on Overall Performance. [The others averaged about 7.] Don't forget to look at the Overall Practicality rating, where it ranked first by more than half a point at 6.6. Where features are concerned, no other spreadsheet available today can beat Excel.

There has to be a catch—and there is. Unlike the other five spreadsheets reviewed and benchmarked here, Excel is graphics based instead of character based (it runs under Microsoft Windows). That means a lot more bits and bytes have to be processed. In five of our seven tests, Excel came in last by a wide margin.

The message is clear: Excel was clearly the leading spreadsheet in terms of capabilities. It should have been easy to predict the outcome: Once the hardware had caught up to the software (and Windows itself improved) there would be no serious challengers to Excel as long as Excel continued to outperform its competition.

This brings us to another consideration: price. If there are important differences in the prices of competing products, a lower-quality and lower-priced product might have a larger market share than a higher-quality higher-priced product. Ford sells more Tauruses and generates higher revenues than Mercedes-Benz does with its mid-sized sedan, though Mercedes would normally be considered

to be of substantially higher quality.

The magazine review articles, which generally report list prices, give an account of how list prices for spreadsheets varied across time and package, but this information does not explain much about how the spreadsheet market evolved. For one thing, in any one year, the list prices for competing products don't differ by very much. As Figure 8.4 shows, Lotus normally charged in the vicinity of \$500 for 1-2-3, and that was about what Microsoft charged for Excel. Although Borland initially (1988, 1989) charged considerably less for its early version of Quattro, its more advanced product, Quattro Pro (introduced in 1990) was listed at just about the same price as the other two products. But the magazine review articles contain list price. And as we shall see shortly, an examination of actual prices tells quite a different story.

There are many reasons that list prices don't tell much about the market. First, list prices do not include upgrade purchases, which are less expensive than first-time purchases. Second, list prices fail to account for units sold in office suites. Third, list prices fail to account for the units sold to OEMs, which carry a far lower price.

If, then, we want to look at prices, it is far more informative to look at average prices received by the manufacturer (Figure 8.5). The history of average prices clearly shows Borland's price-discount strategy which was far less apparent looking at retail prices. It shows that Lotus kept its prices similar to Excel's even in the face of the latter's increasing market share and superior reviews. Lotus began to undercut Microsoft's price significantly only in 1996, well after it had fallen below Excel in market share.

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