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Corporate Productivity and Diffusion of Enduser Devices

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SPECIAL REPORT

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# **CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES**

## **SCATTERGRAM ANALYSIS**

**Center for Research on Information Technology  
and Organizations (CRITO)**  
Graduate School of Management  
University of California, Irvine

**Kenneth L. Kraemer**

**Vijay Gurbaxani**

Graduate School of Management  
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University of California, Irvine

# **CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES: SECTOR GRAPHS**

Kenneth L. Kraemer  
Vijay Gurbaxani

## **IT Returns Project**

**Center for Research on Information Technology  
and Organizations (CRITO)**

Graduate School of Management  
and  
Department of Information and Computer Science  
University of California, Irvine

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January 1999

Revised

## LIST OF SECTOR CHARTS

### **Manufacturing Sector**

All Manufacturing .....	1
Aircraft and Parts .....	2
Chemicals .....	3
Computer Equipment .....	4
Electrical Equipment .....	5
Electronic Equipment .....	6
Food Processing .....	7
Industrial Machinery .....	8
Instrumentation .....	9
Lumber, Wood and Paper .....	10
Motor Vehicles and Parts .....	11
Oil, Gas and Petroleum .....	12
Pharmaceuticals .....	13
Primary Metals .....	14
Printing and Publishing .....	15
Textiles and Apparel .....	16

### **Services Sector**

All Services .....	17
Airlines .....	18
Banking .....	19
Communications .....	20
Computer-Related Services .....	21
Department and Specialty Stores .....	22
Food and Drug Stores .....	23
Health Services .....	24
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Transportation Services .....	27
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**CORPORATE PRODUCTIVITY AND LEVEL OF IT INVESTMENT:  
A GUIDE TO INTERPRETING THE SCATTERGRAM**

Some corporations assess the payoff from IT investment by its correlation with corporate productivity. They plot the value for a measure of IT per corporate employee against the value for the total corporate revenue per corporate employee and compare this point with the values from other corporations. The expectation is that the higher the investment in IT, the higher the productivity of the corporation.

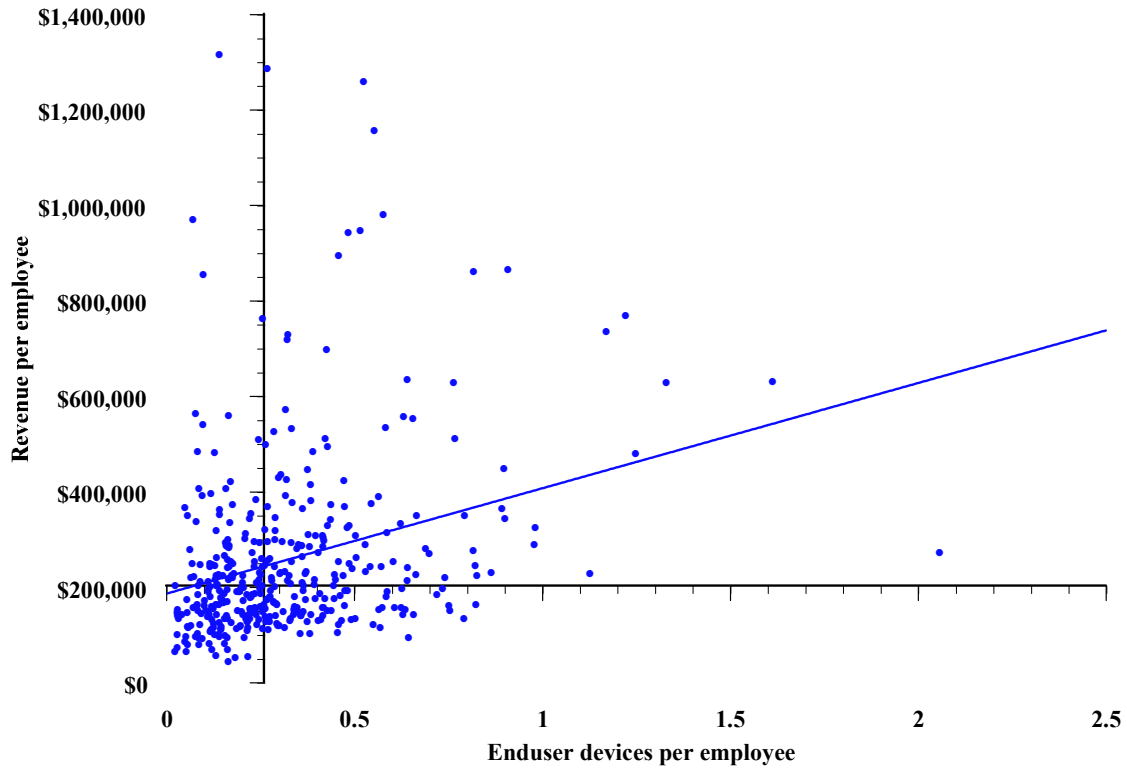
The graph on the front is an example of the type of graph that is produced. This guide is written to assist you in interpreting your firm's position on the graph. One caveat — corporation productivity can be measured in a variety of ways and factors other than IT investment can be associated with a given value. However, the analysis we've done over the years has consistently indicated that for many types of firms, IT investment is associated with corporate productivity.

To help in positioning your individual company, the intersection of the x-axis (PCs and terminals per corporate employee) and the y-axis (Total sales revenue per corporate employee) is the median value (50 percentile). The median total revenue per corporate employee indicates that 50% of all the firms earned more per employee and 50% of all the firms earned less per employee. Similarly, the median of PCs and terminals per corporate employee means that 50% of the firms had less enduser devices per employee and 50% had more. For simplicity, we refer to datapoints to the left of the vertical line as "low IT investment" and datapoints to the right of the vertical line as "high IT investment"; datapoints which are above the horizontal line are referred to as 'high corporate productivity' and datapoints which are below the horizontal line are referred to as 'low corporate productivity'. The graph can therefore be divided into the four quadrants shown below. Roughly each of the quadrants can be interpreted in the following way::

High corporate productivity and low IT investment	High corporate productivity and high IT investment
Low corporate productivity and low IT investment	Low corporate productivity and high IT investment

The diagonal line portrays the association between corporate productivity and IT investment. The slope indicates how correlated these two variables are. Correlation can vary from -1.00 to +1.00. The closer the correlation is to 1.0 or +1.00, the more associated the two variables are. A correlation of '0' means that the two variables are not associated. The square of the correlation indicates the amount of variance explained in corporate productivity by the measure of IT investment.

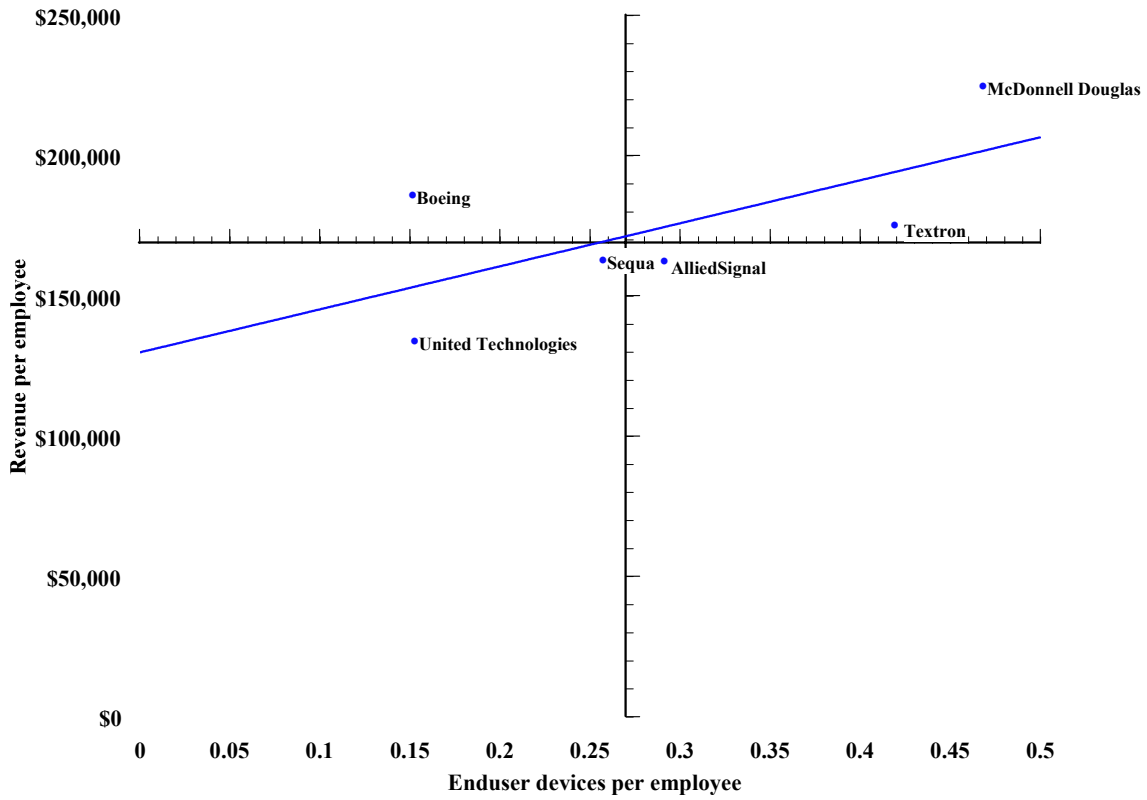
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG MANUFACTURING COMPANIES, 1996**



revenue per employee = \$148,125 + \$376,602(PCs & terminals per employee)

correlation = .43; percent variance explained = 18%

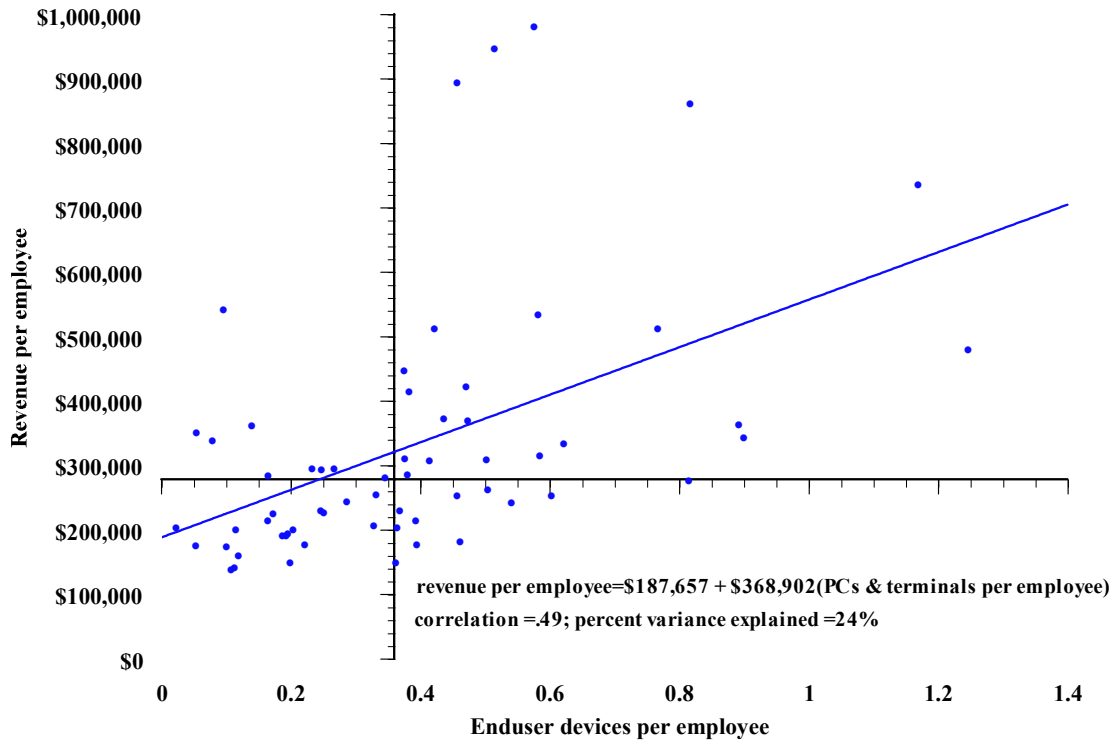
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG AIRCRAFT & PARTS COMPANIES, 1996**



revenue per employee = \$129,570 + \$153,416(PCs & terminals per employee)  
 correlation = .49; percent variance explained = 24%

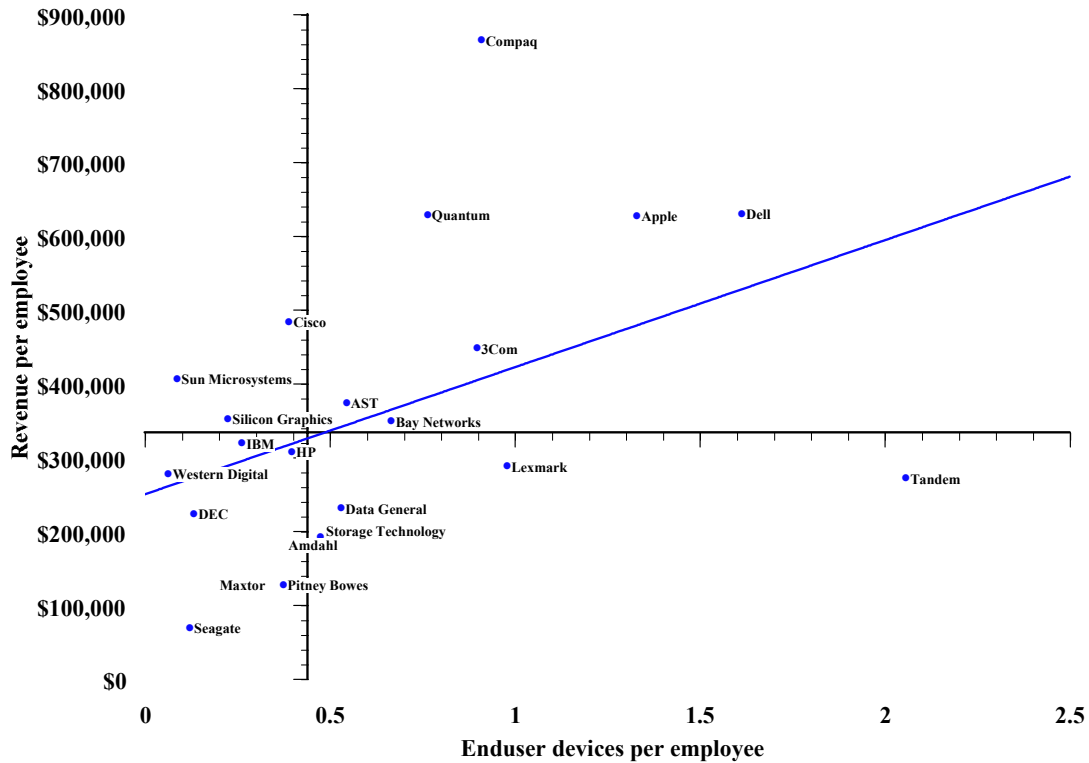
*AlliedSignal*  
*Boeing*  
*McDonnell Douglas*  
*Sequa*  
*Textron*  
*United Technologies*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG CHEMICAL COMPANIES, 1996**



- |                                     |                              |   |                             |
|-------------------------------------|------------------------------|---|-----------------------------|
| <i>A Schulman</i>                   | <i>Cytec Industries</i>      | <i>Hercules</i>                               | <i>Procter &amp; Gamble</i> |
| <i>Abbott Laboratories</i>          | <i>Dial</i>                  | <i>IMC Global</i>                             | <i>RPM</i>                  |
| <i>Air Products &amp; Chemicals</i> | <i>Dow Chemical</i>          | <i>IVAX</i>                                   | <i>Rohm &amp; Haas</i>      |
| <i>Albemarle Corporation</i>        | <i>EI Du Pont De Nemours</i> | <i>International Flavors &amp; Fragrances</i> | <i>Schering Plough</i>      |
| <i>Alberto Culver</i>               | <i>Eastman Chemical</i>      | <i>Johnson &amp; Johnson</i>                  | <i>Sherwin Williams</i>     |
| <i>Allergan</i>                     | <i>Ecolab</i>                | <i>Lubrizol</i>                               | <i>Sterling Chemicals</i>   |
| <i>American Home Products</i>       | <i>Eli Lilly</i>             | <i>Mallinckrodt</i>                           | <i>Union Carbide</i>        |
| <i>Amgen</i>                        | <i>Estee Lauder</i>          | <i>Merck &amp; Co.</i>                        | <i>Uniroyal Chemical</i>    |
| <i>Arcadian</i>                     | <i>Ethyl</i>                 | <i>Monsanto</i>                               | <i>Valhi</i>                |
| <i>Avon Products</i>                | <i>FMC</i>                   | <i>Morton International</i>                   | <i>Warner Lambert</i>       |
| <i>BF Goodrich</i>                  | <i>Ferro</i>                 | <i>Nalco Chemical</i>                         | <i>Wellman</i>              |
| <i>Bristol Myers Squibb</i>         | <i>GAF</i>                   | <i>Olin</i>                                   | <i>Witco</i>                |
| <i>CF Industries</i>                | <i>Geon</i>                  | <i>PPG Industries</i>                         |                             |
| <i>Cabot</i>                        | <i>Georgia Gulf</i>          | <i>Pfizer</i>                                 |                             |
| <i>Chiron</i>                       | <i>Great Lakes Chemical</i>  | <i>Pharmacia &amp; Upjohn</i>                 |                             |
| <i>Clorox</i>                       | <i>HB Fuller</i>             | <i>Praxair</i>                                |                             |
| <i>Colgate Palmolive</i>            | <i>Helene Curtis</i>         |   |                             |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG COMPUTER EQUIPMENT COMPANIES, 1996**



revenue per employee = \$249,717 + \$172,082(PCs & terminals per employee)

correlation = .46; percent variance explained = 21%

*3 COM*

*AST Research*

*Amdahl*

*Apple Computer*

*Bay Networks*

*Cisco Systems*

*Compaq Computer*

*Data General*

*Dell Computer*

*Digital Equipment*

*Hewlett Packard*

*IBM*

*Lexmark International*

*Maxtor*

*Pitney Bowes*

*Quantum*

*Seagate Technology*

*Silicon Graphics*

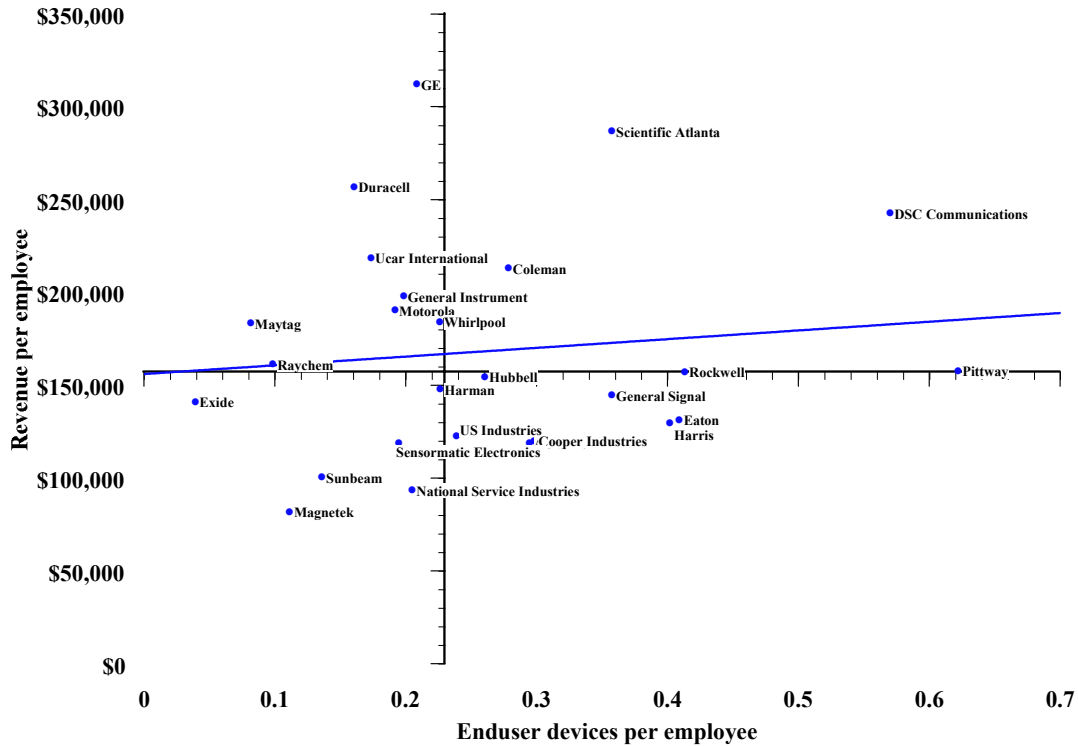
*Storage Technology*

*Sun Microsystems*

*Tandem*

*Western Digital*

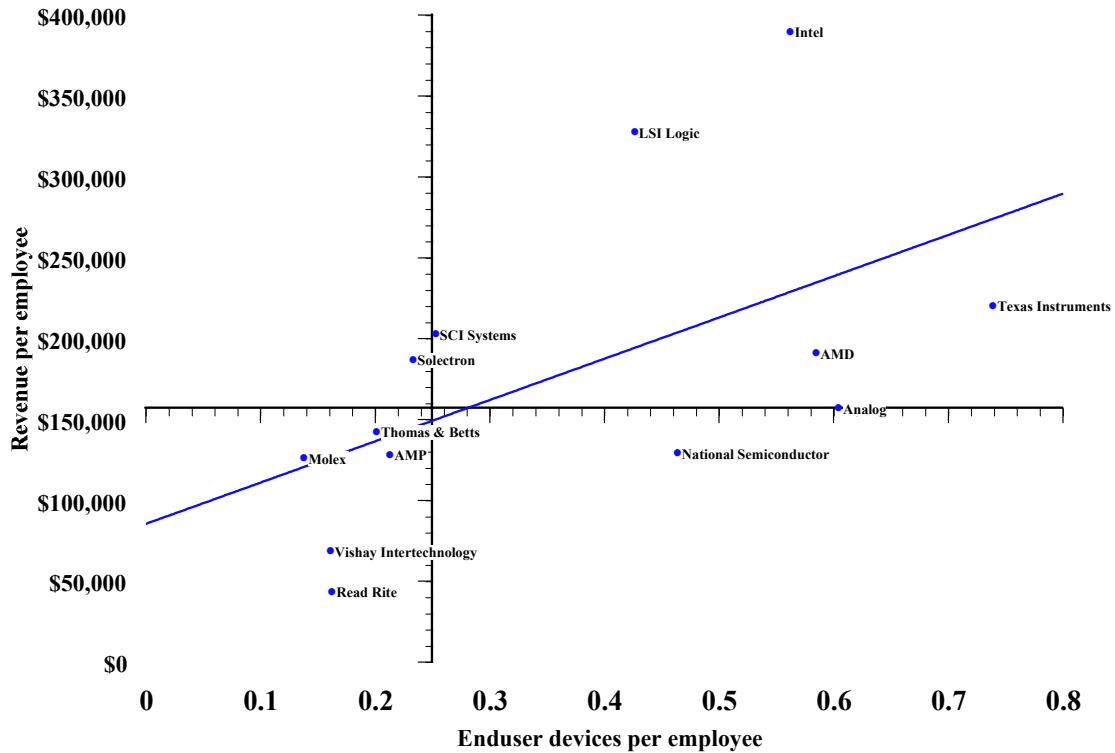
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG ELECTRICAL EQUIPMENT COMPANIES, 1996**



revenue per employee = \$155,682 + \$46,942(PCs & terminals per employee)  
 correlation = .11; percent variance explained = 1%

- |                               |                                    |                                |
|-------------------------------|------------------------------------|--------------------------------|
| <i>AO Smith</i>               | <i>General Signal</i>              | <i>Rockwell International</i>  |
| <i>Coleman Company</i>        | <i>Harman International</i>        | <i>Scientific Atlanta</i>      |
| <i>Cooper Industries</i>      | <i>Harris</i>                      | <i>Sensormatic Electronics</i> |
| <i>DSC Communications</i>     | <i>Hubbell</i>                     | <i>Sunbeam</i>                 |
| <i>Duracell International</i> | <i>Magnetek</i>                    | <i>US Industries</i>           |
| <i>Eaton</i>                  | <i>Maytag</i>                      | <i>UCAR International</i>      |
| <i>Exide</i>                  | <i>Motorola</i>                    | <i>Whirlpool</i>               |
| <i>General Electric</i>       | <i>National Service Industries</i> |                                |
| <i>General Instrument</i>     | <i>Pittway</i>                     |                                |
|                               | <i>Raychem</i>                     |                                |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG ELECTRONICS COMPANIES, 1996**

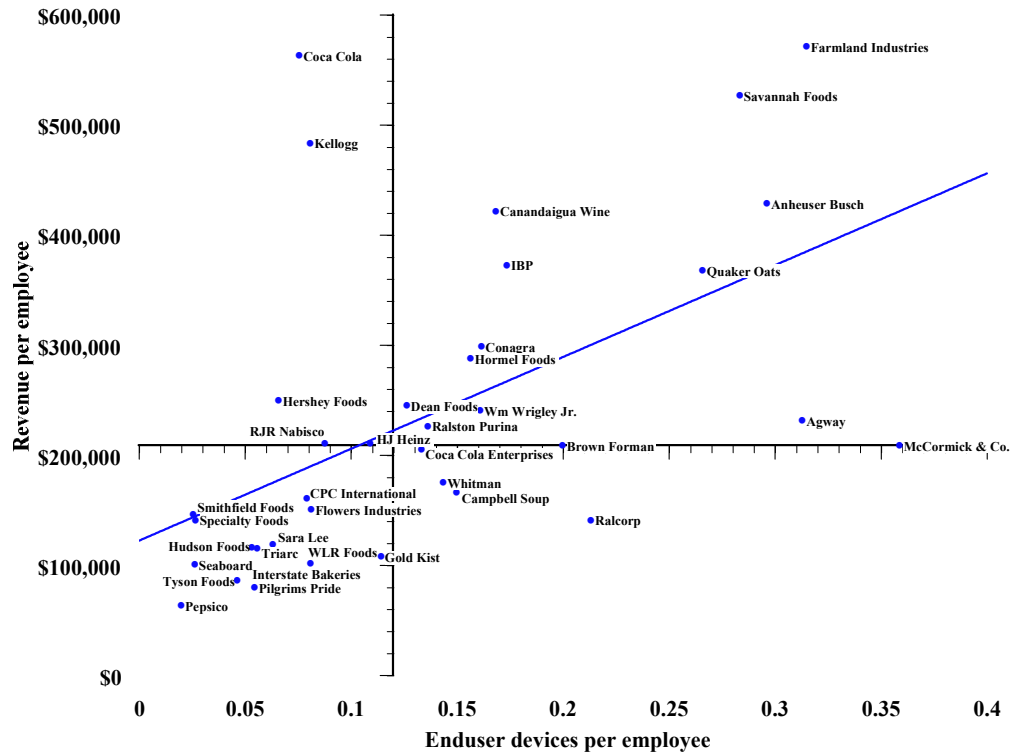


revenue per employee = \$85,021 + \$255,140(PCs & terminals per employee)  
 correlation = .55; percent variance explained = 31%

- |                               |                               |
|-------------------------------|-------------------------------|
| <i>Amp</i>                    | <i>National Semiconductor</i> |
| <i>Advanced Micro Devices</i> | <i>Read Rite</i>              |
| <i>Analog Devices</i>         | <i>SCI Systems</i>            |
| <i>Intel</i>                  | <i>Solectron</i>              |
| <i>LSI Logic</i>              | <i>Texas Instruments</i>      |
| <i>Micron Technology</i>      | <i>Thomas &amp; Betts</i>     |
| <i>Molex</i>                  | <i>Vishay Intertechnology</i> |



**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG FOOD MANUFACTURING COMPANIES, 1996**

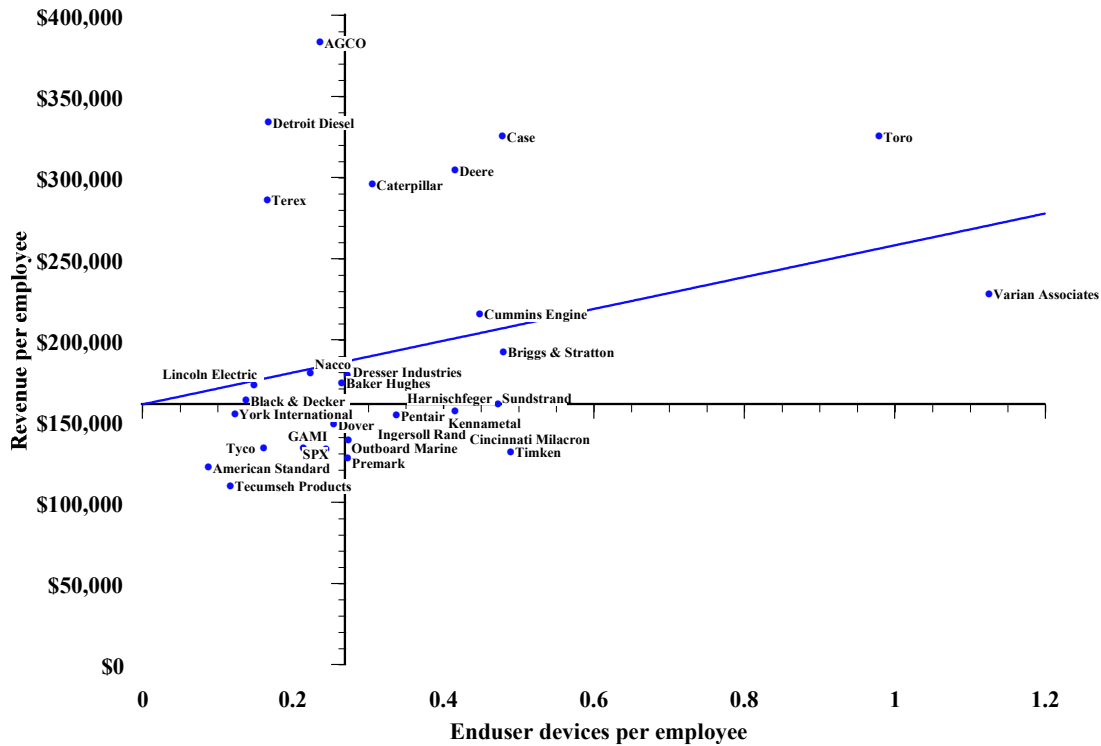


revenue per employee = \$121,822 + \$834,219(PCs & terminals per employee)

correlation = .54; percent variance explained = 30%

<i>Agway Inc.</i>	<i>Dean Foods</i>	<i>Interstate Bakeries</i>	<i>Sara Lee Corporation</i>
<i>Anheuser Busch</i>	<i>Farmland Industries</i>	<i>Kellogg Company</i>	<i>Savannah Foods &amp; Industries</i>
<i>Brown Forman</i>	<i>Flowers Industries</i>	<i>McCormick &amp; Company Inc.</i>	<i>Seaboard Corporation</i>
<i>CPC International Inc.</i>	<i>Gold Kist Inc.</i>	<i>Pepsico Inc.</i>	<i>Smithfield Foods</i>
<i>Campbell Soup</i>	<i>H. J. Heinz</i>	<i>Pilgrims Pride</i>	<i>Specialty Foods</i>
<i>Canandaigua Wine</i>	<i>Hershey Foods</i>	<i>Quaker Oats</i>	<i>Triarc Companies</i>
<i>Coca Cola Company</i>	<i>Hormel Foods</i>	<i>RJR Nabisco</i>	<i>Tyson Foods</i>
<i>Coca Cola Enterprises</i>	<i>Hudson Foods Inc.</i>	<i>Ralcorp</i>	<i>WLR Foods</i>
<i>Conagra Inc.</i>	<i>IBP Inc.</i>	<i>Ralston Purina</i>	<i>Whitman</i>
			<i>Wm Wrigley Jr.</i>

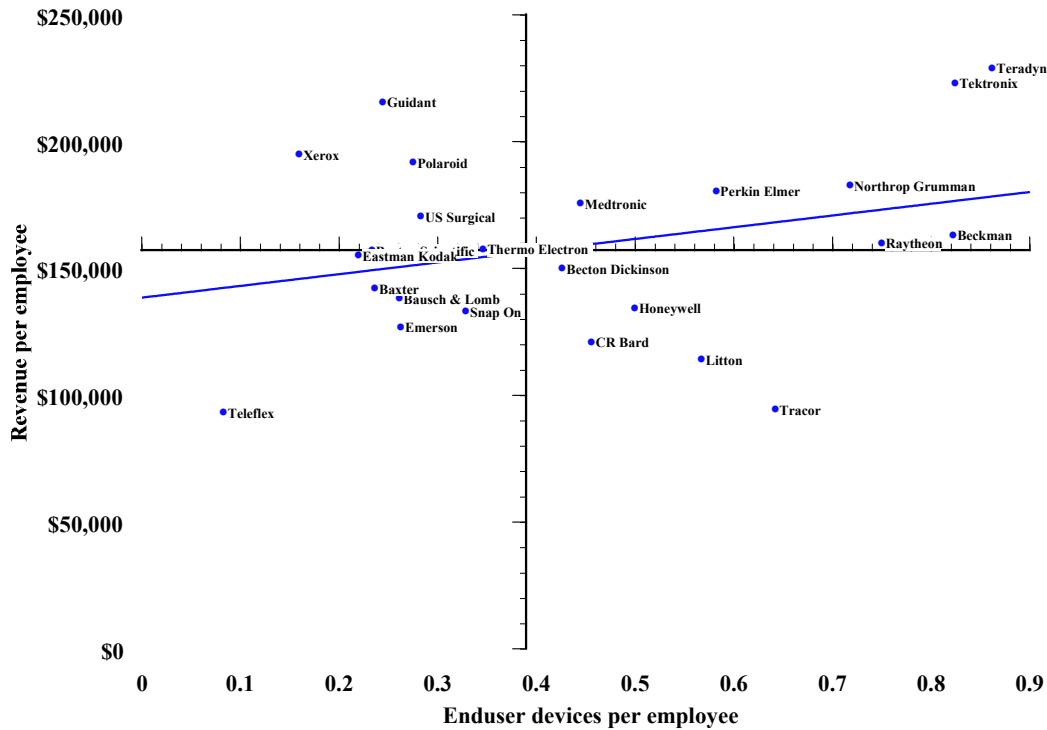
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG INDUSTRIAL MACHINERY COMPANIES, 1996**



revenue per employee = \$159,800 + \$98,008(PCs & terminals per employee)  
 correlation = .29; percent variance explained = 8%

- |                                    |                                       |                               |
|------------------------------------|---------------------------------------|-------------------------------|
| <i>AGCO</i>                        | <i>Dover Corporation</i>              | <i>SPX Corporation</i>        |
| <i>American Standard Companies</i> | <i>Dresser Industries</i>             | <i>Sundstrand Corporation</i> |
| <i>Baker Hughes</i>                | <i>Great American Mgmt Investment</i> | <i>Tecumseh Products</i>      |
| <i>Black &amp; Decker</i>          | <i>Harnischfeger Industries</i>       | <i>Terex Corporation</i>      |
| <i>Briggs &amp; Stratton</i>       | <i>Ingersoll Rand</i>                 | <i>Timken Company</i>         |
| <i>Case Corporation</i>            | <i>Kennametal</i>                     | <i>Toro Company</i>           |
| <i>Caterpillar</i>                 | <i>Lincoln Electric</i>               | <i>Tyco International</i>     |
| <i>Cincinnati Milacron</i>         | <i>NACCO Industries</i>               | <i>Varian Associates</i>      |
| <i>Cummins Engine</i>              | <i>Outboard Marine Corporation</i>    | <i>York International</i>     |
| <i>Deere &amp; Company</i>         | <i>Pentair</i>                        |                               |
| <i>Detroit Diesel</i>              | <i>Premark International</i>          |                               |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG INSTRUMENT AND MEASURING EQUIPMENT COMPANIES, 1996**



revenue per employee = \$138,243 + \$46,286(PCs & terminals per employee)

correlation = .29; percent variance explained = 9%

Search & Navigation Equipment

Litton Industries  
Northrop Grumman  
Raytheon  
Tracor

Environmental Controls

Honeywell

Process Control Instruments

Emerson Electric

Instruments to Measure Electricity

Snap On  
Tektronix  
Teradyne

Analytical Instruments

Beckman Instruments  
Perkin Elmer

Measuring & Controlling Devices

Thermo Electron

Surgical & Medical Instruments

Baxter International  
Becton Dickinson & Company  
Boston Scientific  
CR Bard  
Teleflex  
United States Surgical

Electromedical Equipment

Guidant  
Medtronic

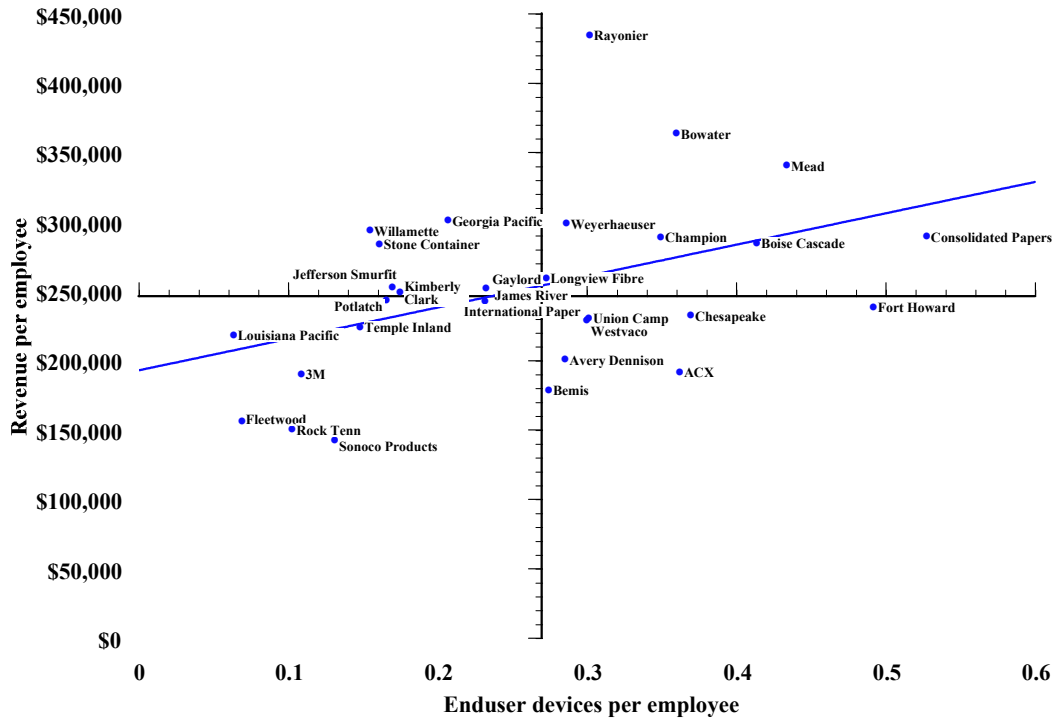
Ophthalmic Goods

Bausch & Lomb

Photographic Equipment

Eastman Kodak  
Polaroid  
Xerox

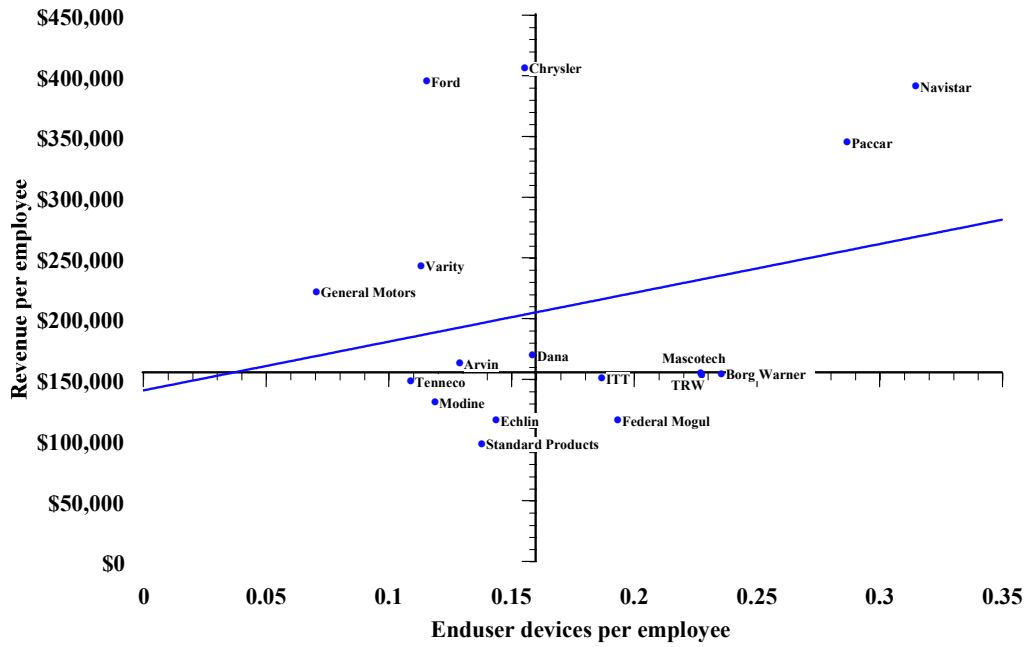
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG LUMBER, WOOD AND PAPER COMPANIES, 1996**



revenue per employee = \$192,604 + \$226,316(PCs & terminals per employee)  
 correlation = .44; percent variance explained = 19%

- |                                   |                                      |                              |
|-----------------------------------|--------------------------------------|------------------------------|
| <i>ACX Technologies</i>           | <i>Gaylord Container Corporation</i> | <i>Potlatch Corporation</i>  |
| <i>Avery Dennison Corporation</i> | <i>Georgia Pacific</i>               | <i>Rayonier</i>              |
| <i>Bemis Company</i>              | <i>International Paper</i>           | <i>Rock Tenn</i>             |
| <i>Boise Cascade</i>              | <i>James River</i>                   | <i>Sonoco Products</i>       |
| <i>Bowater</i>                    | <i>Jefferson Smurfit</i>             | <i>Stone Container</i>       |
| <i>Champion International</i>     | <i>Kimberly Clark</i>                | <i>Temple Inland</i>         |
| <i>Chesapeake Corporation</i>     | <i>Longview Fibre</i>                | <i>Union Camp</i>            |
| <i>Consolidated Papers</i>        | <i>Louisiana Pacific</i>             | <i>Westvaco</i>              |
| <i>Fleetwood Enterprises</i>      | <i>Mead Corporation</i>              | <i>Weyerhaeuser Company</i>  |
| <i>Fort Howard Corporation</i>    | <i>3M Company</i>                    | <i>Willamette Industries</i> |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG MOTOR VEHICLES & PARTS MANUFACTURING COMPANIES, 1996**



revenue per employee = \$170,196 + \$454,201(PCs & terminals per employee)  
 correlation = .42; percent variance explained = 18%

*Arvin Industries*

*Borg Warner Automotive*

*Chrysler*

*Dana*

*Echlin*

*Federal Mogul*

*Ford Motor*

*General Motors*

*ITT Industries*

*Mascotech*

*Modine Manufacturing*

*Navistar International*

*Paccar*

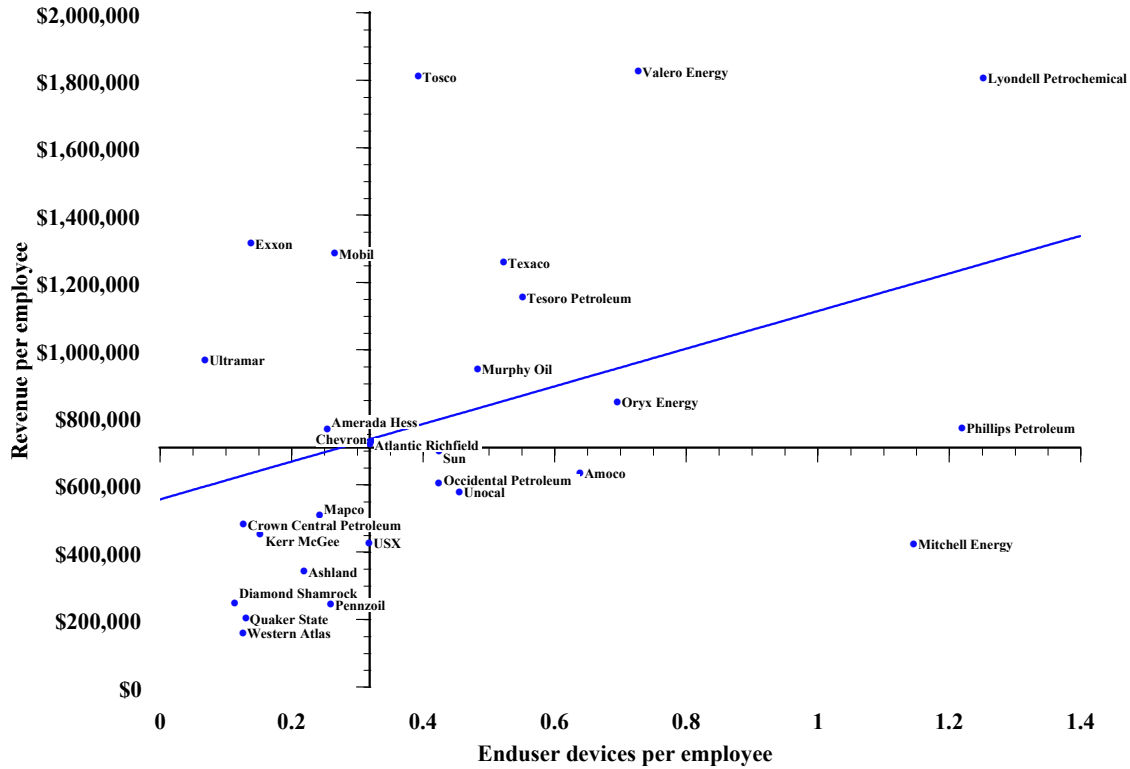
*Standard Products*

*TRW*

*Tenneco*

*Varity*

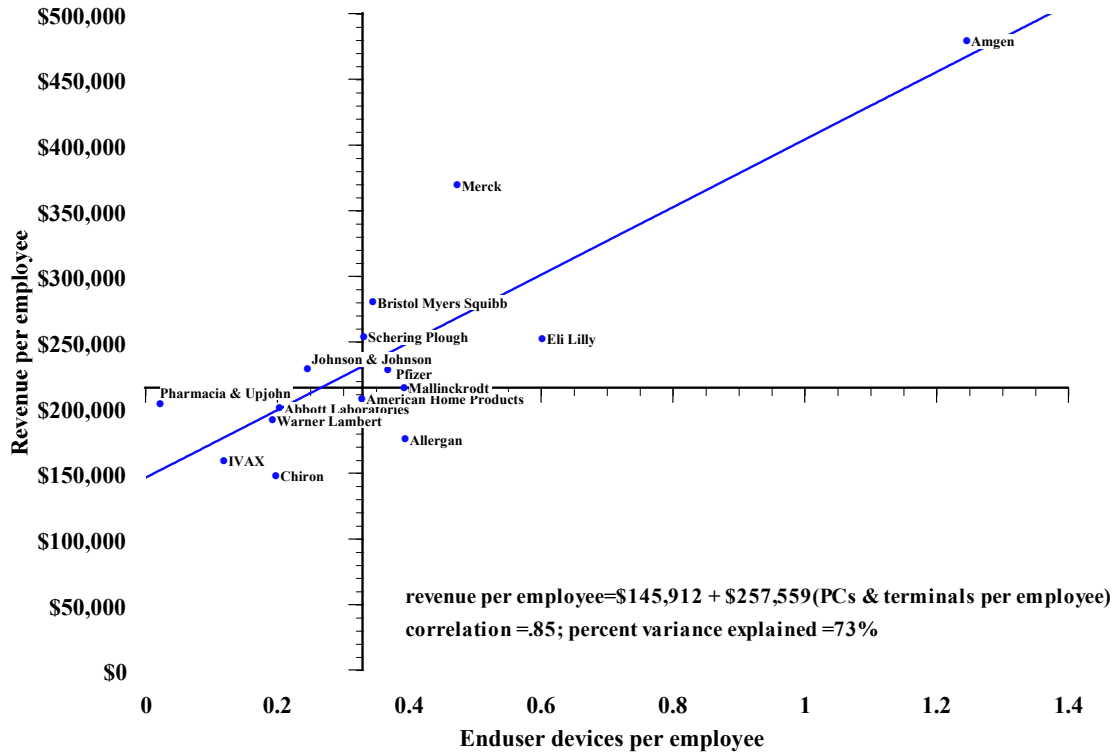
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG OIL, GAS & PETROLEUM COMPANIES, 1996**



revenue per employee = \$554,336 + \$558,373(PCs & terminals per employee)  
 correlation = .38; percent variance explained = 14%

<i>Amerada Hess</i>	<i>Exxon</i>	<i>Occidental Petroleum</i>	<i>Texaco</i>
<i>Amoco</i>	<i>Kerr McGee</i>	<i>Oryx Energy</i>	<i>Tosco</i>
<i>Ashland</i>	<i>Lyondell Petrochemical</i>	<i>Pennzoil</i>	<i>USX</i>
<i>Atlantic Richfield</i>	<i>Mapco</i>	<i>Phillips Petroleum</i>	<i>Ultramar</i>
<i>Chevron</i>	<i>Mitchell Energy</i>	<i>Quaker State</i>	<i>Unocal</i>
<i>Crown Central Petroleum</i>	<i>Mobil</i>	<i>Sun</i>	<i>Valero Energy</i>
<i>Diamond Shamrock</i>	<i>Murphy Oil</i>	<i>Tesoro Petroleum</i>	<i>Western Atlas</i>

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG PHARMACEUTICAL COMPANIES, 1996**



*Abbott Laboratories*

*Allergan*

*American Home Products*

*Amgen*

*Bristol Myers Squibb*

*Chiron*

*Eli Lilly*

*IVAX*

*Johnson & Johnson*

*Mallinckrodt*

*Merck & Co.*

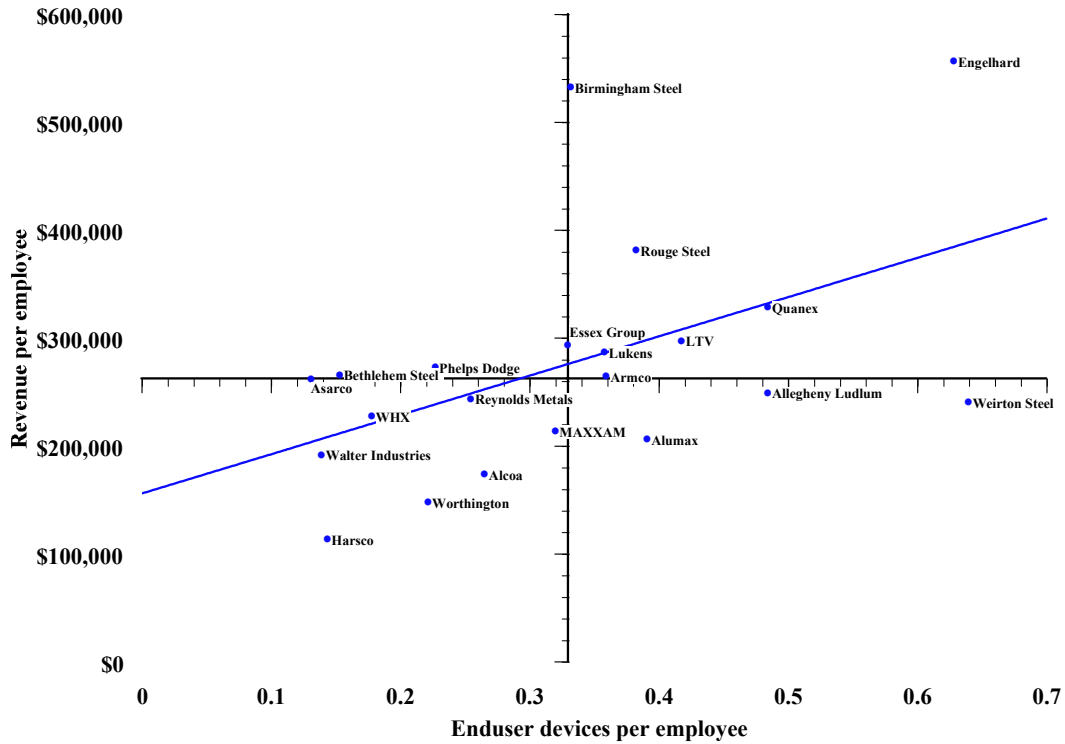
*Pfizer*

*Pharmacia & Upjohn*

*Schering Plough*

*Warner Lambert*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG PRIMARY METAL COMPANIES, 1996**

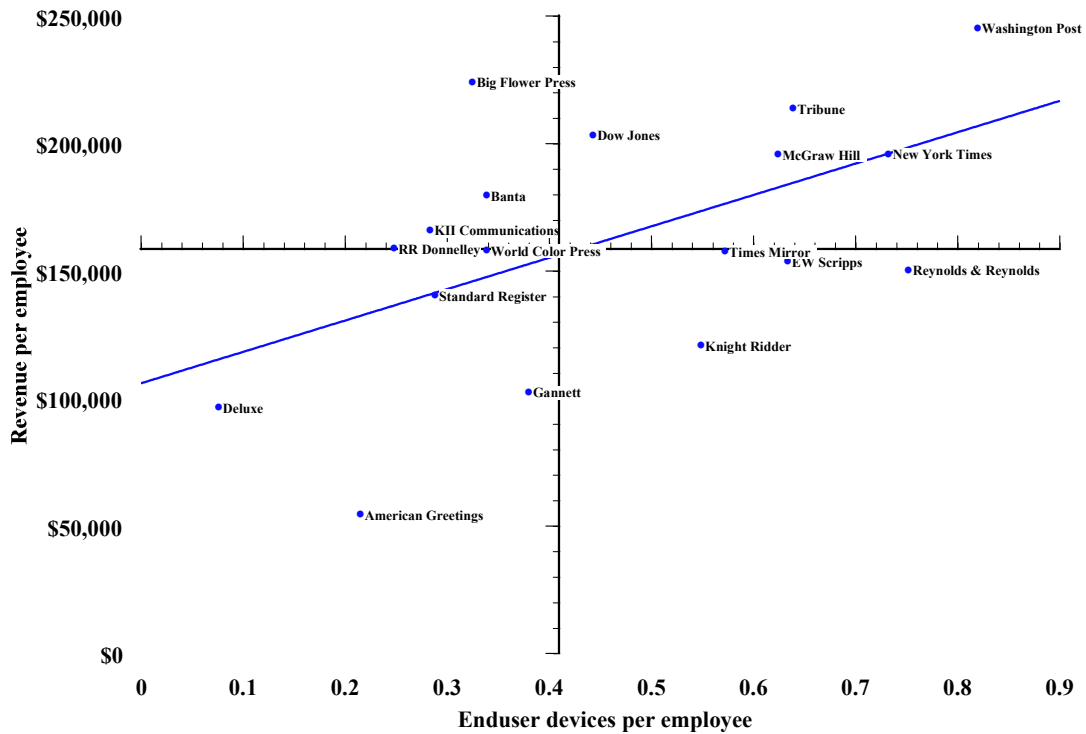


revenue per employee = \$155,433 + \$363,978(PCs & terminals per employee)  
 correlation = .50; percent variance explained = 25%

- |                          |                               |
|--------------------------|-------------------------------|
| <i>Alcoa</i>             | <i>Lukens</i>                 |
| <i>Allegheeny Ludlum</i> | <i>MAXXAM</i>                 |
| <i>Alumax</i>            | <i>Phelps Dodge</i>           |
| <i>Armco</i>             | <i>Quanex</i>                 |
| <i>Asarco</i>            | <i>Reynolds Metals</i>        |
| <i>Bethlehem Steel</i>   | <i>Rouge Steel</i>            |
| <i>Birmingham Steel</i>  | <i>WHX Corporation</i>        |
| <i>Engelhard</i>         | <i>Walter Industries</i>      |
| <i>Essex Group</i>       | <i>Weirton Steel</i>          |
| <i>Harsco</i>            | <i>Worthington Industries</i> |
| <i>LTV Corporation</i>   |                               |



**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG PRINTING AND PUBLISHING COMPANIES, 1996**



revenue per employee = \$105,672 + \$123,098(PCs & terminals per employee)

correlation = .54; percent variance explained = 29%

*American Greetings*

*Banta Corporation*

*Big Flower Press*

*Deluxe Corporation*

*Dow Jones & Company*

*E. W. Scripps Company*

*Gannett Company*

*KII Communications*

*Knight Ridder*

*McGraw Hill Companies*

*New York Times*

*R.R. Donnelley & Sons*

*Reynolds & Reynolds*

*Standard Register*

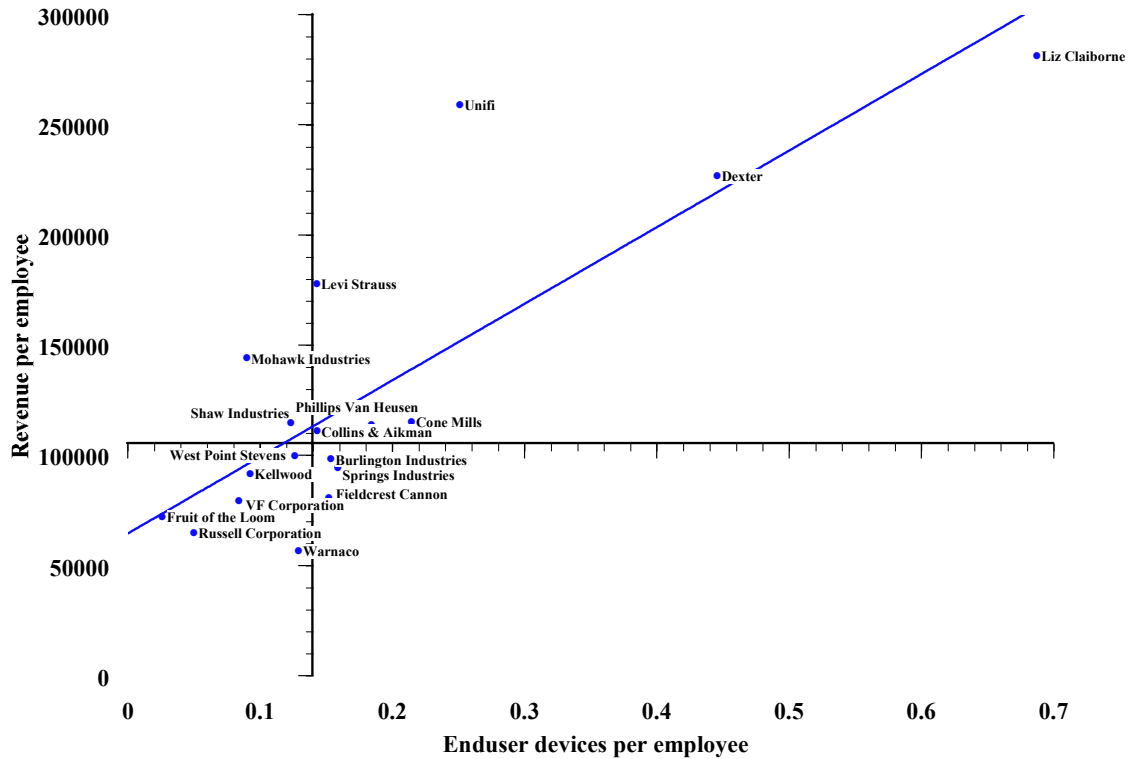
*Times Mirror*

*Tribune Company*

*Washington Post*

*World Color Press*

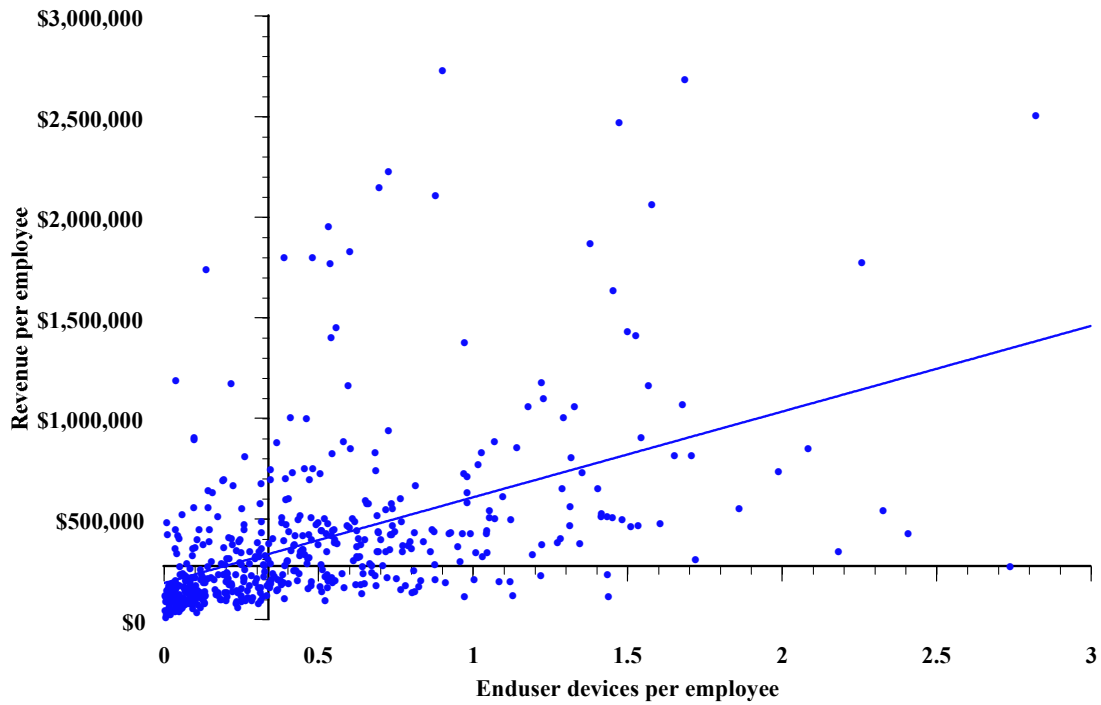
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG TEXTILE AND APPAREL COMPANIES, 1996**



revenue per employee = \$64,074 + \$347,590(PCs & terminals per employee)  
 correlation = .82; percent variance explained = 66%

- |                              |                            |                           |
|------------------------------|----------------------------|---------------------------|
| <i>Burlington Industries</i> | <i>Kellwood</i>            | <i>Shaw Industries</i>    |
| <i>Collins &amp; Aikman</i>  | <i>Levi Strauss</i>        | <i>Springs Industries</i> |
| <i>Cone Mills</i>            | <i>Liz Claiborne</i>       | <i>Unifi</i>              |
| <i>Dexter</i>                | <i>Mohawk Industries</i>   | <i>VF Corporation</i>     |
| <i>Fieldcrest Cannon</i>     | <i>Phillips Van Heusen</i> | <i>Warnaco Group</i>      |
| <i>Fruit of the Loom</i>     | <i>Russell Corporation</i> | <i>West Point Stevens</i> |

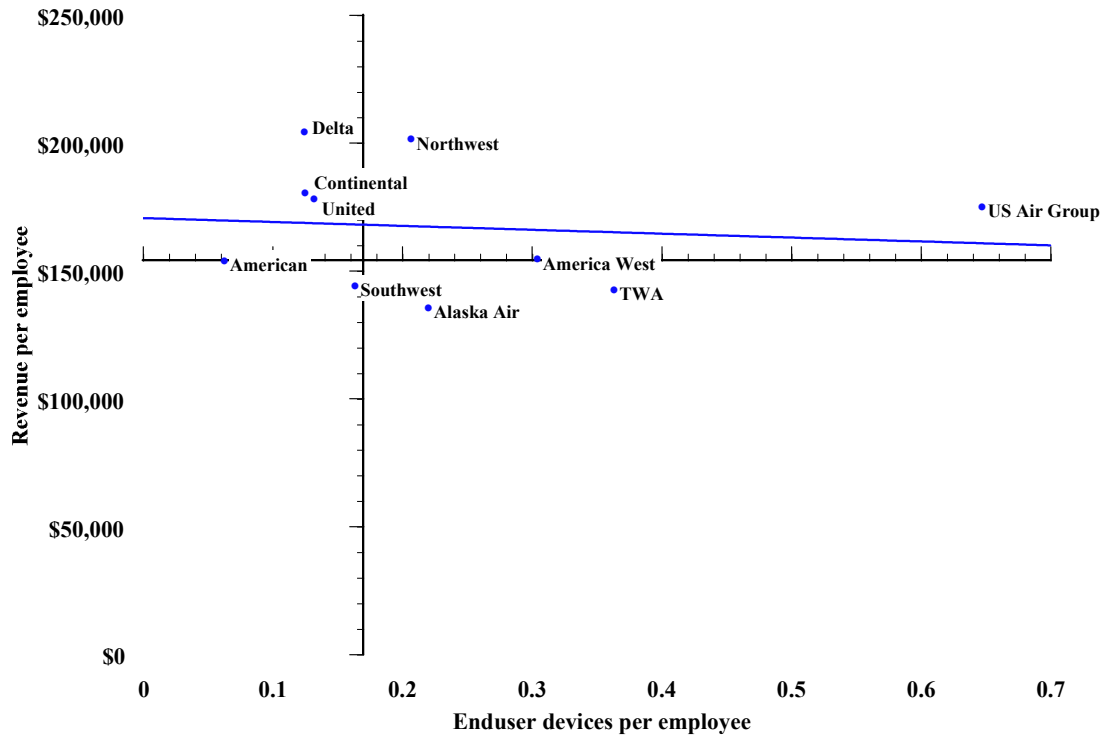
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG SERVICES COMPANIES, 1996**



revenue per employee = \$202,790 + \$398,303(PCs & terminals per employee)

correlation = .46; percent variance explained = 21%

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG AIRLINE COMPANIES, 1996**



revenue per employee=\$170,476- \$15,229(PCs & terminals per employee)

correlation =.10; percent variance explained =1%

*Alaska Air Group*

*America West Airlines*

*American Airlines*

*Continental Airlines*

*Delta Airlines*

*Northwest Airlines*

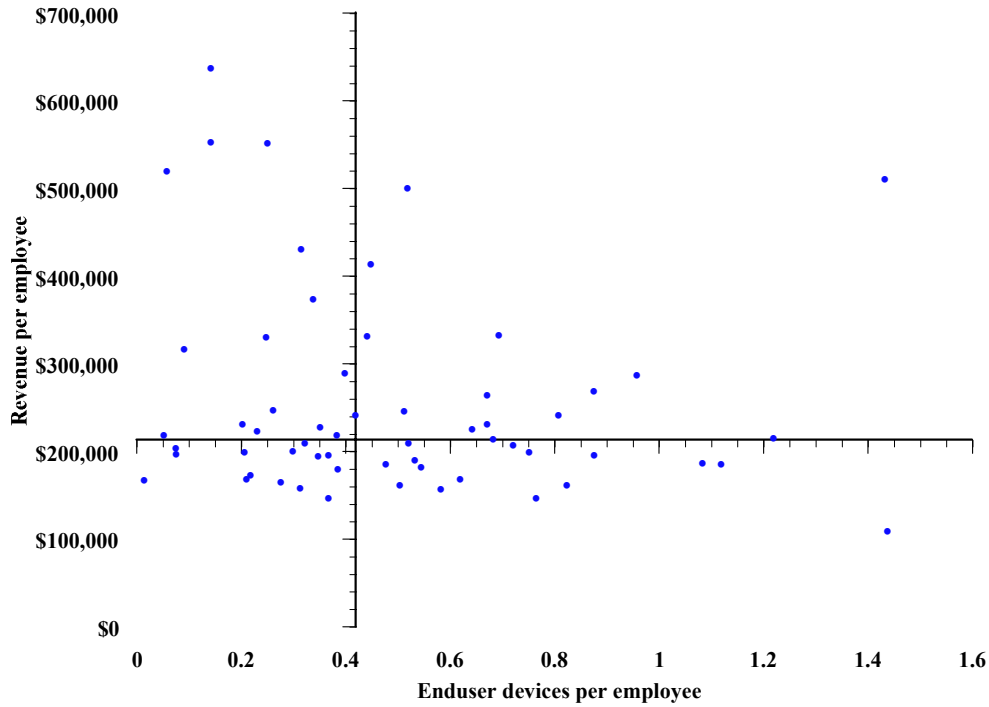
*Southwest Airlines*

*Trans World Airlines*

*United Airlines*

*U S Air Group*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG BANKING INSTITUTIONS, 1996**



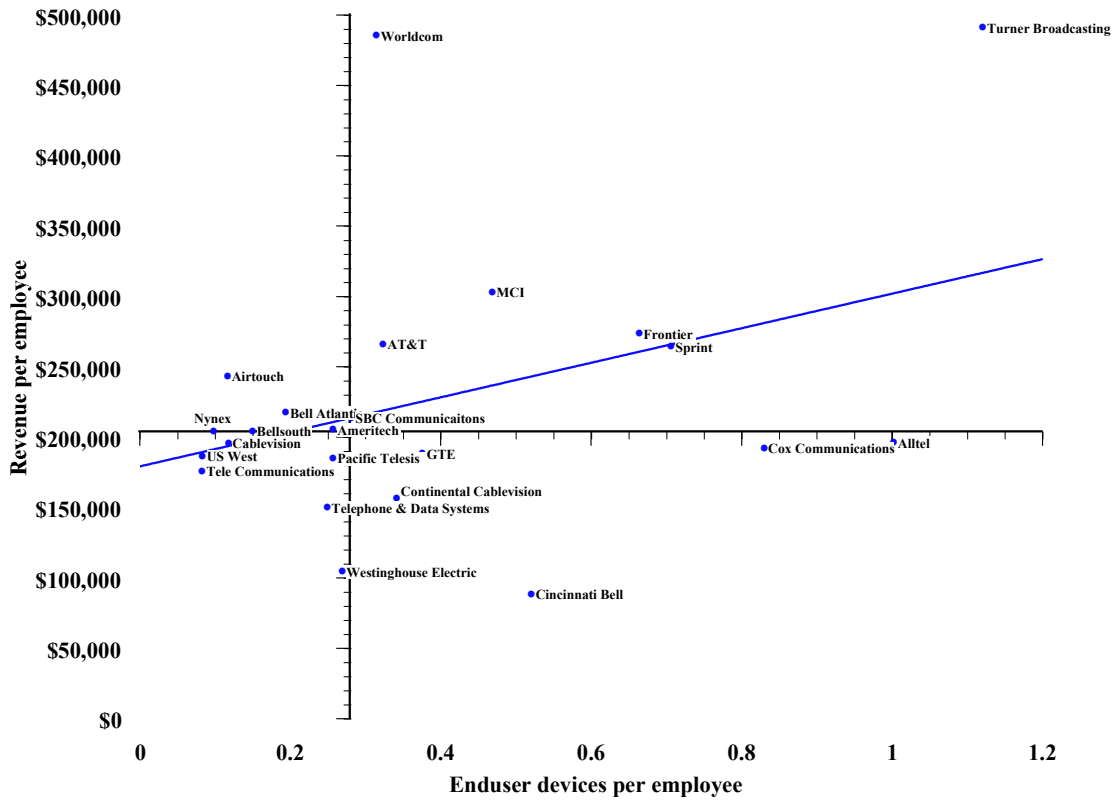
*Amsouth Bancorporation  
Banc One  
Bancorp Hawaii  
Bank of Boston  
Bank of New York  
Bankamerica  
Bankers Trust  
Banponce  
Barnett Banks  
Baybanks  
Boatmens Bancshares  
Cal Fed  
Charter One  
Chase Manhattan  
Citicorp*

*Comerica  
Corestates Financial  
Crestar Financial  
Fifth Third Bancorp  
First Bank System  
First Chicago NBD  
First Empire State  
First of America  
First Security  
First Tennessee National  
First Union  
Firststar  
Fleet Financial  
Glendale Federal  
Golden West Financial*

*Great Western Financial  
HF Ahmanson  
Huntington Banchares  
JP Morgan  
Keycorp  
MBNA  
Marshall & Ilsley  
Mellon Bank  
Mercantile Bancorporation  
National City  
Nationsbank  
Northern Trust  
Norwest  
Old Kent Financial  
PNC Bank*

*Regions Financial  
Republic New York  
Signet Banking  
Southern National  
Southtrust  
Standard Federal  
State Street  
Suntrust Banks  
UJB Financial  
US Bancorp  
Union Planters  
Wachovia  
Washington Mutual  
Wells Fargo*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG COMMUNICATIONS COMPANIES, 1996**

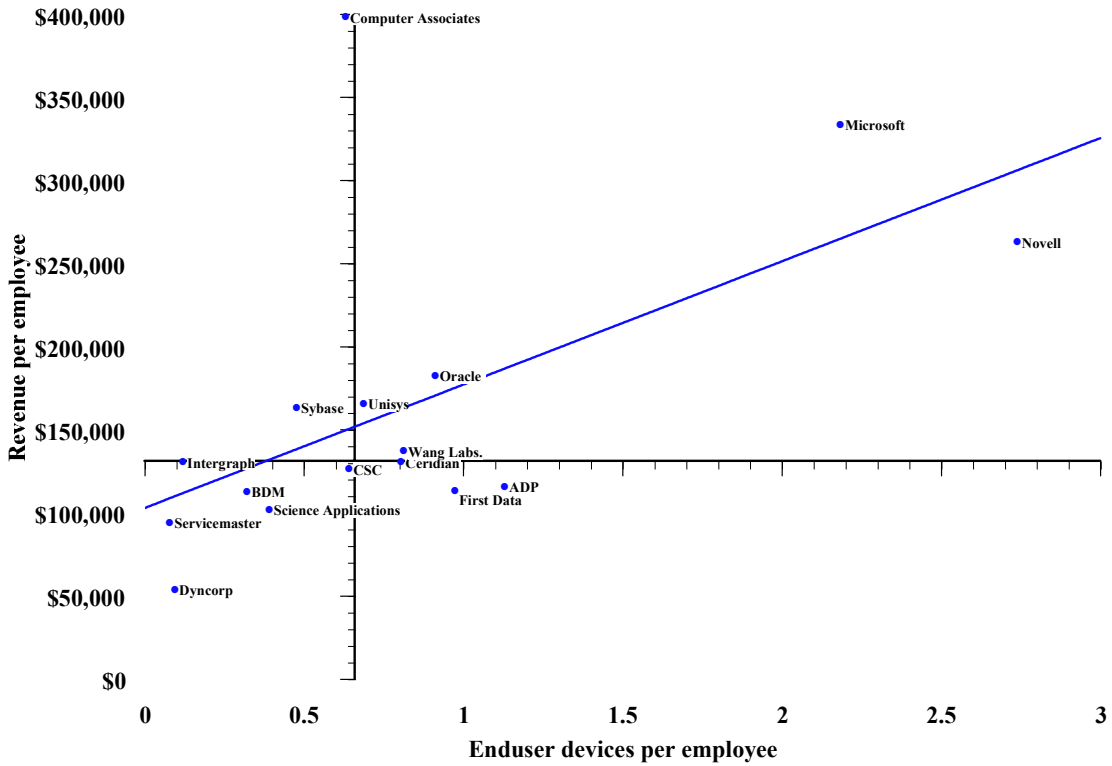


revenue per employee = \$178,734 + \$122,724(PCs & terminals per employee)

correlation = .38; percent variance explained = 14%

- |                                |                                |                                     |
|--------------------------------|--------------------------------|-------------------------------------|
| <i>AT&amp;T</i>                | <i>Continental Cablevision</i> | <i>Sprint</i>                       |
| <i>Airtouch Communications</i> | <i>Cox Communications</i>      | <i>Tele Communications</i>          |
| <i>Alltel</i>                  | <i>Frontier</i>                | <i>Telephone &amp; Data Systems</i> |
| <i>Ameritech</i>               | <i>GTE</i>                     | <i>Turner Broadcasting System</i>   |
| <i>Bell Atlantic</i>           | <i>MCI Communications</i>      | <i>US West</i>                      |
| <i>Bellsouth</i>               | <i>Nynex</i>                   | <i>Westinghouse Electric</i>        |
| <i>Cablevision Systems</i>     | <i>Pacific Telesis</i>         | <i>Worldcom</i>                     |
| <i>Cincinnati Bell</i>         | <i>SBC Communications</i>      |                                     |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG COMPUTING SERVICES COMPANIES, 1996**



revenue per employee = \$102,602 + \$74,173(PCs & terminals per employee)

correlation = .59; percent variance explained = 35%

*Automatic Data Processing*

*BDM International*

*Ceridian*

*Computer Associates International*

*Computer Sciences Corporation*

*Dyncorp*

*EG&G*

*First Data Corporation*

*Intergraph*

*Microsoft*

*Novell*

*Oracle*

*Science Applications International*

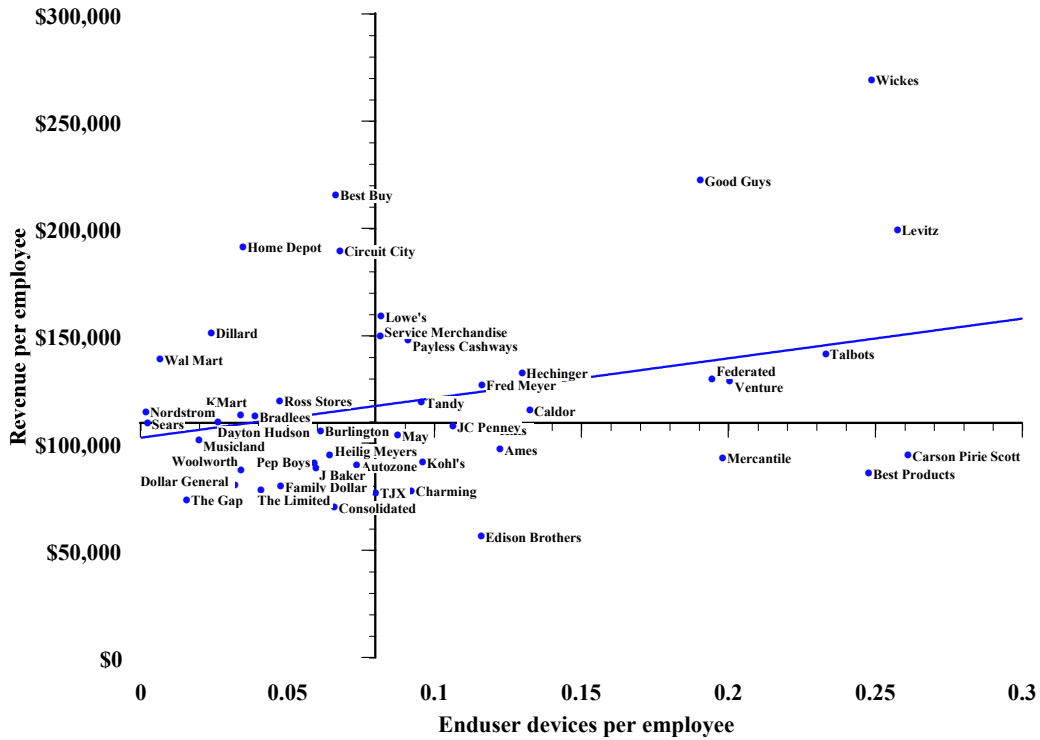
*Servicemaster*

*Sybase*

*Unisys*

*Wang Laboratories*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG DEPARTMENT & SPECIALTY STORES, 1996**

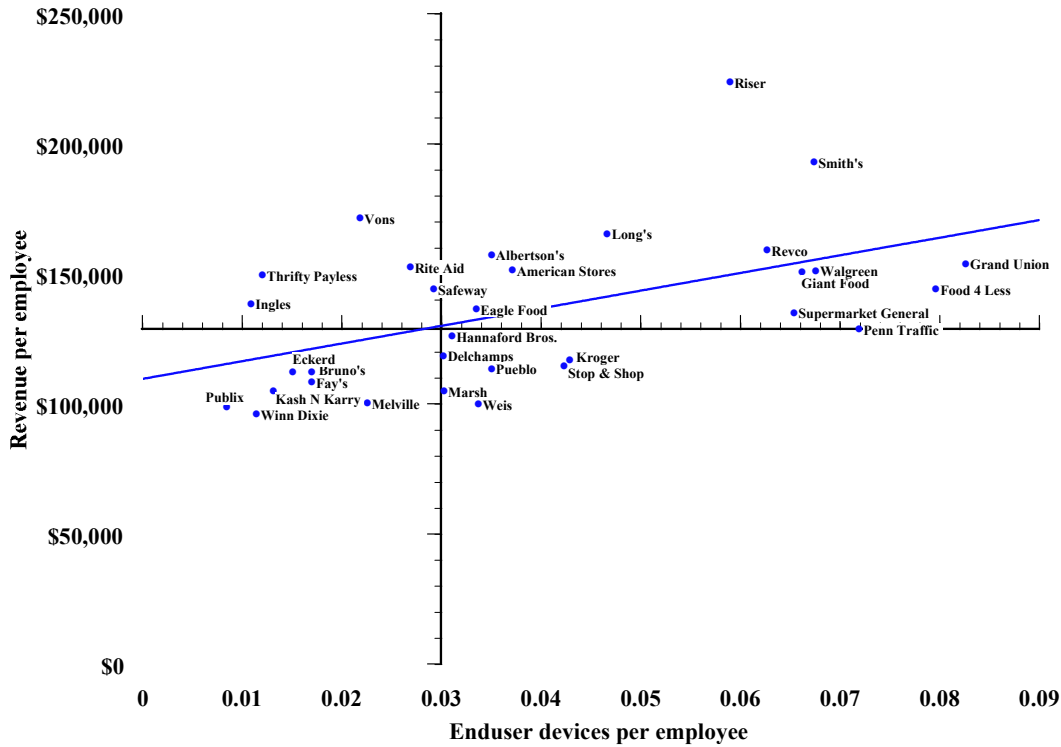


revenue per employee = \$102,142 + \$185,049(PCs & terminals per employee)  
 correlation = .31; percent variance explained = 9%

- |                         |                             |                       |                         |
|-------------------------|-----------------------------|-----------------------|-------------------------|
| Ames                    | Dillard                     | JC Penney             | Sears, Roebuck          |
| Autozone                | Dollar General              | KMart                 | Service Merchandise Co. |
| Best Buy                | Edison Brothers             | Kohl's                | TJX Companies           |
| Best Products           | Family Dollar               | Levitz                | Talbots                 |
| Bradlees                | Federated Department Stores | Lowe's                | Tandy Corporation       |
| Burlington Coat Factory | Fred Meyer                  | May Department Stores | The Gap                 |
| Caldor                  | Good Guys                   | Mercantile Stores     | The Limited             |
| Carson Pirie Scott      | Hechinger                   | Musicland Stores      | Venture Stores          |
| Charming Shoppes        | Heilig Meyers               | Nordstrom             | Wal Mart Stores         |
| Circuit City Stores     | Hills Department Stores     | Payless Cashways      | Wickes                  |
| Consolidated Stores     | Home Depot                  | Pep Boys              | Woolworth               |
| Dayton Hudson           | J Baker                     | Ross Stores           |                         |



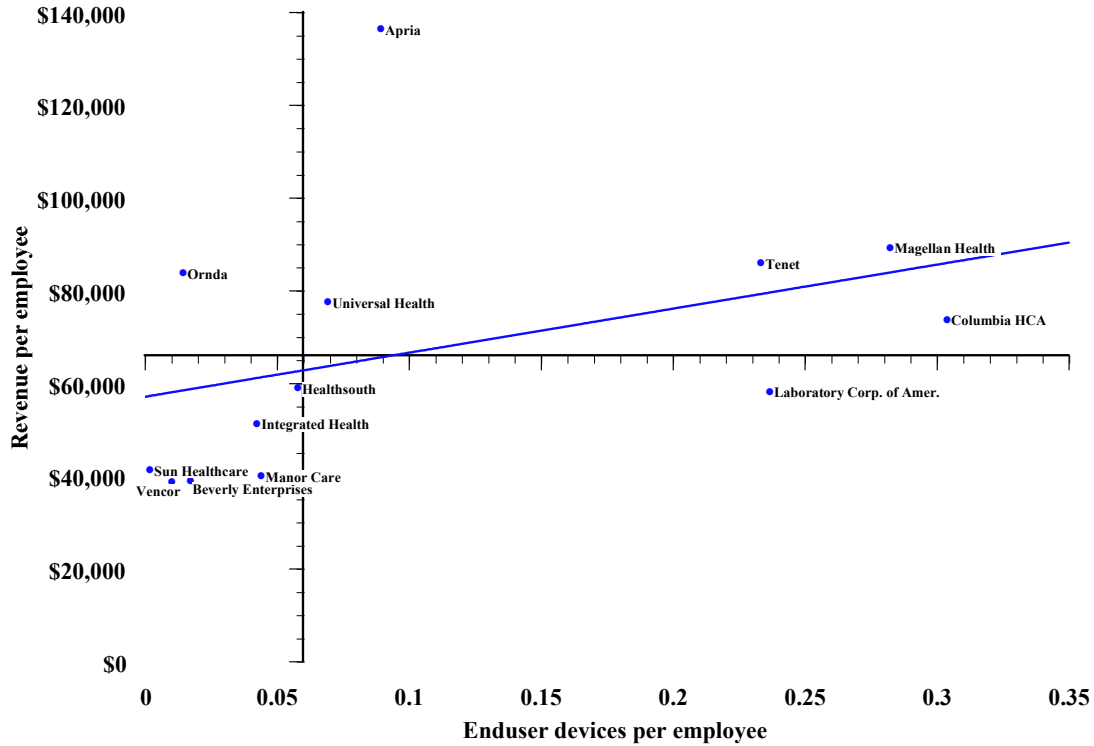
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG FOOD & DRUG STORES, 1996**



revenue per employee = \$92,934 + \$483,357(PCs & terminals per employee)  
 correlation = .47; percent variance explained = 22%

- |                           |                                 |                             |                                  |
|---------------------------|---------------------------------|-----------------------------|----------------------------------|
| <i>Albertson's</i>        | <i>Giant Food</i>               | <i>Melville Corporation</i> | <i>Smith's Food &amp; Drug</i>   |
| <i>American Stores</i>    | <i>Grand Union</i>              | <i>Penn Traffic</i>         | <i>Stop &amp; Shop Companies</i> |
| <i>Bruno's</i>            | <i>Hannaford Brothers</i>       | <i>Publix Super Markets</i> | <i>Supermarket General</i>       |
| <i>Delchamps</i>          | <i>Ingles Markets</i>           | <i>Pueblo International</i> | <i>Thrifty Payless</i>           |
| <i>Eagle Food Centers</i> | <i>Kash N Karry Food Stores</i> | <i>Revco</i>                | <i>Vons Companies</i>            |
| <i>Eckerd</i>             | <i>Kroger</i>                   | <i>Rite Aid</i>             | <i>Walgreen</i>                  |
| <i>Fay's</i>              | <i>Longs Drug Stores</i>        | <i>Riser Foods</i>          | <i>Weis Markets</i>              |
| <i>Food 4 Less</i>        | <i>Marsh Supermarkets</i>       | <i>Safeway</i>              | <i>Winn Dixie Stores</i>         |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG HEALTH SERVICES COMPANIES, 1996**



revenue per employee = \$57,466 + \$93,647(PCs & terminals per employee)  
 correlation = .37; percent variance explained = 14%

*Apria Healthcare Group*

*Beverly Enterprises*

*Columbia HCA Healthcare*

*Integrated Health Services*

*Laboratory Corporation of America*

*Magellan Health Services*

*Manor Care*

*Ornda Healthcorp*

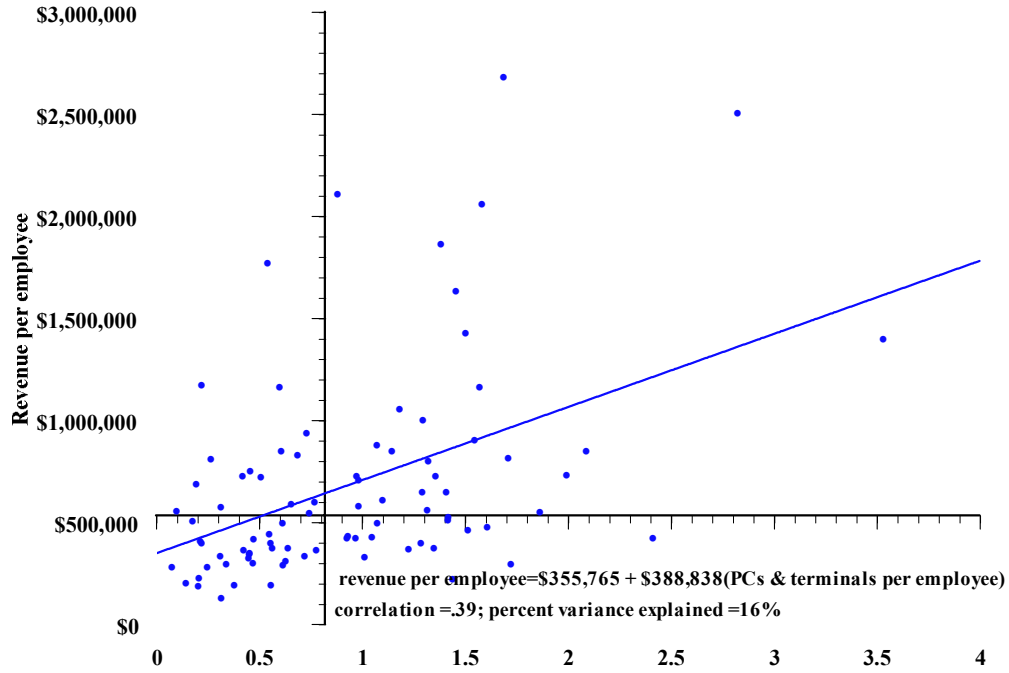
*Sun Healthcare Group*

*Tenet Healthcare*

*Universal Health Services*

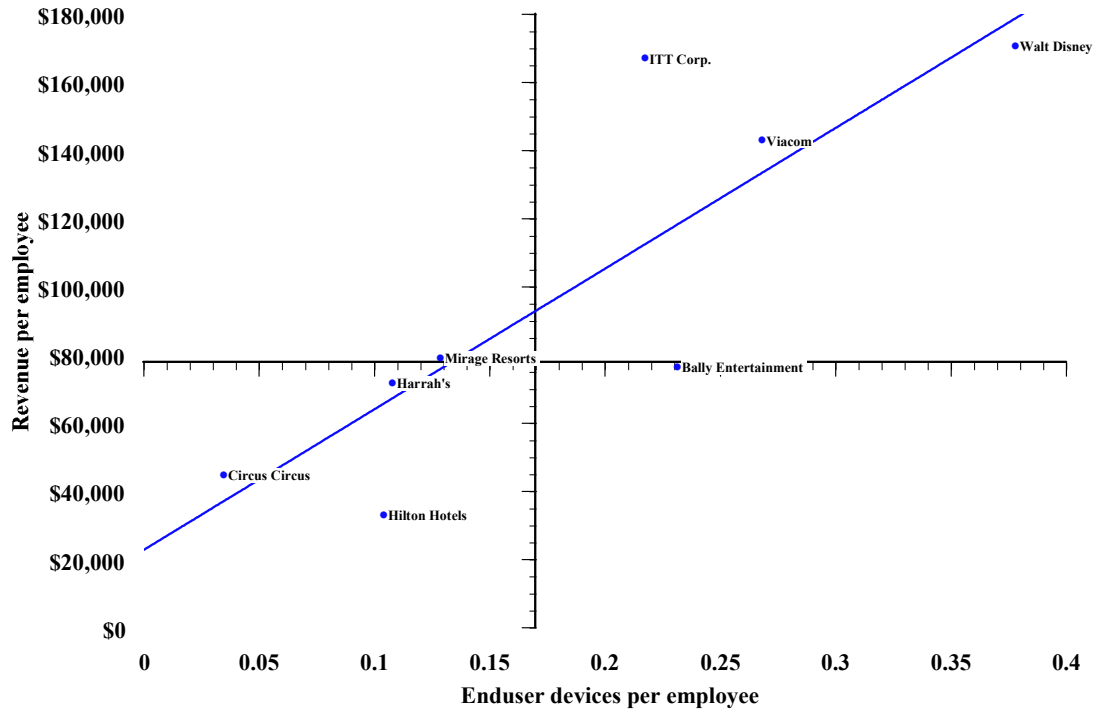
*Vencor*

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG INSURANCE COMPANIES, 1996**



<b>Enduser devices per employee</b>				
<i>20th Century</i>	<i>Cuna Mutual</i>	<i>Loews</i>	<i>Provident</i>	<i>United Healthcare</i>
<i>AFLAC</i>	<i>FHP International</i>	<i>Lutheran Brotherhood</i>	<i>Providian</i>	<i>United Service Auto</i>
<i>Aetna Life</i>	<i>Federated Mutual</i>	<i>Massachusetts Mutual</i>	<i>Reliance Group</i>	<i>Unitrin</i>
<i>Alleghany</i>	<i>First Colony</i>	<i>Metropolitan Life</i>	<i>Reliastar Financial</i>	<i>Value Health</i>
<i>Allmerica Financial</i>	<i>Foundation Health</i>	<i>Midatlantic Medical</i>	<i>Safeco</i>	<i>WR Berkley</i>
<i>American Bankers Insurance</i>	<i>Fremont General</i>	<i>Minnesota Mutual</i>	<i>Sentry Insurance</i>	<i>Wellpoint Health</i>
	<i>Geico</i>	<i>Mutual Life of NY</i>	<i>St Paul Companies</i>	
<i>American Financial Group</i>	<i>General American Life</i>	<i>Mutual of Omaha</i>	<i>Standard Insurance</i>	
<i>American General</i>	<i>General Re</i>	<i>National Life Insurance</i>	<i>State Farm Group</i>	
<i>American International</i>	<i>Guardian Life</i>	<i>Nationwide Insurance</i>	<i>Sunamerica</i>	
<i>American National</i>	<i>Harleysville Mutual</i>	<i>New England Mutual</i>	<i>Teachers Insurance</i>	
<i>American Re</i>	<i>Healthsource</i>	<i>New York Life</i>	<i>TIG</i>	
<i>American United Life</i>	<i>Humana</i>	<i>Ohio Casualty</i>	<i>Torchmark</i>	
<i>Amica Mutual</i>	<i>ITT Hartford</i>	<i>Old Republic International</i>	<i>Transamerica</i>	
<i>Aon</i>	<i>Jefferson Pilot</i>	<i>Pacific Mutual Life</i>	<i>Travelers Group</i>	
<i>Auto Owners Insurance</i>	<i>John Alden Financial</i>	<i>Pacificare Health Systems</i>	<i>UNUM</i>	
<i>Berkshire Hathaway</i>	<i>John Hancock</i>	<i>Penn Mutual Life</i>	<i>USF&amp;G</i>	
<i>Cigna</i>	<i>Knights of Columbus</i>	<i>Phoenix Home Life</i>	<i>US Healthcare</i>	
<i>Chubb</i>	<i>Leucadia National</i>	<i>Physicians Corporation</i>	<i>US Life</i>	
<i>Cincinnati Financial</i>	<i>Liberty Mutual</i>	<i>Principal Mutual Life</i>		
<i>Conseco</i>	<i>Lincoln National</i>	<i>Progressive</i>		

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG RECREATIONAL SERVICES COMPANIES, 1996**



revenue per employee=\$22,598- \$412,718(PCs & terminals per employee)

correlation =.84; percent variance explained =66%

*Bally Entertainment Corporation*

*Circus Circus Enterprises*

*Harrah's Entertainment*

*Hilton Hotels*

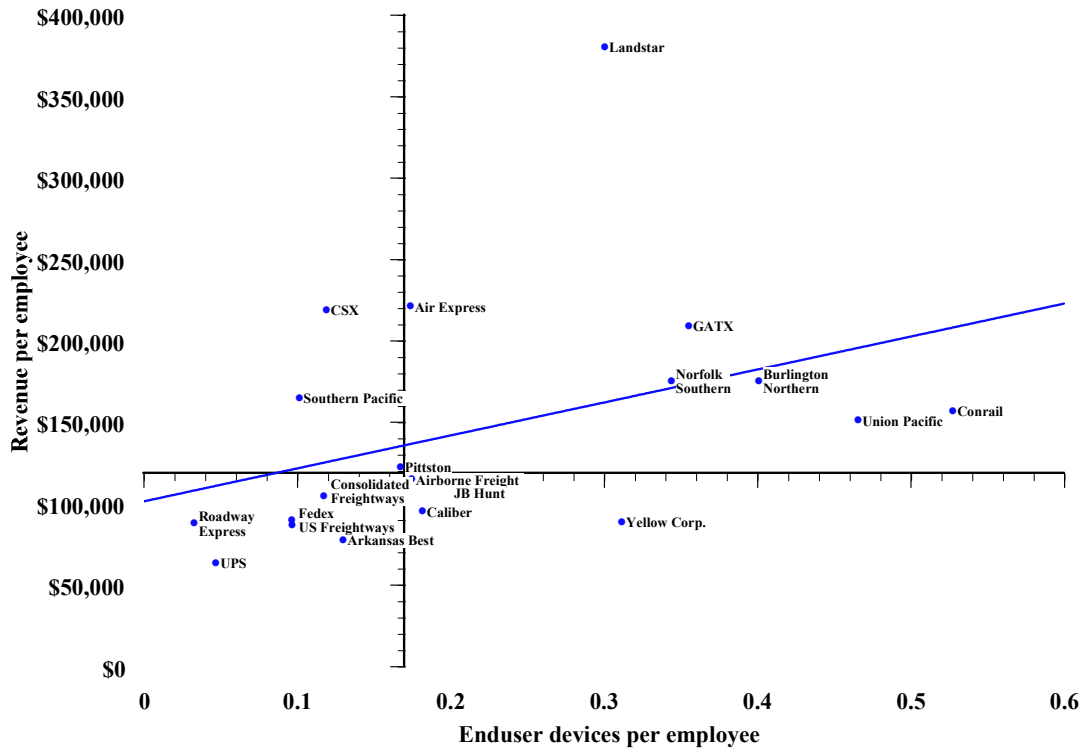
*ITT Corporation*

*Mirage Resorts Inc.*

*Viacom*

*Walt Disney Company*

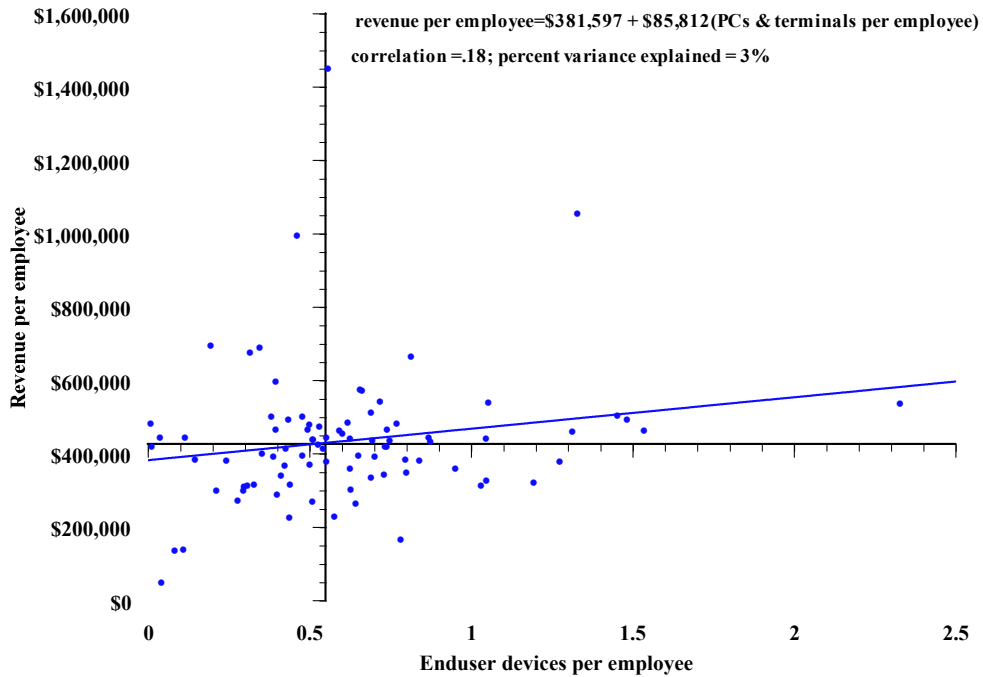
**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG TRANSPORTATION SERVICES COMPANIES, 1996**



revenue per employee = \$101,066 + \$202,448(PCs & terminals per employee)  
 correlation = .39; percent variance explained = 15%

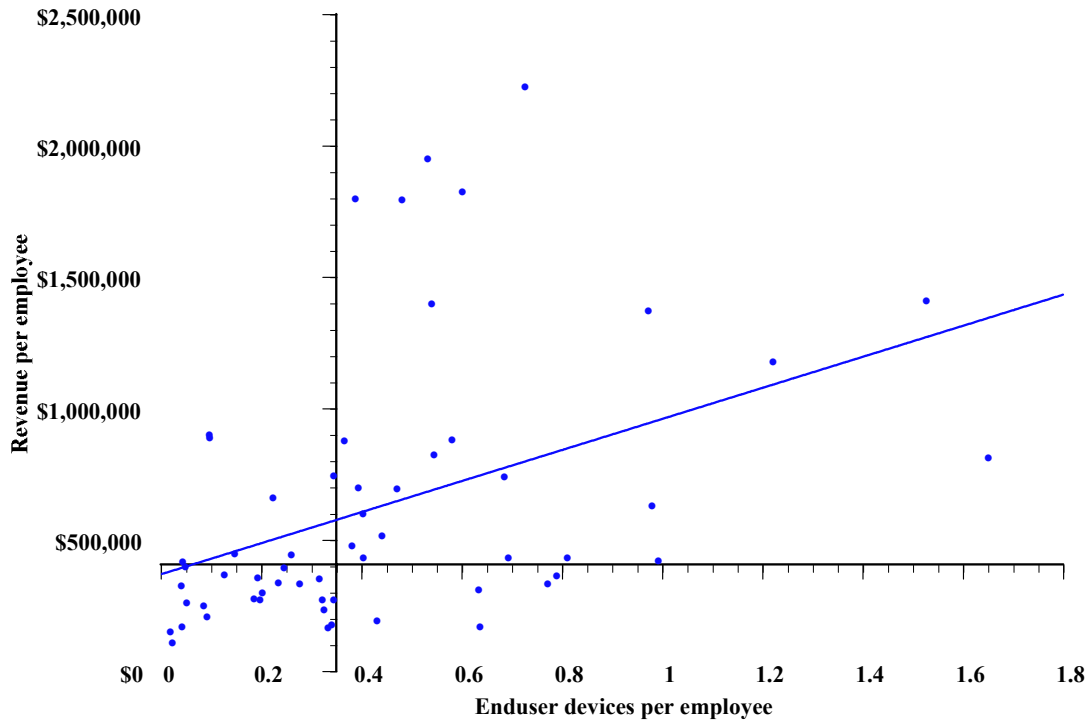
- |                                     |                                   |   |
|-------------------------------------|-----------------------------------|---|
| <i>Air Express Internaitonal</i>    | <i>Consolidated Freightways</i>   | <i>Roadway Express</i>                  |
| <i>Airborne Freight</i>             | <i>Federal Express</i>            | <i>Southern Pacific Rail</i>            |
| <i>Arkansas Best</i>                | <i>GATX</i>                       | <i>US Freightways</i>                   |
| <i>Burlington Northern Santa Fe</i> | <i>JB Hunt Transport Services</i> | <i>Union Pacific</i>                    |
| <i>CSX Corporation</i>              | <i>Landstar System</i>            | <i>United Parcel Service of America</i> |
| <i>Caliber System</i>               | <i>Norfolk Southern</i>           | <i>Yellow Corporation</i>               |
| <i>Conrail</i>                      | <i>Pittston Company</i>           |   |

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG UTILITY COMPANIES, 1996**



<i>Allegheny Power System</i>	<i>DTE Energy</i>	<i>Midamerican Energy</i>	<i>Peco Energy</i>	<i>Williams Cos</i>
<i>American Electric Power</i>	<i>Delmarva Power &amp; Light</i>	<i>Montana Power</i>	<i>Peoples Energy</i>	<i>Wisconsin Energy</i>
<i>Atlanta Gas Light</i>	<i>Dominion Resources</i>	<i>National Fuel Gas</i>	<i>Pinnacle West Capital</i>	
<i>Atlantic Energy</i>	<i>Duke Power</i>	<i>New England Electric</i>	<i>Portland General</i>	
<i>Baltimore Gas &amp; Electric</i>	<i>Eastern Enterprises</i>	<i>New York State Electric &amp; Gas</i>	<i>Potomac Electric Power</i>	
<i>Boston Edison</i>	<i>El Paso Natural Gas</i>	<i>Niagara Mohawk Power</i>	<i>Public Service Co of Col.</i>	
<i>Brooklyn Union Gas</i>	<i>Enova</i>	<i>Nicor</i>	<i>Public Service Enterprise</i>	
<i>Browning Ferris Industries</i>	<i>Enserch</i>	<i>Nipsco Industries</i>	<i>Puget Sound Power &amp;</i>	
<i>CMS Energy</i>	<i>Entergy</i>	<i>Noram Energy</i>	<i>Light</i>	
<i>Carolina Power &amp; Light</i>	<i>Equitable Resources</i>	<i>Northeast Utilities</i>	<i>Rochester Gas &amp; Electric</i>	
<i>Centerior Energy</i>	<i>FPL Group</i>	<i>Northern States Power</i>	<i>Scana</i>	
<i>Central &amp; South West</i>	<i>Florida Progress</i>	<i>Ogden</i>	<i>SCECorp</i>	
<i>Central Maine Power</i>	<i>General Public Utilities</i>	<i>Ohio Edison</i>	<i>Sonat</i>	
<i>Cinergy</i>	<i>Hawaiian Electric</i>	<i>Oklahoma Gas &amp; Electric</i>	<i>Southern Company</i>	
<i>Citizens Utilities</i>	<i>Houston Industries</i>	<i>Oneok</i>	<i>TECO Energy</i>	
<i>Coastal</i>	<i>Illinova</i>	<i>Orange &amp; Rockland Utilities</i>	<i>Texas Utilities</i>	
<i>Columbia Gas</i>	<i>KN Energy</i>	<i>PP&amp;L Resources</i>	<i>Unicom</i>	
<i>Commonwealth Energy</i>	<i>Kansas City Power &amp; Light</i>	<i>Pacific Enterprises</i>	<i>Union Electric</i>	
<i>Consolidated Edison</i>	<i>LG&amp;E</i>	<i>Pacific Gas &amp; Electric</i>	<i>Utilicorp</i>	
<i>Consolidated Natural Gas</i>	<i>Long Island Lighting</i>	<i>Pacificorp</i>	<i>WMX Technologies</i>	
<i>DPL</i>	<i>MCN</i>	<i>Panergy</i>	<i>Western Gas</i>	
<i>DQE</i>			<i>Western Resources</i>	

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG WHOLESALE TRADE COMPANIES, 1996**

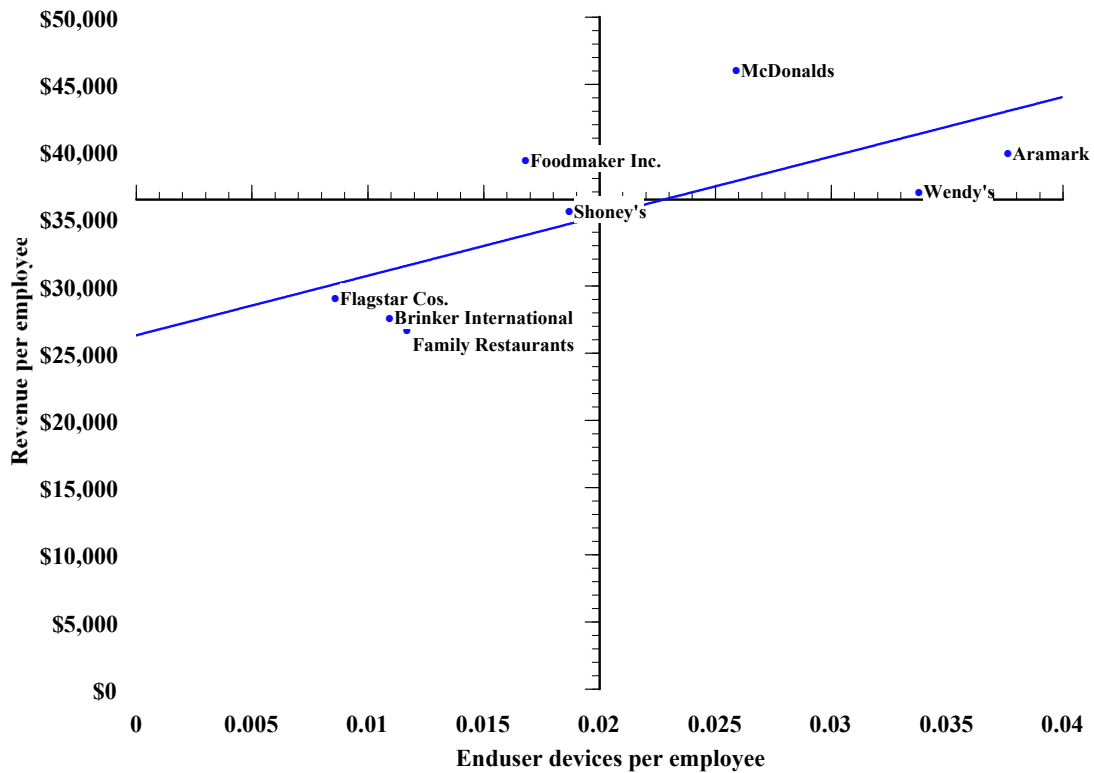


revenue per employee = \$368,179 + \$591,026(PCs & terminals per employee)

correlation = .41; percent variance explained = 17%

<u>Durable Goods</u>		<u>Non-Durable Goods</u>		
Ameridata Technologies	Inland Steel	Alco Standard	McKesson	Univar
Anixter	Intelligent Electronics	Amerisource Health	Nash Finch	Universal
Arrow Electronics	Kaman	Andersons	Richfood	White Rose Foods
Avent	Marshall Industries	Bergen Brunswig	Roundy's	
Bearings	Merisel	Cardinal Health	Rykoff Sexton	
Commercial Metals	Microage	Certified Grocers	Sigma Aldrich	
Cotter	Owens & Minor	Dimon	Smart & Final	
Crane	Rexel	Enron	Spartan Stores	
Earle M. Jorgensen	Safeguard Scientifics	Fleming	Standard Commercial	
Fisher Scientific	Stewart & Stevenson	Foxmeyer Health	Super Food Services	
Genuine Parts	Tech Data	International Multifoods	Supervalu	
Graybar Electric	Waban	JP Foodservice	Sysco	
Handleman	WW Grainger	MA Hanna	United Grocers	
Hughes Supply	Wyle Electronics		United Stationers	

**CORPORATE PRODUCTIVITY AND DIFFUSION OF ENDUSER DEVICES  
AMONG EATING PLACES, 1996**



revenue per employee = \$26,215 + \$443,480(PCs & terminals per employee)  
 correlation = .71; percent variance explained = 50%

- Aramark*
- Brinker International*
- Family Restaurants*
- Flagstar*
- Foodmaker*
- McDonalds*
- Shoney's*
- Wendy's*



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