

# Ranking the *Benefits* of IS Applications for Manufacturing

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*In a survey of senior managers who use information systems in 310 manufacturing organizations and who are authorized to make decisions regarding investment in information systems, the managers ranked three applications as most beneficial to their operations: financial reporting, product costing, and inventory management. Their responses are analyzed and explained.*

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The present dynamic industrial environment is characterized by:

- High costs of raw materials, machinery, labor, and overhead.
- Significant differences in production processes.
- Too lengthy production times.
- A high degree of interdependence among the different components of the process (stage 1 has to be completed before stage 2 can begin) and dependence upon external factors, such as suppliers
- A competitive market

The heart of every manufacturing organization is its production, which includes management of customers' orders, planning and managing of inventory and raw materials purchasing, planning and managing of production, and everything connected with these factors. To control all these components and to properly manage

the firm, a reliable, up-to-date information system is a prime necessity. In a complex firm, it is impossible to keep track of all the components and the vast amount of essential information integral to managerial activities and production processes without integrating computerized information systems into the actual production management. Simultaneously, one must control the operations on the shop floor and feed the ongoing information coming from the production process into the firm's management information systems.

Clearly not all manufacturing organizations are at this advanced stage of development. In the March/April 1994 issue of *Industrial Management*, Uma G. Gupta notes that "In spite of... technological advances, today we find the problem of islands of automation to be as persistent and prevalent as ever before," attributing the lack generally to "the lack of technologies that support an integrative shop floor architecture."

In any event, some applications are used more frequently and more profitably than others.

In a survey of senior managers who use information systems in 310 manufacturing organizations and who are authorized to make decisions regarding investment in information systems, the managers ranked three basic applications as most beneficial to their operations: financial reporting, product costing, and inventory management. The companies in the sample represent a wide spectrum with respect to size and operating characteristics.<sup>1</sup> Table 1 presents the distribution of the organizations by their characteristics. Figure 1 represents the distribution of the sample by manufacturing sectors.

## The Results

Figure 2 depicts the percentage of the organizations that are using each application referenced, as well as the average benefit derived from using each application.

As Figure 2 shows, the financial reporting application is most frequently used (99% of the organization in the sample use this application). The benefit derived from this application, as perceived by the respondents, is the highest among all the applications.

Oddly enough, this application is not the most important application for a manufacturing organization; a plant cannot increase sales nor can it reduce cost by this application. But this application is almost always the first one to be implemented, for three reasons:

- Although this application does not help in decision making with respect to inventory management, purchasing management, or customer orders, every organization needs it.
- This application is so standard that there is almost no need to adjust it to the specific needs of any organization.
- There are many inexpensive software packages for this application that can be implemented on any computer.

Therefore, most of the organizations (manufacturing and non-manufacturing) started with this application, and most of the managers are so habituated to it that they do not believe they can work without it.

**Table 1: Distribution of the Respondent Organizations' Characteristics**

	<u>Min.</u>	<u>Max.</u>	<u>Mean</u>
Volume of 1990 sales (in million \$ U.S.)	1	400	41.78
Number of employees	10	2400	200
Number of suppliers	1	5000	177
Number of customers	1	10,000	672
Average lead time to customers (in days)	1	720	39

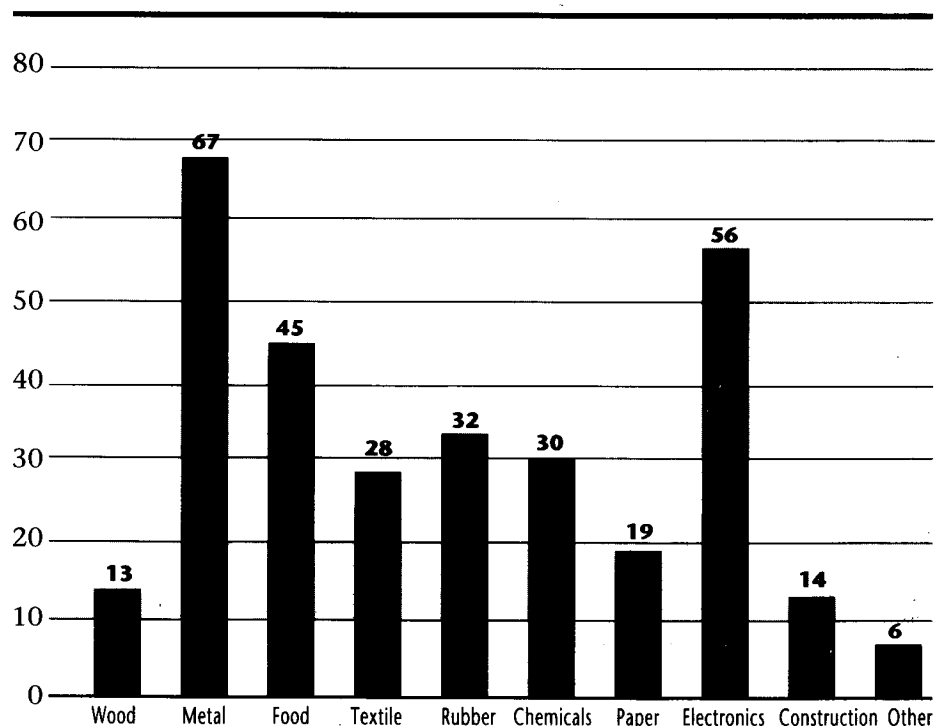
The benefit derived from the product costing application is the second highest, the benefit derived from the inventory application the third highest. These two applications are also necessary for each manufacturing organization. The product costing application is an efficient tool for an essential task, and an inventory system is necessary to enable follow-up of raw materials, work in process, and finished goods.

As Figure 2 indicates, the differences of the benefits between these two applications, as perceived by the respondent managers, is not significant. The inventory application is a little more widely used, probably because, like the financial reporting application, it is simple, standard, and easy to implement.

The product costing application is more complicated and sometimes has to be adjusted for the specific needs of the organization. In addition, this application requires other applications, like a bill of material. Many interviewees told us that they are aware of the importance of this application (hence, the average benefit of this application is high), and they are in the process of implementing it.

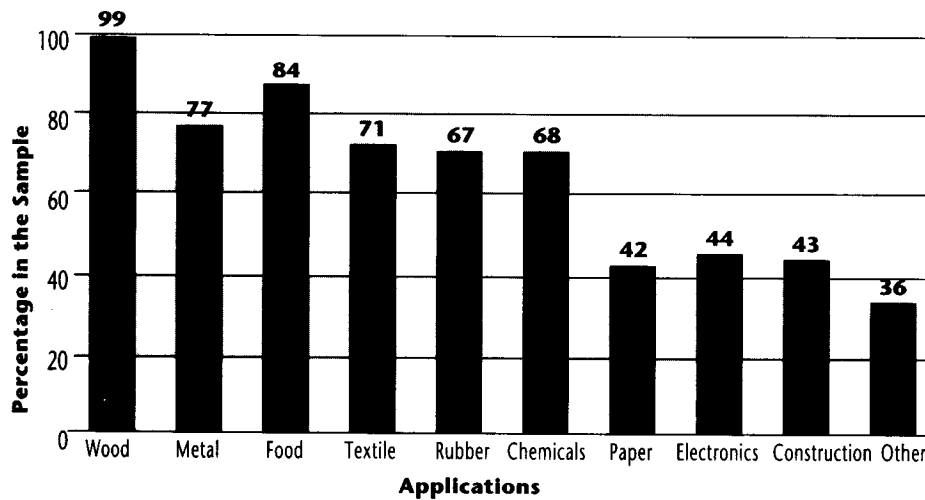
The next application in the order of benefit and in the order of use is customer order management. This application processes each customer order (technical specifications, packaging requirements, quantity, supply time to the customer, etc.), helping the organization to supply orders according to the customer's specification, to supply the orders on time, etc. This

**Figure 1: Distribution of the Sample According to Sectors**



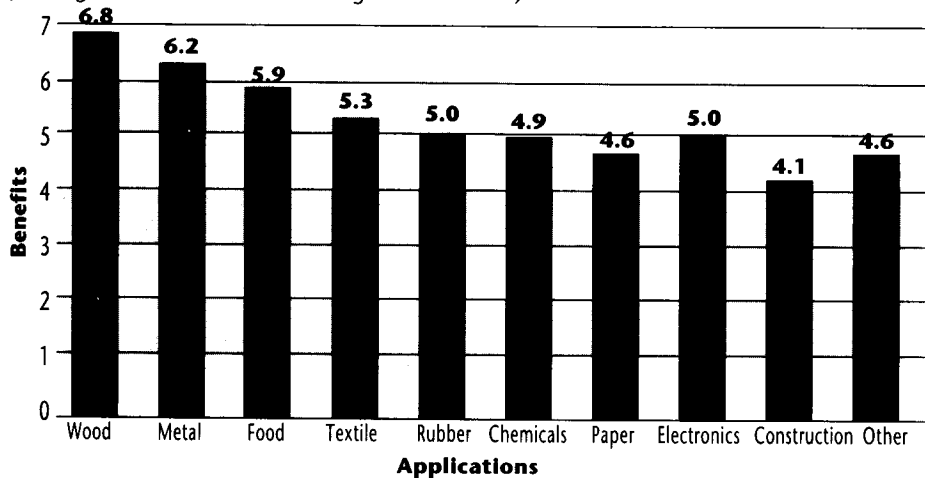
**Figure 2: Applications & Benefits**

**Computerized Applications**



**The Benefits Derived by Using the Applications**

(7 being Most Beneficial and 0 being Least Beneficial)



application helps the organization increase its sales.

Hence, the average level of the benefit derived from using this application is relatively high, and the application is being used by most of the organizations in the sample.

Nevertheless, not every organization needs this application. An organization that produces for inventory (as opposed to producing by customer orders) does not need this application. Seventy-one percent of the organizations in our sample that produce wholly or substantially for customer orders use this application. Since the benefit derived from this application is tangible (increasing sales), the average perceived benefit of this application is relatively high.

The reason that the benefit is not as high as the benefit derived from

using financial reporting or product costing and inventory management is that the average benefit was lowered by those who marked it low because they do not need it to produce for inventory.

The MRP (material requirement planning), the bill of materials, and the orders from suppliers applications deal with the planning of purchasing and use of raw materials as a function of the production plan.

Using customer orders and/or the sales plan, the MRP and the bill of materials applications identify what raw materials and of what quantities are needed for what dates. Based on the recommendations of these two applications, the purchasing manager orders raw materials from the suppliers. These applications allow the organization to order the raw materi-

als as close as possible to the date they are needed and to reduce the carrying costs of inventory. The orders from suppliers' application helps the purchasing manager to plan and to track the purchasing orders.

By using this application an organization can negotiate better prices for raw materials, since the purchasing manager has full and complete information regarding previous purchase orders.

As Figure 2 shows, the benefit derived from the bill of materials and the order from suppliers applications is similar, as is the scope of their use, since both of them are dealing with the same functional area, planning the use and purchasing of raw materials. The benefit derived from using the bill of material application is a little higher because this application is used also for production planning, indicating for each work order what and how much raw material should be withdrawn from the warehouse.

The perceived benefit derived from using the MRP application, and the scope of its use, are lower than the other two applications for several reasons.

First, not all organizations need it. Process manufacturing plants that produce the same products over long periods of time (e.g., chemical plants) do not need this application since they do not use many different types of raw materials; they have long-term arrangements for supplying the same raw materials and the same quantities. Second, this application is less widely used because of its complexity, its cost, and the fact that until recently it could be implemented only on expensive hardware such as mainframe and mini-computers.

Consequently, not many organizations have implemented it yet, and managers who had not had the opportunity to use it were not aware of its benefit. Therefore, the average perceived benefit of this application is lower than the other two applications, although objectively, based on its potential for reducing costs, it should have been higher.

The MRP application is very important for planning the purchasing and the use of raw materials. It is obvious that by using this application an organization can reduce the cost of carrying inventory. Doubtless the use of this application will become more popular.

The data collection application collects data from the shop floor and enables the managers to control production, to identify any aberration of a standard, and to react to trouble such as broken machinery.

The benefit derived from this application is relatively high (5 out of 7). Managers know that they have to be aware of everything happening in production. Nevertheless, the use of this application is relatively small (44% of the sample), probably because in many organizations the needed equipment for data collection is not available, sometimes because of its cost and sometimes because of technological limitations. It is possible that old machines cannot be connected to data collection equipment.

Yet, as Figure 2 shows, managers do realize that this application is important, and there is no doubt that very soon more of the organizations will use this application.

The shop floor control application is usually very complex. Such an application is needed mainly by firms in which manufacturing is a long and complicated multi-stage procedure, such as the electronics, metal, wood, and textile industries.

In these firms, reliable and up-to-date information is of great importance because of the interdependence of manufacturing stages; any delay or missing item can cause heavy loss. But some organizations do not need a floor control system (especially a process plant). Therefore, the average benefit derived from this application as was perceived by the respondents is not so high, and this application is not widely used. Yet, since because the costs of this application are decreasing and new software tools make it easier to use, this application will probably be more widely used.

The quality control application collects data regarding the results of quality assurance, analyzes this data by using statistical tools, and enables the organization to improve the quality of the products. As Figure 2 shows, the average benefit of this application is relatively high, yet this application is not being widely used. The high perceived benefit results from the increasing importance of quality for sales.

Yet, this application is not widely used, probably for two reasons: the emphasis on quality is relatively new, and the application was not well de-

veloped until recently. The use of this application should increase significantly in the near future.

The good news is that the respondents in Israeli manufacturing plants feel that their computer-based systems are beneficial and useful for decision-making. The bad news is that they, as their U.S. counterparts do, are still focusing heavily on accounting/financial applications rather than on systems that directly relate to the bottom line of the manufacturing process. Nevertheless, many managers in the Israeli manufacturing industry have begun to realize that benefits can be derived from using application directly related to the manufacturing process.

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### References

Gupta, U., :An Empirical Investigation of the Contribution of Information Systems to Productivity," Industrial Management March/April 1994, pp. 15-18.

<sup>1</sup> *The sampled organizations were selected from the Annual Survey of Manufacturing companies published by the Central Bureau of Statistics in Israel. Structured interviews were conducted in Israel in 1992. The international reader can learn from the results of this research because the Israeli manufacturing industry is very similar to the American with respect to products, their management systems, and--most important--the use of information systems for purposes of inventory management, purchasing, sales, production management, and decision making.*



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