

# INVENTORY MANAGEMENT IN SMALL BUSINESS: A DECISION MATRIX APPROACH

S. Altan Erdem, University of Minnesota, Duluth Tom K. Massey, Jr., University of North Texas

## ABSTRACT

This article provides a decision tool to assist small business managers in their search for an appropriate inventory management system. In the article, a functional taxonomy that would match various small business sectors with certain operational consideration points is proposed. This taxonomy is basically a two-dimensional decision matrix that can equip these managers with various perspectives which are broad enough to reveal potential gains of different systems.

## INTRODUCTION

The management processes associated with maintaining optimal inventory levels presents numerous and continual challenges to the goods-oriented small business. In each of these firms the design and implementation of a particular inventory planning system should originate with the underlying strategic planning policies within the business. These decisions are conditioned by numerous financial and structural concerns. It is important to note that research has shown that inventory planning discrepancies have created difficulties for small business, each of these areas must be carefully considered.

As Robinson, Logan and Salem [20] have reminded both researchers and managers, inadequate inventory planning has been demonstrated to be one of the major causes of small business failure [8; 14]. Indeed, the importance to the small firm of effective inventory management has been underscored by others. In a study by Wichmann [23], 22 percent of the firms under review encountered inventory control problems in their operations. Additionally, Robinson, et al. [20] showed that periodic management review of minimum inventory levels was positively and significantly ( $p < .01$ ) related to return-on-sales ratios among small grocers. Without question, these studies suggest that small business managers have numerous inventory planning options available to them. They may select from among techniques that range from judgmental heuristic processes to elaborate computer-based models. For example, the traditional economic order quantity method [4] combines intuitive appeal with straight-forward mathematics. However, given the widespread availability of computer technology and a more complete understanding of sophisticated relationships in inventory management, other more complete understanding of sophisticated relationships in inventory

management, other more complex methods have evolved. Among these newer methods are Just-In-Time Production Technology, and Flexible Manufacturing Systems. With this wide range of choices available, it becomes extremely crucial to the small business manager that the most effective inventory management system is implemented.

Lynagh and Poist [17] have written that the study of inventory and logistics management within small business is a research frontier. Indeed, numerous researchers have devoted much effort to extending the bounds of this frontier. Many articles to date have presented excellent summaries of skillfully designed empirical studies and have reported the significance of their managerial implications. What is needed at this time is a framework within which managerial needs can be operationalized and research unified. To offer a starting point for developing such a framework, the purpose of this article is to suggest a two-dimensional matrix that promises to provide small business managers with a decision aid for selecting an appropriate inventory management system and serve as a paradigm for scholarly research. In use, this taxonomy jointly considers three basic functional areas of small business and examines the relevant decision criteria faced within each.

## A FUNCTIONAL TAXONOMY

Regardless of the specific method that a manager may choose, Kahn and Rocha [15] have provided several summary aspects of an inventory management system that can be used by any manufacturing-or distribution-oriented firm.

Specifically, they have suggested that managers:

- stock merchandise according to profitability;
- actively seek to eliminate stockouts;
- decrease emphasis on less profitable items; and
- strive to maintain desirable relationships among inventory levels of various products.

It is important to note that these researchers are not alone in their views. For example, Duncan, Hollander, and Savitt [9, p. 377] have provided three additional criteria. They have recommended that a profitable inventory management system be:

- no more elaborate than necessary;
- cost-justified; and

- used as a management tool and not become a surrogate for management itself.

As Bowersox [6] has effectively argued, any successful logistics management system embodies the systems, total cost, and trade-off concepts. From raw materials to finished goods, the management of inventory flows embodies aspects of both opportunity and cost. The inventory manager must constantly balance anticipated opportunities against the associated costs.

Table 1 shows several opportunities and costs that the purchase and maintenance of large inventories presents to an organization. To illustrate, large quantities of inventory-on-hand offers the opportunity for production or sale to occur without the need to worry about stock-outs or waiting for replenishment. The purchase of large quantities of inventory often provides opportunities for significant cost savings, vis-a-vis quantity discounts. In addition, large inventories can reduce the risk of stockout risk due to supply inconsistencies or "lumpy" demand.

#### TABLE 1 LARGE QUANTITY INVENTORY PURCHASES

##### POSSIBLE POSSIBLE BENEFITS COSTS

Lower stockout costs Expend cash-on-hand

Lower purchase prices Use valuable lines of credit

Lower re-order costs Higher pilferage costs

Higher spoilage costs

Higher space cost for storage

Several costs present themselves under these conditions, as well. The purchase of large inventories requires the associated expenditure of cash or the use of valuable lines of credit (which are frequently needed elsewhere in the firm). Storage, pilferage, and spoilage of inventory can also counter many of the benefits. Indeed, the small business manager must be in a position to make informed decisions about the benefits and costs of inventory. It is from analyses such as this that the proposed decision framework has been designed.

Figure 1 presents a functional taxonomy that offers small business managers a framework within which various inventory management options, such as the one offered in Table 1, can be objectively evaluated. It embodies factors that compel the small business manager to

completely review various inventory needs. Within this framework, managers are provided an opportunity assign specific cost estimates and consider any associated benefits. By following a procedure such as this, a more informed inventory management decision should lead to increased profitability through a systems approach.

FIGURE 1

## DECISION ELEMENTS FUNCTIONAL AREAS

Manufacturing Wholesaling Retailing																	
Demand							-----	Financial				Considerations				-----	
-----					Space				Utilization				-----				
- Supplier				Relationships				-----					Information				
Systems					-----					Perishability							-----
-----																	

The two-dimensional schema detailed in the figure provides an analytical design that associates traditional business functions with a suggested set of inventory decision factors. Specifically, Dimension 1 includes three basic functional areas of small business that rely upon sound inventory management for optimal profitability. In turn, Dimension 2 enumerates seven critical decision factors that must be evaluated when choosing an inventory management system.

## DIMENSION 1: FUNCTIONAL AREAS

Manufacturers, wholesalers, and retailers represent the three main functional components that are found in goods-oriented organizations. Additionally, it is important that one single function can be preformed within a given enterprise.

### Manufacturing

Manufacturing represents the fabrication or transformation of goods. Regardless of the particular nature of the manufacturing activity, inventories must be maintained for the transformation of one form or resource into another. These stocks, whether in the form of raw materials or component materials and parts, must be effectively and efficiently managed.

### Wholesaling

Within the context of this matrix, the wholesaling function shall be described as the activity

responsible for moving goods from the manufacturer to other resellers. It is important to note that this function does not represent selling to final consumers. Rather, these firms market their goods to other channel members--other wholesalers, brokers, distributors, or retailers.

## Retailing

Retailers sell to final consumers. Given the rather volatile nature of consumer demand, small business retailers must continually be alert to change. Recent trends in retail industry, such as emergence of specialty markets and national specialty chains [22], retailers are finding themselves subject to unpredictable difficulties. This observation suggests that careful choice of inventory is not only advisable, but essential. By carefully choosing their inventory management technique, retailers may afford themselves the opportunity to change direction quickly and thereby take advantage of many new opportunities within their markets and retail operations.

## DIMENSION 2: DECISION ELEMENTS

This dimension includes seven decision elements that need careful and continual management review. Each of these elements will be outlined and the implications to small business performance detailed.

## Demand

Regardless of whether the specific function being evaluated is manufacturing, wholesaling, or retailing, inventory needs must be anticipated, secured, maintained, and monitored. Although the estimation of inventory requirements that will be needed to fulfill manufacturing processes tend to be more deterministic than, say, anticipating final consumer demand levels, estimates must be made nonetheless.

An important aspect of demand estimation is accurately anticipating seasonal and other cyclic changes. Special forecasting methods may be needed for this purpose. Arsham and Shao [3] have effectively demonstrated how small business managers can utilize specific techniques to include these demand swings into their planning cycles. Such techniques will be particularly useful for wholesalers and retailers of "seasonal" items (e.g., holiday items, lawn and garden supplies) .

Meeting customer demand requirements on time, both in the promptness and quantity of deliver, is an important concern to the inventory manager. The ability to deliver promised goods to distributors, retailers, or final consumers is critical to the long-run viability of the firm.

In fact, the degree of flexibility on this "customer service" issue may indeed prompt consideration of alternative inventory management methods. For example, an inventory system that seeks to eliminate (minimize) backup inventories, vis-a-vis a JIT-type approach, will tend to increase the likelihood of stockouts. Consequently, managers may wish to avoid this and similar approaches in favor of a more stock-intensive methods under such conditions.

### Financial Considerations

An important consideration in the selection of an inventory management technique is the availability and management of funds. Cash-on-hand, debt (either/both long-or short-term) , and equity are sources for this funding. For example, the traditional "working capital" analysis is somewhat inappropriate for this evaluation for the "going concern."

Current Assets portion of the equation. By including the book value of inventory in the value of working capital, the analysis will likely understate/overstate the funds available for future inventory acquisition. The evaluation of working capital for this application should reflect current assets based upon the current market value of inventory (if it were to be sold immediately in its present form).

The accurate determination of available funds is critical because without sufficient levels of cash and/or credit large purchases and their associated quantity benefits are impossible. Indeed, the underlying need for funds rationing will be an important consideration in the purchase of inventory.

### Space Utilization

Productive utilization of physical space by a small business represents another critical consideration of inventory managers. Space can be acquired by ownership, rental, or lease. The key issue that must be evaluated here is the cost of space relative to the value of its utilization. For example, if selling space is able to generate \$15 per square foot per month, it has greater value than if the same space generated \$12 per square foot. A retail manager will make this kind of comparison any time that an alternative product line is being considered.

A similar productivity comparison can be used for manufacturing analyses. For example, if a manufacturing area is generating \$40 value-added per square foot, it has a greater value than areas generating \$30 per square foot. Under both selling and manufacturing situations, a "return on space" (ROS) value can be calculated for various alternatives. The alternative with the highest net ROS will be selected.

Making necessary ROS comparisons across selling/manufacturing/warehouse space is difficult. Despite these difficulties, however, relative assessments must be made.

### Supplier Relationships

This aspect of the analysis relates to the quality of all operational interaction between a business unit and its vendor (s). This crucial decision element goes beyond simply a concern for location of suppliers, which is considerably critical for the adoption of certain inventory management techniques like JIT, to include financial relationships, order processing, reorder scheduling, and support services. In fact, Dollinger and Kilchin [7] has provided guidance in this important area.

When the channel environment is hostile and members do not agree on certain basics, the success of buffer-stock minimization methods becomes extremely questionable. In the event of conflict, management style and organizational structure become relevant issues since they represent the potential to reduce (or solve) channel conflicts. Leadership styles and attitudes of members are important in this potential [16; 21]. It has been shown that participative leadership motivates cooperation and decreases conflict [12; 13]. As a result, the inverse relationship between cooperation and conflict [2; 11; 18] makes up this subject able to limit the benefits of JIT idea in the case of any conflict. The perceived ability of a manager to mitigate conflict and encourage cooperation among all necessary channel participants will guide the final selection of an inventory method.

### Information System

Many of the sophisticated inventory management systems require the use of high-level computer hardware and software systems if they are to work effectively. The ability to measure and maintain manufacturing floor and stocking area inventories on a continuous basis is essential for various zero buffer methods. In a retail environment, shelf and stockroom inventory control is frequently maintained by on-line point-of-sale devices vis-a-vis stock keeping unit identifiers by item.

In addition to the obvious hardware and software costs, the implementation, maintenance, and up-grade of a system can be high. A decision must be made regarding the hiring of in-house specialists or securing outside consultants. Each of these new costs must be balanced against the benefits gained by using a different or "more sophisticated" inventory management system.

### Environment

Environmental issues include prevailing technology (industry and market), social forces, and regulatory forces. Input, output, competitive sectors of marketing channels [1] , together with the possibility of vertical integration that promises an efficiency in coordination [51] are important aspects in this stage of the analysis.

### Perishability

Perishability includes spoilage (e.g., food items) and obsolescence. This latter characteristic includes both market and technological obsolescence. Under obsolescence, whether it is precipitated by a change in market behavior or a new technological process, a small business unit can face a very serious situation in terms of covering costs. Consequently, a business that faces high perishability risk may desire to minimize their inventory levels. Under such circumstances, an inventory minimizing procedure could be sought.

### CONCLUDING REMARKS

This article has developed a decision aid for small business managers to assist them in analyzing their inventory management needs. A functional taxonomy jointly considers the traditional realms of goods-oriented small businesses together with seven important decision factors.

It is necessary to point out that this taxonomy should be subject to rigorous empirical study. Researchers are encouraged to investigate the proposed framework with serious concerns like stability of production schedules and availability of suppliers. Only through continued study will models such as this one possess the potential to fully serve the onsite needs of small business inventory managers.

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