

A C K E R M A N  
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FORUM**

*The industry publication dedicated to helping warehouse managers and their bosses improve productivity and manage more profitably with tips, comments and articles written by practicing professionals.*

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## ***Understanding Warehouse Costs and Risks***

By Thomas W. Speh, Ph.D.

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*Editor's Note: Presented here is a revision of an article written nearly two decades ago by professor Tom Speh, of Miami University, Oxford, Ohio. When written, the purpose of this work was to provide a guideline for public warehouse operators and their customers. Both buyer and seller were accustomed to a transactional pricing and costing system that combined a monthly price per unit for storage with the costs of materials handling and administrative services. The vendor needed to make certain that this pricing would yield a profit, and the buyer wanted to be sure that no money was left on the table. In revising this work, we recognize the need to create a mechanism that is useful for wholesale distributors, as well as logistics service providers who are not using unit pricing. Both buyer and vendor need to understand the process, in order to compare price to actual value of the services rendered. KBA*

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Warehousing is nothing more than the management of space and time. The space management portion, storage, has a cost per month, because there is a monthly cost for warehouse space. The time management component includes labor involved in handling materials as they move in and out of the warehouse. If you are buying or selling warehouse services, or simply providing warehousing services for your own organization, the models that are presented in this article will enable you to isolate and analyze the costs of warehousing.

All companies with warehouses incur the same elements of cost, but they compile them differently. The goal of this article is to convey a costing system that can be used to compare costs of one warehouse with another, or one company to others.

Some warehousing costs tend to be ignored or misallocated, because the analyst does not recognize where they belong. In any costing system, allocation of overhead costs is a matter of judgment, and no specific formula will be correct for every user. The cost models shown here have been designed to ensure that no item is overlooked. We assume that each user will customize the models, and make individual judgments regarding allocation of administrative costs.

### ***Four Categories Of Warehouse Costs***

**1. Handling.** All expenses associated with moving product in or out of the warehouse should be included in

the handling cost center. The largest component is the labor used to handle the product that moves through the distribution center. It includes receiving, put-away, order selection, and loading. It also may include labor to re-warehouse, repackage, or refurbish damaged product.

Handling also includes all costs associated with the equipment used to handle product in the warehouse, such as the depreciation of equipment cost, and the cost of fuel, or electricity to power the equipment.

Other handling expenses are the detention of truck or rail cars, operating supplies, and trash disposal. In effect, handling includes all those costs that are associated with "goods in motion."

**2. Storage.** Storage expenses are costs associated with "goods at rest." These costs would be incurred whether or not any product ever moved. Because storage expenses are related to the cost of occupying a facility, and these costs are normally accumulated each month, storage is expressed as a monthly cost. If an entire building is dedicated to an operation, storage expenses are the total occupancy cost for that facility.

**3. Operations administration.** These expenses are incurred to support the operation of the distribution center. Closing the facility would eliminate these costs. Included are costs for line supervision, clerical effort, information technology, supplies, insurance, and taxes.

**4. General administrative expenses.** Expenses not incurred for a specific distribution center are included in this category. General management, nonoperating staff, and general office expenses are examples. Allocation of such expenses to each warehouse is a judgment call.

### ***Productivity Improvement***

Most warehousing costs, particularly storage and handling, can be influenced by improvements in productivity. Improved methods and equipment may enable the operator to increase the number of units moved without increasing labor, resulting in a higher number of units handled per hour. Changes in inventory, storage layout or equipment may enable the operator to expand the number of units stored in the same number of cubic feet of storage space.

### ***The Risk Factor***

Cost per unit is escalated when a distribution center is not fully utilized. Fixed costs always will be influenced by the rate of utilization. Variable costs, such as labor, never

are quite as flexible as they seem. Management may be reluctant to eliminate experienced workers, particularly when they will be needed for a coming busy season. The same is true for forklift trucks and other materials handling equipment. Therefore, the primary risk in controlling costs is the rate of utilization.

Errors represent another unknown risk. People make mistakes, which may result in product damage and errors, or shipping errors.

Just as the insurance underwriter factors in the risk of loss, the warehouse operator must make a realistic estimate of risk costs. Risk may be expressed as a percentage of total warehousing costs. It should be based on past experience. Methods to reduce risk should be explored.

The simplest way to calculate the risk factor is to include it in the size of the markup. Many time and material agreements have a low percentage of profit, but the unit pricing agreement must factor in a higher profit percentage that reflects the substantial risk of changing volume.

As you contemplate the risk factor, consider the position of the buyer. With a time and material agreement, the buyer agrees to pay for all space and labor that is used, which often includes the rent for a building that is dedicated for the buyer's use. In contrast, the buyer of a unit price agreement pays only for services that actually are used. Expansion and construction can be challenging, as well as costly.

A good analogy is the difference between a hotel and an apartment. When you stay in a hotel, the price per square foot of space occupied is higher than the cost of leasing an apartment. You pay the premium because you want the flexibility of occupying the space only on the days you need it. While the apartment may be cheaper, you pay for it whether or not it is in use.

### ***Developing a Handling Price***

A building block approach, using the categories of warehousing costs included in this article, can be used to develop an hourly selling price. First, all of the costs listed in section I, Handling, are totaled. Next, a portion of the costs in section III, Operating Administrative Expense, and in section IV, General Administrative Expense are added to direct handling expense, in order to develop a burdened handling expense. An additional percentage of profit is added to develop a handling sales price. This figure is divided by the hours billed, to convert the figures into a handling fee per man-hour. While you may not invoice your customers by the hour, the hourly fees can be used to check the validity of current pricing.

### ***Creating A Storage Price***

A similar building block approach is used, but the result is expressed in square feet, rather than hours. Since storage costs increase with time, this storage fee is expressed on a per month basis.

The first step is to total all costs listed in section II, Storage. Following the handling example described in this article, a portion of operating and general administrative expenses must be added, in order to develop a burdened storage expense. Then, a desired profit margin percentage is added to create a price per square foot per month. That price determines the storage rate per unit.

## ***The Importance Of Inventory Turns***

Because storage costs are calculated on a monthly basis, the total cost of storing an item depends on how long it will be in the warehouse. In the past, each unit received for storage had an anniversary date with renewal storage charges added each month afterward. Later billing systems were designed to simplify the clerical task by charging a half month for items received after the 15th of the month, and a full month for everything in storage on the first day of the succeeding month. Regardless of the system used, an inventory that turns 24 times per year should cost less to store than one that turns six times per year. For that reason, the inventory turn rate is a critical data point in creating storage prices.

## ***The "Make Or Buy" Factor***

Nearly all services available from a logistics service provider can be replicated by an internally managed project. The buyer who knows the amount of space needed, and has estimated the number of people required to staff the operation, should be able to simulate the "do-it-yourself" cost of providing comparable logistics services. This cost is then compared with the prices offered by a logistics service provider. In this situation, the risk factor is critical. The do-it-yourself option is full of risk, unlike a unit price agreement that provides maximum flexibility because the risk is absorbed by the logistics service contractor.

## ***Living With Hurdle Rates***

When your company makes an investment in logistics facilities, financial managers want to know about the return on investment. Hurdle rate reflects the minimum percentage of investment return that is acceptable for your company. If you choose the "do-it-yourself" option, your return on investment will be based on the dollars saved, rather than the cost of contracting the service to another party. Yet, you must recognize the substantial risk of doing it yourself, then compare it to the employment of an independent service provider.

## ***Simulating A Logistics Service Provider***

Some private warehouse operators treat their operations as if they were public warehouses. Transfer costs for internal storage and handling prices are determined, and the warehouse manager is held accountable for profitable operation at the established rates.



*Thomas W. Speth is Associate Director of MBA Programs at Miami University. He also holds a part-time position with CSCMP, as Director of Strategic Initiatives. Dr. Speth retired from full-time teaching at Miami's Farmer School of Business in 2008, where he taught courses in Logistics and Supply Chain Management for 35 years. He has worked on consulting projects in a variety of supply chain areas with many different firms.*

# A FORM FOR WAREHOUSE COST CALCULATION

## I. HANDLING

### A. Labor

1. Direct payments:
  - a. Wages ..... \$ \_\_\_\_\_
  - b. Overtime ..... \$ \_\_\_\_\_
2. Fringe benefits
  - a. Health insurance ..... \$ \_\_\_\_\_
  - b. Pension ..... \$ \_\_\_\_\_
  - c. Life insurance ..... \$ \_\_\_\_\_
  - d. Uniforms ..... \$ \_\_\_\_\_
  - e. Other ..... \$ \_\_\_\_\_
3. Compensated time off
  - a. Vacation ..... \$ \_\_\_\_\_
  - b. Holidays ..... \$ \_\_\_\_\_
  - c. Sick leave ..... \$ \_\_\_\_\_
  - d. Jury duty ..... \$ \_\_\_\_\_
  - e. Funeral leave ..... \$ \_\_\_\_\_
  - f. Other ..... \$ \_\_\_\_\_
4. Taxes
  - a. FICA ..... \$ \_\_\_\_\_
  - b. Workers compensation ..... \$ \_\_\_\_\_
  - c. Unemployment compensation .. \$ \_\_\_\_\_
  - d. Other ..... \$ \_\_\_\_\_
5. Temporary labor
6. Development costs
  - a. Training ..... \$ \_\_\_\_\_
  - b. Education allowances ..... \$ \_\_\_\_\_
  - c. Other ..... \$ \_\_\_\_\_

### B. Handling equipment

1. Lift trucks and attachments
  - a. Rental ..... \$ \_\_\_\_\_
  - b. Depreciation and interest ..... \$ \_\_\_\_\_
  - c. Maintenance ..... \$ \_\_\_\_\_
  - d. Motor fuel or electricity ..... \$ \_\_\_\_\_
2. Conveyors
  - a. Depreciation and interest ..... \$ \_\_\_\_\_
  - b. Maintenance ..... \$ \_\_\_\_\_
  - c. Electric power ..... \$ \_\_\_\_\_
3. Pallets
  - a. Purchase or replacement costs .. \$ \_\_\_\_\_
  - b. Repair ..... \$ \_\_\_\_\_

### C. Other handling expenses

1. Detention/demurrage
2. Recouping damaged product
3. Trash and/or snow removal
4. Maintenance of loading docks and related equipment

## II. STORAGE

### A. Facility

1. Rent, or depreciation and interest ... \$ \_\_\_\_\_
2. Taxes ..... \$ \_\_\_\_\_

## II. STORAGE (continued)

3. Insurance ..... \$ \_\_\_\_\_
4. Building maintenance ..... \$ \_\_\_\_\_
5. Other ..... \$ \_\_\_\_\_

### B. Grounds

1. Lawn and landscaping maintenance . \$ \_\_\_\_\_
2. Parking lot maintenance ..... \$ \_\_\_\_\_

### C. Storage equipment (racks and/or shelving)

1. Depreciation and interest ..... \$ \_\_\_\_\_
2. Maintenance ..... \$ \_\_\_\_\_

### D. Utilities

1. Heat and/or temperature control .... \$ \_\_\_\_\_
2. Lighting ..... \$ \_\_\_\_\_

### E. Security

1. Sprinkler and other fire protection systems ..... \$ \_\_\_\_\_
2. Electronic burglar alarms ..... \$ \_\_\_\_\_
3. Guard service ..... \$ \_\_\_\_\_

### F. Pest control

### G. Other facility expense

## III. OPERATING ADMINISTRATIVE EXPENSE

### A. Supervisory salaries ..... \$ \_\_\_\_\_

### B. Clerical salaries ..... \$ \_\_\_\_\_

### C. Labor purchased from staffing services ..... \$ \_\_\_\_\_

### D. Office and data processing equipment

1. Depreciation and interest ..... \$ \_\_\_\_\_
2. Software ..... \$ \_\_\_\_\_
3. Maintenance ..... \$ \_\_\_\_\_
4. Training ..... \$ \_\_\_\_\_
- E. Office maintenance ..... \$ \_\_\_\_\_
- F. Communications costs ..... \$ \_\_\_\_\_
- G. Legal and professional ..... \$ \_\_\_\_\_
- H. Taxes and licenses ..... \$ \_\_\_\_\_
- I. Travel ..... \$ \_\_\_\_\_
- J. Insurance and claims ..... \$ \_\_\_\_\_
- K. Losses due to damage, shortages and errors ..... \$ \_\_\_\_\_

## IV. GENERAL ADMINISTRATIVE EXPENSE

### A. Executive salaries ..... \$ \_\_\_\_\_

### B. Executive office expenses ..... \$ \_\_\_\_\_

### C. Selling and advertising expenses ... \$ \_\_\_\_\_

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# **WAREHOUSING TIPS**

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## ***When Does Mechanization Make Sense?***

The short answer is that the investment is sound when payback is reasonably sure, and short. Equipment vendors are taught to demonstrate payback, and any buyer who does not ask the salesman about return on investment is asking for trouble.

Mechanization always has risks, the biggest of which is that equipment won't function as promised. Another risk is a lack of flexibility, and warehouse mechanization always has had an inverse relationship to flexibility. To some extent, this has changed with robotic equipment, some of which is capable of reprogramming, or even moving to another building.

Payback also is related to volume, so there is a risk that unexpected erosion of volume will increase payback time far longer than originally estimated. Because logistics service providers seldom are able to control volume, mechanization is especially risky for the logistics service provider.

Mechanization should save either space or time, and in rare instances, it may save both; therefore, the greatest opportunities are in the most labor intensive warehouse jobs. These include building or stripping pallets, picking orders, or handling of less-than-case quantities. Extremely long travel within a warehouse also is a candidate for mechanization.

When land is extraordinarily expensive, mechanization, such as stacker cranes, will enable an unusual amount of material to be stored in a modest number of square feet. It can be used to eliminate unpleasant, hard-to-fill jobs, such as labor within a freezer warehouse, or to improve accuracy, such as using bar code scanning or voice recognition to reduce receiving and/or shipping errors.

In the last analysis, measure the risk, and balance it against the projected reward. Where possible, share the risk with the vendor.



## ***Relocating Your Distribution Center***

Here are four of the most frequent reasons why warehouses must be moved:

- ① The facility is too small and cannot be expanded.
- ② The customer base is changed, and the present location does not adequately serve the new market.
- ③ The supplier base has changed, and the current location is not ideal.
- ④ Because of mergers and acquisitions, your company now has too many warehouses.

Several factors must be evaluated when considering the location of a warehouse. Cost and availability of transportation is the most important variable, because transportation is the largest logistics cost for most companies.

Measurement of risk, including fire protection, and the risk of flood, windstorm, and earthquake is nearly as important. Is there a contingency plan if a natural disaster wiped out the warehouse?

Cost and availability of labor is of varying importance, since some warehouse operations are more labor-intensive than others.

Finally, tax incentives are a good indication of how badly a community wants to attract new warehouse operations. In some cases, they can provide significant savings.



## ***Company Statements***

In addition to financial statements, many companies publish written statements to inform employees, customers, and the public what they stand for. Company mission, values, vision and strategy usually are included in the statement.

The mission statement explains why the company exists. A values statement describes your beliefs and behaviors. Vision tells where you are going and what you want to be. Strategy describes your competitive game plan.

Few warehousing companies publish all four statements. As well, many companies publish statements that are so bland and generic that they are meaningless.



## ***Form Follows Function***

Have you ever asked why your warehouse exists? Why was it established? Why is it located where it is?

It is not uncommon to find a warehouse operation that has strayed far from its original function. Perhaps a mixing center also is being used as a storehouse for slow movers. Or, a factory storehouse currently is used to handle returned merchandise. If the form has strayed from the original function, was it because of a careless error, or a deliberate change of policy? In too many cases, the change is accidental. In nearly all instances, the change of form degrades the original function of the warehouse. For example, if it is a mixing center, it should never be too full, nor should it contain the slowest moving items.



## ***Contain Hidden Costs With Warehouse Management Systems***

How often is an item lost in your warehouse, only to turn up later during a physical inventory? How much time is spent searching for lost items? How much time is spent checking the work of order pickers or receivers, even though the function can be performed electronically? How many shipments are returned because the wrong product was sent? What is the total cost of an incorrectly shipped order? How much time is spent in cycle counting, or conducting full physical inventories?

All of these functions can be enhanced and improved with the application of a warehouse management system.

# ***KEN'S COMMENTS***

## ***EFCA -- A Threat To Private Enterprise***



We have tried to maintain a neutral position on controversial issues, and avoided any approach that appears to favor a single political party. That said, your editor has concluded that the Employment Free Choice Act, also known as EFCA, or the card check bill, is the most dangerous legislation proposed in the United States for more than half of a century. It should not be a partisan issue.

Certain facts are undeniable. Labor unions were an important factor in industrial reformation during the 19th and early 20th centuries; yet, the percentage of the unionized workforce has declined each year during the past half century. The logistics service industry, like many others, has been transformed from a unionized business to one that is nearly union free. Labor leaders, facing the prospect of extinction, have contributed significant donations to politicians who agree to sponsor legislation allowing them to expand. EFCA, for the labor lobby, is payback for political contributions and support.

The EFCA is dangerous for these reasons: First, it will deny the secret ballot to workers who face a choice of whether or not to recognize a union. Second, if a union claims recognition and begins to negotiate, a federal arbitrator will dictate a settlement if no agreement is reached within 90 days.

Unions essentially are a franchise business, and the union organizer is compensated for expanding the group. If that individual is unscrupulous, a variety of illegal techniques may be employed to induce prospects to sign a union recognition card. This could, and has, included harassment and personal threats.

There is no law that can force a corporation to remain in business. Thousands of business owners would liquidate their companies rather than suffer with a hostile work environment; therefore, passage of EFCA has the potential to convert the current recession into a second Great Depression that is worse than 1929.

Two legal scholars, writing for the Wall Street Journal, have expressed the opinion that EFCA is unconstitutional because it denies citizens the right of the secret ballot. Unfortunately, the test of constitutionality cannot take place until, or unless, the legislation is passed.

The majority of people in this country are union free and want to stay that way. Our Congress is supposed to reflect the will of the people. If you believe that EFCA is a threat to our economy, contact your Senator and Representative, and ask them to reject this legislation.

## ***The Influence Of Future Shock***

In 1970, Alvin Toffler broke new ground with his book, *Future Shock*. Published in 15 nations, this book influenced the world public, with its message that future shock is a disease suffered by people who are overwhelmed by change. The real problem was not change, but acceleration of the pace of change.

The recorded history of mankind equals 800 lifetimes, at 62 years each. Of these 800, 650 were spent in caves. Writing has been used only for the last 70, and printing during the last seven. Most of the products we use today were developed during the last two. These events have changed our world since Toffler's book was released:

- The United States suffered the worst attack on its soil in our history.
- Radical terrorists have engaged in a global war against the United States and other Western nations.
- The Soviet Union collapsed.
- For the first time, the United States lost a war.
- One United States President was forced to resign, and another was impeached.
- Transportation was deregulated in the United States.
- The costs of communicating and computing have fallen drastically.
- We have suffered the worst economic downturn since the Great Depression.

During 1970, Federal Express and the expectation of overnight delivery service was no more than a dream in the mind of founder Fred Smith. While "just in time" was utilized in Japan, it was unknown in the United States. Barcode technology had not yet entered the warehouse. ESFR sprinkler systems, which made older systems obsolete, were not yet introduced. Computers were bulky and expensive machines, and the warehouse management systems we use today did not exist.

The web-based technology, which is used widely in warehousing and other business activity, was unknown in 1970. The concept of the lean organization had not yet been developed. While processing of returns always was a necessary evil, the concept of reverse logistics had not yet been introduced.



## ***The Growth Of A Flexible Workforce***

As the economy recovers, warehouse operators may elect to use staffing service employees rather than full-time workers. Others will use permanent part timers, such as college students, who are unwilling to take a full time job.

If there is a downturn in volume, the flexible workers are the first to be cut. This provides increased stability to full-time workers, which can be a positive morale factor.

## What Only the CEO Can Do

By A.G. Lafley, *Harvard Business Review*, May 09, pg. 54

Most people consider the chief executive to be a coach and/or a problem solver. The author, of this article, CEO of Procter & Gamble, views the job differently. Only the CEO can link the external world with the internal organization, and that must be done, because without that link the company cannot succeed. Lafley recognizes these four tasks of the CEO:

- ① Define the “meaningful outside.” How do we connect with the ultimate consumer?
- ② Decide what business you are in. At the same time, determine what businesses you should not be in.
- ③ Balance present and future. Consider both short-term and long-term goals and results.
- ④ Shape values and standards. Are they relevant for both today and tomorrow?



## WMS: A Blueprint For Success

By Chris Werling, *Parcel*, March 2009, pg. 30.

Written by an independent consultant, this article serves as a useful primer for implementation of warehouse management systems.

The first step is testing, ensuring that every aspect of the system functions as expected. Training should start early, and include those on the warehouse floor as well as the office staff who work with the system. The timing of conversion, the process of moving data to the new system, may be critical. Validation is a second test to confirm that everything is on track. The most common mistakes in implementation result from poor planning, improper training, and/or inaccurate item analysis.



## Cost-Saving Strategies for Contracts

By J. S. Millstein and Tim Roughton, *CSCMP's Supply-Chain Quarterly*, Quarter 1/09, pg. 34.

The authors of this article are lawyers in the New York and London offices of a corporate law firm. They addressed four areas that offer opportunities to improve outsourcing contracts with new ways to cut costs. The four areas are flexibility, enforcement of contractual rights, renegotiation and leverage. Regarding flexibility, they stress the importance of recognizing the price of superior service. Don't ask for or agree to service requirements that truly are not needed. In these difficult times, a dispute resolution provision is an important part of every outsourcing agreement. Changing economic conditions may signal the need to renegotiate terms that were acceptable prior to the current recession.

## Finding New Value In Truck Leasing,

By Gene Scoggins, *Inbound Logistics*, April 2009, pg. 26.

The author, president of NationalLease, a major provider of leased motor trucks, focused on transportation equipment in this article; yet the same arguments apply to lift trucks, and other capital equipment used in warehouses. Some advantages of equipment leasing include the following:

- Conserve capital to grow the business. Your dollars might earn more with many other investments.
- Manage credit. In today's banking climate, financing of equipment can be challenging.
- Avoid depreciation losses. Leased equipment is not depreciated.
- Control maintenance costs.



## Compliance Education

By Chris Gillis, *American Shipper*, March 2009, pg. 9.

Managers who are ignorant of federal regulations governing import and export activities run the risk of incurring severe penalties and unwanted publicity. The World Academy, based in New Jersey, offers three-day compliance seminars for shippers and logistics service providers. More information is available at [www.theworldacademy.com](http://www.theworldacademy.com).



## Motivating Your Staff During A Down Economy

By John Brown, *Material Handling Management*, May 2009, pg. 44.

When a California trucking company faced the need to reduce salary expenditures by 20%, management elected to adopt a four-day work week rather than resort to a layoff. At the same time, the company launched a training program conducted by a professional business coach. The six-week program was entitled, “Battling Burnout and Regaining Control.” Many of the sessions were forum discussions that permitted workers to express their fears and anxieties. The CEO stated, “I was pleasantly surprised at how much they helped me cope with the stress of leading a company during this economic storm.”



## Logistics Bright Spots

*American Shipper*, May 2009, pg. 16.

An increasing number of logistics service providers are using solar energy to power their facilities. Warehouse roofs are ideal for solar panel installations because they offer large expanses of access to sunlight. All of the examples provided in the article are from facilities on the Pacific coast.