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A Periodic Assessment of Industry Trends

PROVIDED BY AND FOR THE WAREHOUSING PROFESSIONAL

Driving Performance Management in the Warehouse

• Setting Goals • Identifying Barriers
• Providing Feedback • Taking Corrective Action

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The main objective of a Performance Management program is the design, development and installation of fair and achievable performance metrics. When a Performance Management program is installed, a standard is developed for a prescribed "best method."

A good performance measurement program focuses on the comparison of how long tasks should take to how long they actually take. The program also sets up procedures to get feedback on performance against standards.

At the core of a Labor Performance Management project is the evaluation of the labor content of a work function to establish work standards. *Webster's Dictionary* defines "standard" as "that which is established by a competent authority as a rule or measure of quantity."

Standards are derived by applying industry-accepted industrial engineering techniques and procedures, including the use of time study or predetermined time systems, including the use of standards databases. The developed standards should represent what is considered a fair day's work under normal working conditions.

Established standards measure the quantity of time it should take to perform work involved in producing product(s) or service(s) and offer fair goals for a worker, department or company.

A properly installed Performance Management program has a lot to offer associates and managers of warehouse and distribution operations. It can improve productivity as much as 30% by highlighting operational problems, improving methods and developing a system of goals and feedback for all associates. This means that management will have a "fair day's work" identified.

Goals/Metrics

Eli Goldratt, author of *The Goal*, states that metrics drive behavior. A company can use Performance Standards, or Metrics, to set goals for its associates and then provide feedback for management and associates.

If goals are not met, management knows something is wrong. Usually, unmet goals indicate that a barrier to productivity exists. Based on our philosophy, management is responsible to remove the barriers to productivity so associates can perform to their best ability.

Referencing an individual as "associate" has significance. The word "associate" projects team versus individual. Associate creates a mindset of equality and respect for the individual. A Performance Management system drives appropriate behavior by aligning goals and metrics with a company's objectives. The genesis of Performance Management is to improve profitability though continuous improvement and hold associates accountable during their workday. > pg. 2

"The developed standards should represent what is considered a fair day's work under normal working conditions."

Increased Productivity
Increased productivity comes from the motivational effect that performance metrics have on associates. They give increased output when they know two things: they are being fairly and consistently measured and that management cares how each associate is doing, whether as an individual or team.

Psychologists tell us that:

- Most people are fair-minded. They do not want to be taken advantage of, nor do they wish to take advantage of others.
- Most people like and want goals. They like to know how they are doing in comparison to their "best" and in comparison to others. People like to be judged against a performance metric, as long as they believe the metric is fair.
- A person will try to live up to stated expectations.

Engineered Standards
Engineered standards meet these psychological criteria. An engineered standard is based on the following principles (Table 1):

In other words, an engineered standard (100%) is the time required to produce a unit of work by an associate possessing average skill and working at a reasonable, normal pace under normal working conditions.

This standard is equivalent to a "C" grade in scholastics. Studies show that companies operate at 60-70% of their productivity potential if they do not use standards to manage and motivate associates. When standards are properly implemented and labor reporting is installed, performance rises to 75-80%. Productivity continues to increase gradually when management removes barriers to productivity and provides coaching on the associates' performance.

TABLE 1. PRINCIPLES OF ENGINEERED STANDARDS

Element	Definition
Average Performance	Expected performance from the conscientious worker in return for base pay
Effort Level	Easily maintained year after year by the physically normal operator without drawing on reserve energy. Effort level considers fatigue factors, time of day, etc.
Skill Level	Performance that an associate is able to do without undue hesitation, planning or error.

Work Smarter
To clarify, measuring the amount of time it should take to complete a job is not based on speeding up normal worker motions. Rather, measurements are based on the average worker's normal pace. Allowances are made for personal time, rest periods, unavoidable delays, fatigue factors, etc. Standards motivate a distribution associate, for example, to work more efficiently and, therefore, be more productive. The old adage "work smarter, not harder" applies very well here. The associate must fill non-productive gaps, however, to come up to standard. To help achieve productivity gains, supervisors (coaches) need to be trained to think in terms of hours of work rather than units.

Benefits of a Performance Management Program

Most companies engage in Labor Performance Management programs to drive labor costs out of their supply chains. In recent years, industry analyst groups such as ARC, AMR and Gartner have begun to formally follow the Performance Management market and produce alerts and reports similar to those in the WMS and TMS space.

> "This investment is necessary to improve workforce productivity, reduce labor costs, create better quality and create more accurate management data. While it might seem on the surface that this type of labor management would be rejected by workers, our user reference calls in fact show just the opposite. The labor management system benchmark standards take into consideration safety first, set known achievable goals and allow for incentive compensation through measurable peak performance. Results show higher staff retention with greater productivity." – AMR Research

It is common for the analyst groups to report 20% or more productivity savings from Performance Management projects with project payback in 12 months or less. AMR concurs and says, "By getting dynamic performance feedback on streamlined warehouse operations using specialized labor management software, companies can expect to increase workforce productivity anywhere from 10% to 30%."

Companies that are seriously looking into Performance Management are strongly encouraged to talk with any of the analyst groups that follow Performance Management to obtain their reports and briefings on the strong ROI that Performance Management projects can deliver.

Uses of Performance Management

When an accurate Performance Management program is installed and associates have faith in it, management is helped in the following:

Identifying Barriers to Productivity. Labor standards make it easy to detect below-average performance and provide a definitive goal for the distribution associate. Most Performance Management programs are coupled with commercial labor management software (LMS) that automatically generates reports and alerts showing variances from standard performance.

Planning Work. Labor standards also provide a productive and efficient way to plan and schedule labor, particularly temporary labor. The ability to plan, balance and adjust labor scheduling decisions not only reduces labor shortages, but also minimizes overtime, thereby reducing excessive labor costs.

Getting Information. Cost-to-serve data identifies how much direct labor has been spent on a process, task or component of a task, which helps determine product or service pricing. Without a Performance Management system, the time spent on a process or product could be over or understated, resulting in the company losing control to be competitive.

A Performance Management system identifies not only how long a process takes, but also the productivity of an individual, department or entire facility. In today's market, Third Party Logistics providers (3PLs) need performance management to complete job costing on new contracts and on Value Added Services (VAS). The risks are too high and the margins too thin for 3PLs not to have an understanding of their associates' performance by task, job code or client.

Planning Incentives. Maximum productivity increases are attained when labor standards are coupled with an incentive pay system. A common approach to incentive pay systems is to develop a matrix of individual or team performance versus incremental pay, with qualification gates for such issues as attendance, quality and safety. The combination of productivity, quality and safety must all be addressed in an incentive pay formula to achieve long-term success.

Show "What If." A Performance Management system can be the basis for a valuable simulation system. The system can model various scenarios, using standards developed for specific tasks, to yield the best approach to solve any given problem. In a well-built simulation modeling system, parameters can be changed to present "what if" conditions that show the amount of labor and time required to complete given tasks. Simulation is a cost-effective approach to looking at proposed changes and is less disruptive to the operation and workforce.

In summary, Performance Management system benefits include:

- Identifies and quantifies productivity problems (barriers to productivity).
- Provides base data for cost-to-serve or activity-based accounting.
- Defines best practices or preferred methods.
- Provides a basis for incentive pay.
- Reduces lost time, thus producing more direct labor or productive time.
- Improves quality and safety (ergonomics) by defining and training to proper methods.
- Helps solve layout, slotting and material handling problems by providing a relevant database.
- Measures management effectiveness.
- Provides proper data for comparing alternative cost-reduction methods.
- Improves "time compression" of an activity, resulting in better customer service.
- Strengthens communication between associates and management.
- Facilitates planning and scheduling for functions and activities on a daily, weekly or monthly basis.

Contains the basis for continuous improvement in the operation Bottom Line Profits

Performance Management systems have been used successfully in private industry, public operations, food and drug chains, cartage and transportation firms, terminal warehouses, shipping rooms, manufacturing, and retail stores. Not everyone is interested in merely improving productivity or determining equipment justifications with a Performance Management system. Some production operations use Performance Management to aid in the decision of whether to build additional facilities or optimize present locations. In general, all users of Performance Management expect improved "bottom-line" profits.

"The greatest production results when each worker is given a definite task to be performed in a definite time in a definite manner."

History of Performance Management

In the 19th and early 20th centuries, Taylor, Gantt, the Gilbreths, Segur, Emerson and others originated the scientific management concept. They introduced and developed many new management principles with techniques designed to systematize and standardize the planning, operation and control of industry. Basic to the implementation of many of these progressive steps was the establishment of an adequate basis for Performance Management.

The Beginning

Frederick W. Taylor is generally known as the father of scientific management. He was responsible for the first definitive approach to Performance Management. As a foreman for a Philadelphia steel company, Taylor followed the time-proven approach of experimenting with new procedures, noting the results and then drawing conclusions. He developed a simple principle: "The greatest production results when each worker is given a definite task to be performed in a definite time in a definite manner."

Next, Taylor used a stopwatch to establish the time needed to perform a given operation. Soon after Taylor began his work, Frank B. Gilbreth, a successful building contractor, left the construction field to study scientific management methods. With the encouragement of his wife, Dr. Lillian Gilbreth, he devoted his life to promoting scientific management and conducting research in the field of motion study.

Taylor and Gilbreth attracted many followers who saw fundamental differences in their procedures. One group was known as the Motion group, the other as the Time Study group. Ultimately, these two groups found common ground and combined the best features of both procedures into what is now known as "Methods Engineering."

Taylor recognized the relationship between methods and time. The Gilbreths refined Taylor's concept by dividing work elements into smaller units and assigning a separate time to each task. In addition, they contributed to methods improvements by establishing the principles of motion economy.

In 1912, Gilbreth presented a paper to the American Management Association that explained:

- Principles of motion economy.
- Systematic elimination of inefficiencies.
- The concept of determining performance times by analyzing motions required to perform work.

Therbligs

The Gilbreths stimulated interest in motion study of operations and established the first scientific classification of motions. Frank Gilbreth called these motions "therbligs," which is Gilbreth spelled backward.

The Gilbreths were the first to use a constant-speed camera to make detailed studies of motions and methods. Eventually, they developed the micro-motion study procedure that forms the basis for many Performance Management principles. Instead of assigning time values to individual work elements, they assigned therbligs to motions such as Transport Empty, Transport Loaded, Grasp, Use and Assemble. Therblig classifications were not developed with concern for absolute performance times, but to provide a methods improvement tool.

While most therbligs defined motions of the hands and arms, some denote mental reactions; others indicate periods of inactivity, such as rest and delays. Gilbreth made the first attempt at measuring times by identifying motions required to perform an operation. He placed ruled paper in the path of a particular movement and took motion pictures of the motions performed. This technique helped determine the distance each motion required. It constituted a great refinement in motion analysis and was more precise and scientific than anything that had been developed previously.

Cyclograph

Gilbreth also used a cyclograph, which used small electric bulbs fastened to an operator's fingers that flashed at regular intervals. By taking pictures with a stereoscopic camera, the movements of the hands and fingers were recorded on a camera plate in three dimensions. Since the flashes occurred at known time intervals, the time involved and distance covered could be determined by the movement between each dot appearing in the photograph.

Other pioneers in the development of predetermined times were H.L. Gantt and Harrington Emerson. Gantt's emphasis on the factors that influenced productivity led to:

- Closer study of job difficulties.
- Identifying the importance of leadership.
- Use of standards.

In a similar vein, Emerson helped develop concepts of modern management processes. His "first principle" of management was that people work most effectively when they have clearly defined goals.

"In the 19th and early 20th centuries, Taylor, Gantt, the Gilbreths, Segur, Emerson and others originated the scientific management concept."

Motion Time Analysis
In the 1920s, A. B. Segur applied times to therbligs and developed the first predetermined motion time system called motion time analysis (MTA). The desire to predetermine basic motions and the time required by an average operator was indirectly acknowledged almost from the beginning of Performance Management. MTA was the first system to accomplish this application.

From these origins, Performance Management has rapidly evolved due to advanced technology, research and development.

Performance Management Techniques

The saying, "If you can't measure it, you can't manage it," applies to any element in the business cycle, ranging from staffing requirements to order fill times.

In today's competitive world, the difference between profit and breaking even can often be determined by how well business details are managed. Management's control of labor can be no better than its measurement. More accurate measurement provides the information to control costs.

By nature, people want to know what is expected of them – from the president to associates in the warehouse. They also want feedback on how well they are meeting expectations. This is the basis for a Performance Management system – goals, feedback and corrective action when there is a difference between the goal (standard) and the actual performance.

"If you can't measure it, you can't manage it."

Ways to Measure Work

Fundamental ways to measure work include:

- Estimating
- Historical data
- Work sampling and multiple regressions
- Time Study (direct observations timing)
- Pre-determined motion time systems (PMTS), i.e., MSD (Master Standard Data), MOST (Maynard Operation Sequence Technique, 1972), MTM (Method-Time Measurement, 1948)
- Discrete X, Y, Z and Vectors (linear distance traveled)

The last three are generally considered engineered Performance Management practices.

Estimating. This requires judgment of how long a segment of work should take. Examples are selecting an order, restocking a section of pick flow racks or determining how many letdowns can be expected in a two-hour period.

Historical Data. This data determines how long it actually takes to complete a segment of work. Typically, the operator reports the hours spent on performing an activity and the number of units is tracked so a units-per-man-hour value can be established. Sometimes it is a macro number, such as total throughput in pounds, pieces or pallets versus total hours. The information can be assembled to identify productivity by area, order number, individual or group. Historical times, however, include problems, delays or unknowns that become part of the total cost.

Work Sampling and Multiple Regressions. With this measurement technique, weighted variables are applied to each order or segment of work, run through a multiple regression analysis and developed into a reasonable standard. Work sampling permits isolation of delays and problems. This technique is a costly approach to measure work because it requires constant updates as methods change and product seasonality changes occur.

Time Study. This involves observing a task being performed while recording elapsed time. The time is then "normalized" by the observer, depending on the skill and effort required for the work being performed. Although popular, this method is subjective and relies heavily on the experience of the analyst. Skill, pace and method are all factors that the analyst must determine.

Time study involves a random sampling of different operators performing elements of work. These samples are then collected and analyzed to determine time values. Opinions vary regarding the reaction of associates to time study. Management usually feels there will be increased acceptance of the study when an analyst is seen observing a task. The opposing faction says that people are not comfortable when being followed and timed. They are also concerned that only a small percentage of the workforce will determine the average time for performance of a task.

To combat some of the shortcomings of time study, industrial engineers have developed a uniform concept of normal pace; time study personnel have been trained to exercise proper judgment; and statistics have been used to validate the accuracy of the time studies. Time study, with the advent of PDAs and more sophisticated time study software has made this an attractive option to the practicing engineers who are more comfortable with this approach.

Predetermined Motion Time System (PMTS). Predetermined motion times are time values predetermined for a given body motion or combination of body motions. PMTS has been in use for more than 80 years.

STANDARD: Time value for customary work elements

PMTS: Time values pre-determined for a given body motion.

Prior to the concept of PMTS, standard data was used for the workplace. Standard data consists of time values for customary work elements and combinations of work elements at specific types of workstations.

Standard data led to a more universal set of time values – values for the body instead of the workplace. This evolution, from common times for specific work elements to common times for body motions, greatly expanded the usefulness of time study analysis and research. Time values for body motions can be used universally (on comparable body motions), whereas time of specific work elements are restricted to comparable work operations.

The expanded usefulness of PMTS values justified more intensive studies and more sophisticated techniques. Accordingly, time values for basic body motions have been verified extensively by micro-motion analyses, stroboscopic camera measurements and electronic impulse readings. These techniques are more expensive and time-consuming, but they provide far greater accuracy and detail than is possible with stopwatch studies alone.

In the Warehouse

The most frequently used PMTS for installing standards in a warehouse are simplified forms of Methods Time Measurement (MTM). Simply defined, PMTS is a procedure that analyzes the basic motions required to perform a task and assigns to each motion a universally accepted and highly accurate predetermined time standard. The engineer analyzes the performed task, not the associates who perform the task.

There are several advantages to using a predetermined approach. Associates may be less threatened since the engineer is not following them around with a PDA and stopwatch. Since the predetermined times used are at 100% performance, no subjective "rating" (the technician's estimate of the worker's pace compared to 100% performance) is required. Also, no performance rating is required of the "method" employed by the worker.

Win-Win

More often than not, there are as many different methods employed to complete the same task as associates who perform the task. By analyzing the movements and motions necessary to perform the task, the engineer can develop the best method, as well as provide recommendations for improving layout, equipment, tools, etc., and prepare an easy-to-read instruction or methods sheet for training associates.

The warehousing industry has found that overhead expenses for maintenance of a basic Time Study or PMTS program are minimal. Changes to the work environment can be incorporated into the Performance Management program with a minimum of time and energy. A company with a full-time industrial engineer to support a program typically spends only 10-20% of that person's time in relation to the Performance Management system itself. The greatest portion of time is spent on feasibility studies, special projects, equipment analyses and justification, layout development, work simplification and other industrial engineering-related duties.

Also, the industrial engineer's time is spent defining the method based on input from managers, frontline supervisors and associates. This approach creates a "win-win" work environment in which the people involved have the opportunity to work together to increase productivity. It is an atmosphere oriented toward eliminating barriers to productivity.

Any Performance Management system represents a change to the work force and oftentimes is initially disruptive. This initial resistance to change is normally overcome by explaining the approach to the work force at group meetings and following up with communications on the work floor. Most resistance is eliminated as soon as associates realize that the focus of the program is on "eliminating barriers and process improvement" and not a punitive device.

"Prior to the concept of PMTS, standard data was used for the workplace. Standard data consists of time values for customary work elements and combinations of work elements at specific types of workstations."

TABLE 2. ENGINEERED METHODS AND STANDARDS		
	Methods Engineering	**Engineered Standards**
Objective	Determine the most effective and efficient way to perform a task within the parameters of quality and safety.	Determine how long it should take to perform the job detailed in the workflow process charts using the documented preferred methods.
Methodology	A systematic, investigative analysis designed to evaluate people, space, equipment and methods used in the operation to identify barriers to productivity and develop preferred methods that eliminate or minimize these barriers, as well as increase productivity.	Using time study or PMTS, develop time values for each micro-motion (work element) described in the workflow process charts. The sequence and the frequency of the micro-motions are also identified to develop total times for each move.
Result	Engineering work flow process charts that describe and identify all of the job steps and micro-motions used to perform the preferred methods for each job. The preferred method is the most productive way to perform a job with the greatest economy of motion. A methods checklist is developed from the flow process chart. This checklist can be used for operator training.	The standard time necessary to perform the preferred method for each job is established at 100% performance. An engineered standard is the time required to produce a unit of work by an associate possessing average skill and working at a reasonable, normal pace under normal working conditions.

"An effective method is to observe the job being performed and take notes on what people are doing."

In summary, the proper use of either a PMTS or Time Study to develop standards in warehouses, trucking operations, retail stores and clerical areas assures everyone involved that standards will be:

- Accurate and reliable.
- Dynamic and updated to coincide with new facilities, equipment or methods.
- Based on safe methods.
- Based on the accomplishment of quality work.
- Achievable by the normal worker, with average skill, working at a normal pace.

Components of a Program

Preferred methods are the foundation on which standards are built. They are also a basis for performance evaluation. Although the information is presented differently, the same information is in the preferred methods, methods checklists, flow charts and standards.

Know the Job

Before any preferred methods can be written, job familiarity is needed. Generally, any existing training documents should be reviewed first. While reviewing, make notes about anything that is unclear. Training documents usually consist of tasks or procedures rather than methods. (This is referred to as "what" is done versus "how" it is done.) Nevertheless, these documents provide insight into the flow of the job.

An effective method is to observe the job being performed and take notes on what people are doing. Write what is observed. Informally talk with an associate about the job while taking notes to get a feel for exceptions.

Use a layout or diagram of the work area to chart where the job starts and ends. A review of earlier notes may show whether all the job steps have been observed, but it will not be possible to know conclusively if some elements of the job may be missing. For example, if forklift replenish slots are being observed but there is no information on the necessary paperwork, RF or voice system usage, the methods are incomplete and questions must be asked about them. A comprehensive flow diagram can be constructed only when detailed notes have been taken and there is an understanding about how exceptions fit into the job.

Talking with someone who knows the job, such as a supervisor, is helpful. Any inconsistencies, ambiguities or exceptions should be discussed. Again, it is important to separate the way the job is done from the way it should be done.

Finally, the information can be incorporated into a methods checklist (Table 3). Methods should be one to three sentences long. Generally, each checklist should have 12 to 24 lines with room for comments and observed exceptions. There should also be room for a check mark to denote whether the method observed was good or bad. If a method was done badly or inconsistently, a comment should be written to expand on the situation.

An important distinction exists between job procedures and preferred methods. Procedures are a course of action; methods are a particular manner of performing a procedure (Table 4).

> "Talking with someone who knows the job, such as a supervisor, is helpful. Any inconsistencies, ambiguities or exceptions should be discussed. Again, it is important to separate the way the job is done from the way it should be done."

TABLE 3. PALLET JACK SELECTION CHECKLIST (PARTIAL LIST)

Yes	No	Methods	Comments
		8. Parks equipment close to picking side of aisle. Keeps distance between side of picking pallet and slot to about one step (2½ ft.).	
		9. Peels selection label from backing while walking to slot.	
		10. Places selection label on case as selector reaches for case in slot.	
		11. Walks across the aisle only when necessary to select a case directly across where machine is parked.	
		12. Avoids moving equipment for cases within one 'leg' (two bays). Moves machine only when picking sequence changes to new 'leg.'	
		13. If case hook is used, pulls all needed cases forward in slot with hook before placing hook aside.	
		14. Avoids damaging cases, especially when using case hook. Replaces any fallen cases to proper slots.	
		15. Builds pallet from front (battery end) to back, without over-building front pallet. Builds solid base on both pallets.	

TABLE 4. EXAMPLES OF DIFFERENCES		
Job	**Job Procedure**	**Preferred Method**
Order Selection	Apply the label to the case.	Begin peeling the label as you are stepping to the slot; then apply the label as you are obtaining the case.
Forklift	Bring empty pallets in groups of 10 to the designated spot in front of the warehouse.	Move the stack of empty pallets down the aisle as each replenishment is done. Bring them to the designated spot in front of the warehouse after a stack of 10 is made.

Consider Safety, Consistency and Quality
While no one set of rules can specify all the necessary combinations, the use of the proper principles and concepts can help in making the right choices. Three criteria need to be addressed when developing a preferred method: safety, consistency and quality.

Safety. Safety methods for the associate and product should address normal practices and regulations. Ergonomics plays a role in methods development to improve performance while enhancing comfort, health and the safety of the operator.

As a preventive process, the inclusion of ergonomic factors in the method can prevent many Cumulative Trauma Disorders (CTDs), such as carpal tunnel syndrome, tendinitis and bursitis. People at risk include those whose jobs require repetitive exertions and who have poor posture (e.g., repetitive and awkward use of the shoulder, elbow, forearm, wrist and hand).

Preventive methods lead to less lost time due to work-related injuries and reduced training costs because new associates are not needed to fill in for associates lost to CTD injuries. Ergonomics can help solve problems already present through the redesign of equipment and work areas.

Consistency. Consistency requires that jobs are performed using the same methods all the time. Jobs need definition. Two jobs may need to be created out of one during methods development. Different circumstances may require different methods or separate job duties.

Quality. Quality issues affect productivity and efficiency. Nothing can be truly productive or efficient if it is of poor quality. In today's market, a company's only advantage over its competitors may be the quality of the services or product it provides.

Good performance and good quality go hand in hand. People who are properly trained produce high quality work at an acceptable performance level.

Developing the Flow Chart
Flow charts are techniques for organizing and structuring a job. Flow charts also help to point out job inefficiencies. Although a good industrial engineer can notice wasteful steps in a job and make corrections without the aid of a flow chart and diagram, these tools often make solutions more obvious.

To develop a flow chart, draw the travel course of a job. Mark any operational notes or question marks on the diagram (Figure 1).

Another effective technique calls for writing down the major routines in a job. And for each routine, write the subroutines. These are the motions made up of a pattern or series of patterns.

For example, a selection job might include:

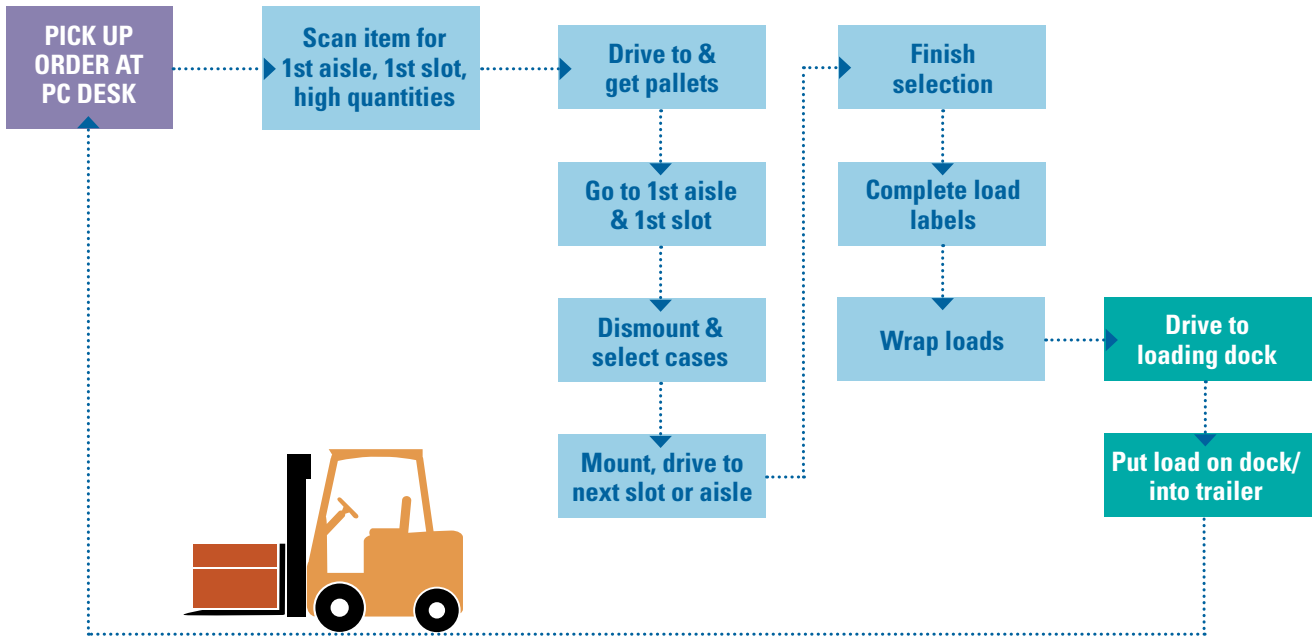
- Pick up order at window
- Wrap pallets
- Circle back for shorts

Subroutines for "Wrap pallets":

- Dismount single jack
- Obtain wrap
- Separate wrap from roll
- Walk to pallet
- Slide wrap under case

After the job is diagrammed and chronologically listed, watch the job process again. When the flow chart is complete, fill out the flow process chart matrix and flow diagram and maintain them.

FIGURE 1. FLOW DIAGRAM FOR DRY GROCERY ORDER SELECTION



"The time value or percentage of time by which the normal time is increased or the amount of non-productive time applied, to compensate for justifiable causes or policy requirements which necessitate performance time not directly measured for each element or task. Usually includes: irregular elements, minor unavoidable delays, rest time to overcome fatigue and time for personal needs."

Establishing Time Values

Once the flow process chart has been developed, times must be established for each element of work. All direct labor should be associated with a variable or indicator often known as Key Volume Indicators (KVIs). KVIs measure the amount of work performed to complete a defined job task.

In a manufacturing facility, a KVI could be the number of production units completed. In a warehouse selection job, a KVI could be the number of cases selected, the number of line items or the number of containers (pallets, totes) shipped.

To thoroughly evaluate a task, a number of KVIs are used. A selection job, for instance, requires certain tasks to be performed for each assignment: travel a specified distance, handle a specific number of pallets, items and cases, and so on. To evaluate multiple functions within a job task, time must be allowed to perform each function as compared to each KVI.

Jobs can have different KVIs. For example, the KVIs for picking may be defined as follows:

- Assignment (Cycle) Time: Time given once per assignment or cycle
- Order Time: Time given per each individual order
- KVI 2 – Aisle Time: Time to travel a given aisle length
- KVI 3 – Container Time: Time to obtain a shippable container, such as a pallet
- KVI 4 – Item Time: Time for each different line item to be picked
- KVI 5 – Piece Time: Time to obtain and place each case

The number of "variables per assignment" is multiplied by the time allowed for each KVI. All time is summed to arrive at a goal time for each assignment.

"Every worker must be allowed time for personal needs, although the amount of personal time will vary with the individual. 5% of the working day is considered average."

Assigning Frequencies
Frequency is how often something happens. Before frequencies can be assigned, each work element must be assigned to a KVI. Observations should be used only when a model cannot represent the frequency or no data are available.

Using picking as an example, the distance from the last pick to the dock door must be calculated if the labor software does not have the ability to calculate discrete travel distances. Methods to determine the proper distance are:

- Direct observation: randomly following many selectors, measuring the distance from their last pick to the dock door, then calculating the average distance traveled.
- Calculate the distance from every aisle to every dock door and average the distances (model method).
- Use orders to determine the location of the last pick. This raw data method calculates an average distance to the specifically assigned door.

Including Allowances

Any Performance Management technique must include a standard time adjustment. This adjustment adds time for personal or unavoidable delays (interruptions) and slowdowns caused by fatigue. The Industrial Engineering Terminology Standard Z94.12 defines allowance as "the time value or percentage of time by which the normal time is increased, or the amount of non-productive time applied, to compensate for justifiable causes or policy requirements which necessitate performance time not directly measured for each element or task. Usually includes: irregular elements, minor unavoidable delays, rest time to overcome fatigue and time for personal needs." The allowance is normally referred to as PF&D, or personal, fatigue and minor delays.

Personal Allowance. Every worker must be allowed time for personal needs, although the amount of personal time will vary with the individual. 5% of the working day is considered average.

Fatigue Allowance. Fatigue allowance compensates the operator for a loss in efficiency due to fatigue. It is based on a standard drop in production with respect to time. The allowance does not evaluate any effect this fatigue may have on the operator when working with normal skill and normal effort. Most operations provide 7% of the working day for fatigue. This allowance varies according to the job or kind of work done.

Unavoidable Delays. Unavoidable interruptions can occur in many operations in a facility. Examples include waiting for another operator, brief discussions with a department manager, supervisor or material handlers and cleaning work areas. These delays are beyond the control of the operator. Generally, 3% of the workday is allowed for unavoidable delays. This percentage may need to be revised or adjusted to accommodate varying job conditions.

Although percentages for each allowance may vary, 15% of the workday is most commonly used. No scientific method is available for determining the amount of time for each category. Personal time is usually negotiated by the union or set by the company. Unavoidable delays can be calculated by work sampling, if necessary. Fatigue allowances have been broken down into psychological, physiological and environmental factors.

TABLE 5. PF&D ALLOWANCES

Element	Percentage of Time
Personal Allowance	5%
Fatigue Allowance	7%
Delay Allowance	3%
Total Typical PF&D Allowance	15%

Training Associates
Any form of measurement can record how much work is being accomplished, but a Preferred Method determines how much work should be accomplished. All associates can be trained to use the Preferred Method for each job function. Training, or the lack of it, is probably the main reason people do not perform as expected. A Performance Management system or standards will not reap the potential productivity benefits if associates are not properly trained.

Maintaining the Standards
To be truly effective, Performance Management systems require ongoing maintenance to keep standards up-to-date, viable and truly predictive of what can be expected of production processes. If a Performance Management system is not properly maintained, it will probably fail within three to four years, depending on how rapidly the operations environment changes.

The most common reason for Performance Management system breakdown is failure to update the standards in response to "creeping methods changes."

Example: A company installs a work standard for use of an automatic pallet dispenser. Four years later, the pallet dispenser breaks down and is no longer used. Selectors now have to obtain pallets from a stack manually, which requires more time. The standard is not updated to reflect the methods change and therefore is not accurately tracking time to perform the job. When standards become 5-10% in error, problems begin to arise.

In some cases, associates devise a new, more efficient method of performing a task to make the work easier. Associates who make the methods changes often are reluctant to disclose the changes to management because they do not want management to raise production quotas. Therefore, a cautious associate may stretch out the workday or produce for fewer hours.

To keep in touch with methods changes on the floor, management must constantly monitor productivity levels and perform standards audits to ensure the standards are valid and up-to-date. During the audits, a properly trained auditor will see methods improvement opportunities as they arise. These more effective methods should be adapted and training on the new standard updated. This process reduces the chance of ill will between associates and management.

Maintenance of labor standards developed using Time Study and PMTS involves different processes. A job may need to be restudied to revise an engineered labor standard that is based on Time Study. Maintenance of engineered labor standards using PMTS requires analysis of the new methods and updating flow charts to reflect the new motions required to perform the job.

Labor Management Software/ Labor Management System (LMS)

A versatile Labor Management System can provide a data interface to a company's Warehouse Management System (WMS). In many cases, a company's WMS provider offers fully-integrated LMS modules. Best-of-breed Labor Management Systems (BOB LMS) applications consist of the base application that keeps track of the standards elements, key volume indicators and frequency of KVIs. Most LMS have integrated reporting capabilities.

BOB LMS solutions support three-tier architecture: database, application layer and user interface. This architecture allows data and reporting to be distributed across a company's entire network. For example, a company with two DCs can have one centralized database that has been partitioned for each facility. Reporting can be done by each DC, as well as by the company. Therefore, an executive can run reports, evaluate and monitor each DC in real time and compare performance between the centers.

BOB LMS providers that offer a thin (web browser) user interface can also provide a standard, but configurable, dashboard that monitors key performance and indicators. More importantly, BOB LMS solutions have event and alert functionality that can send emails, text messages and phone calls when performance has passed either a predefined upper or lower control limit.

Data Collection: Radio Frequency (RF)

Radio Frequency (RF) is the most common use for data collection in the DC. Data transmission ranges from product tracking in manufacturing to inventory management in a DC. RF devices in combination with WMS provide efficient and highly accurate labor management data in functions such as forklift operations, value-add services (VAS) and inventory control that were previously difficult to measure.

In most RF and WMS installations, the RF wireless terminal is used to communicate in real-time with the WMS, allowing for near-time recording of the task or element performed. Accurate, updated information is available in seconds to an associate anywhere in a facility.

RF benefits include time savings, since KVI performance is automatically recorded and available in real-time to associates and management. RF/WMS systems provide immediate, accurate inventory and location information.

Data Collection: Voice Technology

The integration of voice technology with LMS offers additional benefits and associate acceptance of a Performance Management program. Voice solutions can send performance data directly to the associate's headset, providing goal times for each assignment, updated performance by assignment and cumulative performance for the day.

"Flexible and easy-to-use reporting is key to the success of any Performance Management system. To successfully manage and control operations, supervisors and managers must have access to labor management information that is both timely and complete."

Reporting

A reporting system monitors associate performance and compares that performance with previously determined goals. It also identifies and quantifies barriers to productivity. It identifies the activity by job code, store number, product number, etc. In many cases, lost time is not within the worker's control. It is created by management. Thus, labor reporting is also a means of holding managers accountable for their associates' productivity and indirect labor.

Flexible and easy-to-use reporting is key to the success of any Performance Management system. To successfully manage and control operations, supervisors and managers must have access to labor management information that is both timely and complete.

Performance Management reporting can vary from a simple Microsoft® Excel spreadsheet to a robust integrated Labor Management System. Even the simplest of systems can provide essential performance and labor utilization information for management's use in optimizing operations.

Any labor reporting system should serve three main functions:

- Measure as many job functions as possible (ideally all)
- Provide feedback as fast as possible to associates and management
- Capture data for cost-to-serve

Measure all job functions. One of the more important aspects of a Performance Management system is coverage. An effective reporting system encompasses virtually all direct labor jobs. Jobs that are not tracked tend to be less productive. Associates who are working on jobs with standards may feel they are being treated unfairly if other associates have no standards. Also, tracking indirect labor hours is important to keep them within reasonable limits.

Timely. Performance Management reports are useful to management only when they are timely. Labor performance must be reported as it occurs or immediately after a shift is completed. Timely information can be used to manage and shift labor hours to areas where they are needed.

When first-line managers receive reports quickly, they can respond quickly. Timely information helps managers correct problems or at least prevent them from becoming crises. PDAs, operational kiosks, floor monitors and personal computers provide online options that give immediate feedback to associates and managers.

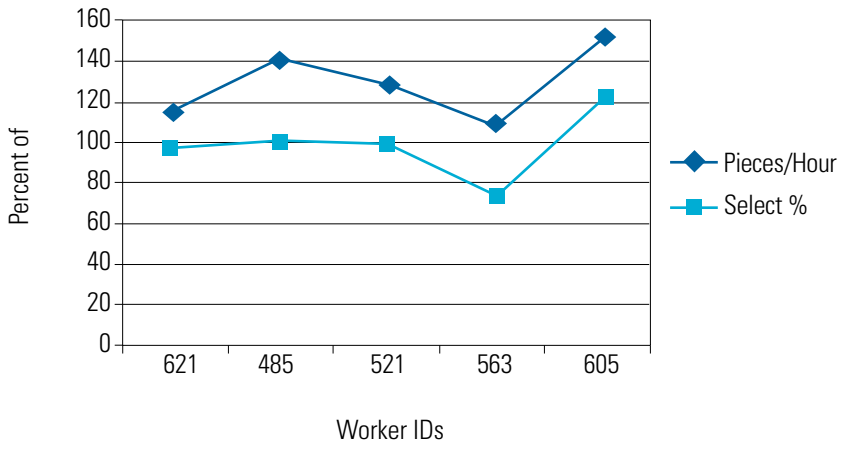
Tailored reports. An effective reporting system should generate reports tailored for their recipient. For example, a vice president of operations would need only a summary report, while an area supervisor or team lead needs a more detailed report.

Many reports are geared toward financial information rather than information that is useful to the manager or supervisor. For example, a report may illustrate the total cases throughput per warehouse labor hours. This measurement does not help the receiving supervisor who schedules the labor for that department.

Relative and meaningful. Information from the report should drive proactive behavior. Comparisons help managers measure actual against estimated or standard performance. Reporting systems also reflect change. This helps managers detect patterns that affect labor scheduling. Graphically illustrating these results shows trends as they develop (Figure 2).

Two familiar sayings relate to warehousing and distribution: "If you can't measure it, you can't manage it," and you cannot "improve what you don't measure." When barriers to productivity are identified and quantified, the labor force will be more effective and efficient.

FIGURE 2. COMPARISON OF WORKERS METRICS



Two examples of labor reporting are shown. The first shows one associate's record for a single day (Table 6). The second shows a summary for a supervisor for the same day (Table 7).

Associate 563's performance is below an acceptable level for this particular company and the supervisor must address why his performance is at this level. Is there a barrier to productivity beyond his control management should be addressing or does he need coaching and counseling to improve his performance?

Incentives in the Warehouse

According to *Webster's Dictionary*, an incentive is "something that stimulates one to take action, work harder and is encouraging and motivating." The desired result of incentives is increased productivity. If pay is the incentive, the definition becomes more precise. It is now a system that will give extra pay for extra effort.

Incentive programs are not new concepts. Frederick Taylor wrote about them in his 1911 book, *Scientific Management*. He described a system in which men were paid so much for each wheelbarrow of coal or coke—considered one of the first piecework systems.

Incentives are all around us. Major league baseball players receive a monetary bonus if their team goes to the World Series or if a player wins the Golden Glove award. Parents use incentives to encourage children to get good grades. Banks reward people who save money by paying interest. It is no wonder that the business community has adopted incentives to reward associates for doing a good job. When used correctly, an incentive system based on an engineered standard can yield anywhere from 15-30% additional improvement in productivity.

"According to *Webster's Dictionary*, an incentive is 'something that stimulates one to take action, work harder, and is encouraging and motivating.' The desired result of incentives is increased productivity."

Include All

One of the most important aspects of incentives is that they are much more effective if everyone is given the opportunity to participate. For example, if selectors are rewarded with incentives, forklift drivers should also be rewarded. Excluding some associates can lead to jealousy and bad feelings within the work force and destroy any sense of cooperation among associates.

All associates should have goals so they can gauge how well they are doing their jobs and standards provide such goals. It becomes a matter of both personal and company pride, and both the company and the associates win if everyone is proud of the job done.

Extra effort is needed to run a successful incentive program, but it is a small price to pay for what can be a tremendous boost to a company. Not only will productivity increase, but typically associates will be happier, stay with the company longer and, in the long term, increase productivity even more.

An incentive does not have to be based on productivity. It can be based on attendance, a decrease in product damage, quality or other measures.

Incentive systems should not emphasize quantity at the expense of quality and safety. In the push to increase productivity, performance can get sloppy or careless, nullifying the positives of the incentive program.

"It does not matter if the company is a union or non-union shop. People want to be treated fairly, have open communication about the Performance Management system, and understand the process."

Taking Action

In most cases, a good Performance Management system highlights opportunities for improvement, such as the need for training, re-slotting and equipment maintenance. Are you prepared to take action and correct these lost time activities?

Supervisors may feel additional job pressure because they are forced to manage their people. For some supervisors, it means leaving their office and getting out on the floor.

Do you have enough supervisors and are they managers of people? How will they react when they are held accountable for their department's training, indirect time and overall performance? Are productivity, safety and quality part of the supervisor's job description? Are they capable of coaching and counseling?

As in any new system, top management must be committed to a successful program. Supervisors especially need to know they are fully backed when a challenge to the program arises. The path forward towards a successful Performance Management culture can start with a "crawl" phase or move quickly through the "Walk to Run." The key is getting started down the path and realizing the significant benefits that lie ahead. ■

TABLE 6. LABOR MANAGEMENT REPORT: DETAIL FOR A SINGLE EMPLOYEE

Associate Name: H Green Associate ID: 563 Sup ID:_____ Area:_____ Shift:_____ Date:_____

CODES: I=Indirect, S=Direct Selection Job

Job Code	Doc #	Start Time	Breaks	Perf %	Std Mins	Dir Mins	Ind Mins	KVI 2 Aisle	KVI 3 Pallets	KVI 4 Items	KVI 5 Pces	Wt	Cube	Sel Pces	Pces/Hr
ISTART	731	15:30	–	–	0	0	11	0	0	0	0	0	0	0	0
SDRY01	05779	15:41	–	98%	82	84	0	4	2	141	197	4108	118	197	141
IMEET	772	17:05	–	–	0	0	18	0	0	0	0	0	0	0	0
SDRY01	00842	17:23	B1	95%	62	65	0	3	2	110	155	2489	106	155	143
SDRY01	06166	18:43	Lunch	90%	64	71	0	3	2	102	169	3300	117	169	143
SDRY01	06637	20:24	–	107%	63	59	0	2	2	88	141	2749	114	141	143
IBATT	804	21:23	–	–	0	0	13	0	0	0	0	0	0	0	0
SDRY01	06671	21:36	B2	20%	23	117	0	2	1	39	52	628	43	52	27
ISTOP	829	23:48	–	–	0	0	0	0	0	0	0	0	0	0	0
TOTALS	**–**	**–**	**–**	**74%**	**294**	**396**	**42**	**14**	**9**	**480**	**714**	**13274**	**498**	**714**	**108**

TABLE 7. LABOR MANAGEMENT REPORT: DETAIL FOR A SINGLE SUPERVISOR

Sup ID:_____ Area:_____ Shift:_____ Date:_____

Assoc ID	Assoc Name	Perf %	Std Hrs	Dir Hrs	Ind Hrs	Total Hrs	Sched %	Ind %	Lost Time	Sel Pces	Select %	Pces/Hr
621	M Mouse	97%	6.9	7.1	0.2	7.3	97%	3%	0	815	97%	115
485	R Roni	100%	5.6	5.6	1.2	6.8	82%	18%	17	789	100%	141
521	G Post	99%	6.8	6.9	1.1	8.0	86%	14%	0	880	99%	128
563	H Green	74%	4.9	6.6	0.7	7.3	90%	10%	0	714	74%	108
605	B Blue	122%	8.3	6.8	0.5	7.3	93%	7%	0	1032	122%	152
RANGE TOTALS	**–**	**98%**	**32.5**	**33**	**3.7**	**36.7**	**90%**	**10%**	**17**	**4230**	**98%**	**128**

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About the Author

Al Gagnon joined enVista, a leading supply chain focused, enterprise cost management firm as Senior Account Executive to advance the company's rapidly accelerating labor performance management and lean process improvement business.

Al's background is working with executives on Labor Performance Management initiatives to improve their company's bottom line financial results. Before joining enVista he spent over 10 years as an executive at two of the major supply chain solution vendors in the sales and marketing area. Prior to that Al managed a successful software and consulting firm with his father, Gene Gagnon (Gagnon & Associates).

Al has worked with executives from some of the largest distribution networks in the U.S. including numerous multi-site rollouts to small single site implementations that have delivered millions of dollars of shareholder value.

Al has delivered presentations on Labor Performance Management to senior logistics executives at industry conferences including WERC, CSCMP, IFDA, RILA and FMI and numerous client sponsored events.

Al has a BA from the University of St. Thomas with a double major in management and marketing.

The first edition of this work was published in 1993. The author was Eugene J. Gagnon, president and CEO of Gagnon & Associates, an international management and industrial engineering firm established in 1960.

Gene received his bachelor of Industrial Engineering degree from the University of Minnesota. He was a registered Professional Engineer and a Certified Management Consultant, a member of the Institute for Industrial Engineering, an active member of CLM and a charter member of WERC. He wrote numerous articles and a book, *Supervising on the Line*, for warehouse supervisors.

Gagnon & Associates was involved in human resource management systems for distribution associates for more than 30 years. Under Gene's leadership, the company developed state-of-the-art productivity improvement systems ranging from computerized work measurement to forklift control programs and ergonomics. ■