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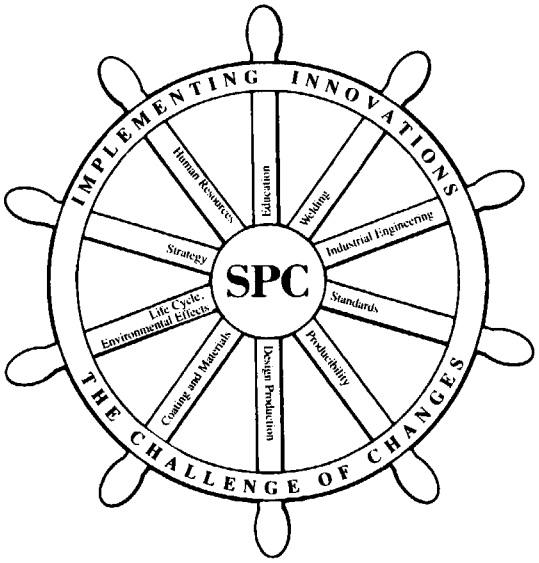

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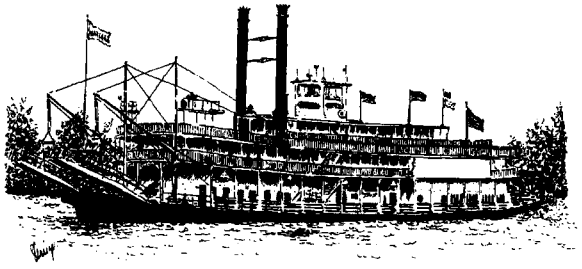

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TQM and JIT need TOC, TOC needs TQM and JIT

No. 8B-3

Frank Rack, **Member, Managing Change Inc.**

ABSTRACT

In the last. two decades, three management philosophies have emerged that have greatly improved America's competitiveness: Total Quality Management (TQM), Just-In-Time (JIT), and the Theory of Constraints (TOC). TQM has proved that customer service and product quality are vitally important. JIT has proven the importance of reducing inventories and eliminating waste. TQM and JIT are forcing management to a new scale of importance not only as to how they view throughput., inventory and operating expense, but more importantly the role of people-their most important resource.

TQm has proven to virtually everybody in the. industrial world that improved quality , necessary for success. Were it not for JIT, inventory would still be considered an asset in most situations. If it were not for TQM and JIT, those actions that are essential to improve future throughput would not have been implemented. This paper discusses how the TOC needs TQM and JIT, and how TQM and JIT needs TOC. TQM and JIT needs TOC in three very important areas:

1. primary focus,
2. measurements, and
3. scheduling.

BACKGROUND

E. M. Goldratt provides a good description of "What a company tries to achieve". He reviews the slogans of TQM: "Quality is Job One", JIT: "Inventory is a liability", and TOC: "Balance flow not *capacity",* and then states:

"Those are just a few of `the slogans that have shaken the foundation of industrial management. In the eighties three powerful movements were witnessed- Total Quality Management (TQM), Just In Time (JIT), and Theory of Constraints (TOC). Those three movements have challenged almost everything that was previously accepted. Those movements each had their modest start in some local technique. But all have evolved with breathtaking speed."

Goldratt concludes that the initial perception of what these movements encompassed was much too narrow. The change in perception is described in the following way:

It is about time to realize that JIT's primary focus is not the reduction of inventory on the shop floor. It is not just a mechanical Kanban technique. It is definitely a new overall management philosophy.

It is about time to realize that TOc's primary focus is not bottlenecks on the shop floor. It is not just a mechanical optimized production technique. It is definitely a new management philosophy.

IL is about time to realize that TQM's primary focus is *not* the quality of the products. It is not just a mechanical statistical process control technique. It is definitely a new overall management philosophy (1).

All three of these management philosophies have the same overall objective:

IMPLEMENT PROCESS OF ONGOING IMPROVEMENT (POOGI).

A POOGI is a process of ongoing change, something cannot be improved without changing it. As a result managers trying to put their company onto such a process must have the ability Lo continually answer three questions.

1. What to change?

Not everything needs to be changed. Managers must be able to identify the few changes that if they make them (solve the core problems), will add most Lo the performance of the organization.

2 . To what to change?

Many Limes it is obvious that something

must be changed, yet it is far from obvious what to change to. cost allocations is a good example. Managers need to be able to develop simple, practical solutions to the core problems.

3. How to cause the change?

Even when managers have done an excellent job of addressing the first two questions, they still face the mammoth task of causing the organization to adopt it. Managers must have the ability to induce people to take ownership of the solution.

TOTAL QUAI. ITY MANAGEMENT (TQM)

Virtually all the players in the industrial world today agree that quality is necessary for success. Deming's 14 points listed below have become gospel to many Fortune 500 and other companies:

1. Create constancy of purpose toward improvement of product and service.
2. Adopt the new philosophy. Refuse to accept defects.
3. Cease dependence on mass inspection.
4. End the practice of awarding business on the basis of price tag. Require suppliers to provide statistical evidence of quality.
5. Find problems. Continually and forever make improvements.
6. Institute modern methods of training on the job.
7. Give the employees the proper tools to do the job right.
8. Drive out fear, so that everyone can work effectively.
9. Break down barriers between departments; encourage different departments to work together on problem solving.
10. Eliminate numerical goals, posters, and slogans that ask for new levels of productivity without providing specific improvement methods.
11. Eliminate work standards that prescribe numerical quotas; use statistical methods to continuously improve quality and productivity.
12. Remove barriers to pride in workmanship.
13. Provide vigorous and ongoing education and retraining.
14. Clearly demonstrate managements commitment to the above 13 points every day.

The TQM movement has evolved from an internal quality program to comprehensive effort that Put the customer's requirements as the key point. The customers are the ones who really pay the salaries of all in an organization. TQM programs highlight everything that should please the customers: better customer service, higher reliability, improved due-date performance, faster response to client's needs, lower cost of most products, etc.

"Total Quality Management induced a real revelation to Western industry. It shattered the fixation of saving nickels and dimes and brought the industry back to its senses. The goal of the company is not to save money but to make money, 'and making money you can do only through pleased customers. In short, the power of Total Quality Management stems from the fact that it set a new direction, or more precisely I should say that, it rediscovered the old direction.(2)"

Successful implementation of any TQM program requires a commitment from the top and the empowerment to the people in the organization to make decisions. Employee empowerment and true commitment at the top of an organization has always been a major obstacle for TQM. The primary reason is the perception by many managers that they must give up the power and authority that they have fought to gain throughout their career.

JUST IN TIME (JIT)

Unlike their American counterparts, Japanese businesses were receptive to the TQM philosophies of Deming, Jurand, and others. As with any process, improvements can be made and the JIT movement provided a new strategy to help in achieving a competitive advantage and increased profits for the implementors.

S. Brown discusses the following ten Principles that JIT is based on:

1. Reduce manufacturing lead time.
2. Cut inventories to a minimum.
3. Synchronize all production processes to the rate of customer demand.
4. Use demand flows to control the shop.
5. Reduce lot sizes and set-up times.
6. Strive for linear production.
7. Make it right the first time.
8. Eliminate waste, in the form of rework.
9. Dedicate work cells to product families.
10. Form partnerships with vendors.

Brown also states: “JIT enables managers to solve deep-rooted operating problems. It enables management to stop "putting out fires“, running from one crisis to another and papering over problems by accumulating inventory. (3)"

Inventory

The Japanese JIT philosophy has proven the important role played by reducing inventory. JIT treats inventory as a liability. Nevertheless conventiona1 cost accounting lists inventory under the heading of assets. However for quite a long time auditors have been feeling more than a little uneasy about inventory profits-profits generated by increasing work-in-process (WIP) and finished goods inventory. Since lately most corporations have started to view inventory as a liability, it is more than a little inconsistent. to record inventory as an asset. To consider inventory in a way that treats an increase of WIP or finished goods inventory as contributing positively to the net profit is becoming more and more indigestible to top managers.

When value added is discussed, what is meant by this term? Value added to what? Can value be added to the product (such as a pump or Valve)? No, unless it is a one product company. Value can only be added to a company's (shipyard's) bottom line when the ship is sold. In shipbuilding the policy of partial payments based on physical progress results in a very misleading picture of true physical progress and worse than that a very erroneous picture of true shipyard profits.

This policy also greatly inflates the value of inventory by adding labor (added value) to the inventory. This added value is really the labor content of each work order which is assigned a agreed to value usually before the start of construction. The value for the material on each work order also has been agreed to and is measured separately from the labor content for partial physical progress payments. It is common practice not to pay 100% of the value of WIP until the ship is delivered and fully accepted.

How can shipyards who have been operating under this and many other such erroneous policies change? Many U.S. manufacturing companies have made the scheduling shift from Just-In-Case (JIC) to JIT, but the total paradigm shift is not made until companies implement the TOC methodology of Drum-Buffer-Rope (DBR). The basics of DBR are described in Reference (4). In the TOC, DBR is also referred to as "Buffer Management." In the TOC the conflict as to inventory being a liability or an asset is resolved as follows;

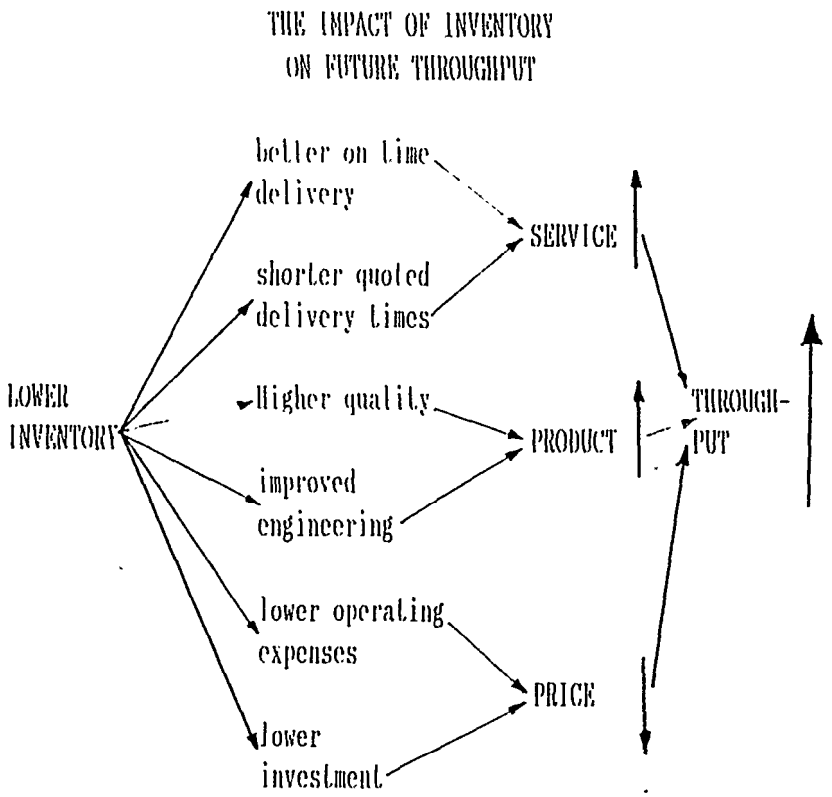
Inventory is only an asset. when it. protects throughput.

JIT follower's have used and improved upon the TQM techniques and have focused their efforts mainly on finding the causes for high inventory and then worked to eliminate the causes. Americans usually try EXPEDITING.

Goldratt and Fox call the 6 elements shown in Figure 1 as "the six competitive edge issues in today's and tomorrow's market. The real race today is not just in one of them, but in all six. Oddly enough, most of these e1ements are considered by our financia1 systems as intangibles. Maybe they should be thought of instead as our future throughput. (4)"

THEORY of CONSTRAINTS (TOC)

The TOC is an all encompassing management philosophy that includes a consistent. set of principles, procedures,



source: "The Race ",R.M.Coldratt,R.E.Fox

Figure 1

and techniques, where every program, every decision, and every action is evaluated in terms of whether it contributes to the successful accomplishment of the common goal of the organization.

In any organization there are usually very few real constraints, and these are not always limited resources that would be considered as bottlenecks. A constraint is defined as anything that limits a system from achieving a higher performance toward its goal. There are only two types of constraints:

1) physical constraints and
2) Non-physical constraints.

Physical Constraints

physical constraints fall into three major categories:

1. resources,
2. material (vendors), and
3. market.

Resources. Resource constraints are mainly people and machines. This type of physical constraint once identified should be fairly easy to break. Some examples of how resource constraints are overcome is by purchasing additional resources (hire more people or purchase or rent or lease additional equipment), work more overtime, subcontract out that portion of work that caused the constraint. and other actions that will break the bottleneck.

Material (Vendors). To have a material physical constraint really means that the material is not available. The only way to overcome this type of physical constraint is to find an alternative material that will satisfy the requirements. In general, material constraints arc really policy constraints in that the purchase price that an organization may be willing to pay for the material is too high or that the quoted delivery time may be later than that organization is willing to accept. The material in fact exists but some organizational policy prevents it from being obtained to meet existing requirements.

Market. Market physical constraints are very similar to material constraints in that they exist only due to the "0rganizations" perception of their market. The true market for a "company ' s" products is global. Another perception that appears to cause market physical constraints is that most organizations limit their Products to a specific type? or segment of the global market place.

Non-physical Constraints

Non-physical constraints also normally fall into three major categories:

1. rules,
2. training, and
3. measurements.

These rules, training, and measurements constraints hereinafter called RTMs, are usually established and implemented to solve a problem and arc based on certain assumptions that are very valid at that time. However, since these RTMs have proven to be successful, assumptions that they were based on are not challenged to verify that they arc still valid. Present cost accounting RTMs are a good example.

Goldratt in The Haystack Syndrome states: "We must come to terms with an unpleasant reality: the more powerful the solution, the faster it might make itself obsolete. Ignoring this reality leads to only one conclusion-

THE POWERFUL SOLUTION OF YESTERDAY MIGHT BECOME THE DISASTER OF TODAY! (1)"

PRESENT SITUATION

J. Rogness identifies the present situation facing American shipbuilding and other industries in today's competitive marketplace:

"The intent of this paper is not to cast blame upon shipyard executives for the productivity constraints in U.S. shipbuilding, but rather to raise questions, stir debate, and perhaps break some new ground in management philosophy. The enemy of U.S. shipbuilding has been identified as authoritarian bureaucracy. The action that has been proposed is an intellectual revolution based on a simple rule: When data are accurate and reasoning is sound but the answer is still incorrect, there is only one avenue remaining: Check the premises, the assumptions upon which the equation or argument is based. (5)"

TQM and JIT have provided many new techniques that have had a very positive impact on improving the competitiveness Of companies who have successfully implemented these techniques. However

there are a growing number of companies that are experiencing some difficulties in developing and maintaining a process of ongoing improvement (POOGI).

Goldratt states: "Making money you can do only at the end of the pipe, through the customer. This means that the desired outcome will be achieved only through the synchronized efforts of many resources. This new direction implies that we should view our organization not as a mere pile of links but as a chain. One function doesn't do its job and the end result is jeopardized. (2)"

TQM and JIT provide many powerful techniques and the 14 points of TQM and the 10 principles of JIT listed above all are very helpful but deal primarily with the links-a function or level in the organization and not the "weakest link" in the organization. The main reason that people and managers deal with links is because of the basic pyramid organizational structure which consists of many different functions and many levels within each of these functions. Reference (6) discusses the two major inherent problems that exist in almost every organization:

1. more functions and levels cause more distortions, and
2. walls of distrust are formed between functions and levels.

TQM and JIT efforts are usually successful within functions because the managers in charge of those functions have the authority to direct the change or can more easily build a consensus within their sphere of influence (control). However if the problem is in another function or in a level above their sphere of influence those managers have little influence on implementing the required changes.

TQM AND JIT NEED TOC

TQM and JIT need TOC to provide the necessary synergism to help those involved in the implementation to make the following three major paradigm shifts:

1. Logistics,
2. "Cost. World" to "Throughput World", and
3. Thinking Process.

The logistic paradigm shift was discussed briefly in the Inventory section above. JIT techniques are playing a major role in starting this paradigm shift but do not provide the techniques needed to completed this paradigm shift. Reference (4) provides a detail description on the buffer management techniques that must be implemented to complete the logistic paradigm shift.

Reference (6) addresses "Moving Shipbuilding From the "Cost World" to the "Throughput World" and Figure 2 lists six of the most important areas of "cost world" thinking that should be changed to permit a company to make the second paradigm shift to "throughput world" thinking.

The Thinking Process (TP) paradigm shift will be discussed later.

TOC also provides the required information in the following three important areas:

1. primary focus,
2. measurements, and
3. scheduling.

Primary Focus

Deming's point 5: "Find problems. Continually and forever make improvements" and JIT's principle 2: "Cut inventories to a minimum, and finally 5: "Reduce lot sizes and set-up times," are good examples of why TQM and JIT efforts deal with focusing on links and not on the chain's weakest link. In addition TQM and JIT techniques deal mainly with physical constraints.

Focusing on Physical Constraints. The primary consideration in focusing on constraints is to aim the effort to what is important. TQM and JIT established

"COST WORLD" AND "THROUGHPUT WORLD" PARADIGMS

EVERYTHING IS IMPORTANT	WEAKEST LINK
INDEPENDENT VARIABLES (20:80 Pareto)	DEPENDENT VARIABLES (0.01:99.9 Pareto)
FIRST ORDER SOLUTIONS (Correlations)	SECOND ORDER SOLUTIONS. (Effect-Cause-Effect)
COST ACCOUNTING (Wrong Local Measurements)	THEORY OF CONSTRAINTS (Control Measurements)
ORDER OF SIGNIFICANCE #l. Operating Expense #2. Throughput #3. Inventory	ORDER OF SIGNIFICANCE #l. Throughput #2. Inventory #3. Operating Expense
FIREFIGHTING	TEAMWORK

Source: Managing Change, Inc.

Figure 2

Throughput (T) as the most important area. The TOC defines Throughput as the rate at which the system generates money through sales. Throughput is considered the most important area because there is no apparent limit to increasing T. JIT clearly established Inventory (I) as next in importance. Operating Expense (OE) is now ranked third. How much can OE and Inventory be reduced before the reduction limits T? Money is saved by TQM and JIT efforts but the goal of an organization is to make more money now and in the future while simultaneously increasing the quality of life of customers, co-workers, families and the organization.

Throughput clearly has the most significant impact on the bottom line.

Goldratt raises the following question relative to the techniques use in TQM:

"Where arc the techniques that management needs to deal with the chain? The unavoidable results of not having such techniques is a very slow improvement in performance of the chain. After a while, when people realize that many of their efforts are not leading to real improvements in performance of the company, they start to shy away, and their actions are just lip service. This situation is caused by the inertia of the inventors rather than the inertia of the implementers. (2)"

The same situation as stated above results from using JIT techniques.

TOC Five(5) Focusing Steps

The TOC employs the following 5 step approach when dealing with physical constraints:

1. Identify the system's constraint(s),
2. Decide how to exploit the system's constraint(s),
3. Subordinate everything else to the above decision,
4. Elevate the system's constraint, and

5. If, in the previous step, the constraint was broken, go back to step one and repeat process.

Using the above 5 steps is very effective when dealing with physical constraints, but there is a major concern:

WARNING: DO NOT allow INERTIA to cause a system's constraint.

Focusing on Non-Physical Constraints. Identifying and dealing with non-physical constraints can be very, very frustrating. The managers, the workers, the consumers, and the stockholders must have a better understanding of how a company must manage to be competitive.

The five steps of the TOC listed above are very familiar and powerful. Managers must realize that the underlying assumption in these five steps was that the constraints were physical: resources, material, or markets. Most managers are well aware that the real constraints of a company are always erroneous Rules, Training and Measurements (RTMs). These erroneous RTMs do not always give rise to a physical constraint. Row should a manager 60 about improving an organization in the more difficult case, where no relatively permanent, physical constraints exists?

The first stop still holds, managers must identify the erroneous RTMs that, right now, arc blocking the performance of the entire company. There is no point in just seeking erroneous RTMs, as there are too many of them in any organization. Trying to deal with all of them is not only ineffective, but it will throw the organization into chaos.

The problem is how to identify the RTMs which arc currently the organization's constraints. When the constraints are physical it is quite easy to identify them, but how can managers do it when the constraints are RTMs? Direct observations, statistical methods, and the like, are totally ineffective in this case. Thus, the first step must now be viewed in a different light. "Identify the system's constraints" should no longer be regarded as a practical recommendation of where to start; it should be regarded as a mandatory demand for a process that will enable management to identify the constraint.

This is the first step of the thinking process, the Effect-Cause-Effect Current Reality Tree. It deals with What to Change? This technique enables management to pin-point the core problem, to clearly identify the system's constraints-even when it is not physical.

When managers are dealing with non-physical constraints, the second and third steps become irrelevant. There is no point in exploiting an erroneous policy? Why should managers even try to subordinate everything to an erroneous policy? Therefore, when the constraints are not physical, managers must proceed directly to the fourth step, to elevate the system's constraints. Rut once again, this fourth step now presents a major stumbling block. If the constraints are physical, how to elevate them is clear but elevating an erroneous RTM means to replace it with a more suitable RTM.

"Elevate The System's Constraints" should be viewed as a mandatory demand for a technique that enables management to construct a replacement. RTM for their organization. Clearly, this process is not available for most organizations. This is exactly the task of the second step of the thinking processes, The Evaporating Cloud and the Effect-Cause-Effect Future Reality Tree. It deals with What to Change To?-with how to construct a suitable solution to identify the core problem- checking carefully that it will eliminate all the negative effects of the existing, erroneous RTMs, without creating devastating now ones.

The real challenge comes when managers examine the fifth step, in a case where the constraint is an erroneous RTM. "Do not allow inertia to cause a

system's constraint", in a case where managers want to replace an erroneous RTM, translates actually into a cultural change. The fifth focusing step of the TOC used for dealing with physical constraints should now be viewed as a demand for a management process that enables a smooth transition from an old rooted RTM into a new one. This is the task of the third step of the thinking processes, the Prerequisite Tree and the Transition Trees. It deals with How to cause the Change?-with how to smoothly transfer an organization from one mode of operation into another.

The thinking process should NOT be viewed as a replacement of the five steps. It should be viewed as what it is, as a process that enables the execution of the steps in a very common case where the constraints arc not physical, but no less tangible, devastating RTMs.

The Three Major Blocks of the Thinking Process (TP) are shown in Figure
These three major blocks not only provides the primary focus for dealing with non-physical constraints (RTMs) but also provides the means to make the third paradigm shift in the:

THINKING PROCESS

MEASUREMENTS

TQM is silent in the area of measurements and relies upon present outdated cost. accounting methods. JIT considers inventory a liability but accounts for it as an asset, a direct conflict.

The recognized measures for making money are net profit and return on investment. But Goldratt presents a slightly different outlook:

"These two measurements seem sufficient, but many a company has been rudely reminded by the threat of bankruptcy, that there is also a survival measurement, like cash flow. Cash flow is an on-off measurement.

THREE MAJOR BLOCKS
of the
THINKING PROCESS

WHAT TO CHANGE ?
Finding the core problem(s)
METHOD:
Effect-Cause-Effect (Current Reality Tree)

TO WHAT TO CHANGE?
Finding a simple solution
METHODS:
Evaporating Cloud & Effect-Cause-Effect (Future Reality Three)

HOW TO CAUSE THE CHANGE?
Finding the needed actions for the transition
METHODS:
Prerequisite tree, transition trees & Socratic method

Source: Avraham Y. Goldratt Institute

Figure 3

When we have enough cash, it is not important.. When we don't have enough cash, nothing else is important. (4)"

The present cost accounting concepts and procedures that are a bridge between actions and the bottom line measurements

have proven to be inadequate. Johnson and Kaplan are just two of many writers that describe these inadequacies (7). How then is the impact that a local decision or action has on the bottom line measured?

Theory of Constraints(TOC) Measurements

The TOC uses the same global measurements that are also used by today's cost accountants, but with clearer definitions. All measurements use at least two of the following inclusive TOC definitions:

THROUGHRPUt (T) - The rate at which the system generates Money through sales. This is defined as the Selling Price minus Raw Materials.

INVENTORY (I) - All the Money the system invests in purchasing things the system intends to sell. This is the total amount of investment in the system, including such things as buildings, equipment, vehicles, and conventional inventory (but not including added value for labor in inventory).

OPERATING EXPENSE (OE) - All the Money the system spends in turning inventory into throughput. This is all the money constantly poured into the system to keep it operating, such as expenses for labor, supplies, maintenance, depreciation, etc.

The above definitions differ from the standard cost account methods in several ways. The major differences are:

Throughput only occurs when the money is received from the customer. Throughput is not when a work order is completed or when a product such as an automobile is sold to a distributor. In both these examples, the completed work order and the auto at the distributor are defined in the TOC as inventory.

Inventory includes everything purchased (invest money in). Money, paid to others (not your employees). There is no value added in the TOC definition of inventory.

Operating expense is all the money paid to the employees of a company. In addition such items as depreciation and interest on investments are defined as operating expenses. All material that is scrapped is defined as operating expense as is all material or services paid for that are used in the operations required to make the product.

These definitions can be used to judge the results for an overall organization by using the following formulas:

Net Profit = Throughput - Operating Expense

$$NP = T - OE$$

Return on Investment = Throughput - Operating Expense divided by Inventory

$$ROI = \frac{T - OE}{I}$$

At the operating level of an organization, any decision which increases Throughput, decreases Inventory, and decreases Operating Expense for the overall organization, will move the organization towards its goal of making more money.

Goldratt in the "TOC Journal," refers to other uses of T, I, and OE for measuring non- financial measurements.

For example one of the most used non-financial measurements is Inventory Turns. Inventory turns is expressed readily by the ratio between Throughput and Inventory. Likewise the ratio between Throughput and Operating Expense is a good way of measuring Productivity. The formulas are expressed:

$$\text{Inventory Turns} = \frac{T}{x}$$

$$\text{Productivity} = \frac{T}{OE}$$

present cost accounting methods do not provide correct measurements for local and non-financial areas such AS productivity, efficiency and inventory turns to mention a few. However local measurements like productivity and inventory turns can be expressed as shown above.

Reference (6) described other "cost world" measurements that when used without challenging the basic assumptions upon which they are based often lead to erroneous decisions. Examples discussed are :

1. Cost Accounting,
2. Performance Measurements,
3. Worker Time Standards,
4. Departmental Efficiencies,
5. Plant Utilization, and
6. Inventory and Value-Added Costing.

Reference (6) also described the TOC Control Measurements used to monitor subsystems as well AS complete systems. The real meaning of control is having the knowledge of where things are versus where they are supposed to be, and who is responsible for any deviation. The three TOC control measurements are:

1. local operating expense,
2. throughput-dollar-days (TDD), and
3. inventory-dollar-days (IDD).

With TQM being silent in the area of measurements and JIT presenting a conflict AS to how Inventory is measured how does an organizations trying to implement TQM and JIT use present cost accounting methods and procedures to effectively measure the impact of A local action or decision has on the bottom line?

Whereas the standard method of allocation of overhead to the cost of making a product resulted in very accurate Profit calculations in the Past, today it is virtually impossible to determine "product costs" unless it is a one Product company. Shipyards face the impossible task of determining the "product costs" of every line item in order to arrive at the cost of a ship. Perhaps the right answer is to not try to revise the present cost accounting system which WAS based on assumptions that are no longer valid but to develop a system that meets the goals of the organization. (6)

SCHEDULING

TQM is silent in the Area of scheduling, therefore present systems like Critical Path Networking (CPN) and Manufacturing Resources Planning (MRPII) are commonly used. These systems essentially try to balance capacity, whereas the TOC advocates the balance of flow and protection of constraints AS the real key elements to ensuring throughput. Present scheduling systems treat physical constraints AS bottlenecks. In reality most physical constraints arc not bottlenecks but resources that have sufficient capacity on average, but which lack capacity during some intervals of time. These resources have enough "productive capacity" but not enough "protective capacity. (1)"

Many present manufacturing Planning And scheduling techniques attempt. to optimize the use of all resources. This practice results in a tremendous build up in work-in-process (WIP) or A better name, inventory. The full negative impact of this inventory buildup is somewhat disguised because of the policy of partial physical progress payments required in many contracts.

In addition many present manufacturing planning and scheduling methods such as:

1. standard interval scheduling,
2. establishing schedule start and completion dates for all work orders, and
3. assignment of budgets do not consider the TOC philosophy of constraints and balancing flow not capacity.

Many present manufacturing planning, scheduling, performance measurement and

progressing practices all result in a very negative effect on throughput and bottom line profits.

In Reference (8), Numbers 4, 5, and 6, Goldratt presents a very good discussion on JIT and the conflicts between the "Push-Pull" and "Pull-Push" methods of scheduling. JIT uses their KANBAN cards as a mechanism to "stop the push." However, "JIT or MRP, who is better? Who cares. Both are not good enough for our plant." Goldratt then provides his reasoning:

"We have to protect the performance of the plant as a whole. Trying to protect each unit of the plant causes us to spread protection everywhere.

Let's face it, we can afford only A limited amount of protection. We can not fill the plant with unlimited numbers of containers, we can not release material years before we have to ship the order. We Can not be too generous with protection, we can not waste it.

We must reserve the protection for what really counts. We must concentrate protection on what really matters. And in our plant it's crystal clear, we must protect our clients. We must deliver to them on time. (8)"

Reference (1) provides A detailed description of how data and information effect the decision process and how it can be used in the development of A scheduling system that deals with physical constraints. However as emphasized above the real problem is Policy Constraints (RTMs). TOC provides the tools to synergize TQM and JIT efforts and develop a true POOGI.

TOC NEEDS TQM AND JIT

The TQM and JIT movements are commonplace in most organizations today. The degree of implementation varies greatly from devout practitioners to interested parties to skeptics and even those who have discontinued their efforts. One thing is obvious-almost all have at least heard about TQM and JIT and in more and more situations some form of TQM and/or JIT is specified as a contract requirement. The present IS0 9000 movement also relates directly to these movements.

The TOC works well for those people and organizations that arc familiar with TQM and JIT and those that arc using TQM and JIT as A base to build upon. The majority of the techniques developed by TQM and JIT are very powerful and very effective in solving physical constraints (Links). The commitment of top management and their people in many organizations in many industries exist and there is also a growing consensus of the need for the TQM and JIT management philosophies. Many debate the merits of TQM, JIT and TOC as if there needs to be a choice. All three movements have the same objective:

"To make more money, now and in the future while simultaneously increasing the quality of life of our customers, co-workers, families, and organization."

It is obvious all three movements are essential ingredients to a successful implementation of A

PROCESS OF ONGOING IMPROVEMENT.

CONCLUSION

All elements of the traditional Approach used by the maritime industry and the government for purchasing ships from U.S. shipyards needs to be challenged.

THE TECHNOLOGY EXISTS.

The challenge is:

HOW TO CAUSE THE CHANGE!

TQM JIT and the TOC together provide the "tools" that will enable the parties to develop and implement a process of ongoing improvement. The adversarial relationships that exist today must be replaced with total cooperation and all efforts when implemented will result in a:

WIN-WIN SITUATION

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