

Project Quality- WASTE

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What is Project Quality

Most articles are written about quality programs aimed at *workmanship*. However, those articles miss the mark of what it takes for a project as a whole to rise to the level of excellence, to the level of the project in its entirety with all its bits and pieces being *quality*.

All the welds may be perfect, all tolerances met. And yet the project may overrun the budget and schedule, adversarialness characterize the relationship of the parties, and claims enriching lawyers and consultants. Those are not the characteristics of a quality project.

Quality projects are those in which the *qualified parties of all the entities*:

- Know what to do**
- Know when to do it**
- Use the effective tools in doing it**
- Know the standard of performance**
- Collaborate with the others in planning, coordinating and executing what is to be done**
- Establish and meet or exceed productivity goals**
- Establish and attain a goal of claims prevention and conflict management**
- Then they do what needs to be done when it needs to be done according to the standards of the industry or the contract**
- And each accepts accountability**
- And then strive to improve**
- And achieve the needs of the user within the schedule and budget**

Quality performance then is a *collective process*. It goes beyond workmanship. The *process* of developing competent teams and individuals, of accurate and adequate design, of supply chain management, scheduling and

coordinating, of timely and objective decision-making, of conflict management, goal attainment and workmanship . . . this is what a quality project is all about.

DEFECTS AND WASTE

At the outset, try broadening the use of the word *defect*. It is obvious that a leak in the roof or in the joint of two pieces of pipe is a defect. But how about the on the structural drawings and the architectural drawings being significantly different. When a clarification is sought, the document is called a Request for Information, but if we call it a *defect* instead. We write punchlists for workmanship glitches; shouldn't a drawing glitch also be a punchlist. And the failure of the owner to provide a timely decision which results in costly impact to work flow: isn't that a defect in the management responsibility of the owner? And the failure to update the schedule is defective project management and the failure of the mechanical contractor to timely assimilate data from other trades in order to issue coordination drawings is defective coordination responsibility. And each time a shop drawing submittal is returned with comments causing resubmittal, and ultimately a delivery delay, we are dealing with punchlists or defects in the supply chain. Back charges are defects in a contractor's performance of an obligation to the owner or another contractor. And each of these defects, like a domino, affects some subsequent activity.

The point is: each entity on a construction project has a quality responsibility and failure to properly discharge it is a a defect which diminishes the probability of total project success. Each of these process "defects" by diminishing the probability of project success is adding to the cost of the project. And this needless cost is what we might call *WASTE*. And this is what the concept of Six Sigma is all about: *WASTE*. Waste is not just wasting a pipe spool that was misfabricated. Waste can be a waste of time, unnecessary crew movement, crew conflicts and structural conflicts, unnecessary material handling . . . Waste creates variances, such as work flow or stop and go or rework, or overtime orany number of consequences which increase cost.

The following examples of WASTE may *impact productivity from 10 to 50% or even more* (as substantiated by countless industry studies):

- **Stacking of trades**
- **Oversized crews**
- **Learning curve**
- **Overtime**
- **Acceleration**
- **Work flow changes**
- **Absenteeism**
- **Personnel turnover**
- **Congestion**
- **Weather conditions**
- **Morale and attitude**

In addition, there are some contractual issues which contribute to waste. Changed conditions often occur at the front end of a project during activities such as excavation, pile driving and other site work. Often the condition which is discovered during construction, which inevitably increases time and cost, could have been discovered by a prudent soils and site investigation during the design phase. As often, owners do not undertake an adequate soils investigation and think they protect themselves through clauses which shift the risk to the contractor. However, no matter which party has the liability, the discovery of such a condition generally delays the project and costs someone additional money. It is waste. The funds necessary to conduct an adequate soils and site investigation in the design phase are meager in comparison to the subsequent impact on a project of running into these conditions during construction and trying to figure out solutions and liability during an on going project.

The same is true of plans and specifications which have not been well coordinated, or checked for accuracy and constructability. In these instances, the resolution of issues which could have been prevented by the expenditure of a few extra hours of design review will occur during construction when

workforce is often at its peak. Commissioning at the design phase costs a few extra bucks but its value may be many times that cost by avoiding problems in the construction phase. The same is true for coordination drawings which so many contractors for some reason seem to disdain. The extra time spent on developing coordination drawings which are actually used in the field overcome the extra dollars spent in doing them properly. In all of these instances of pushing into construction issues which could have and should have been, resolved well in advance, the extra dollars spent amounts to waste.

The failure of the contractor to review drawings in the office and discover discrepancies and getting them resolved in advance of installation, rather than running into conflicts when the field force begins installation, is another example of waste.

When a contractor is meeting its budget but is using unit prices that have not changed in years, the waste is that money perhaps could have changed through productivity improvement programs, establishing and monitoring earned value systems and evaluating how the units can be improved.

When a contractor is outsourcing most or a great deal of its labor, and has no program for effectively managing that outsourced labor, the impact on productivity is waste.

Lack of adequate safety programs is a huge waste issue. In spite of OSHA millions of workforce hours are lost each year through preventable injuries and deaths. The greatest waste is to the employee who has been seriously injured and his family, for often there is no amount of money which can compensate for their emotional and traumatic losses.

Ineffective cash flow management is waste. The owner who is making excess payments for front end loading and overbilling; the contractor which is not billing change orders on a timely basis. Having a fat overhead is waste. When the owner of a company gives the impression that the reason to make profit is to buy him another boat or a larger house, you can take to the bank that the negative effect on field productivity will be measurable.

And the list goes on. But many owners, designers and contractors are “wising up” and instituting programs to intentionally defining areas of improvement and analyzing the system to determine how to reduce the gap between current performance and potential performance (desired goal). This approach is termed DMAIC:

D DEFINE the goals of an improvement activity The Pareto 80/20 concept of identifying the key issues which create waste, the low hanging fruit, is a good place to begin.

M MEASURE the present system or results

A ANALYZE the present process to see how the gap between the present and desired result can be narrowed or eliminated

I IMPROVE the process. Communicate to those who are performing the function. Even better, get the participation and input of those who are performing the function. *The concept of eliminate and simplify should be the guiding principle.* One of the reasons to have processes that are written and communicated is to be able to analyze the steps in that process that can be eliminated or shortened or modified.

BRILLIANT EXECUTION is the proof that the process is working.

C CONTROL the new function. Monitor, get feedback, continue the improvement process.

Some of the fall out of this process has been:

Integrated teams at the outset of a project

Delivery systems such as Design-Build, CM at Risk

Pre-Qualification

BIM

Commissioning

Lean Construction

Modular construction

Pre-assembly

Three step built in quality (P-I-F)

Effective partnering (real collaboration, not “kubaya”)

Supply Chain Management programs

So Six Sigma is not a hare brained idea. It is an approach to the improvement of the total construction experience and the attainment of the goals of all the parties. It has been estimated that there is about \$120 billion – how many zeros is that . . . 120,000,000,000 - is wasted in the construction industry each year. The issue: how about your projects? Do you have a handle on the amount of waste on your projects and what the issues are that contribute to waste? Do you have a yardstick for measurement, a process for improvement?

Remember, everything in construction is a process. AIA has established a very thorough process from Program Requirements through Schematic Design, Design Development and Construction Documents. The three step quality move toward of Preparatory, Interim, and Final is a process for attaining desired results. A CPM (logic diagram) is a process setting forth all the activities necessary to have a successful project. So to improve and prevent defects, we begin with the processes. Evaluate your processes and how those processes are being implemented and their results. It is not really rocket science.

HOW TO PRODUCE CONSTRUCTION WASTE

DON'T

- **Plan the work**
- **Review the plans and specifications**
- **Establish what is to be done**
- **Establish how it is to be done**
- **Have an adequate work force**
- **Commit to built in quality**
- **Update the schedule**
- **Get started early, establish and meet early goals to establish momentum**

DO

- **Commit to inspect and correct**
- **Have untrained field personnel**
- **Claim you just can't get good people any more**
- **Have inadequate supervision**

NEVER

- **Accept responsibility for your mistakes**
- **Read referenced codes and standards**
- **Agree to remediate obviously defective work**

ALWAYS

- **Accuse the owner's inspector of trying to put you out of business**
- **Claim that the deviation from the contract is just the way the industry does it**
- **Wait until the subcontractors leave the job before final inspection**
- **Have your quality control person report directly to the superintendent who has the power to fire him**

- **Put your profit margin ahead of the contractual requirements**
- **Blame someone else for any and everything that may go wrong**