Using Personal Checklists to Facilitate Total Quality Management

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1. Introduction

Total Quality Management (TQM) awareness and training programs often are used to prepare employees to work on quality-improvement teams. These teams in turn seek to improve organizational processes, which typically are messy interdepartmental problems with high payoff solutions.

Organizing the teams, however, usually takes time. Management has to pinpoint the high-priority problems before the teams are formed. And additional teams can be formed only after the first teams are off the ground and have scored some successes. This delay can create problems: After completing their training, many participants are left in limbo for months or even years, as they wait to get involved with quality-improvement teams. During that time, employees’ enthusiasm cools; they may also forget most of what they learned.

A Personal Quality Checklist allows employees to keep track of desirable personal job-performance traits, and failures (“defects”) to achieve set goals in certain categories. And as a simple supplement to TQM training, the checklist can keep employees involved and interested through the entire TQM process.

There are two broad types of job-performance enhancers that the checklists can help monitor:

• Waste-reducers or time-savers, such as “on-time arrival to meetings and appointments”;


• Value-adding activities, for example, “talk at least once a week to all the people who report to me.”

The first category helps employees develop a personal understanding of quality in terms of their immediate work environment. This is valuable in its own right and leads to more effective participation on improvement teams and other TQM activities. But the checklist is more than a training device. It can bring immediate and substantial improvements in personal job performance. The aggregate effect of personal performance improvements can be substantial, and they free up time and ease participation in team improvement projects and other TQM activities.

Improvement of personal performance can’t be the sole basis for judging the effectiveness of TQM, but improvement of personal performance can contribute greatly to the final TQM effort.

Checklists can play the same role in TQM as a good suggestion system. The best Japanese suggestion systems, which elicit an average of one or more suggestions per week per employee, are geared primarily toward improving the immediate workplace. They also include training in ways to recognize improvement opportunities. This process fosters an organizational culture oriented to continual improvement.

### 2. Sergesketter’s Application at the Central Region of AT&T

Following is an example of a personal quality checklist initiated in April 1990 by Bernard F. Sergesketter, vice-president of the Central Region of AT&T. His total defects per month and his definition of defects is shown in the following computer file:

<table>
<thead>
<tr>
<th>#BERNIEFS.ASC</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 36 38 9 10 14 8 4 3</td>
</tr>
<tr>
<td>6 3 9 5 3 2 2 4 1</td>
</tr>
<tr>
<td>Personal defect list per month, April, 1990, through September, 1991.</td>
</tr>
<tr>
<td>#B.F. Sergesketter, Vice-President, Central Region, AT&amp;T.</td>
</tr>
<tr>
<td>#Definition of defects:</td>
</tr>
<tr>
<td>#On-time for meetings</td>
</tr>
<tr>
<td>#Phone:</td>
</tr>
<tr>
<td># Two rings or better</td>
</tr>
<tr>
<td># Same or next day response</td>
</tr>
<tr>
<td>#Letters:</td>
</tr>
<tr>
<td># Response in 5 business days</td>
</tr>
<tr>
<td># or better with no errors</td>
</tr>
<tr>
<td>#Clean desk</td>
</tr>
<tr>
<td>#Credenza: only same day paper</td>
</tr>
<tr>
<td>#Haircut</td>
</tr>
<tr>
<td>#Shoes shined</td>
</tr>
<tr>
<td>#Clothes pressed</td>
</tr>
<tr>
<td>#Weight below 190 pounds (Sergesketter’s height is about 6’4”)</td>
</tr>
<tr>
<td>#Exercise at least 3 times per week</td>
</tr>
</tbody>
</table>

Here is a runs chart of Sergesketter’s first 18 monthly totals:

```
Number of Defects per Month against Months

105.0 +
+ 4

DEFECTS

70.0 +
+ 5

35.0 +
+ 6

0.0 +
+ 9

7 8 0 A 1 3 4 8
B 2 5 6 7 9

0 12 24
```

The substantial drop in the number of defects—rapid at first, slowing later—is clear. But there is more to the story than this simple statistical record. Reduction of defects is valuable only if it improves job performance.
Below is Sergesketter’s rationale as he presented it to his branch manager associates in May 1990, after he started his checklist:

To do my job I primarily employ meetings, telephone calls and correspondence. Consequently, these are the areas I am measuring (or attempting to measure) along with some personal appearance and health items (I need all the help I can get).

What I learned is:

a. The extent to which I was not returning phone calls the same or next day—this was a surprise to me;

b. We had no way to count defects related to correspondence. As a result, we have started date-stamping incoming correspondence and the file copy of the response;

c. When you share your defect list with others, they will help you reduce defects;

d. None of the items I measure is in the four-minute-mile category, yet I run an estimated rate of 100 defects per month;

e. In those areas which I am measuring, 68% annual reduction of defect levels looks very attainable.

Concerning being on time for meetings, I will be late for a meeting rather than cut short a conversation with a customer... but I will count that as a defect. As a result, I attempt to schedule my calls when probably I will not be late for a meeting. If I notify people in advance that I will be late and specify the time I will be there, I do not count a defect unless I miss the specified time without further notification. Arriving for a meeting even one second late counts as a defect—you have to draw the line somewhere.

I encourage and challenge you to start counting defects. It is impossible to reduce defects if we don’t count them... and we can’t reasonably ask associates to count defects if we don’t!

If several thousand of us here in the Central Region started counting defects, we will reduce their number and differentiate ourselves from our competitors in a significant way.

In a talk given at about the same time, Sergesketter made the following challenge to his associates:

I want you to make a list of at least five areas that are important to you...five things that will help you meet your personal and business needs...and to count “defects” with a goal of 68% annual improvement.

Note that no standard list was required, nor any attempt made to use the lists to “grade” employee performance.

Eighteen months later, several interesting things had happened at the Central Region of AT&T:

• Employees developed their own customized personal Checklists. Here, for example, are the categories Diane Shank identified in her own area: making it to meetings on time; returning all calls and audix within 24 hours; going through the in-basket in less than 24 hours; providing prompt feedback within 24 hours; answering all questions in 5 business days; taking public transportation to work instead of driving; practicing music 15 minutes daily; avoiding chocolate; answering the phone in two rings.

• Employees like to compare checklists and help each other to avoid defects.
• Meetings start on time, end on time, and are much more businesslike.

• Sergesketter estimates this simple approach has freed up at least one hour a day for him. This is an interesting observation for senior managers who say they believe in TQM, but can’t find time to lead TQM activities.

3. A do-it-yourself project

The simplicity of the Personal Quality Checklist concept often creates skepticism about its potential benefits. The only way to convince yourself of its usefulness is to try it.

I did. Even though I was aware of Sergesketter’s experiences, I was surprised by how much and how quickly my checklist helped me. I noticed an improvement in my general ability to cope with my job from the first day—and I have maintained the improvements for over 31 weeks. Even though “keeping clean desk” was not an explicit category on my list, my desk did go from cluttered to clean in just one week, much to the shock of my associates.

The hardest part was drawing up the checklist. Actual data-collection is almost effortless: One just puts down tick marks when defects are noticed. It’s very tempting to develop more elaborate systems that entail more record keeping; unfortunately such systems add little value and tend to collapse under the data-keeping burden. This appears to be the problem with many of the popular, pre-packaged time-management systems.

Getting a good checklist is crucial. It requires some insight into one’s own job function and some knowledge of TQM principles. To help others develop and implement their personal checklists, I provide below a description of how I developed my own.

The typical workday of professors does not fit popular stereotypes. In addition to going to meetings, professors spend a substantial amount of time on familiar management-type activities, such as Sergesketter’s processing of incoming written and oral communications.

My list of incoming tasks is very diverse. Most of them can be done very quickly, and according to TQM, the quicker they are done, the better. For example, to make the feedback most useful, I should read, comment on, and return students’ progress reports on projects as quickly as possible.

I was an excellent guinea pig for testing the Personal Quality Checklist—I had long been a walking laboratory of poor job habits. But I had one important strength: From my background in TQM, I knew that attempting to work harder and faster, or to install a completely new system would probably be counterproductive. I knew also that the surest route to improvement was to eliminate wasted effort—obvious and non-obvious—in all its forms. (Training in the identification and elimination of waste is essential to the success of the personal checklist, so I have provided a “micro-lecture” on this subject in the Appendix.)

After careful self-observation and reflection over two or three weeks, I assembled a list of seven categories, some borrowed from Sergesketter, others tailor-made for my situation. My checklist is shown below; to save space, I haven’t shown the room left for comments on the actual form.
### HARRY ROBERTS'S PERSONAL QUALITY CHECKLIST

#### WEEK OF ____________

<table>
<thead>
<tr>
<th>DEFECT CATEGORY</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>S</th>
<th>Sun</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>• LATE FOR MEETING OR APPOINTMENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• SEARCH FOR SOMETHING MISPLACED OR LOST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• DELAYED RETURN OF PHONE CALL OR REPLY TO LETTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PUT A SMALL TASK IN A &quot;HOLD PILE&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FAILURE TO DISCARD INCOMING JUNK PROMPTLY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MISSING A CHANCE TO CLEAN UP JUNK IN OFFICE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• UNNECESSARY INSPECTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Definitions and explanations:

- **Late for meeting or appointment**: Late by even one second. Always carry background reading or work materials in case others are late.

- **Search for something misplaced or lost**: More than momentary confusion as to location of important document, book, address, working materials, etc. Forgetting a task or working material is included here.

- **Delayed return of phone call or reply to letter**: Failure to act at the first opportunity. Note: even if a lengthy reply to a letter will eventually be needed, a short acknowledgment should be made immediately.

- **Putting a small task in a ‘hold pile’ (when it can be done quickly now)**: A hold pile ("work-in-process") seems unavoidable but must be kept small and attacked continually. Note: one important "small task" is filing.

- **Failure to discard incoming junk promptly**: Failure to act on first reading or skimming of written materials. In case of doubt, have a "hold-in-case pile" that is periodically quickly screened and discarded.

- **Missing a chance to clean up junk in office**: I suffer from decades of accumulated junk. With due diligence, much can be done to throw out junk.

- **Unnecessary Inspection**: Checking something I've probably already done but didn't pay attention when I did it.

Notice that I count defects daily to track my improvement. Also, if personal quality checklists are used for TQM training, each participant will have data drawn from personal experience to illustrate elementary TQM tools, such as runs charts and Pareto diagrams. The data can also be used for simple time-series analysis, such as fitting of trends and day-of-week effects, if these are within the scope of the training program. Later, the data may be aggregated by weeks or months for longer-term monitoring.

I began my checklist on Monday, September 30, 1991. During the first week, I accumulated seven defects: five for “search for something lost or misplaced” and two for “unnecessary inspection.” That did not surprise me; if anything, I was expecting an even poorer performance.

What surprised me was that I had no defects at all on any of the other five categories. Were these other five categories unnecessary? The answer provided a surprising insight: The very existence of a well-constructed personal quality checklist can
give an immediate improvement that is not actually measured.

This is how it happened. If—the week before my checklist and without my knowledge—a guardian angel had been tracking my defects in these other five categories, I’m certain there would have been many defects. But the presence of the checklist in my pocket had an almost uncanny effect on my behavior: I realized that with only a little effort, I could prevent most defects in these categories. Almost magically, the checklist calmed me down, made me resist the temptation to try to do everything at once or shuffle madly to find what I should do next, and in general create even more desktop chaos. Instead, my desk went from cluttered to clean during the first week, and right now I’d almost rather eat glass than let it revert to the previous mess. The key category in this feat seemed to be: “Putting a small task in a ‘hold pile’.”

These five categories are relatively controllable by me just by paying attention. On the other hand, the “lost or misplaced” category is not so controllable because my underlying administrative systems are bad. Poor organization and filing will take a long time and a lot of work to correct, and defects will continue. But each defect that I observe gives some specific insight into how I can move towards improvement of the system, at least to the extent of providing temporary workarounds.

“Unnecessary inspection” also is relatively uncontrollable. I suffer from the stereotypical professorial absentmindedness. The only way I have found to combat it is through my own kind of mistake-proofing: I try to talk to myself when I am doing an important task, for example, “I am putting this material in George Bateman’s mail box.” Of course, I have to train myself to do this; but the recurrence of a defect on “unnecessary inspection” seems to reinforce my habit of never to putting anything down without telling myself what I am doing.

My checklist’s calming effect led to a gratifying initial improvement. After the first week, my total weekly defects have been trending down, more rapidly at first, then more slowly. But the gains are not measured solely in defect reduction. The existence of the list permits me to watch myself as I do things and remove inefficiencies that are not directly covered in any of my seven categories.

I give this much detail on my own experience with a personal checklist because I have found that many people seem to identify with me. A colleague on the faculty said he could have used my list verbatim. For this reason, I will also list some other defect categories that I considered and discarded. Some did not really apply to me while others did but were less crucial, and I wanted to keep the checklist short for easy record-keeping.

Following are categories not used:

- **Unnecessary shuttling of materials between home and University:** I (and other commuters) pay a heavy price for maintaining two offices.
- **Failure to meet target dates for major projects:** I’m pretty good at this defect category, and won’t try to change my current system for the time being. But this heading could serve as a reminder and warning if I notice any slippage.
- **Failure to listen carefully:** I’m pretty good at this category, too, but this heading also could serve as a reminder and warning.
- **Failure to devote time to long-term improvement activities:** These include background reading and study, enhancement of computer capabilities, etc. I do a little of this, but not nearly enough.
However, some improvement may come by freeing up time through reduction of other defects.

- **Failure to recover promptly from interruptions**: For example, falling into dazed paper-shuffling and even clock-watching when the interruption ends. Cleaning up office junk is one way to recover from the shock of an interruption, but it is desirable to get back quickly to what you were doing when the interruption struck.

- **Personal fitness lapses**: I realized that I have become so addicted to fitness that a checklist would be superfluous; it’s the one thing I have done consistently well! But it seems to be a very popular category for most people who have tried the checklist approach.

- **Procrastination**: Letting unimportant immediate tasks be an excuse for postponing longer-term projects, especially unpleasant projects. This is a promising category that I may include later. It does pose tricky problems of definition: How and when does one actually recognize that procrastination is occurring?

- **Miscellaneous defects**: Misdialing phone numbers, typos in manuscripts, failure to make notes of things I have to do or of names and phone numbers, misfiling, etc.

Nonetheless, improvement on my basic seven categories may indirectly prompt me to improve in these alternative categories and others as well. I have the impression, for example, that I am rebounding more swiftly from interruptions, and misdialing fewer phone numbers, etc. There is another TQM principle operating here: Improvements in some measurements will tend to drive improvements in categories that are not being measured.

It is important to feel free to modify an initial personal checklist in the light of experience.

Statistical continuity over time will be preserved so long as some of the defect categories are retained. Individual additions and deletions may be desirable. Like everything else, the personal quality checklist should be subject to continuous improvement.

4. Benjamin Franklin’s Precedent: Improving Character and Behavior

Sergesketter’s innovation has potential even outside the world of business and organizations. For example, over 200 years ago Benjamin Franklin reported in his *Autobiography* a similar approach for improving one’s character and behavior. His 13 categories were: temperance, silence, order, resolution, frugality, industry, sincerity, justice, moderation, cleanliness, tranquillity, chastity (or “venery”), and humility.

He reported overall satisfaction with results, but admitted some failures. “In truth, I found myself incorrigible with respect to Order; and now I am grown old and my memory bad, I feel very sensibly the want of it.” Order, of course, is an essential ingredient of the personal quality checklist.

Franklin also had a hard time with humility: “In reality, there is, perhaps, no one of our natural passions so hard to subdue as pride...even if I could conceive that I had completely overcome it, I should probably be proud of my humility.”

Inspired by Franklin, I have drawn up a second list of my own to improve character and behavior. My aim was less ambitious and more specific than Franklin’s. My seven headings are:

1. **FLUSTERING**: getting rattled under pressure;

2. **GRIPING**: blaming others (including Congress or the White House) when something goes wrong;
(3) UNPLEASANTNESS: making irritation or frustration obvious by the way I talk or act;
(4) WORRY that is not directed towards doing something about the object of worry;
(5) DEFEATISM: depression, discouragement, and gloominess;
(6) DRIVING LAPSES: mental lapses, usually minor but worrisome, even though they have thus far never resulted in an accident;
(7) UNKIND HUMOR.

Unpleasantness was inserted because I realized that I often replied in an irritated tone of voice when my wife asked me to do something that I was about to do anyway. Although I’m still picking up an occasional defect on this category, I am doing much better than I did before the checklist. Surprisingly, my wife has also improved by not asking me to do so many of those things that I was about to do! (She knows of my checklist.)

One might think that a mere checklist wouldn’t budge character and behavioral problems, especially discouragement or depression, or that it might even make them worse. I’m not so sure. If the checklist is firmly embedded in one’s consciousness, the threat of a defect is a surprisingly strong deterrent to undesirable behavior, even apparently uncontrollable behavior. One student with a life-long problem of speeding has reported major improvement by including “speeding” as a category on his list. And Sergesketter has reported that a marriage has apparently been saved by each of the partners making separate checklists—each listing categories that were annoying the other person!

Surprisingly, the calming effect of the list was even stronger on my “character and behavior” list than my business checklist. My defect level started and has continued very low. I was amazed to find that even such categories as “Defeatism” are controllable. If I start to feel sorry for myself, I immediately reject the feeling and do something or think about something else, thus staying off a defect.

5. Other Possibilities

For many years I have required my students in statistics and TQM courses to do applied projects, with emphasis on organizational improvement. Since some students have not had easy access to organizations, I have allowed substitution of a personal improvement project. Over the years I have received some very good personal projects: improving foreign language skills or free-throw shooting; getting a fast start in the morning; losing weight; improving fitness; relieving hypertension; and many others. One student even speeded up the time it took to shave in the morning.

These projects, however, have required relatively elaborate design, data collection, and analysis. They are not simple to start or carry out. On the key question of improving of study efficiency—an area of concern to many students—there was only meager progress. Elaborate logging or work sampling to see how they used their time sometimes helped. One student, for example, found that he was spending to over 20 hours a week watching television, much more than he had realized. But no breakthroughs have occurred. I tried to get students to log obvious mistakes and errors, and learn from these, but with little
success. Also, I was not able to improve my own job performance along the lines that I was preaching to students.

Sergesketter's personal quality checklist is a much simpler approach. Indeed, the reason why the checklist escaped my attention is that it is so simple, in concept and implementation. Nor did I think of making a personal project itself a tool for behavioral modification. Instead, I was thinking more in terms of getting data that would provide practice in statistical tools, a desirable aim for teaching but not necessarily the best route to improvement. Suppose, for example, that a student with a serious obesity problem formulated a program for diet and exercise. Deviations from this program would be called defects. Suppose now that the student had no defects, so that the data set was a string of zeros. Totally uninteresting statistically, but a tremendous step in the battle against obesity!

There are variations of the personal quality checklist that retain much of its simplicity. At AT&T, for example, some people have tried to list "missed opportunities" as a defect, that is a mismatch between the product or service and its specification or applicable standard. Similarly any mistake that results in customer dissatisfaction is a defect.

Rather than counting defects, some of my students have measured the actual time spent in desirable activities, such as meeting customers, training subordinates, or job-related training. However, keeping track of time is usually harder than counting of defects.

6. Should One Aim for Perfection?

How far should we go in reducing personal defects? One school of thought says we should never stop—perfection is the goal: keep on reducing defect numbers by 68 percent a year.

There's a lot to be said for that philosophy, but one must also note that inclusion of new categories or the introduction of other, more elaborate, types of personal improvement projects may merit higher priority. The checklist itself should be subject to continuous improvement.

The categories on any checklist are likely to include only a small fraction of one's activities. For example, "On time for meetings" says nothing in itself about what one does in the meetings. Being on time indirectly should lead to improved participation in meetings; so that one category on the list may "drive" other categories not on the list. But participation in meetings may be made more effective by a new category that deals with behavior; for example, avoidance of direct disparagement of anything said by other participants, or making one's own point in a tactful yet forceful way.

Once defects are rare in any one category, that category is easy to keep track of. It could be moved to a special "hold-the-gains" checklist. I believe that for the categories most valuable for checklists, the extremely low error rates achievable in manufacturing are simply unattainable; "on time for meetings" is a good illustration.

Error rates in the order of three per million in manufacturing are usually achieved by mistake-proofing and automation. Although there is some room for both mistake-proofing and automation in personal quality performance, this room is limited by human inattention and the influence of extraneous events. It would be surprising, for example, if anyone could achieve an error rate even as low as 1,000
per million in dialing phone numbers. I've made a major effort and am doing no better than 10,000 per million!

7. Questions, Problems, and Extensions

I have now had extensive experience in helping others develop and implement checklists. This includes my Winter 1992 class of 81 students in the course in Statistics and Quality Management of the Executive Program at the University of Chicago Graduate School of Business. All this experience has been encouraging. Improvements are coming from both the expected sources:

1. The initial calming effect of having the checklist in one's pocket. (Delores Conway suggests that it is better to call this a "transfer effect," a de-bundling that permits action without introspection, and which harnesses motivation.)

2. Continuing improvement as the list is maintained over time, progress is monitored, and defects studied to suggest ways of fixing the system flaws that led to them.

Sometimes, several problems are seen in the development of the initial checklist:

- Failure to provide an operational definition of each defect category, thus making it difficult to recognize when a defect occurs or leading to inconsistency in recording defects.
- A list that has too few waste-reducers/time-savers by comparison with additional value-adding activities. One needs to save time to make room for new activities. Otherwise frustration will result.
- Inclusion of categories that in themselves require major attention should be avoided. Obesity and lack of fitness are two common examples. If one's weight is already satisfactory, for example, a category like Sergesketter's "Weight below 190 pounds" will suffice; but if one is seriously overweight, a good program for weight reduction and fitness is needed. However, even for the overweight, it can be helpful to include a checklist category like "Eating between meals" that may address an important cause of the problem.

Most people follow Sergesketter's example and include fitness as a checklist category. Unfortunately, many set ambitious targets such as "One hour a day" and end up with nothing but defects. My suggestion here is not to use the checklist but to record and monitor time spent exercising and keep track of daily or weekly totals. A surprisingly little time in exercise will go a surprisingly long way!

- Some categories may accumulate so many defects that one may spend excessive time in recording them. An example might be, "Failure to recover promptly from interruptions." This might be temporarily removed from the list while the system was redesigned or re-engineered to reduce interruptions to a manageable rate.
- Some people want to record not only defects but opportunities for defects, thus making it possible to monitor percentage defects. Theoretically, this could permit more satisfactory statistical analysis but in practice, it's likely to be overkill because it's so hard to count all opportunities for defects. In some cases it's an impossible task; for example, "Opportunities for accidents" are very hard to define and count.
- Some argue that the emphasis on "defects" is a negative approach. There are two answers
to those objections: (1) it's generally easier to keep track of defects than the things done right; and (2) only defects point the way to improvement of the underlying processes.

But for those who want to count successes, there is no reason that special categories couldn't be added to the list. The fitness example above is one illustration. Others are scholarly publications (for a professor) or new customers (for a salesman).

A close friend—a very well organized person—rejected the idea of a checklist because he felt that it would provoke unnecessary anxiety. Another friend, a very badly organized sort, rejected the idea because it would be too hard to implement.

Personal quality checklists often lead to insightful analyses that draw on a wide range of TQM ideas and tools. Elementary improvement tools like flowcharts, cause-and-effect diagrams, and Pareto analysis can be applied to one's own activities. As data are accumulated, tools of statistical process control, intervention analysis, and experimental design can be applied. Just-in-time principles can be invoked; for example, one user, William Raglan (XP-62), designed a kanban scheme for his in-basker:

8. Desk Kanban Overflow

The goal of never having more than one project on the desk at a time did not prove to be workable, so I have in effect adopted a modified Kanban (a Japanese term for containers or other devices used to help assure, say, just-in-time availability of parts on an assembly line.) The nature of {my} engineering work often involves extended projects and reports. I took a standard five-bin vertical

file and modified it to make three larger and sloped-sided bins. Using all five bins seemed too much temptation for it to become merely a storage container. Each of the three bins has either a red, yellow, or green colored tab to identify it. The colors indicate an approximate priority to each task (another reason to keep it to three bins). The system I use is that material is removed from only one bin at a time for use on the desk. If someone brings temporary material, e.g., for immediate discussion, I can scoop up the stuff on the desk and put it in the empty bin and then rapidly retrieve it later. The additional bins serve as hold for projects that are in suspension; for example, documents in typing or projects waiting for other input.

The system has been in operation only for a week, but there have been two positive aspects in addition to having a clean desk. The first is that action of clearing the material when colleagues bring temporary material for discussion signals complete attention to their problem. If additional work is required, I can either file it and list it on a priority list or replace one of the Kanban bins if it is urgent. A second advantage is that when the boss has a hot item, I can identify my three top priority tasks and inquire if he wants one bumped out of the Kanban and which one.

This serves to identify his true level of urgency. Otherwise, I determine the priority.

Finally, for teaching of statistical methodology, the checklists provide personal data very quickly and this permits practice in simple time-series analysis: fitting of the data leads to
exploration of the effects of trend, day-of-week, lags, extraneous variables, and deliberate interventions. In most cases, the trend component is significantly downward within just a few weeks; often, indeed, the downtrend is obvious by visual analysis of the time-series plot alone, as it was in the data on Sergesketter displayed in Section 2 above.

8. Acknowledgments

In addition to Sergesketter, many others have helped me develop the applications of personal quality checklists, including the students in the 62nd Group of the Executive Program of the University of Chicago Graduate School of Business. Delores Conway of the University of Southern California suggested several of the ideas I have incorporated into Sections 6 and 7.

APPENDIX: MICRO-LECTURE ON WASTE REDUCTION

1. Introduction

Waste is any process or step that could be eliminated without harm to the product or service, or performed faster or more cheaply.

Waste is a relative concept: Whenever a process is improved, the old process becomes wasteful.

A relentless attack on waste is a central management strategy at leading Japanese companies. Suggestion systems are just one manifestation. The development of just-in-time manufacturing at Toyota was essentially a consequence of the drive to reduce waste.

Identification of waste is not always easy. The most obvious forms of waste are mistakes and blunders, defective product, scrap, rework, etc. But other forms of waste are just as harmful, if less obvious.

One purpose of this micro-lecture is to sensitize you to these more subtle forms of waste. My presentation is based on lists of wasteful processes or steps. There is some duplication among these lists. Seeing them all together may heighten your ability to recognize wasteful activity, including waste in your own personal activities.

2. Toyota’s Seven Wastes (Ohno)

- Waste of overproduction (Also irregular production: the end-of-month or end-of-quarter surge)
  - Waste of time on hand (waiting)
  - Waste in transportation
  - Waste of processing itself
  - Waste of processing itself (Tim Fuller’s “complexity”—extra process steps because of prior errors—can lead to these wastes)
  - Waste of stock on hand (inventory)
  - Waste of movement
  - Waste of making defective products (leads to Tim Fuller’s complexity)

3. Canon’s Nine Wastes

- Waste caused by work-in-process
- Waste caused by defects
- Waste in equipment
- Waste in expenses
- Waste in indirect labor
- Waste in planning
- Waste in human resources
- Waste in operations
- Waste in startup

4. Schonberger’s Non-obvious Wastes

- Promotional waste (negative selling)
- Waste of tracking the orders
- Waste of automating the waste
5. Further Wastes

- A starter: Collecting unneeded (or unused) data; it isn't always desirable to "get some data"
- Another: Unnecessary delay in switching from one task to another
- Query: Is an inspection necessarily a waste?
  How about a move or transport, a delay, a storage?

6. Additional Wasteful Activities (Tim Fuller)

- Sorting to prioritize
- Repeating work
- HUrring for things that are missing
- Doing tasks that serve no purpose
- Walking around but not carrying anything

7. Zangwill's Generalization: Most Work Is Waste

Tim Fuller's studies have shown that complexity (rework), caused by internal or external errors, accounts for a big chunk of the time spent presumably working. Conversely, "real work" accounts for only a small fraction. Enormous improvements would be possible if errors could be eliminated. But even "real work" can include a substantial component of waste, so there would be room for still more improvement even if all errors could be eliminated.
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