The Optimization Trap – Spares Optimisation

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The Optimization Trap
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Whether it is maintenance strategy, planning, manning, PMs or inventory, for all good managers an optimal outcome is always the goal. Yet, it has been proven time and time again that optimization does not always deliver the results that are expected. I call this phenomenon The Optimization Trap. Surprisingly, most people that are caught by the optimization trap don't even realize it.

This paper explains the Optimization Trap, what it is, how to tell whether you are in danger of falling into the trap, and, if you have already, what you can do about.

First, some definitions.

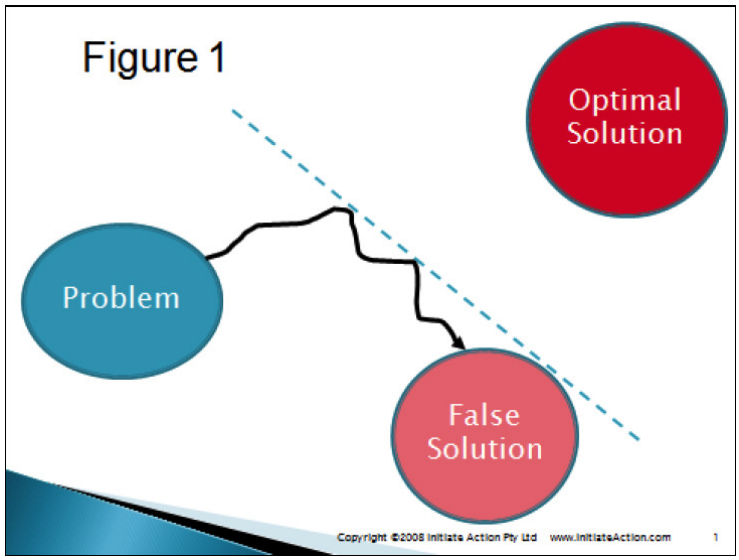
Management: The utilisation and coordination of resources such as capital, plant, materials, and labour to achieve defined objectives. In other words - management is about getting things done.

Problem Solving: Has been defined as a cognitive process that requires the modulation and control of more routine or fundamental skills (Goldstein & Levin, 1987). It occurs when we do not know how to proceed from a given state to a desired goal state.

Constraints: Limitations or restrictions. In our environment these could be limitations on capital, plant, materials, and labour.

Optimization: Solving problems by trading off choices to achieve the best outcome, within the given constraints.

So, putting those definitions together - Management is about proceeding from a given state to a known goal within limitations or restrictions so that we make the best tradeoff between choices.



Here is the real issue. What happens when you impose constraints that are not real? You may think they are real or you may not realize that you are assuming constraints. When this happens you limit the potential to reach

the desired goal – in this case optimization.

In the above figure a manager starts with a problem. This could be anything but let's say for this example that it is a budget problem. The manager needs to get to a desired goal of optimizing the budget so they only spend what needs to be spent and nothing more. In Figure 1, this is the Optimal Solution.

However, the manager unwittingly makes some assumptions about the impact of spending cuts. Let's say he underestimates the effect that these will have. This assumption is an unrecognized constraint on reaching the Optimal Solution. The constraint is represented by the dotted blue line and the Manager cannot even see that Optimal Solution exists.

As a result, the Manager doesn't reach the Optimal Solution instead he is diverted by the constraint and ends up at the False Solution. But he does not even realize that this is a false solution.

This is The Optimization Trap.

Have you ever been involved in one of these situations?

- A reduction in spare parts has left you without the ones that you actually need.
- Reduced maintenance budget has left you unable to properly maintain the plant.
- Reduced manning or overtime has left you unable to get the work done.

These are familiar examples of the Optimization Trap and are the sorts of situations that we all see and experience on an all too regular basis.

Now, I can almost hear you thinking, 'Are you suggesting that we do not try to optimize?' Of course not.

But optimization is all about understanding constraints.
To solve a problem you must understand the constraints.

In mathematics and operations research there is both constrained and unconstrained optimization. However, in management, from a practical perspective, all problems are constrained, as there is only so much resource, money and time to apply to problems, and herein lays the issue.

Where a manager draws the line in terms of the constraints to their problem can have a significant impact on the suitability and longevity of the solution. I think we would all agree that the constraints have a significant impact on your solutions.

The problem is that the constraints are not always clear.

What we mostly don't realize, is that many constraints are assumed rather than real. These constraints are imposed or assumed based on the needs of the problem solver, not the needs of the problem.

Constraints can be used to simplify the range of solutions, the resources required, the time involved, and in some cases the internal company politics.

However, the issue is that in many cases the application of constraints in the pursuit of optimization can severely limit the results that are achieved. In the worst case this can lead to a belief that nothing further can be achieved. This is the ultimate optimization trap.

For real success, optimization needs to be conducted with an understanding of the true constraints. Let's look at some examples.

Here are some examples of constraints that are often assumed with inventory optimization.

- They assume that the supply chain is fixed. That is, that the parts supply arrangements cannot be changed.
- They assume that their own internal processes don't influence the outcome.
- They assume that their demand data reflects the actual usage, rather than just the demands of their staff.
- They assume that only 'my department' needs to be involved in an optimization program.

These assumptions (and more) reduce the effectiveness of traditional optimization. And remember that these assumptions are often not spelled out, they just happen. So just what is The Optimization Trap? Here is my definition:

Taking actions that, without you realizing it, limits your opportunities and your results.

This means that we sometimes, unknowingly, go down a path that we think will lead to optimization but which, in reality, does not – as per the example in Figure 1. We end up in a situation that is sub optimized but don't realize it.

So, how do you make sure that you don't fall into the optimization trap in the first place and, if you do, how do you climb back out?

In the rest of this article I am going to take you through 7 principles for avoiding the optimization trap. If you have fallen into the optimization trap you can use these principles as a ladder to help you climb back out. If you want to avoid the trap in the first place use these principles as a check list for your own behavior.

Principle 1 The Fundamentals Don't Change

No matter what it is that you are trying to optimize there will be fundamental management processes and guidelines that you should apply. Always ensure that you are applying the fundamentals before trying more sophisticated techniques and avoid applying 'silver bullet' solutions.

It is almost human nature that we are always looking for short cuts… and I get that. But just as a farmer cannot sow seed at the last minute and hope for a crop the next week, we cannot ignore the basics and then expect that some sophisticated tools will make up the difference, no matter how much we want them to. It just doesn't work that way.

Principle 2 Challenge Your Assumptions

The easiest way to fall into the optimization trap is to be ignorant of your own assumptions. I know that I have mentioned this already but it bears repeating. It is your assumptions that set the boundaries of your thinking and thus the scope of your solution. By challenging both your implicit and explicit assumptions you will ensure an appropriate scope and better solutions.

Explicit assumptions are easy to recognize, that's where we consciously make an assumption about the way things are or should be. But implicit assumptions are dangerous because they are not obvious. Usually they follow from some logic that we have applied but not thought through entirely, so we don't realize that we are making the assumption.

You must ensure that you try to review the implicit assumptions that you are making.

Principle 3 Beware 100% Hindsight

It is very tempting to rely on hard data; after all, facts are hard to argue. There are two problems however with data. First, it often doesn't show what you think it does. Second, it is all history, it tells us what was, not what could be. As I said earlier sometimes relying on data can be like trying to drive the car with just the rear view mirror.

You need to understand what the data truly represents, not what you think it represents.

Principle 4 Process Provides Performance

It is widely accepted that the outcomes that are achieved from any activity result from the processes that drive the activity. It is not the other way around. Sure, the outcome must be considered when you initially design the process but then you must consistently apply the process.

Significant and lasting performance is achieved by working on the processes that drive the outcome and through consistent application of the processes.

You know that if you complete, say, a maintenance task a certain way you will get a consistent result. However, if one person does it one way and another person does it another way, then the results will most likely vary.

The key is to identify the best and most appropriate process and to then stick with it.

Principle 5 Think Outside the Silo

Typically, organizations are divided into different departments, or silos, which focus on specific activities. This is done to make managing easier through grouping like activities and limiting the span of control for a supervisor. Ironically however the structures that we use to make managing more effectively often limit our ability to improve operations.

This is because optimization efforts often focus only on the activity within a single silo and so miss out on cross department opportunities. Worse, on occasion they actually have a negative impact on other departments.

So, involving all the affected departments helps produce a more robust and complete solution.

Principle 6 Action = Culture

I am sure you have heard the old expression about walking the talk. Well, the true measure of an organization's culture is not found in the words that are used but in the actions of the staff and management. Ultimately, people's actions influence their mindset and this drives their culture.

Safety and quality are two areas that in the past 30 years have been through significant change in what people do, as opposed to what they say they do.

That is taking the actions to keep people safe and/or produce quality products rather than just saying that this is important. To apply this principle you must ensure that you are walking the talk.

Principle 7 Take a Big Picture View.

True success in any business is measured by the overall organizational result. Each department within an organization contributes to that success by fulfilling its role. Managers that take a big picture view will always undertake their actions in the context of the overall organizational result. Without exception this produces better and longer lasting results.

When people overtly do things to make them look better, perhaps at the expense of someone else, we decry them as playing politics. And rightly so.

But sometimes without realizing it we take too narrow a view of our role in the organization and how we can further contribute to the big picture, rather than just improving our own performance.

So there you have The Optimization Trap and 7 principles for avoiding the trap.

It is often said that recognizing a problem is half the solution, so your new awareness of the optimization trap should help you to avoid the trap.

If you have already fallen into the trap, recognize it, acknowledge it and start to climb out.

About The Author

Phillip Slater is an Inventory Process Optimization Specialist and is often referred to as 'The Inventory Guy'. Phillip is the author of the books Smart Inventory Solutions, A New Strategy for Continuous Improvement, (Industrial Press 2007,) and now The Optimization Trap. For more information contact Phillip at pslater@InitiateAction.com or visit the website www.InitiateAction.com