How can you use the science of statistics to improve how you manage and lead so that your results improve, costs decrease and joy of work boosts ?

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Article series written for the Swedish Statistical Society in relation to the award “Statistician of the Year”

Award "Statistician of the Year 2017" by the Swedish Statistical Society. **Motivation by the jury (Professor John Öhrvik):** *"For Martin Lagerström´s innovative application of statistical methodology in the fields of business development and strategic competence development of managers and management teams"* Previous winners of this award are among others Hans Rosling (Professor in International Health), and the Norwegian statistician and tv-profile Jo Röislien.

Executive summary

Have you ever heard of the Holy Grail for firms? Something that will assure you a raise in its results, a decrease in costs and at the same time boost the joy of work? In the following pages I will show you how the science of statistics will improve how you manage and lead so that results improve, costs decrease and joy of work boosts. We will go through the core of true excellence.

These articles will address these questions and its relationship to what great firms do and how they do it. The abilities and personal traits in how to manage and lead a firm for true excellence are many. It is beyond the scope of these articles to describe all these abilities and traits in details. However, if you want an overview over some of these abilities and traits, please click on the link and read the interview: https://bit.ly/2QfgXWJ.

These articles focus only on one but important part of these abilities and traits, i.e. what and how statistical thinking, methods and tools could be used for much better management, i.e. the last link in my adage below.

"As managers lead themselves, they lead their co-workers. As they lead their co-workers, they lead their groups. As they lead their groups, they lead teams. As they lead teams, they lead entire businesses and organizations. It is like the links in a chain. It hangs together".

In order to manage and lead your firm well, your managers need to develop many abilities and traits along each link in this chain and then learn how to combine and align them to your business as a system. How good results a firm finally achieves depends, among other things, on the width and depth of the abilities its managers acquire along each link in this chain.

What is not so often discussed is that statistical thinking, methods and tools are crucial in this better way to manage and lead. As the saying says "the only constant is constant change" these abilities will be even more important in the future. To be brutally honest, they will be vital if you want to innovate and thrive, i.e. if you want stay in business long term. To learn how to manage and lead this better way, a firm needs to teach its managers these profound abilities related to the science of statistics. The few who are willing to do this will vastly improve outcomes.

To apply the science of statistics to improve business results for each link in this chain you need know-how about many other subject domains too. That is why a series of articles have been written. They are needed in order to answer the main question, i.e. how can managers use the science of statistics so that results improve, costs decrease and joy of work boosts ? So, which are these other kinds of competences? One such subject domain is what a firm is, and what it is not. Too many managers look at its firm the wrong way. There are other related subject domains which are important to apply the science of statistics to improve business the right way too.

Therefore, an overview of the articles in the series is given below

- The purpose and goal of the first article is to answer the following questions:
    - What is the essence of firms, and why is that important to know in relation to the science of statistics?
    - What is important for firms to measure? Why, and how can they measure the right things well?
- The purpose and goal of the second article is to describe why the issues mentioned in the first article matters so much for the firms which want to raise results, reduce expenses and boost joy of work. Therefore, the second article focuses to answer the questions below:
    - What are the problems and challenges many firms face today and in the future? How is this related to the old Sufi story of the blind men and the elephant?
    - How is it related to the science of statistics for better management and results?
    - Why are not all firms using the science of statistics? What are the major obstacles?

- The third article builds on the two-first articles and describes how great firms solve these problems and challenges. The purpose and goal of the third article is therefore to compare great firms from others when it comes to the issues below:
    - What differs great firms from others? Why do they perform long track-records of great results? What approaches do they use, and how do they apply them?
    - Why is a firms system and processes vital for great outcomes? How is this related to its results, costs and joy of work?
    - What does an excellent conductor of a well-trimmed orchestra has in common with this much better way to manage and lead?
- The fourth article describes how all this mentioned in the previous three articles are related to the science of statistics. Moreover, what is necessary to do before you apply the science of the statistics to improve outcomes. Its purpose and goals is to answer the following questions:
    - What is similar when it comes to how you manage and lead an orchestra and a firm?
    - What flowcharts should be used? What questions should be asked?
    - What will be accomplished by these steps alone?
- The fifth and last article gives simple examples when it comes to how the science of statistics should, and should not be applied. The purpose and goal of the last article is to highlight the following questions related to the previous articles:
    - What happens when the science of statistics is not used or used wrongly? What are the consequences for managers and co-workers? What are the effect on results, costs and joy of work?
    - How can firms apply the science of statistics the right way, i.e. for true improvement? What does this mean for managers when it comes to how to predict outcomes, costs and joy of work? What does it mean for results and expenses? What does it mean for peace of mind?
    - What are the crucial competencies that managers need to learn related to the science of statistics, and in order to manage and lead to improve results, reduce costs and boost joy of work? What other competencies and traits are needed to manage and lead systems and processes well?
    - What, and how do you combine and apply these approaches so you achieve great outcomes?

The articles illustrate that these competencies along with the science of statistics will be even more important in the future. Moreover, they show that it is possible to go from what, how and to achieve great results too, i.e. if - and only if- firms learn how to combine and use these fact-based approaches well. Besides giving you the facts that it has been done with great results, I have own experiences that they create great outcomes too. Both as a manager, management consultant and now helping top-management teams how to combine and use these approaches well. They will be vital for the firms that want to meet the challenges and problems successfully mentioned in the second article. The firms who learn how to apply these approaches will innovate and thrive.

Article I: What is the essence of firms?

Does it exist some kind of holy grail for a firm to raise its results, decrease its costs and boost joy of work, all at the same time? What is the core of true excellence? How is the science of statistics related to all this? These are some of the questions this and following articles will address.

The abilities and personal traits in how to manage and lead a firm for true excellence are many. It is beyond the scope of this article to describe all these abilities and traits in details. However, if you want an overview over some of these abilities and traits, please click on the link and read the interview: https://bit.ly/2QfgXWJ.

This article and the following articles focus only on one but important part of these abilities and traits, i.e. what and how statistical thinking, methods and tools could be used for much better management, i.e. the last link in my adage below.

"As managers lead themselves, they lead their co-workers. As they lead their co-workers, they lead their groups. As they lead their groups, they lead teams. As they lead teams, they lead entire businesses and organizations. It is like the links in a chain. It hangs together.

In order to manage and lead your firm well, your managers need to develop many abilities and traits along each link in this chain and then learn how to combine and align them to your business as a system. How good results a firm finally achieves depends, among other things, on the width and depth of the abilities its managers acquire along each link in this chain. My adage highlights the essence when it comes to manage and lead well. It has a whole lot to do with influencing others to actions. The starting point of this is what approaches the managers use, and how well he or she uses them.

What is not so often discussed is that statistical thinking, methods and tools are crucial in this better way to manage and lead. As the saying says "the only constant is constant change" these abilities will be even more important in the future. To be brutally honest, they will be vital if you want to innovate and thrive, i.e. if you want to stay in business long term. To learn how to manage and lead this better way, a firm needs to teach its managers these profound abilities related to the science of statistics. The few who are willing to do this will vastly improve outcomes.

To apply the science of statistics to improve business results you need know-how about many other subject domains too. One such subject domain is what a firm is, and what it is not. Too many managers look at their firm the wrong way.

So, what is the essence of firms, and why is that important to know in relation to the science of statistics?

What is an organization?

In order to answer that question we need first to understand the essence of firms. What it is, and what it is not. Every firm has to raise results, reduce costs and boost joy of work in order to continue to exist. That is true for both firms in the private and public sector. In order to achieve that end it needs to be clear about its purpose, goals and the means to achieve them. It needs to have a strategy and plans, and it needs to put that strategy and plan into action, and it needs to be able to answer questions such as e.g. how do we know that we are on the right track and that we have succeeded. It needs to know what to measure, why to measure it and how to measure the few things that really matters for its firm success – not the trivial many.

That means that managers at all levels within a firm need to understand what really drives the firms results, costs and joy of work, and how to achieve it. Too many firms seek to meet this purpose and goal in the wrong way e.g. by focusing on the outcomes not on the causes to these outcomes. This common way to manage and lead has a name too. It is called management by results. Other common names on this type of management are command-and-control or micro-management. Management by results is when you focus too much on the symptoms, i.e. on the results or the outcomes for monitoring such as e.g. profits, revenue, costs etc. These profits, revenues, costs etc. are caused by other things such as what ways of working your

managers and co-workers have created for their work for its users, and how well they have designed and aligned them for its users, i.e. how the firm has designed and aligned its system and its processes for its stakeholders. For example, if there is no clarity in what should be achieved, why, how, when and which ones who are responsible for different parts of the work within a firm, and how these parts should work together etc. then results go down, costs increase and joy of work goes down.

The system and its processes are the firms crucial enablers for the outcomes it finally achieves for its users, customers, society. For true improvement you must fix the enablers (the causes), not the outcomes (the symptoms). Moreover, this way to manage and lead by focusing too much on the symptoms (profits, costs, results etc.) encourage competition between departments instead of co-operation, and to make your departments number, quota by whatever means. This view always leads to poorer results, increased costs and lowers the joy of work for the whole firm. Co-operation always beats competition as John Forbes Nash Jr has mathematically proven in his groundbreaking work on game theory , i.e. when it comes to what factors that govern great decision-making in complex systems; a work he received the Nobel Prize for too. A manager´s main job is to get people to co-operate - not compete- well for its users. This mindset will vastly raise outcomes in all aspects.

That is why it is important to first understand what a firm is and how this is related to the science of statistics. So what is a firm?

A firm is a system with processes. All systems have a purpose and a goal. The fact that a firm is a system means that it consists of different parts that depend and affect each other in unique ways to create the firms output e.g. its products and services for its stakeholders. That means in turn that these parts need to cooperate to achieve the organization's purpose and goals. A firms reason to be is its stakeholders, i.e. without customers that demands the firms products and services, and people who do great work to deliver that, it will soon cease to exist.That is its purpose. That is why it exists, and will continue to exist if it does great work for its stakeholders (users, customers, co-workers, society etc.).

"Power is organized effort" Henry Ford

A firm should achieve something too for its stakeholders. It needs a goal, i.e. what to achieve and accomplish for its stakeholders. The "visible" means the firm has to achieve its goals are through its products and services for its users. It´s products and services must satisfy their stakeholders needs in order for the firm to thrive and continue to exist. To deliver products and services that satisfy its users needs better than others is the main goal for firms in the private sector. In the private sector that will generate money so that the company can survive and continue to exist. In the public sector, the goals is to make effective, efficient and productive use of tax payers money in order to motivate its existence.

That is not enough either. A firm also need to know how it will achieve that end, i.e. its purpose, goals etc. It needs to be able to answer the question "By what approaches". It needs to have a strategy and a plan loaded with know-how to achieve that strategy, and then it needs to take action to achieve it. These are the more "invisible" means a firm has when it comes to how it accomplishes that end.

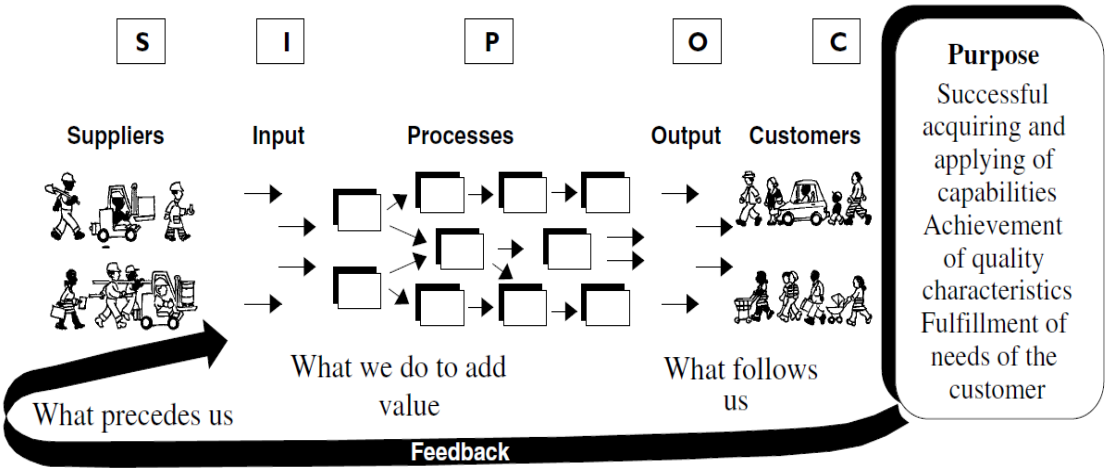

Figure 3-1. The SIPOC model.

Figure 1. The essence of what a firm is. Source: Leader´s Handbook – A guide to inspiring your people and managing the daily work flow. Making things happen, getting things done by Peter R. Scholtes

So by what approaches does a firm achieve that end? The figure above gives a rough view about how a firm achieves its purpose and goals. A firm achieves that end by transforming inputs to outputs for its users, i.e. it needs some input such as competencies, know-how etc. to transform to output such as different products and services that satisfy its users needs. That is how it achieves its purpose and goals. The way the firm does this transformation is through its processes. Everything we do can be described in terms of processes such as deliver products and services, making pizza, making an appointment etc. The firms people work in these processes that convert input to outputs. In order for the process to accomplish that end it needs input from others, either inside or outside the firm, i.e. competence, data, know-how etc. How high quality output the firm finally manages to deliver in form of products and services to its users depends on what processes it has created and how well it has aligned them to support the work flow for all the people who are involved in the work for the firms end-user. Finally, what kind of results the firm achieves, and to what costs and joy of work depends on how its system and its processes performs. Your firm´s system and its processes creates the outcomes, costs and joy of work. If you want to know how well this is done you need to measure the right things too.

What is important to measure?
Some crucial measures more firms should measure to study how well their system and processes are to achieve its purpose and goals are throughput, waiting time/“inventory” and expenses. Other vital measures are how the firms process performs in average and how they vary around that average. The science of statistics contains the know-how to do this in a fact-based way as will be shown later in this article.

One vital such measure to study how a system and its process performs is the time it takes from when the users place their order until they get the products/service in line with their needs. Quality is determined by your users. How well your system and its processes manage to convert all these inputs to the right outputs in form of services and products for your firms users is crucial. This vital measure is called throughput. Unfortunately, throughput is not measured by most firms. Only the few great firms measure it.

Throughput depends in turn on two other measures. First, how many of your firm´s products/services that are waiting to be processed at the same time e.g. due to waiting times or queues at the different departments or units that are involved in the work. Your firm´s co-workers have other work to do at the same time too, i.e. they are not working hundred percent with one product or services as many of them are occupied with other products/services or working assignments at the same time. This measure is called waiting time or inventory. Second, the rate at which your firm converts input to output to products/services for your users is another important measure. This measure is called cycle time.

If you multiply waiting time/inventory and cycle time you get throughput. If you want to experience, test and use these three concepts in your life, you can try it the next time you are about to choose a queue. Imagine you are in a hurry for check-in at an Airport, and you have several queues to choose among. Which one should you use? First calculate approximately how many people that are standing in each queue (Products/services in work, waiting time or inventory). Then check how frequently people are served in each queue (Cycle time). Multiply these two numbers for each queue. You have now chosen queue in a scientific way, i.e. the one with the best throughput. The thing that matters most for the end-user (here the traveler who wants to check-in as fast as possible).

Moreover, it is very important to measure how the work in the system and its processes varies when doing this conversion from input to output. That measure is called variation. Variation in processes are crucial to know and, in other words, to measure. Why? Because when you reduce variation in your system and its process and especially around its bottlenecks you will improve it a lot. In addition, know-how about how the process varies is very important for managers who wants to predict results for users, and the resources they need to create those results with high accuracy.

These two measures – throughput and variation – is related to how much resources you as a manager need when your process converts input to output in form of products and services for your users. The science of statistics contains the approaches for doing this calculations too. These measures – throughput, waiting time, cycle time and variation – are some vital things that should be measured too, but unfortunately they are not measured by too many firms.

So what about joy of work? Could that be measured? How? How is joy of work related to performance? If you feel well, you perform much better results. This is a very fact-based statement. There is a strong correlation between how you feel, and how you perform. This statement is backed up many years of scientific studies, and from different disciplines too. One such discipline concerns what makes groups and teams perform better, and how to measure the effects (Wheelan et al, 2005). Another is over 50 years of research from Integrated Mental Training, and e.g. what differs great elite sports performers from others (Uneståhl et al). A third example is how co-workers joy of work is related to business results which has been done by the Gallup organization. Over the last 30 years it has researched over 80 000 managers and 1 000 000 co-workers around the world to find the true drivers.

A brief overview about this research is given in the figure below.

How is joy of work and business results related?

Questions	Rating 1 -5	User satisfaction	Profitability	Productivity	Turnover
1.Do I know what is expected of me at work? **(What do I get?)**		X	X	X	X
2. Do I have the materials and equipment I need to do my work right? **(What do I get ?)**				X	X
3. At work, do I have the opportunity to do what I do best every day? **(What do I give?)**		X	X		X
4.In the last seven days, have I received recognition or praise for good work? **(What do I give?)**		X	X	X	
5.Does my supervisor, or someone at work seem to care about me as a person? **(What do I give?)**		X	X	X	X
6. Is there someone at work who encourages my development? **(What do I give?)**			X	x	
7. At work, do my opionions seem to count? **(Do I belong?)**			X	X	
8. Does the mission/purpose of my company make me feel like my work is important? **(Do I belong?)**				X	
9. Are my co-workers committed to doing quality work? **(Do I belong?)**			X	X	
10. Do I have a best friend at work? **(Do I belong?)**		X		X	
11. In the last six months, have I talked with someone about my progress? **(How can we grow?)**		X		X	
12. At work, have I had the opportunity to learn and grow? **(How can we grow?)**			X		
Overall satisfaction			X	X	X

Figure 2: How joy of work is related to business results such as customer satisfaction, profitability, productivity and turnover. The relationship between the questions and business outcomes are marked by "X"

The higher the scores are on the above measures related to co-workers joy of work, the better business outcomes your firm will achieve. Many of these measures above are related to what and how you have designed your system and processes too, i.e. when it comes to clarity and how aligned they are to the co-workers daily work.

As Galileo Galilei said *"Measure what is measurable, and make measurable what is not so*". Everything can be measured – both tangible and intangibles – and with high quality too. It is important to measure the right things correctly. This is one thing that truly differentiates the great firms from others. The great firms know how to apply the science of statistics to improve business outcomes as will be shown later in these articles. This is important as what can be measured can be managed, and what gets managed gets done

This view (output, input, process), as described above, along with these measures is not common to see in most firms. It is certainly not how most firms are managed and lead to say it mildly. On the contrary, many firms face big problems and challenges when it comes to results, costs and joy of work. There is a great need for true improvement today and even more in the future. Many believe change is the same as improvement, but it´s not. All improvement requires change, but few changes lead to sustainable improvements. That is a sad, but cold fact.

So, what are the main problems and challenges for firms then? How do we know that? How is this related to the science of statistics for better management and results? Why are not all firms using these approaches? What are the major obstacles? Read the next article if you want to learn more about these issues.

Article II: What are the problems and challenges ?

Many studies (Wheelan et. al, 2005) show that most firms only manage to utilize 20-40 percent of managers and co-workers true potential, often less, that is a lot of waste.

There are four areas that are crucial to unleash more of people´s true potential. They are all related to how well people work together, which also translates to results for users, costs and joy of work. In addition, these things could be measured with high accuracy too. First, that managers need to create the right type of goals, i.e. goals that steer and motivate co-workers to action and results. Second, that the working assignments for different job roles are clear for each and everyone involved in the work, i.e. the purpose, goal, responsibilities, and what competencies and personal traits that are required to deliver great results for different job roles. Everybody needs to know why certain assignments should be done, what should be achieved, what results the role should deliver, how it should deliver it, when and who/whom that are responsible for different assignments. Moreover, the different job roles that are involved in the work flow for your users need to be well-aligned to each other too, and in relation to your firm´s purpose, goals etc. Third, that the relations between the people who are doing the work are clear for everyone, and aligned to each other too in the work flow, as a whole. For example, ways of working, and especially behavioral patterns among the people that are working together determines what kind of culture that exists, and it has large consequences for results, costs and joy of work. The culture will improve when people have hard facts about issues such as what motivates us? What stresses us? What helps? What limits ? What are our strengths ? What are our "blindspots"? These facts could be used to improve decisions, meetings, the work and service for customers etc. Fourth, that the processes that the people work in support their daily work flow. This fourth area includes processes for meetings, decisions, products, services, but also the most crucial ones for world-class performance, such as e.g. how the whole work flow to customers/users performs. That is to say, what design the processes have and how well your firm´s core and support processes support the daily work flow for your customers or users.

You can use the science of statistics to study all this too, i.e. to measure how well any group performs along these four areas, and how it relates to results, expenses, and joy of work. Fact-based approaches to use for these studies are e.g. the Group Development Questionnarie (GDG) combined with the science of statistics. These measures provide an excellent basis or start to both change and improve for a group to improve these four areas over time. These measures relate to a groups results, internal effectiveness and joy of work, which are very important to improve outcomes. However, a firms groups or teams needs to translate their internal effectiveness to external effectiveness in order to improve even further along its purpose and goals. That means that these four areas (goals, roles, relations, processes) need to be based and aligned to the stakeholders needs and the work flow in a certain way. The means to accomplish that end is to apply the science of statistics and combine it with proven management processes, i.e. to study how the work works or performs for real.

In too many firms managers and co-workers don´t feel that the firms vision, goals strategies etc. affect their daily work in concrete terms; they don´t steer and motivate to action and great results. Common problems in these firms are e.g. unclear goals, roles, how roles relates to each other, relations, systems, processes etc. Both within and between different levels as well as between the upper level, middle and lower levels in the firm.

These problems could be summarized in an easier way, as with the old Sufistory of the blind men and the elephant; explained below. The essence of this story is that everybody see his or her view of the elephant but nobody see the whole elephant. As a consequence the whole elephant does not feel and perform as well as it could do. It needs much more energy to move as the different men are focusing on their parts instead of the whole. It does not feel and perform as well as an elephant where all these men move at the same direction as the whole. We want to change and improve the whole elephant, not its single parts. We want to make these blind men to see the whole elephant and work great together towards a common purpose and goal. This clarity will raise results, reduce costs (energy) and boost joy of work for the whole elephant, at the same time. However, this is easier said than done. The only way to study how well the work performs in a fact-

based way is to apply the science of statistics to study it. Some samples when it comes to how to do this are given in the last article.

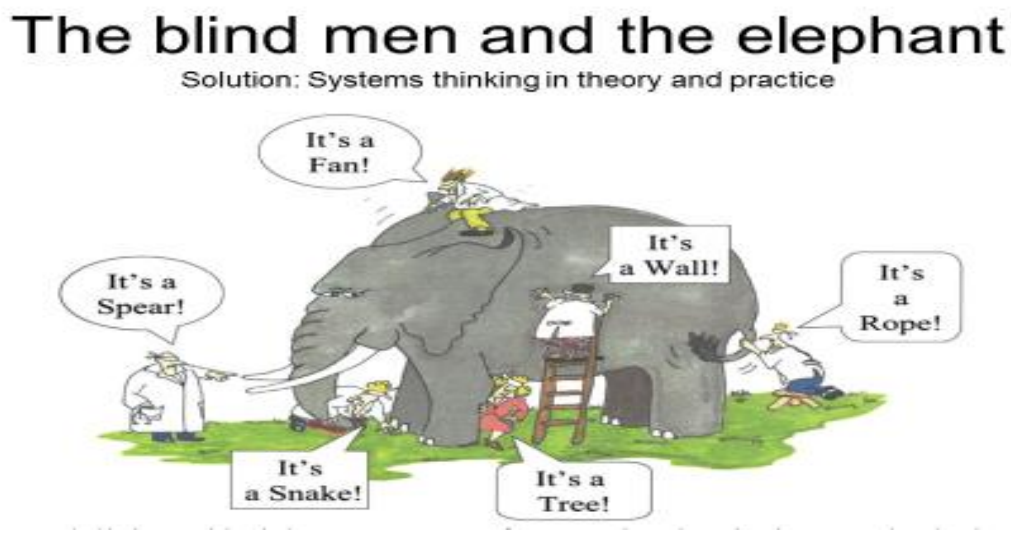

Figure 3. The Blind men and the elephant.

If we look five years ahead, what are the major challenges firms face? Many studies exist of this too and one of them is mentioned next. In short, we see that these problems and challenges still prevails in the long term too.

What are the greatest challenges firms face five years ahead?
A recent study(http://siq.se/organisationers-framsta-utmaningar) by the Swedish Institute for Quality gives you the answer to that question. ("Organizations' main challenges - A five-year horizon study", Swedish Institute for quality SIQ). The study is based on top-managers from 500 firms, both in the public and private sector. These managers were asked what they consider to be the biggest challenges for their firms in the next five years.

The answers identified 48 different challenges, i.e. that these managers considers to be vital for success in the future.

These 48 challenges were grouped into the four major areas below:

1. Developing business with customers and stakeholders
2. Developing new ways to manage and lead that creates glow and commitment
3. To achieve sustainable business in several dimensions such as the firms' social, economic and environmental impact.
4. To drive change and improvement work more strategically

The study concludes that this is a call to all Swedish firms to use new ways to manage and lead. To challenge the prevailing assumptions about what and how to manage and lead and its relationship to results, costs and joy of work. This like other similar studies only mentioned "the what´s", and not "the how´s" to meet these challenges to achieve great results. Like several similar studies and real case studies (Wheeler, Deming et al) these problems and challenges which are mentioned in this and similar studies are no new things under the sun. On the contrary, it is the same problems and challenges that have prevailed since decades. If you want recent overviews about these problems and challenges for the public sector specifically I refer to two books. The first is Lars Stiglund´s book *"What is the problem? – About governance in the public sector" from 2018.* It covers the situation for the public sector in Sweden. The second one is Professor John Seddons book from 2014 *"The Whitehall Effect",* which covers the same issues but in England.

There already exists a better way to manage and lead, and the know-how to achieve or accomplish that end with great outcomes. It has existed for decades too. More important, it has a proven and great track-record

when it comes to results, costs and joy of work too. This better way to manage and lead is based on true co-operation and how to use the science of statistics together with other approaches. Some great books on what and how they are applied for the service sector and its great results are e.g. Making Sense of Data: SPC for the Service Sector by Donald J Wheeler and Dr W. Edward Deming´s books and work. The outcomes are spectacular for the few firms that have succeeded to apply them well. They have vastly raised results, reduced costs and boost joy of work. Yes, at the same time too. Moreover, they can measure its effects too – before and after.

However, before we come to that, we first need to know what the major causes to these common problems are. Why are not all firms using these approaches? One such major obstacle is mindset. Mindset related to what an organization truly is and what competencies that are needed to innovate and thrive. Top-managements mindset to be specific. Another common obstacle is lack of statistical competence and its relationship to much better management and business results. Let´s look at a very common but also wrong mindset about what a firm is. We can call it the organizational chart mindset. Unfortunately, this mindset still rules in most firms, except in the few great firms.

What is the organizational chart mindset ?
This very common and wrong way of thinking and its consequences is best illustrated by a simple study. These kind of studies asks managers and co-workers if they could describe the firm they are working for (Scholtes, 1998). Around 90 percent of the people who answer these studies describe their department, unit or maps out or describes it as an organizational chart, sometimes along with some fuzzy words about the firms purpose, goals, strategy etc. If you then continue to ask the same people if they think something is missing in that description or chart, common answers are that the customers, co-workers etc. are missing. If you then continue to ask, what is the single most important thing that is missing? You sometimes (if you are lucky) get the crucial missing dots, i.e. that the single most important thing that is missing is this: what and how the work for the firms users are managed and led, i.e. the grey areas in the organizational chart. What and how input is transformed to output for the firms users is the crucial know-how that is missing in too many firms.

What are the consequences of the organizational chart mindset?
This is not what an organization is, but it is exactly how too many firms are managed and led. This mindset creates unclear goals, roles, roles and processes within and between different units in the firm. The organizational chart says absolutely nothing about what and how well the work is done in the system and its process. Production does not happen this way (you don´t produce products and services in hierarchies) as in the chart. The work does not flow in hierarchies, except in too many managers heads. Still this chart lives in too many managers heads when the firms decide what and how to design their system and their processes.

This is one crucial thing that dominates how firms decides to design their system and their processes, and what kind of outcomes it will achieve. How do we know that? We just need to look at the real problems in many firms and the challenges they say they face in recent studies such as e.g. the ones mentioned above You will get the same answers from older studies such as newer ones. This has not changed over time either.

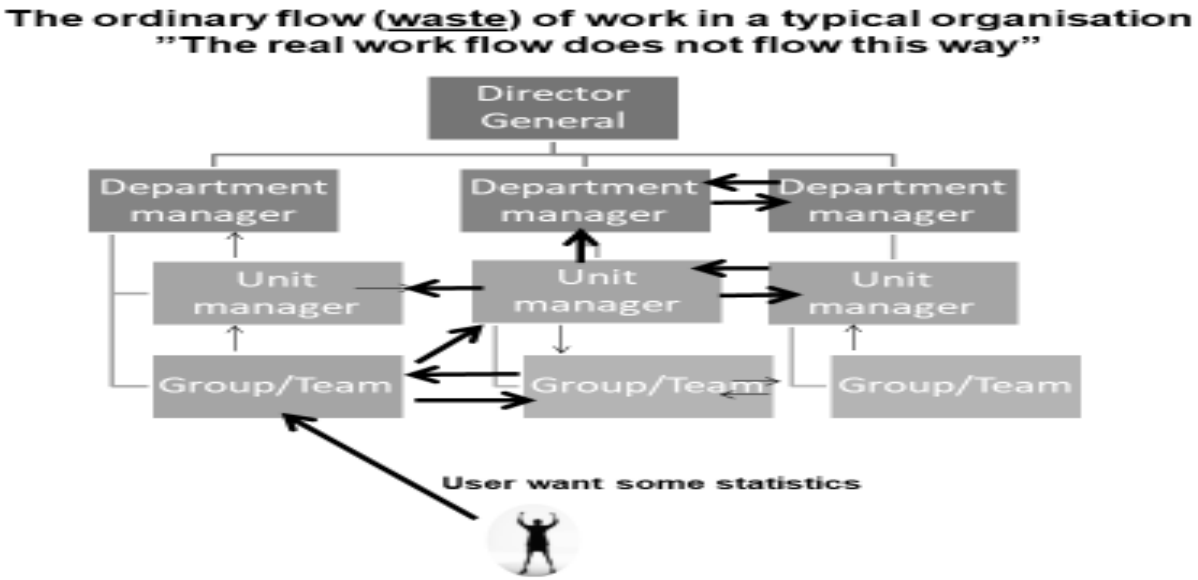

Figure 4. The Organizational chart mindset does not represent how the work is done in a firm.

To be clear: this mindset is still up to this date one major cause that too many firms have problems with unclear goals, missions, roles, systems, processes as mentioned above. In one word - sub-optimization. Sub-optimization always creates lower quality, higher costs and lesser joy of work for the whole – not for the parts in the short term. But we want to change and improve the whole firm (or elephant) not its single parts. That strategy aims for optimization, and the other much more common strategies aims for sub-optimization.

Before we describe what to do and how to do it, we first will look at great firms.
What differs great firms form others? Why do they perform long track record of great results? What approaches do they use, and how? What does an excellent conductor of a well-trimmed orchestra has in common with this much better way to manage and lead?

If you are curious about these issues, then read on as the third article describe these things.

Article III: What differs great firms from others?

Great firms creates long track record of excellent results for its users, managers, co-workers consistently. The big questions is why?

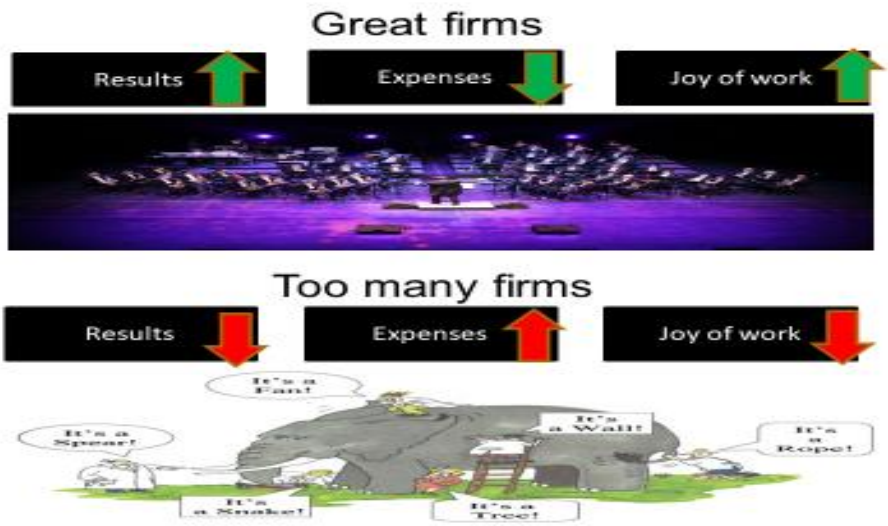

Figure 5. Great firms manage and lead so that results improve, expenses decrease and joy of work increase, while others manage and lead for opposite outcomes.

Because they think differently when it comes to what makes the work function for the bread and butter of the firm, i.e. its´ users, co-workers etc. Great firms have know-how about what the true drivers or enablers are for true excellence, and how to achieve it, see figure below.

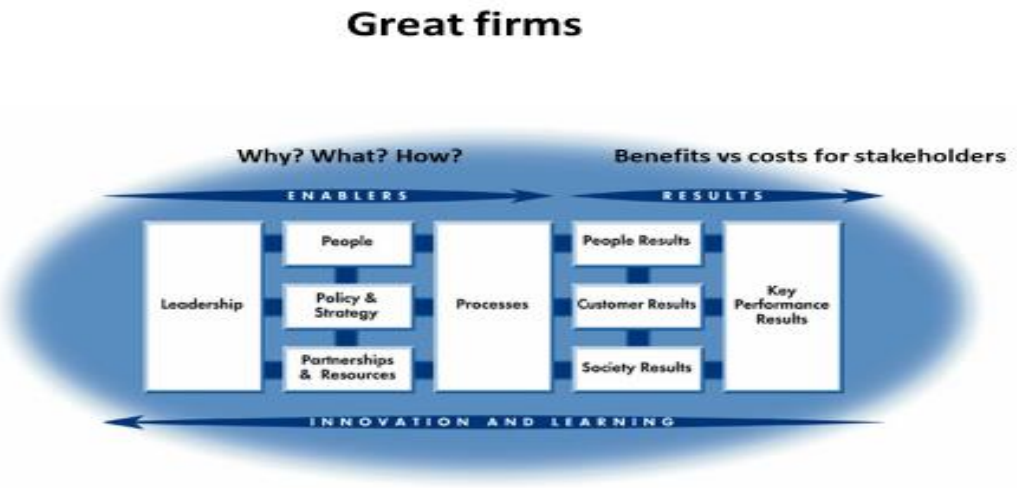

Figure 6. The EFQM Excellence Model. On the left side of the EFQM Excellence model are the "Enablers" (Leadership, People, Operational Planning/Strategy, Partnership and Processes). The value or "Results" for the organizations stakeholders are on right side of the model, How great "Results" (People Results, Customer Results, Society Results and Key Results) an organization will achieve depend on how well the "Enablers perform their tasks jointly. "Excellence" is, according to the EFQM defined as successful approaches that lead to great results. That means that an organization should strive to achieve excellence in everything it does and with respect to all approaches it chooses to use, e.g. how it work with its customers and users, leaders, co-workers, strategy, products and services etc.

More important, great firms knows how to transform the above or similar (theoretical) Excellence Models to practice successfully, so that they lead to great outcomes for their stakeholders. Too many look at these Excellence models the wrong way (only analytically), and that is why these firms have great trouble to transform their management systems to practice successfully. That means they try to transform these Excellence Models by describing the parts such as what and how they work with leadership or processes etc. without knowing how these parts performs jointly. That will lead to lots of activities but no value for the stakeholders. Why is that so? Because in order to generate great results for your firms stakeholders, one must first understand that these parts depend on each other, i.e. they must be viewed as a system with processes. That is the only way to transform these models to practice so that they lead to great outcomes, lower expenses and more joy of work. This is not the common view in most firms unfortunately.

Great firms know that it is vital to improve quality in all these aspects in Excellence Models jointly, in the right order, and with the right approaches. They know that it leads to a chain of great outcomes along these three vital measures at once: results, costs and joy of work. Great firms know what approaches to use and how to combine and apply them to achieve this chain reaction in the figure below as Dr. W. Edwards showed top-management in Asia.

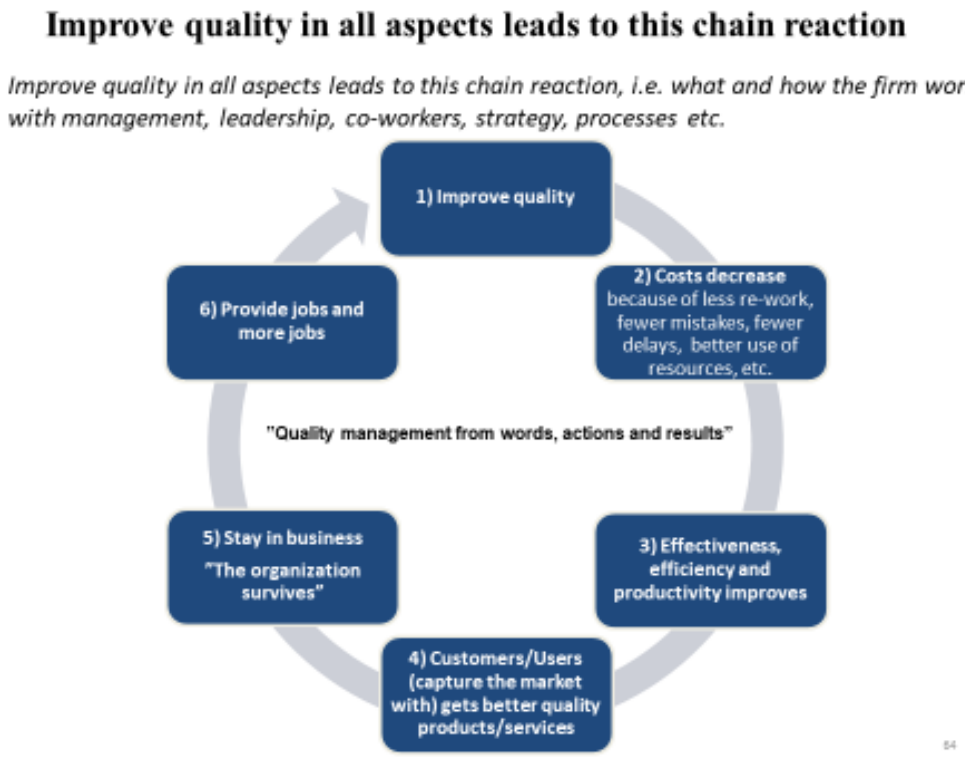

Figure 7. What and how you manage and lead (quality management) create a chain of great outcomes. Dr. Deming used the above figure in Japan during his lectures for top-management team in Japan´s largest companies (JUSE) in order to install this as the main thing to make the main thing. The main thing is to improve quality in all aspects, i.e. what and how the firm works with management, leadership, co-workers, strategy, processes. These approaches combined in the right way leads to this chain reaction.

Great firms knows what approaches to use, and how to use them when it comes to manage and lead systems and its processes for true excellence. Great firms know what approaches to use and how to use them when it comes to unleash co-workers, groups and teams true potential. Great firms know what approaches to choose, and how to apply them in order to create a strategy that goes all the way from what, how, and to awesome results. Great firms know what approaches to choose and how to use them when it comes to how they design its core and support processes so that it leads to better results, lower costs and higher joy of work.

Great firms knows that the true building blocks for world class performance are the design of its system and processes. Great firms teach its managers how to manage and lead systems and processes from the users and co-workers needs (not top-down without alignment to stakeholders). Great firms teach its managers how to use the science of statistics together with other approaches to achieve this chain reaction. Great firms use the science of statistics to focus on what the true causes are to results, costs and joy of work; they don´t focus and manage by command and control, results and costs (the symptoms), but they focus on what causes them. Great firms teach its managers how to use the science of statistics with other approaches to develop goals, strategies etc. based on how the work flows as a system with its processes, i.e. they look at how the whole chain (not the parts or links only) performs for its stakeholders; from the users and to the people involved in the work for them. Great firms view work as it works , i.e. as a system with processes. They don´t view production or work the common way, i.e. like it flows in hierarchies as they know that it creates the problems and challenges mentioned in the beginning of this article. On the contrary, they are very curious to study how the work really flows in reality with facts. Great firms use the science of statistics to study how its system and its processes really performs. Why? Because great firms know that it is a good investment to create time to do this as it generates much better results for its users, managers, co-workers, groups, teams and the entire organization. Moreover with lesser costs and more joy of work. Yes, at the same time too.

This way is vastly different from how most firms are managed. It requires another way of thinking of how to manage and lead the flow of work between the different managers and co-workers that do the work for the firms users. Their reasons to be, i.e. if it want to innovate and thrive. Great firms know that they should focus to manage and lead the system and its processes, and they invest time to learn its managers how to do that well. That is the main thing they stay focus on to be the main thing. That is their focus, i.e. they try to follow that one course until successful.

Why is this talk about systems and processes important?
The reason that systems and processes are crucial for results, costs and joy of work are expressed in a couple of words below by Dr W Edward Deming and his many fact-based studies.

"95% of variation in performance is attributable to the system and its processes and only 5% attributable to individual differences between workers" Dr W. Edward Deming

Please repeat the above line a couple of times. It is a very fact-based statement. Let it sink in, and then some more. It contains the why. It is a big why, and should inspire managers to look at what truly matters for success more in-depth. A starter to learn more about this profound and much better way to manage and lead is Deming´s books such as e.g. "Out of the crisis" (Deming, 1982). If you want to learn more about the science of statistics behind this much better way to manage and lead, I refer to Donald J. Wheeler´s book "Making Sense of Data – SPC for the Service Sector (2003).

This means that managers need to have practical know-how about systems and processes. They need a fact-based understanding when it comes to how its system and its processes perform, and how all this is related to how you manage and lead them for better outcomes. That know-how is needed before you even start to think about to change anything in your business processes. You don´t know what you don´t know. You can´t improve something you don´t understand, you can only change it. Change is not the same as improvement. You can´t manage and lead something you don´t understand well either. That is pure logic.

In order to do so your managers need to focus on the few vital things that truly matter for results, costs and joy of work, i.e. the system and its processes that drive results, costs, joy of work. They don´t focus on the trivial many things or the symptoms, i.e. the end-results (revenue, costs, profits). These strategies that focus on the symptoms often lead to quick-fix solutions as e.g. re-organizations and the like, which often worsen the results in the long term. To counteract these strategy moves, one need to move away from an "inch deep and miles wide strategy, and towards "an inch wide and miles deep strategy" around the few vital factors that truly matter for success.

One vital such approach to find out what to focus on and to vastly improve how to manage and lead is the science of statistics. However, this science must be combined with other sciences such as e.g. systems,

management etc. to be fruitful. Before we dig deeper, I want you to relax your mind, and think about music for a while and consider how to manage and lead an orchestra is similar to how to manage and lead a firm for better results, lower costs and more joy of work. I want you to reflect while you read as what is being said is highly related to the science of statistics, management and outcomes achieved. So let´s play. We will then dig deeper with more practical examples of this. .

What does and orchestra has in common with management and statistics?
What makes and orchestra play extremely well? What does the quote below mean in relation to how to manage and lead? What is its relationship to results, costs and resources? How is it related to how to use the science of statistics to manage and lead much better?

"Why do you play an instrument when you got access to a whole orchestra? "

Figure 8. How a conductor manage and lead a great orchestra is much alike how to manage and lead an organization for better performance.

You can compare this different and much better way of manage and lead to how a great conductor leads a well trimmed orchestra. An orchestra consists of many parts that are involved in the work of playing music. It has a conductor and many musicians that play different instruments in the orchestra.

The purpose and goal of an excellent orchestra is to play music that creates goose bumps for the ones who listen to it, i.e. the audience that has paid for the tickets. That is its purpose and goal. That is why it exists, i.e. for the stakeholders (the audience).

In order to make that happen the conductor needs to manage and lead the whole orchestra like a system and make sure the system has processes that are adapted to each musician, but also in relations to the other musicians in the orchestra. That is the only way to accomplish its purpose and goals with good outcomes. If that is not the case, it may need to refund tickets. To refund tickets is costly, and not much fun either for the musicians in the orchestra.

The conductor must give the right notes to each musician and to organize them well so they play well together. To play well together (co-operate) is easier said than done. The reason for this is that each part (musician) affects how well the whole orchestra plays. However, no single part (musician) can achieve that end by itself. The parts – the musicians in the orchestra - interact and depend on each other for the final outcomes. This is a true sign for all systems and processes, and an orchestra is a system with processes like many other things in life. That is to say, the orchestra has parts which affects each other, and that these parts

jointly produce effects that is different from the effects that each musician produce by her/himself. This is very important but often a neglected fact by too many firms too. Lastly, the effects from these parts jointly are often counter-productive in systems and different in different contexts. For example, one change in one small part in the system will *not* change the other parts in the system in a linear way. On the contrary, that means you must look at what and how they perform jointly. Not individually as that comes later. The effects in systems are far from linear. This is illustrated by the butterfly effect (Lorenz, 1960), which is the idea that small things can have non-linear impacts on a complex system. The concept is imagined with a butterfly flapping its wings and causing a typhoon. Of course, a single act like the butterfly flapping its wings cannot cause a typhoon. Small events can, however, serve as catalysts that act on starting conditions. Another example of these counter intuitive effects in systems is e.g. when a country wants to decrease drug usage among its citizens. If these measures are efficient then it leads to that the supply of drugs decreases. When the supply of drugs decreases, prices on drugs increases, which in turn leads to that the people that are addicted to drugs needs to do more crime in order to finance their usage.

An orchestra is a system so the only way to do study it in a fact-based way is to apply the right statistical thinking, methods and tools to study the work flow, i.e. how the orchestra performs today under its current system and processes. In other words, how they are designed to fulfill the firms purpose, goals, strategy etc.

An important thing to remember is that the results, costs and joy of work in an orchestra varies. Everything in life varies – even the most precise measurement instrument oscillates. This variation is invisible, which is a problem. If the conductor wants to study what and how his orchestra performs for the audience he or she needs to know how it varies. He or she needs to make it visible. You need to have facts about your process average performance and how it varies around that average. You cannot improve something you don´t understand. You can´t manage and lead it well either. You need to have facts. You also need to apply fact-based approaches to get these facts.

For example, if the conductor studies how his orchestra performs during a year with the right statistical approaches he or she will acquire these facts and much more. Some days the orchestra will play excellent and well above its average performance. On other days it will play lousy and way below its average performance. In short, it will have an average performance and a variation around that average. The ways of playing (the processes) are crucial for what and how well it plays. Both when it comes to its average performance and how much it varies around that. The different parts in the process need to be align to each other in line with its purpose and goals. Imagine a competing orchestra now is entering the town. Its average performance is the same, but its performance varies a whole lot more.

How is this related to the results, costs and joy of work in an orchestra?
The two orchestras – the conductors and the competing orchestra – performs the same in average results for its different audiences. However, the competing orchestra performance varies a lot more around its average compared to the first one. That is the only difference among them. Imagine the figures are like the ones below:

The competing orchestra has an average performance of 2,8 units, and a variation of 1,64 units around that average. The conductors orchestra has the same average performance of 2,8, but only a variation of 0,84. These two measures (average performance and variation) are crucial to know if the two conductors want to predict results, costs and joy of work with some accuracy. To predict results and costs accurately is vital for great management of an orchestra, and even more so for a business.

The science of statistics will get you the concrete numbers about this too. The conductor of the competing orchestra will have much more trouble to manage and lead its orchestra. Moreover, he will need almost eight times as much resources in his process to be able to convert his/her input to output in form of great music to the audience (6,5 / 0,84 = 7,74). In addition, the conductor of the competing orchestra will have much more trouble in predicting the results of his orchestra for its audience compared to the other, e.g. due to quality problems, waiting time, overwork, burn out and other issues.

Moreover, the science of statistics will give you concrete facts about if you should change the process of the orchestra, what to change, where to change, and how to change it and what effects you can expect as described under the heading “a simple example” later in this article.

You may think that this talk about orchestra´s and the like above sounds plausible, but not manageable to apply in the service sector. Then I want to say it has been done with great results, and it is still done. I have used these approaches myself with great outcomes both for myself and others. Besides the books mentioned already, I also refer to Professor John Seddon books such as e.g. command-and-control. It is another source to see how these statistical techniques have been successfully applied to the service sector. If you have work in a truly high performance team you already have a glimpse of these issues.

It is easy and understandable to try to fix problems by looking at the parts, links or symptoms instead of the whole chain, system or causes that create the problems. It is actually ingrained in our way of thinking. We are not systems and process thinkers by nature. On the contrary, our decision making abilities are rather poor to put it mildly. This saying is backed up by Kahneman and Tversky scientific studies in decision making; a work that was awarded the Nobel prize 2002. I refer to Kahneman´s more easy digestible book “Think Fast and Slow” if you are interested to get more details about our decision making abilities. In short, we overestimate them a lot. That means, among other things, that we often try to improve the parts, links or symptoms e.g. by outsourcing them or to reorganize so that the costs are spread out on larger scales of operation. This economies of scale (cost per unit of output decrease with increasing scale of operation) mindset is another problem too. It has been proven by the science of statistics and management studies that is has the opposite effects, i.e. it increases costs, lower quality and reduce joy of work. If you only look at the symptom (costs) and not on the cause (system and its processes) to these symptoms, and not in relation to what truly matters for your firm´s purpose and goals (its stakeholders) you will be one of the blind men describing the elephant.

This may be a very bold statement for some people who are reading this as they (just like it was for me before I learned that it is was wrong) have been trained in this economics of scale way of thinking from university etc. The reason behind the costs or expenses depend on other much more important measures for a firm’s purpose and goals such as throughput and waiting time/“inventory”, which will be described in more details later in this article.

If you want the facts behind this in a more easy digestible format I refer to the book *“The Goal: A Process of Ongoing Improvement”* by Eliyahu Goldratt (2014). Another great book that should be mandatory reading for all managers who seeks real improvements in all three areas simultaneously, i.e. its: results, costs and joy of work. This book gives you the counter-intuitive evidence about this economics of scale, and why a firm actually could increase its costs by adopting economics of scale. This book also shows you why it is that way.

A firm should focus on three vital measures if it wants to know how it system and process performs. These are in order of importance: throughput, waiting time/“inventory” and expenses or costs. Notice that costs or expenses are mentioned last as it depends on the two other measures, which are highly related to expenses or costs. That is to say, expenses or costs depends on throughput and inventory/waiting time.

For example, imagine you should deliver 100 products for a user and the tool you use for creating them are taking two hours or 120 minutes to set up for use, and the time it takes to produce one product is five minutes. That means you have invested 5 minutes plus two hours of set up divided by 100. That means it takes 6,2 minutes to produce one product. If you multiply this by the cost of labour per hour, you get the cost per product. If we decide to only deliver 50 products instead of 100, that means that the set-up time for our tool is spread over 50 parts instead. This means we got 2,4 minutes of set-up time instead of 1,2 as before. If all else is the same this will look like that our costs now has increased to 7,4 times the cost per labour per product (5+2,4 = 7,4) instead of 5,4 times the cost of labour. This is true, but if you look at it this way, and most accountants do as they are schooled to do that - i.e. with more set-ups, the cost per products goes up – you will make bad decisions. Why? Because its not the truth because these calculations assume that all of the co-workers that are involved in the work are always going to be fully occupied. This is certainly not the case.

Therefore the costs have actually decreased. The big questions is why it is that way. We have the same amount of people as before, we have not added any costs by doing more set-ups. Nothing has changed in this manner. The only thing that is different is that we can deliver more products faster to the user when we spread it out on smaller units instead of more. What happens then? That means that throughput to our user goes up as we have reduced the waiting time or inventory that we need to deliver our products or services to the user. When we are able to make, deliver and sell more products or services to users, throughput goes up and expenses goes down as the expenses or costs depends on these two measures.

As you probably realize, many things in both life and business are systems just like an orchestra. There is a high degree of dependence between the parts in this system, i.e. between the musicians in the well trimmed Orchestra. Other systems have much lower degree of dependence between their parts to perform well. One such example is a bowling team. In a bowling team each player plays on his or her own and the final result for the whole team is not dependent on how well they play *together.* The final score in this system depends only on how well each player executes his or her process for playing. If you got many great players in your team, the whole team will score high and vice versa. The parts in this system (bowling) have a much lower degree of dependence between its players compared to the players in a well-trimmed Orchestra.

In business this degree of dependence is even higher compared to an orchestra so it is even more important to manage and lead firms like systems, and have facts about how its processes performs. Too many firms are managed and lead like bowling teams, and not as well trimmed orchestras. These facts are vital in order to change and improve your system and its processes so that they are more in line with your firms purpose and goals.

"All organizations are perfectly designed to get the results they are now getting" Tom Northup".

This quote has a much deeper meaning which has many relationships to management. Management is a lot about predicting. As a manager you need to predict output – quality of your products and services, time of delivery tec. - and the resources or input you need to create that output in form of products or services for your users.

The better you are at these skills, the better results, lower costs and higher joy of work you will create. If you use to much or too little resources you will sooner or later get into trouble. How accurate this prediction of results, costs and joy of work will be depends on your managers competence about how their processes performs when it comes to:

1. The average performance of the process and
2. How much the process varies around this average, i.e. its statistical variation,

The above things are highly related (both mathematically and practically) to how accurate your managers predictions will be when it comes to quality, costs and joy of work. I will show you a simple example of this in more practical terms later in this article.

The first obstacle to study how the work works for real is mindset. If you want to raise results, lower costs and boost joy of work you need to look at how the whole system and its processes performs jointly. You can´t look at it analytically only as most firms do, i.e. the parts or links. That comes later. You first need to look at how the whole performs – the whole chain of work. You need to know why your system and its processes perform the way it does, what it performs today, how it varies and how it is managed and led. To repeat: you cannot improve anything you don´t understand. If you don´t understand the history of your system and its processes you are bound to repeat its results over and over again. You can´t manage and lead it optimally either. You can only change it. But if you want to change for improvement you need to adopt an another strategy. You need to study what outcomes your strategy generates, and more importantly what the driving forces are to these outcomes.

" However beautiful the strategy, you should occasionally look at the results" Churchill

Top-management is responsible for how its managers at all levels should think when it comes to how to design the firms systems and processes according to its users/customers. Their reason to be. The crucial thing that determines how you decide to design your system and its processes is mindset. Mindset about what makes work flow well for your users in practice.

Mindset shapes what systems and processes you will design and how well you design them to meet users and customers needs. That means that mindset comes first. Yes first, before systems and processes. Before you even think about changing functions, capabilities, roles, structure and personnel at different levels in your firm. Mindset is about how you look at how the real work works for real as we will come too see later. The science of statistics applied to the work flow will create the right mindset for how to manage and lead for much better outcomes.

The next article builds on the previous articles. The fourth article describes what is similar when it comes to how you manage and lead an orchestra and a firm. It also shows what you need to do before you apply the science of statistics to improve performance and results. If you are curious to know more about this, then read on.

Article IV: What do you need to do before you apply the science of statistics?

Let´s go back to what an organization is again. We now know what it is not, i.e. that production or work flow does not happens in hierarchies except in too many heads.

A short re-cap: all organizations use inputs such as competencies, know-how etc. which it transforms in its system and process to output in form of products or services for its stakeholders, see figure below. Your firms system and its processes determines how well this transformation is done. They are the true building blocks of world-class outcomes. They are the causes. Profits, revenue, costs and the like that too many managers focus on are the symptoms. If you want to improve results, decrease costs and boost joy of work you need to focus to improve the causes – not the symptoms.

"Changing the system and processes will change what people do. Changing what people do will not change the system and processes"

The science of statistics is the means to do that. It contains the know-how for true improvement. The science of statistics are the means to improve, manage and lead these causes so that the results improve, costs decrease and joy of work boosts. Yes, at the same time too – if you learn how to do it. Yes, this is highly applicable to the service sector too, and not only production. Yes, you can measure intangible concepts in business such as service quality, customer service etc. with statistical methods and with high accuracy too. If you don´t believe this, I refer to Douglas W Hubbard excellent work about Applied Information Economics and his book How to Measure Anything: Finding the Value of "Intangibles" in Business. Another mandatory reading for people who are interested in true improvement, and why to measure, what to measure and how to measure the right things with high quality (often intangibles).

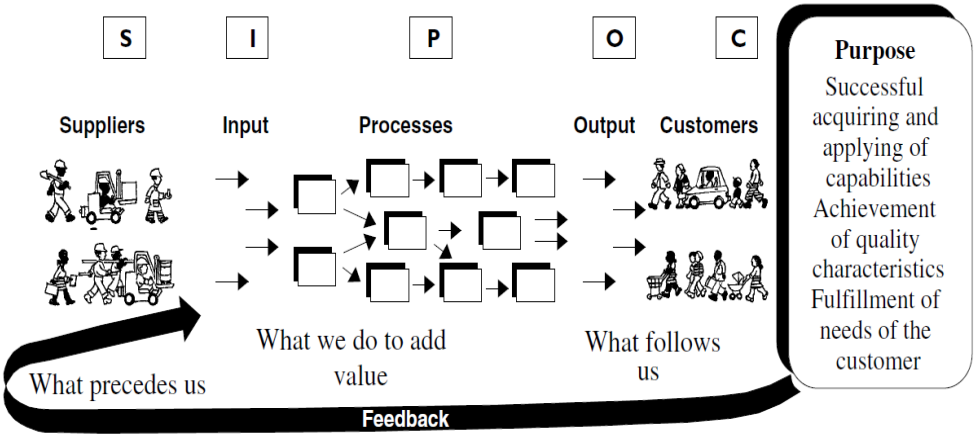

Figure 3-1. The SIPOC model.

In order to show you this let´s look at the above again, but in a slightly different view, a PERT-diagram (Process Evaluation Review Technique) instead as the one below.

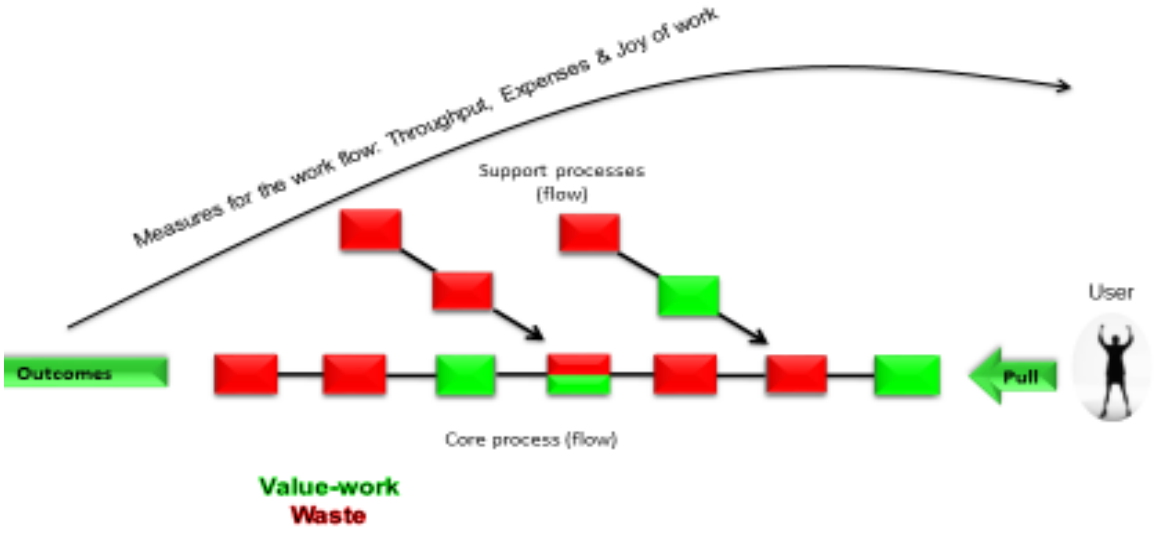

Figure 9. A PERT-diagram (Process Evaluation Review Technique) show the steps involved in a process.

The PERT-diagram shows the steps involved in transforming input to output such as e.g. products and services for a end-user. Some steps in the figure above can be done at the same time, while other steps depend on others and need to be done in a certain order/sequence.

Your firm has a user. This user places (pull) an order for some service or product that your firm offers to the market. This user starts the work of this system with its processes. The different boxes in the figure above are links or parts in the whole process above. All the people who are involved in this work for your user works in different places in your firm. They work in the processes that they have created. They are illustrated by the different boxes in the above figure. Some people are directly involved in your core process such as e.g. producing some statistics to a user, and others work in support processes such as HR, IT etc., i.e. support processes that are needed for the final outcome, i.e. delivery of products/services to your user.

In order for the user to get what he wants, your firm needs to convert inputs from these different boxes such as competence, information etc. to outputs in form of products and services that satisfy your users needs as described earlier in this article.

The processes that are used in the different boxes in the figure above are the means to achieve this conversion. Moreover, these different boxes or processes need to be aligned to each other as a system if you want to achieve this end with great outcomes, lower costs and higher joy of work. This is crucial. This system and its processes ends when the user gets what she/he wants according to his or her needs, i.e. with the right quality and in the right time for his/her needs etc.

“Where facts are few, experts are many”

What does managers need to know before they decide how to design system and its processes?

They need to know how these processes performs as a system (as a whole) before they decide anything at all. They need to have facts, not opinions. If you want to change and improve instead of only change, the first step should always be a careful and thoughtful analysis of what and how your current system and process

performs. Next steps is to study which links or boxes in the process that creates value for the user, and which ones that generates waste.

To this end, it is helpful to start to visualize your process by flowcharts and cause- and-effect diagrams. It is important that the right flowcharts, diagrams and approaches are used. Many use the wrong flowchart and in the wrong way. The simple flowcharts that too many firms use are not enough to improve the real work flow such as e.g. how to produce statistics as illustrated below:

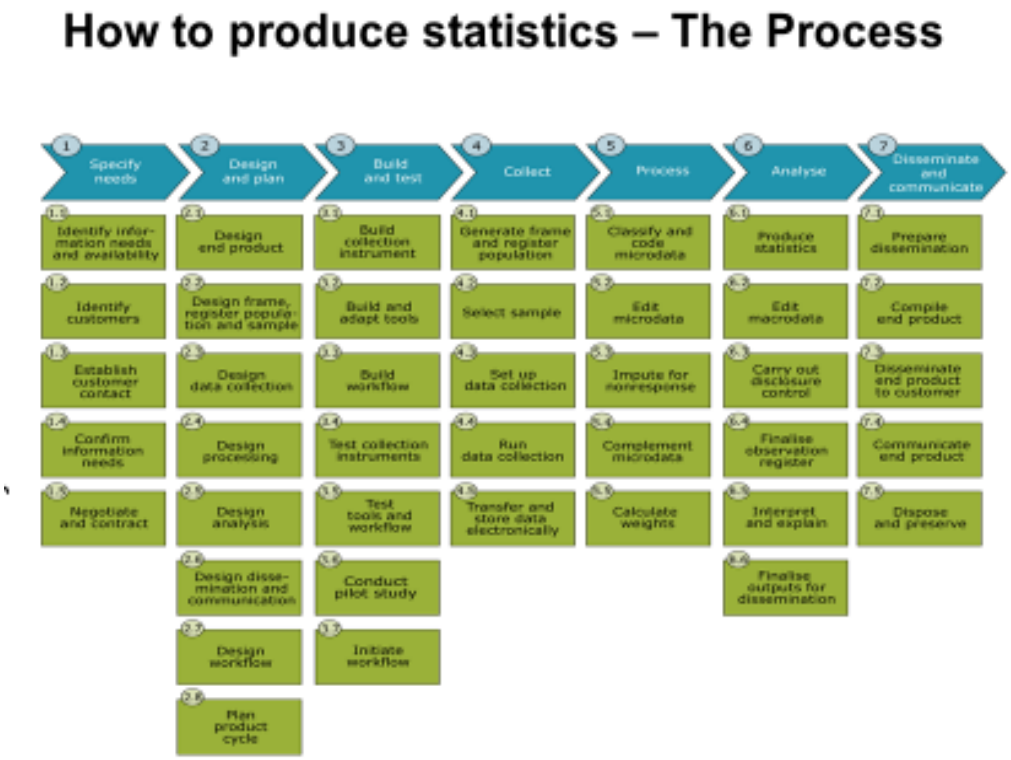

Figure 10. The process of producing statistics.

The above flowchart is called a simple flowchart. It is good as a start. However, this flowchart misses how the work gets done for your user. If you want to improve you need to use a flowchart that is closer to the truth, i.e. that represents how the work is done. You need to visualize how the real work flows. The above simple flowchart does not represent the true work flow as we will soon see.

As it is common that several different departments or units are involved in the firms work for its users, a deployment flowchart and cause-and-effect diagram should be a first step to visualize the work flow, i.e. as it really flows for real. This should be done by the co-workers who do the work, and not by outsiders. These steps alone are profound by themselves only, i.e. to clarify relationships in your system and process and where the greatest pay-off for improvements are in the process.

Great tools for doing these steps are the Deployment Flowchart and cause-and-effect diagrams. A *deployment flowchart* shows time in the vertical sequence of the steps. But the deployment flowchart also shows the interactions between different individuals or groups that are involved in the work flow for a specific user. Each active department, unit or person in the process is listed at the top of an individual column and the action, while flowing downward on the page corresponding to time, moves laterally under the column corresponding to the group or individual involved in that step, but also the relations to other steps.

A highly simplified example of a deployment chart is presented below

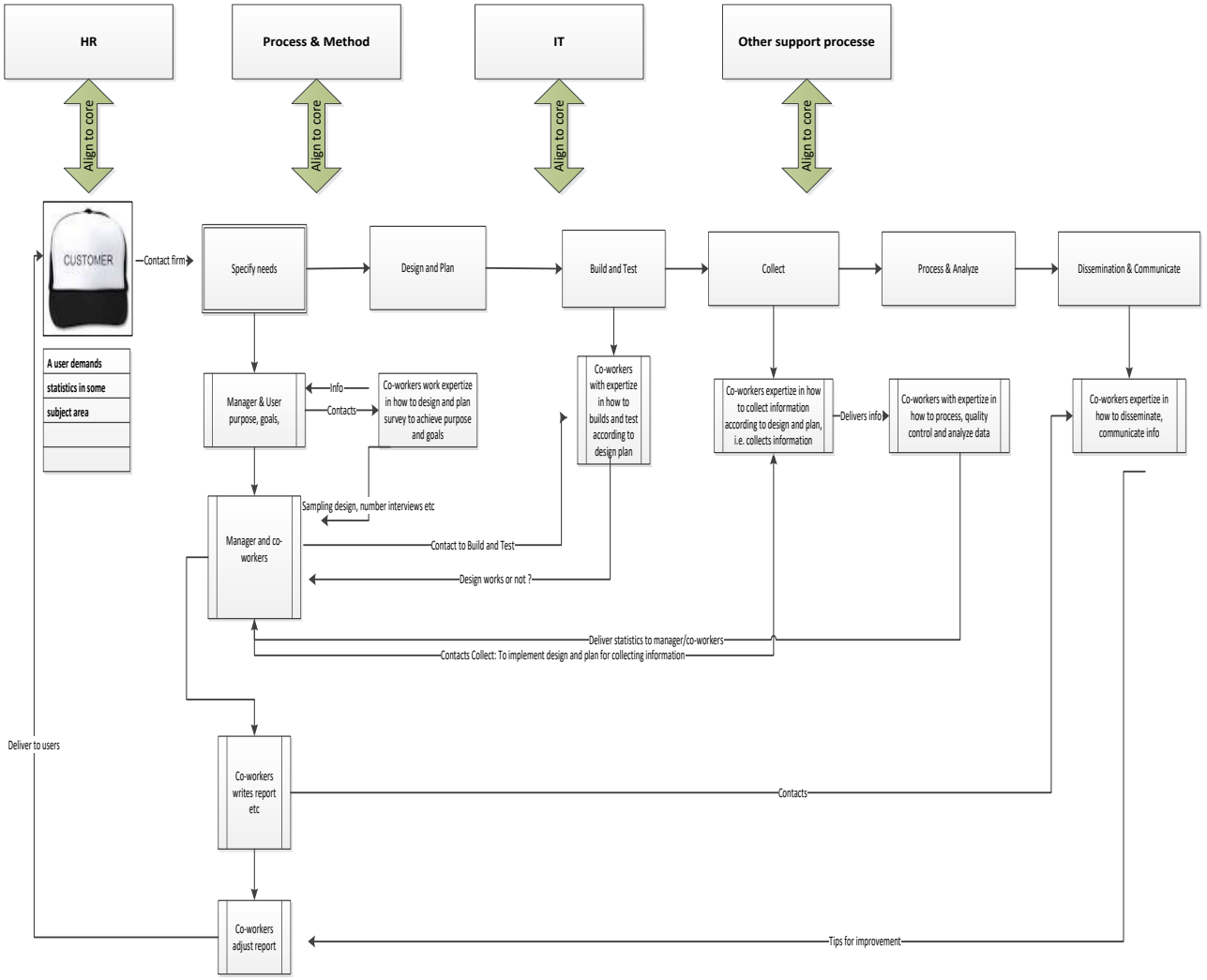

Figure 11. A deployment flowchart which shows the interactions between different individuals or groups that are involved in the work flow for a specific user.

To the left we have the customer or user who starts the core process, which here is statistics. The above core process contains six (6) steps which are illustrated in the six boxes to the right of the user at the top in the above deployment flowchart. These six steps are: identify needs, design and plan, build and test, collect, process and analyze and disseminate and communicate, which are different links in this process. They are all needed in order to deliver statistics to this user. Under each such box the actions are displayed, i.e. the things people that are working in these boxes are doing, and the links to the other boxes in the process. Above the core process is four boxes. These four boxes are the support processes to the core process, such as e.g. HR, IT etc. It is important that these support processes are aligned well to the core process, i.e. that they have a clear purpose, goals and approaches that support the work in the firms core process. A lot of benefits will be reaped by these steps only as described below.

- What will be accomplish with this simplified deployment chart? The deployment chart will clarify the work flow for an end-user where several different departments and co-workers are involved in the work for the user.
- Why is this important? It is important to know and clarify how the current work truly flows - as it is done under its current process design - between all involved stakeholders. It is important to know this first before you collect facts about how the whole process performs today
- What can this be used for? We should later use the science of statistics to study how the work works with facts when it comes to the three vital measures for success, i.e. throughput, waiting

time/inventory and expenses. That means that you will be able to see what results the current process achieves and how much resources it needs to accomplish that end, and to what joy of work. In addition, managers will have facts if the process shows normal or exceptional variation so that they will avoid tampering and can decide for true improvements.

- Who / Whom should do this? It is important that all the managers and all the co-workers that are involved in the work for the user are doing this together (with support from expert in these approaches and quality management)
- How should this be studied? By what approaches? The science of statistics should be used to collect data about how the whole current process performs, i.e. under its current design. The scientific approaches that should be used are the Process Behaviour Chart and the XmR-chart. You will get a practical example of this later in this article too.
- What will be the outcomes? Managers get facts about what and how the process performs under its current design, where and how to improve throughput, inventory and expenses. They will also know if the process should be improved or not. If data shows that it should be improved you will know what to improve, where, how and be able to measure its effects with high accuracy. Moreover, managers will be able to use data about the process to predict results for users, resources needed and also joy of work with much better accuracy.

We also get much information only by creating this deployment chart by itself. If you look again at the above simplified chart: what do you think can go wrong ? What are the major risks? Which are the major opportunities for improve the process?

- One very common risk is that the involved stakeholders in the different boxes above don´t know what is critical for quality for the end-user.
- Another risk, is that all the involved co-workers in the process don´t know what is critical for quality both for the end-user and for each part involved in the work flow. The more unclear these issues are among all involved stakeholders, the more delays, errors, waiting time (inventory), queue, low throughput etc. you will have in the process.
- Other risks are that goals, roles, relations, systems and processes only are designed from each parts view, i.e. not designed with the end user in mind. This leads to even more errors, delays, waiting time, queue etc., i.e. low throughput, high waiting time/"inventory" and high expenses.
- A major risk is that the work varies a lot too between these involved stakeholders which also creates lower joy of work, waiting time/inventory, risks for overtime and that extra resources need to be put in suddenly etc.
- There are many major opportunities to improve this process if action are taken to reduce these risks only.

A cause-and-effect diagram could be used among the involved co-workers to summarize the major causes to the problems in a system and its process. In real life there are often a large number of factors or causes to a problem. An effective way to organize these in order to reduce the effect of the problem is to use a cause-and-effect diagram (Dr Kaoru Ishikawa). The involved co-workers first choose the problem or effect they want to study such as e.g. problems with low throughput to user. Then they brainstorm the causes that influence the effect under consideration such as all factors that influence low throughput. These causes are then arranged and stratified so that only the major causes are shown in the cause-and-effect diagram, and the various sub-causes are listed next to each.

A simple example of such a cause-and-effect diagram based on the simplified example above are shown below. The effect that is studied here is low throughput and is on the right in diagram below. A major cause that effects the whole process is lack of clarity what the user needs in concrete terms as shown in the first branch below. The sub-branches to this branch illustrates the major sub-causes to these as show below.

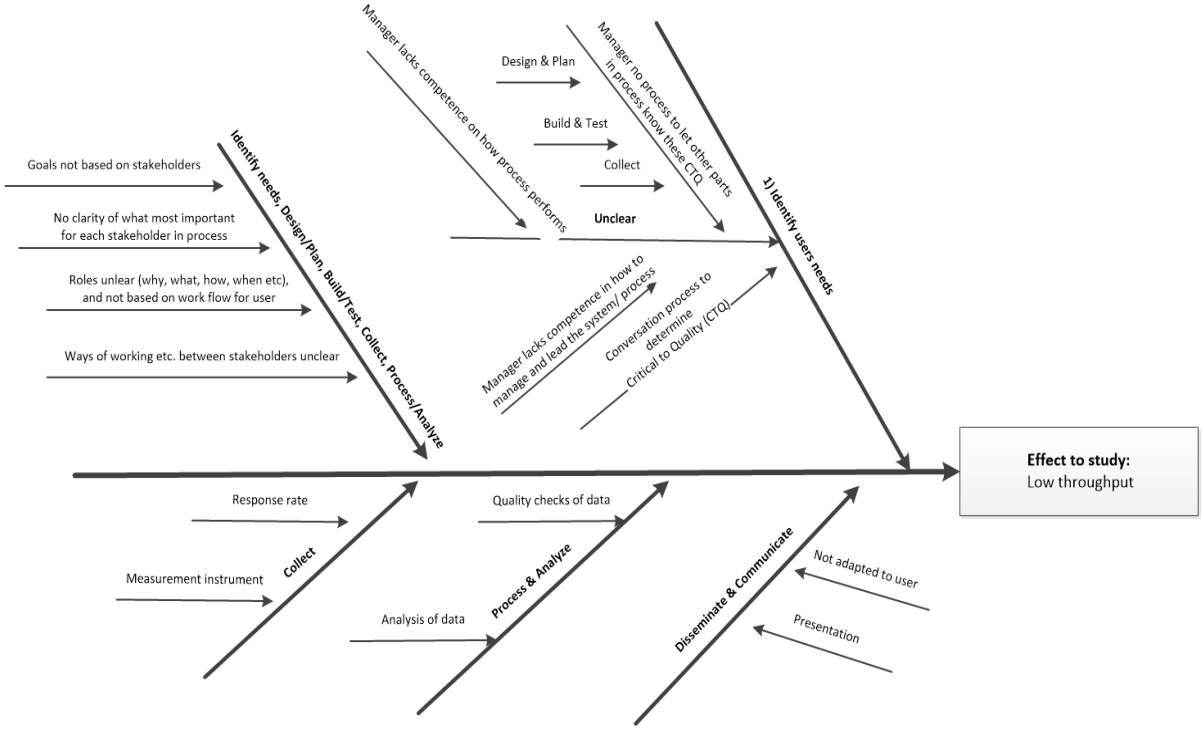

Figure 12. A cause-and-effect diagram to summarize the major causes to the problems in a system and its process that are under study.

The next step is to collect data about how the whole process performs with approaches from the science of statistics, and then to visualize, interpret and analyze the data about the process the right way. That means that you use data to study how the whole chain of work performs for your user as below. A simple practical example is given under the heading “a simple example” below.

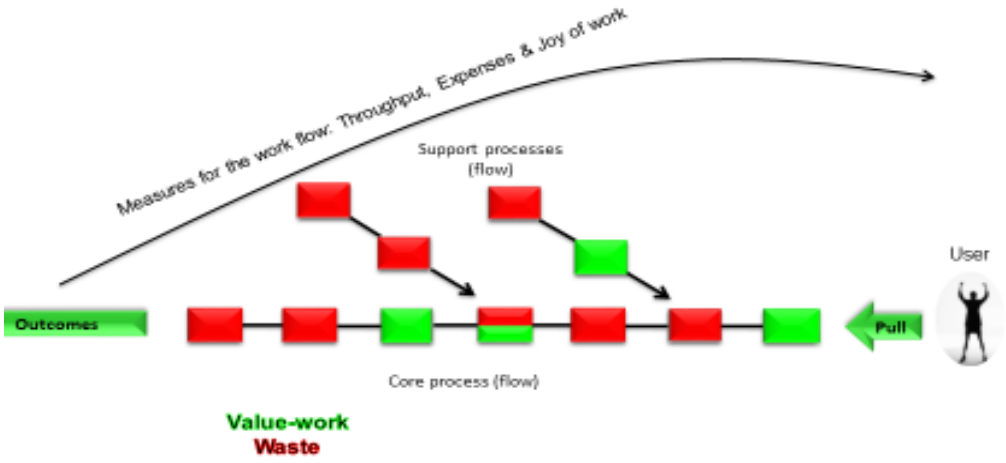

Figure 13. A PERT-diagram of the process in order to measure its performance with the science of statistics.

If we want to use the science of statistics to improve how we manage and lead, we need to clarify the “why, what, how etc.” about the measurement first. We can do this by using a couple of questions from another evidence-based approach which use statistics - Applied Information Economics - such as e.g.

- What problems do we want to solve? We want to study how this system and process really performs during its current design when it comes to the three measures: throughput, waiting time/"inventory" and expenses"
- What do we want to achieve or accomplish? We want to see what and how this process can be improved so it delivers better outcomes along these measures. It is important that the manager install the right positive mindset among all involved people, i.e. that this is done to improve how the process work, not to blame the individual co-workers that are working in the process.
- What decision is this measurement supposed to support? This measurement should support if the process should be improved, where, and how it could be improved along these three measures, i.e. throughput, inventory/waiting time and expenses.
- Why do we care? First, it is important to study this process with fact-based approaches to avoid tampering. Second, we want to see if throughput for the user could be improved in a more effective way, where, how and to make it more fun for the co-workers to create results. Third, the manager of this process want to be able to predict throughput and resources needed in order to transform all the input to output in form of products and services for the user in a much better way. Fourth, we want to have facts where to improve (which link in the whole chain of work) and how to organize the process (its design), and we want to measure how much we have improved due to our changes in the design.
- What is the definition of the thing being measured in terms of observable consequences? The process is measured by how it performs along throughput, inventory and to what expenses.
- How, exactly, does this thing matter to the decision being asked? See answers above.
- How much do we already know about the process now? What is our current level of uncertainty? Before our deployment chart we knew very little about the work flow in concrete terms. The deployment chart in itself has improved our knowledge about all players that are involved in the whole work flow (the process), the risks and the opportunities to improve the process. However, we need to study this for real too, i.e. how the work works in order to see how this process performs in practice in order to lower our uncertainty. What will be accomplish by this? All business decisions is done under uncertainty. If you reduce uncertainty you improve decisions. If you improve your decisions you will improve your outcomes.
- What is the value of information ? The value of information is high as we will get facts about what to improve, why, where, how and we will also be able to measure its effects in concrete ways.

Lastly, you take action to change and improve the vital things that matters for results, costs and joy of work. To get these facts a firm's managers need to study how the work works for real for its stakeholders. The only way to do this in a fact-based way is to apply the science of statistics on the whole work flow for the user. The science of statistics will give managers facts about how this - the whole work flow (the whole chain) - performs, and what links or parts in the whole work flow that should or should not be improved, how and in which order. If you as a manager don´t have these facts you are gambling too high. Risk increases for tampering when you don´t know what you are doing. Tampering is when you change a process with the goal to improve it, but the opposite happens. One very common example of tampering is costly re-organizations. In other words, the risks increase so much that your process drifts, as Deming, Wheeler and other similar work shows, towards lower and lower performance, see figure transformational learning curve below.

Managers need to know why to measure, what to measure and how to measure their system and its processes. Finally, they need to make change initiatives based on facts instead of opinions. Then they will know what to re-design and how, and finally they need to develop the abilities in how to manage and lead the re-designed systems and process like conductors of well trimmed orchestras. Samples of some of these other abilities related to great management are mentioned in this link https://bit.ly/2QfgXWJ.

The fifth and last article gives simple examples when it comes to how the science of statistics should, and should not be applied. The purpose and goal of the last article is to highlight the following questions related to the previous articles:

- What happens when the science of statistics is not used or used wrongly? What are the consequences for managers and co-workers? What are the effect on results, costs and joy of work?
- How can firms apply the science of statistics the right way, i.e. for true improvement? What does this mean for managers when it comes to how to predict outcomes, costs and joy of work? What does it mean for results and expenses? What does it mean for peace of mind?
- What are the crucial competencies that managers need to learn related to the science of statistics, and in order to manage and lead to improve results, reduce costs and boost joy of work? What other competencies and traits are needed to manage and lead systems and processes well?
- What, and how do you combine and apply these approaches so you achieve great outcomes?

Moreover, the last article shows that it is possible to go from what, how and to achieve great results too, i.e. if - and only if- firms learn how to combine and use these fact-based approaches well. Besides giving you the facts that it has been done with great results by others, I have own experiences that they create great outcomes too. Some sample of outcomes from clients are given too.

Article V: How can the science of statistics be used to do all this?

If you want to manage and lead this well you as a manager should be very curious to know how well this process performs together as a system under its current design.

You cannot get these facts by studying single parts, links or by interviewing single parts. You want to have facts to see how the whole chain of work works for real (jointly) for your users in order to change and improve it. If the results are lousy, at least you and your co-workers know, and you should be very happy only to know this, as it is a first step to change and improve it. Again, that mindset is very important for a manager to install in all people involved in these studies, i.e. to avoid the blame game, i.e. not to blame individual workers. The true mindset is true improvement of processes. Not to blame people who only want to do their best.

Is our system and process predictable or not?
You as a manager first want to know if your process converts inputs to outputs when it comes to products and/or services for your user in a predictable or non-predictable way, i.e. if your process shows normal or exceptional variation. Why is this important? If you don´t know how your process varies, the risks skyrockets for tampering.

The science of statistics is the way to get these facts too, i.e. to measure how the work is done in practice to create throughput and how your process oscillates when doing so. If it shows normal variation you will have a fact-based understanding how your process works today, i.e. under the design of its current system and processes. If you try to change a process that shows normal variation you will tamper, i.e. your process will drift towards lower performance. If, on the other hand, your process shows exceptional variation, you have facts that you need to improve your process. Moreover, you will have facts about which links or parts in the whole chain of work you need to improve. You will improve your process performance if you do, i.e. you will not tamper.

Your managers have designed their processes (either consciously or unconsciously which is much more likely) at all levels, i.e. goals, roles, how the roles align to each other etc. That means you will get a fact-based understanding of how your system and its process currently performs.

The manager who has a practical understanding of variation will perform much better and will perform with more peace of mind too. More importantly, your managers will also be able to predict quality, costs and joy of work with high accuracy.

If, on the other hand, your process show exceptional variation you will know where – which links or parts in the chain of work - to make improvements in your system and its process and how. In addition, you will be able to measure how much improvements you have made too. You will be able to show your superiors real numbers - before and after. You will be able to give definite answers to questions such as how do we know that we have succeeded? How much have we improved? Yes, you will be able to give them the numbers too.

We will first illustrate the above thinking with how numbers are used wrongly in too many firms. We will start with a simple example that highlights what has been said above too, and its strong relationship to management.

A simple example
Imagine that you are a manager of 22 co-workers that are creating throughput in some process, and that you have figures about their performance. It is time for the yearly review. You look at your figures, and you see the following data about your co-workers performance, i.e. in this simplified case you see clearly their errors in creating throughput.

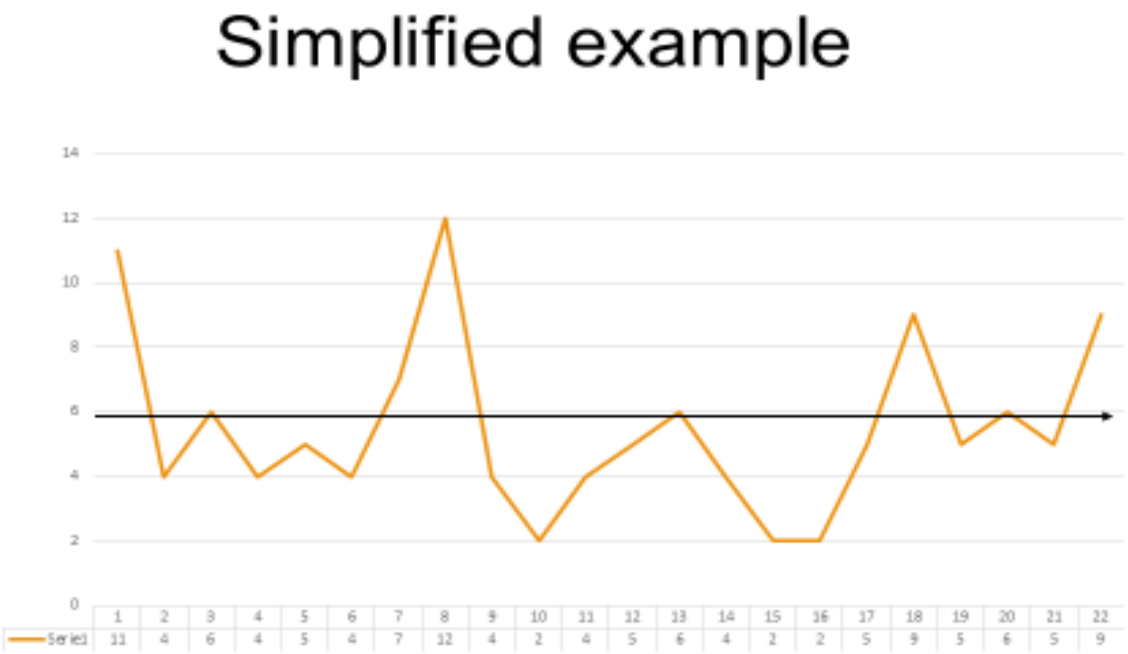

Figure 14. The figure shows errors in throughput per employee for delivering products/services (22 employees, person 1 to person 22) during one year, the average (approximately 6 units). All of these 22 employees work with the same tasks / product, in the same system, in the same process, handle the same work volume as well as working about the same rate

Before you read further, please stop, pause and reflect on the below:

- If you are the manager of these workers, what will you do?
- What actions will you take based on these figures?

In practice common reactions among managers (and even among many statisticians) are presented below:

- ”Co-worker 1, 8 and 18 has done a lot of errors in the work. I need to talk to these co-workers immediately!”
- ”Co-worker 10, 15 and 16 are doing great work and low error rate. I will reward these with a Ferrari and suggest that these co-workers work alongside with co-workers 1, 8 and 18 so they finally learn how to work”
- ”I will ask co-worker 10, 15 and 16 if they can help co-workers 1, 8 and 18”
- ”I will offer more training to co-workers 1, 8 and 18 so they can manage their job better”
- ” I will fire all co-workers 1, 8 and 18 directly! ”

“Where facts are few, experts are many” Unknown

All the above comments are unfortunately very common reactions in too many firms. However, they are also very wrong. It´s an example of faulty use of numbers. It is also behind such expressions such as “lies, damned lies and statistics” as these kind of analysis is not fact-based at all. Furthermore, the above is not analysis of the data – it is only description if we are kind. There is a reason that the science of statistics is called a science.

More importantly, this type of using data gives the wrong co-ordinates to top-management in how to manage and lead it´s firm. It will result in tampering, i.e. wrong decisions will be made that leads to actions that will

lower results, increase costs and decrease joy of work. We will now use the science of statistics on this same data so you will see why this is true.

"How can you say that the sky is the limit, when there are footprints on the moon" Paul Brandt

Let´s now take a look at the true meaning of these data with the science of statistics, and to see what is possible to achieve with the help of the science of statistics.

How can know-how in statistics improve how you manage and lead?

Let´s pause a moment and look at the true meaning of the above figures. That means to look at how the whole system and its processes perform – not the individual parts as is the common way. Let´s look at this work again, but this time we will look at it the right way, i.e. we will use the science of statistics. We will look at it more like a conductor who wants to have correct facts about how the true work flow performs for the user, and we want to use this insight to manage and lead the system with its processes like a conductor of a well-trimmed orchestra. How do you sense the true meaning of your data so that your decisions make sense? First, you need to apply the right statistical approaches, and analysis. Second, you need to interpret what the data really says to you. Nothing has changed except this in this example, i.e. you have the same data and conditions – ceteris paribus. The only difference here is that now you use fact-based approaches from the science of statistics, i.e. you will apply the right statistical tools, analysis and interpretation. Third, this means that your conclusions and decisions will be much better. Better decisions translates to better results, lower costs and higher joy of work.

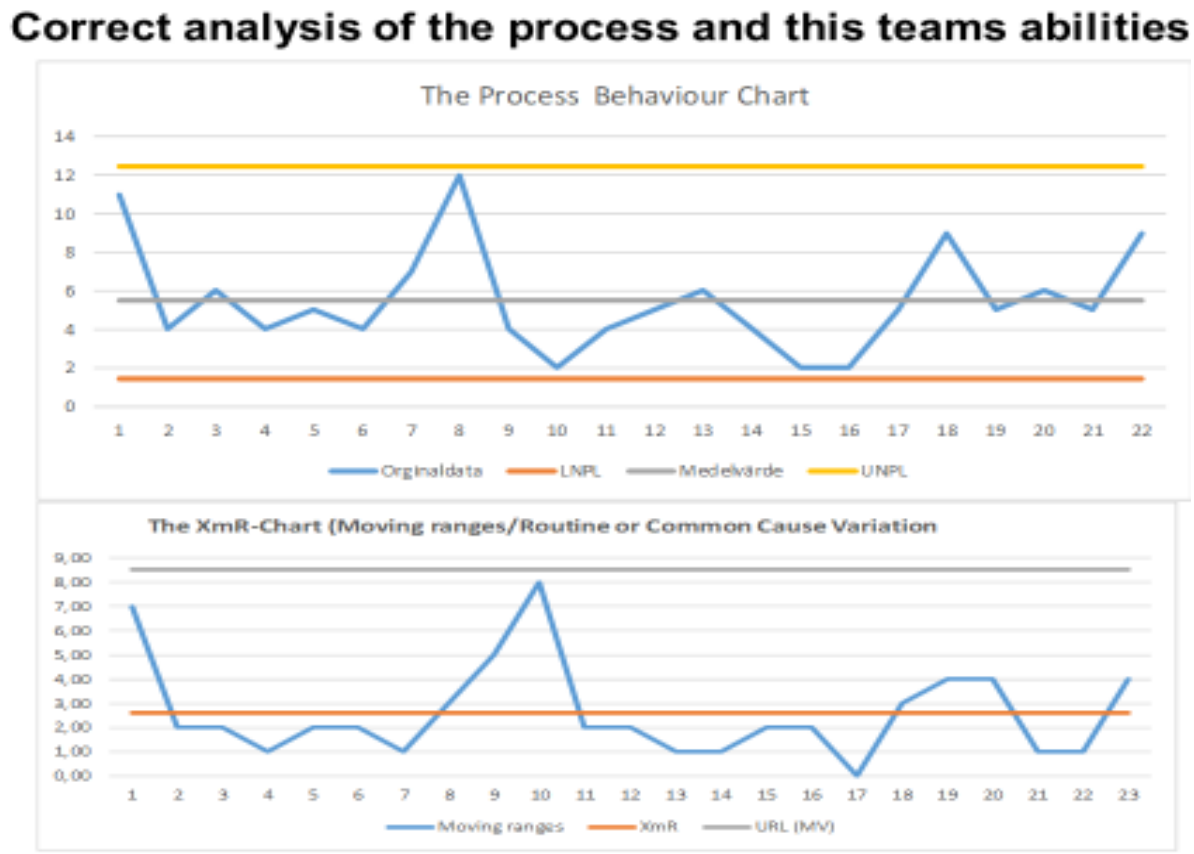

Figure 15. The Process Behavior Chart and The XmR-Chart show the true meaning about how the work performs as a system with its current process.

The Process Behavior Chart is based on the right way how to use, analyze and interpret numbers. It is mathematically proven approach too. In the figure above the data is based on these approaches. The upper and lower lines in the chart above are calculated based on how the current process performs jointly. These

lines help managers to separate real trends from false signals, so they can concentrate to improve things that truly matter and let go of things that don´t matter. This manager will avoid tampering.

This manager knows that he/she has to manage and lead the system and its process, i.e. how the whole chain performs jointly. The chart above shows that this teams performance is highly predictable and normal. It shows that there is nothing unusual going on at all here in this process. The average error in throughput of this team of 22 co-workers is around six (6). It also shows that this teams average performance varies from around 2 errors up to around 12 errors. The upper and lower limit on this chart are calculated to consider the natural variation that is inherent in this team´s current capability or joint abilities with its current goals, roles, processes etc. Again, these results are totally normal for this teams under its present conditions, system and process. These outcomes are what you as a manager should expect from the system and the process your co-workers work in as they are designed now. You will also have much more facts from these measures that you can use to manage and lead much better. If on the other hand the data points should have fallen outside these upper and lower limits as shown in the diagram above, then the process shows exceptional variation. If that is the case this signals major improvement areas in the process under its current design. That means that, the reasons (95% chance that the reasons are deficiencies in process, and not the people who work in it) behind these should be study carefully before blaming individual co-workers.

Management is a lot about prediction as we stated earlier. For the process above, you as a manager can now with high accuracy expect that this team will perform around 2 to 12 errors with around 6 errors for an average under its present system and process. This is your teams current and joint capabilities under the present condition of your system and its process. If you want to change this you need to make major improvements in your system and its process. You will totally waste your time to look for bad performance from any of your individual co-workers as in the first example above. Actually, if you do this you will tamper. You will change things, but not improve. Actually risks are very high that you will change and decrease your process performance (tampering).

The second chart (the XmR-Chart) above supports these conclusions strongly. The purpose of the XmR-chart is to study if the process is normal or not, i.e. to characterize if the process shows normal variation or exceptional variation. In this chart too there are no evidence at all of anything unusual going on when it comes to how this team perform jointly for the user. This teams joint abilities varies, like all things in both business and life. For example, the next year your data will show that different co-workers are creating great throughput and vice versa on pure chance. If a manager decides to take action on these figures without the right analysis as in the first example, he or she will tamper. That means that he or she will worsen results, increase costs and lower joy of work. This manager will then create man made chaos in the long term.

What is going on here?

The wizard behind the oz here, or what is hidden in the first example is statistical variation. Namely, variation in individual co-workers and between individual workers work when it comes to the work-flow for the user and its strong relationship to results, costs and joy of work.

Experiences and countless of studies clearly show that managers don´t know about statistical variation and how strongly it is related to management. That means that too many managers manage and lead as if there was no variation in the work. It is a blindspot, which leads to problems such as poor results, increased costs, stress, burnout, low joy of work etc. If your managers are not aware of variation in the work flow it will lead to false signals and wrong decisions. Common examples are that they create wrong type of goals for their co-workers, i.e. goals that are not based on the true capability of the work flow that are working in the process. Samples of such wrong goals etc. are activity goals, quotas etc. They will also react to symptoms instead of the causes such as e.g. people's failure to meet the goals, quotas etc. – not system and its processes, which is the cause. Other common example is re-organizations without knowing the true problems or causes.

To take action without knowing these issues, causes or true problems lead to lower and lower performance over time. Deming calls it the transformational learning curve which is illustrated in the figure below. In order to learn, you need to know what and how your system and process performs under its current design,

i.e. why it performs the way it does, what it performs and how well it performs, and where it could be improved.

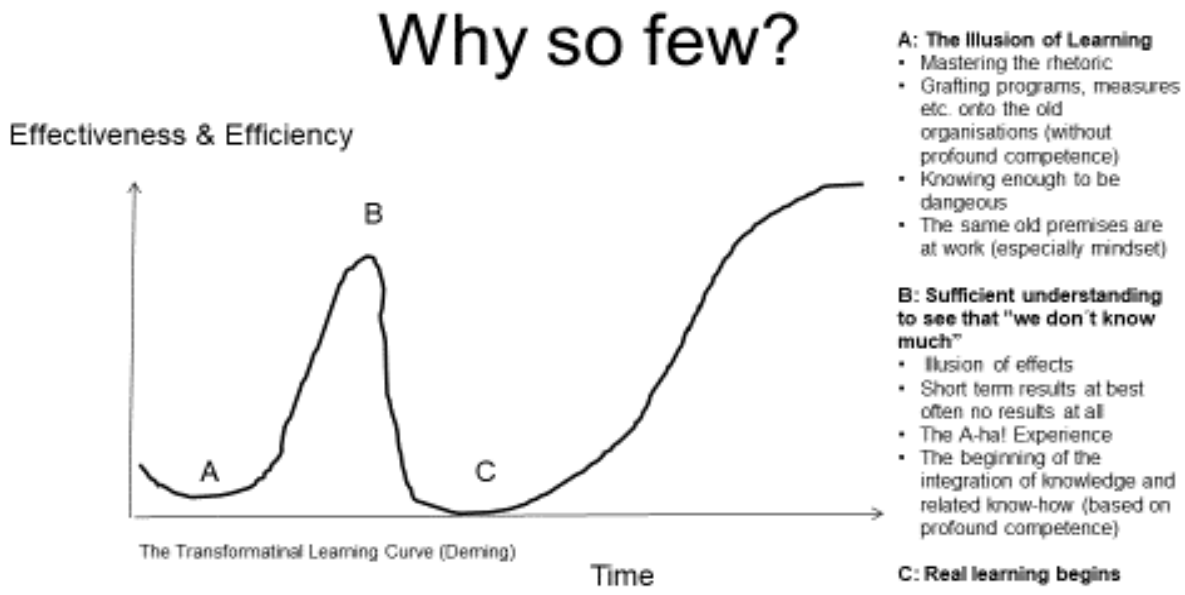

Figure 16. Deming´s Transformational Learning Curve which shows the relationship between type of interventions, effectiveness and time.

In other words, this "statistical illiteracy" among managers related to management and business performance means that your managers will see trends were there are none, or that they don´t see trends where there are in fact real trends they really need to act upon. Just as highlighted in the previous examples.

Moreover, measures will be taken based on the symptoms and not the causes. If you take action on the symptoms you only change things. You want both to happen, i.e. to change and improve. If you want to improve results for your managers, co-workers, groups, teams and business you need to fix the causes not the symptoms. Change and improvement are different, but are way too often mixed up as the same in too many heads. Lastly, your managers will reward your co-workers based on random issues, reprimand or fire the wrong people.

In sum, you will have false signals about what is happening. The first example above is such false signals. In fact, they are totally misleading with bad side effects. False signals leads to faulty decisions. Faulty decisions lead to poor results, high costs and low joy of work. It is a high risk for man-made chaos as Deming and others call it. If you want the facts behind this, the odds are 95 to 5 against that or in other words 18/19 risk that you are wrong and 1/19 chance that you are right. That is a gamble with a very negative expected value. Business is to make decisions under uncertainty. To make better decisions you should aim to reduce the uncertainty in your decisions. If you don´t do this your are gambling. Uncertainty could be mathematically expressed as the expected value for different decisions. The expected value is equal to the probability of a good event happening times its consequences plus the probability of a negative event happening times its consequence. If the expected value is over zero it is a good decision and vice versa. When you measure your process with the science of statistics you reduce uncertainty and as a consequence you will make much better decisions and improve outcomes.

How is variation in the work flow related to management, results, costs and joy of work?

As a manager you need to predict how well your process converts inputs to outputs for your users. You need to predict results for your user and the right amount of resources you need to create these results. Also how much your co-workers enjoy doing this. All these things depend on the amount of variation in the work flow.

The simple example by the two orchestra described earlier, show you how variation affects all three vital measures, i.e. throughput, inventory/waiting time and expenses. It also illustrates how it relates to results and costs. However, it also affects joy of work vastly. Besides the evidence-based approach Group Development Questionnarie and Gallup´s extensive research mentioned previously, other research strongly support that as people get clarity of what is expected of them at work, when they have the right processes that support their daily work etc. it has a strong correlation to several measures such as satisfaction, customer service, productivity, and turnover.

In the future it will be even more important to attract, inspire, retain and grow people in order to create value for users. This is another reason to use the science of statistics as when people feel well they perform well as stated in several studies over the past 50 years such as e.g. Integrated Mental Training (Unestål et al).

When your managers have these facts, they will be able to do the same predictions in their business as the conductor could do for his orchestra. Besides the competencies and traits mentioned in https://bit.ly/2QfgXWJ, the following competencies are crucial related to this better way to manage and lead.

- The ability to think in terms of systems and know- how to manage and lead systems and its processes.
- The ability to understand the variability of work in planning and problem solving, and how this is related to how to manage and lead for better results, lower costs and higher joy of work.
- Understanding the interdependence and interaction between systems and its processes
- Variation, and know- how when it comes to how the parts affects the others.

The above competencies are some of the abilities that Deming called “Profound Knowledge”, which is highly related to the science of statistics. When these competencies are combined with the others described in the article above your firm will create better results, lower costs and more joy of work for the people who are doing the work for your users.

But do firms actually do all this work? No, most firms don´t. Yes, the great firms do it, i.e. the ones that have accomplished great track-records of outcomes over a long time period have done it, and still do it. If you want to dig deeper why these approaches work I refer to the books mentioned above as a start.

I know that these approaches work from my own experiences too. For example, this year I am helping more top-management teams with my tailor-made support, i.e. to go from words, actions and to achieve great results in these issues too. Some samples are given below from my clients testimonials, i.e. in their own words:

“Martin's support is based on his underlying principle: "As managers lead themselves, the others lead. As they lead others, they lead the groups. As they lead groups, they lead teams. As they lead teams, they lead entire businesses and organizations. ". He has taught us how we can lead this system so that it goes together and gives good results for all links in this chain. No other support I've had so far has been as well and thoughtfully done either. Further examples of results that Martin has helped us achieve:

- *How to prepare, implement and follow up changes so that they lead to improvements. We have also reached a consensus e.g. "What do we want to achieve?", "What do we want to achieve?", "What are the benefits of our users and employees compared to today?" And "How do we know we have succeeded to change for the better? "In addition, we have learned how we communicate the change to better motivate managers and employees.*
- *How we set goals that guide and motivate us to action and better results. We have also learned how we measure the effects of the right things, properly and with high quality for all parts of the chain.*

- *How we develop groups to high-performance teams and how we measure the effects of it, such as effectiveness, efficiency, productivity and job satisfaction. In addition, my management team has evolved into a management team with an efficiency of 81 percent. Only 20 percent in Sweden and the United States succeeds to achieve this. It is also noticeable about the managers' effectiveness, efficiency and job satisfaction.*
- *How we lead, govern, develop, follow up, and constantly improve the entire department's processes to our stakeholders in a different and much better way. Martin has, among others things, learned us how to transform W. Edward Deming's management principles into practice in a good way. These management processes go beyond high performance teams, i.e. that's the last step in Martin's support.*
- *Through our work with Martin, we have avoided unnecessary and very costly reorganizations. When the new management processes have become a self-playing piano, we can show even bigger improvements. I am confident we will achieve our goals here too and be able to show measurable improvements: how our employees meet and perform better service to our users at half the cost"*

To be brutally honest, the science of statistics combined with these proven management approaches will be more crucial in the future. They will be vital to learn for the firms who want to innovate and thrive. These approaches – when they are combined - will solve many of the problems and challenges mentioned from the studies that were mentioned in the second article. This proven process for how to manage and lead systems and its processes well is not described in details in these articles. The science of statistics combined with this process for how to manage and lead systems and processes well are the means to walk the talk. They are the means to transform Deming´s 14 Points on quality management into practice and great results too; click on this link if you want to look at these points: https://asq.org/quality-resources/total-quality-management/deming-points .

These fact-based approaches are highly relevant to improve how to manage and lead the public sector in Sweden too. The problems and challenges are huge in the public sector, and many studies since the 1990´s up to this date have highlighted the consequences of them too. In brief, the old Sufistory mentioned in my second article sums them up in one picture. An overview of these studies is given in Lars Stiglund´s book *"What is the problem? – About governance in the public sector" from 2018.*

The Delegation for Trust-Based Public Management was tasked by the Swedish government to study these issues in June 2016. In June 2018 it recommends what to do in general terms, but not how. This is very strange as they disregard over 40 years of research about what works and how to do it. As mentioned in my first article, these approaches already exist and they work very well in practice too.

" A vision without a strategy remains an illusion." Lee Bolman

The firms who don´t improve how to manage and lead systems and its process will struggle to face these challenges. An easy way to illustrate different strategies are the strategy quadrant. The firms which are able to align their vision, goals, strategies, tactics with the operative work at all levels will raise results, lower expenses and boost joy of work.

The firms who don´t improve how to manage and lead systems and its process will struggle to face these challenges. The Strategy Quadrant (see Figure 17 below) clarifies this. The firms which are able to align their vision, goals, strategies, tactics with the operative work will raise results, lower expenses and boost joy of work. These few firms will reside in the first quadrant in the matrix below. The others will reside in quadrant two, three and four in this strategy quadrant. This will affect these firms results, expenses and joy in a negative way to a lesser or greater extent. The firms that will be in the first quadrant are the ones who has managers who walk their talk in the saying below:

" The people work in a system and its process. The job of the manager is to work on the system and its process, to improve it, with the help of the workers"

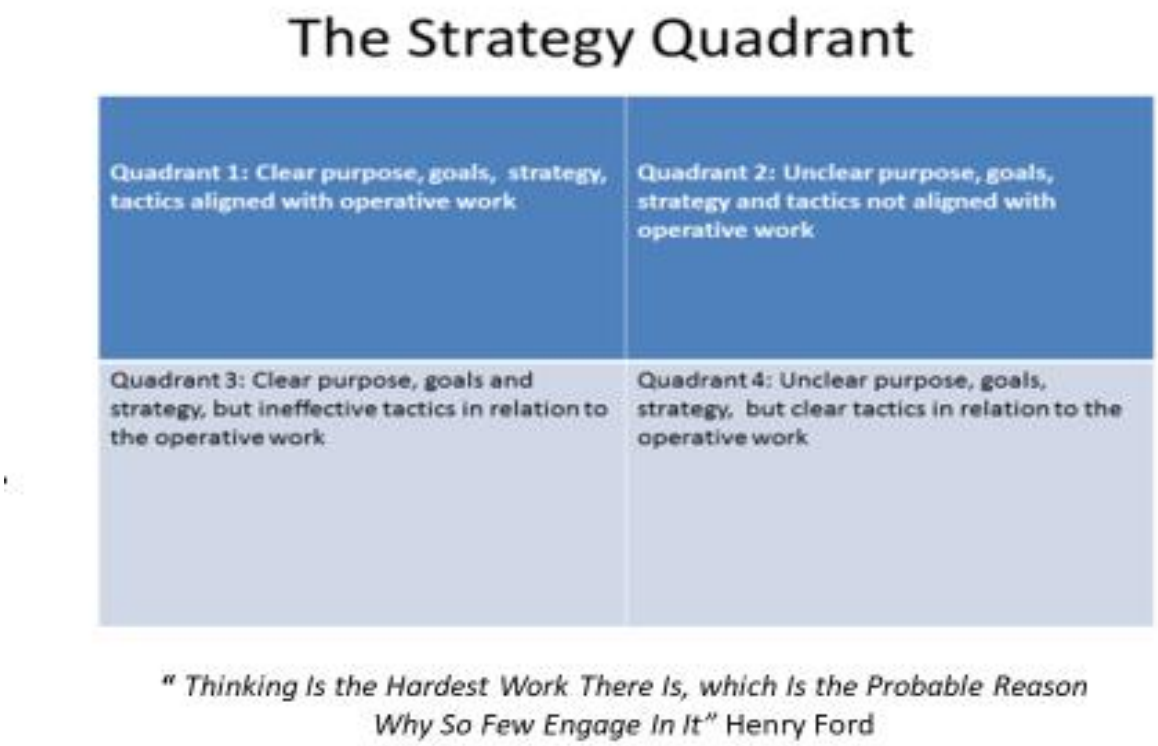

Figure 17. The Strategy Quadrant which shows the how aligned a firm´s purpose, goals, strategy are with the operative work for its users or customers.

Appendix: About me (Martin Lagerström, Executive Coach/Consultant/Advisor)

www.linkedin.com/in/MartinLagerström

My tailor-made support for firms, top-management teams and managers help them combine fact-based methods to raise results, reduce costs and boost joy of work, at the same time too. That´s what my clients in Sweden, Europe South-America and Africa are saying. For information about how this is achieved click here: https://bit.ly/2QfgXWJ.

The core in my support is my adage "As managers lead themselves, they lead their co-workers. As they lead their co-workers, they lead their groups. As they lead their groups, they lead teams. As they lead teams, they lead entire businesses and organizations. It is like the links in a chain. It hangs together. My custom-built support creates great results for each link in this chain. For sample results click on my name on this link and go to last page: https://lnkd.in/gXqRq2D

I also dare to say that I walk my talk here as I have used my own support myself with excellent outcomes. When I worked as a manager these methods created great results for users, co-workers and the whole firm each year during 10 years. They worked just as well when I worked as a senior management consultant for 6 years. I have also used some of these methods in elite sports (Swedish champion) and to feel and function better in life.

The approaches in my support are all:
1. Research-/fact-based
2. Proven to be best-practice within each area
3. Practical to use (know-how)
4. Extensive to both width and depth
5. System-based

What and how they are combined is why it creates such powerful outcomes.

Lately, my custom-built support has won seven Awards which I am grateful for such as e.g. ACQ5 Global Award 2018 and 2017 and "The Statistician of the Year 2017 (https://bit.ly/2N9eq27). Other accolades are Business Excellence Award and Most Influential Executive Coach & Advisor. It has also been selected as best practices by UNECE and others. My support has been nominated too by SiQ's for its Quality Innovation Award.

My educations are tailor-made to help top-management teams and managers to grow, act and achieve great results. For a quick overview of educations, certifications etc., please next page.

University degrees
Three University Degrees, Stockholm University with excellent grades

- Degree of Bachelor of Science with a major in Statistics.
- Degree of Bachelor of Science with a major in Business Administration.
- Degree of Bachelor of Science with a major in Psychology.

Certifications and licenses

- Certified professional business-, management- and leadership coach. One of few that is quality assured by ICC/ICF/EMCC on a practioner level (6 months, including 250 hours logged , approved training and evaluation)
- Certified & Licensed Mental Master Coach. The most comprehensive & advanced in the world in mental training. Quality assured by 50 years scientific research (4 000 hours education,, training, practice, evaluation)
- Certified ICC International Coach. Quality assured by ICC/ICF/EMCC (300 hours logged, approved education & training)
- Certified Advanced Group and Team Coaching processes. Quality assured by ICF/ICC (15 hours education and practicum)
- Certified Group Development Questionnarie (GDQ) by Susan Wheelan (4 days education and practicum). Quality assured by decades of research.
- Certified in several DiSC modules, 16 days education (Certified DiSC Personality Profiles, Certified DiSC Coaching, Certified DiSC Group-and Team , Certified DiSC Innovation & Teambuilding, Certified DiSC Everything Workplace, Certified DiSC Work of Leaders and Certified DiSC High Performing Teams. Quality assured: by 40 years scientific research.
- Certified Change Management, ADKAR/Prosci . Quality assured by 12 years scientific research. (3 days education & practicum).
- Certified Applied Information Economics (AIE) for doing reliable, relevant and usable Return-on-Investment, risk management analysis with advanced statistical approaches.
- Certified JobMatch Talent (3 days education). Quality assured by scientific studies and European Federation of Psychologists' Associations (EFPA).

Diploma

- Diploma Business Intelligence by Docere Intelligence (one month education & practicum)
- Diploma Speed Reading, Learning & Memory (4 weeks)
- Diploma e-learning Lectora Inspire & Camtesia (2 days)
- Diploma DreamBroker (create, produce and communicate video)
- Diploma Virtual Facilitation Skills Intensive (15 hours education and practicum)

Self-studies

- My self studies contribute the most to my learning so far in my opinion. For over 25 years I have had a burning desire to learn more about many different excellence modalities .
- These self-studies are highly related to each link in the chain in my adage “As managers lead themselves, they lead their co-workers. As they lead their co-workers, they lead their groups. As they lead their groups, they lead teams. As they lead teams, they lead entire businesses and organizations. It is like the links in a chain. It hangs together."