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Identifying and Battling Self-Inflicted Enterprise-Wide Inefficiencies

David J. Patrishkoff*

*President – E3 Extreme Enterprise Efficiency® LLC, 12472 Lake Underhill Road - Suite 429 - Orlando, Florida 32828 USA

Email: davepatrishkoff@eeefficiency.com

Abstract

The author's manufacturing process improvement activities in various industries have shown that, on average, 80% of all manufacturing operations are NVA (Non-Value-Added). These observations combined with the author's historical case study research concluded that there are 54 controllable forms of inefficiency and waste that can plague any manufacturing operation. All of these inefficiencies are self-inflicted and therefore preventable and repairable. These 54 Inefficiencies form a linked network of destructive chain reactions that hold organizations back from achieving greatness. Each of these 54 forms of waste and inefficiency has been given a playing card and rank (Ace, King, Queen, Jack & Joker), which defines the tiered cause and effect relationship in the interrelated network of waste & inefficiencies. Aces are the main root causes of waste in an organization and the top tiered barriers to success. The Jacks are the final effects. The higher ranked inefficiencies on the cards (Aces, Kings, Queens, etc.) are the root causes for the lower ranked cards. 52 playing cards and 2 Joker cards imitate a secret network of inefficiencies that can play out every day at work. These cards can be used in various ways to identify waste in an organization and can be played as a war game to test the skills of management and professionals to address various inefficiencies that might be present in an organization. These cards are also used by the author for Pictorial Process Analysis (PPA), which is an expanded form of process mapping with 10 layers of efficiency analysis.

Keywords: bpm; business process management; lean; lean manufacturing; process management; industrial engineering; operations management.

1 Introduction

Decades of advancements in Lean Manufacturing, Industrial Engineering and Operational Management has created an impressive array of tools, software, methodologies and techniques capable of dramatically improving the efficiency of any manufacturing operation. A detailed listing of this cumulative Body of Knowledge is even available on the web for anyone to download, study and apply to their operations. Unfortunately, high levels of manufacturing quality, performance and efficiency are not as widespread as the knowledge available to attain this high level of performance.

A detailed value stream map or Pictorial Process Analysis (PPA) of any current-day manufacturing process will show that on average, 80% of all efforts in a manufacturing operation are non-value activities. Why is there such widespread and dismal performance levels in the modern age of manufacturing? I believe it is because of the weakness in the inefficiency assessment tools used to identify waste and inefficiency in an organization. Most tools focus on the waste present in the manufacturing operations area, assuming that this waste is the root cause of an operation's inefficiencies and lackluster performance. Tools such as spaghetti charts, balance charts, cycle time worksheets, downtime worksheets, time and motion worksheets and other tools focus on the identification of inefficiencies in operations. These tools do not focus on the weaknesses in operations management that can spread havoc in their organization and hold it back from greatness. Joseph M. Juran lists 12 common strategies in "Juran's Quality Manual" that make companies successful in achieving high quality. None of these 12 strategies mention tools like Value stream maps or other tools. What Juran does list are management behaviors and attitudes required to drive quality and efficiency in an organization. Juran successfully trained top management from many companies in Quality Management starting in the 1950's. He believed such training should start with management, which was a concept rejected in the USA at the time.

Most of the Lean efficiency improvement tools assume that top management has flawless behaviors and attitudes, ready to remove any roadblocks in the way of efficiency gains. Operations Management is not always up to this task of driving continuous improvement from the top down. When a manufacturing operation is not Lean, it is not the fault of the employees, it almost always comes back to shortcomings in Operations Management. Lean-thinking Leadership is required to drive a Lean organization. The spark and drive for enterprise-wide efficiency improvements has to come from the top. Deming drafted his 14 Key Management Principles for business transformation, which were noted in his book "Out of the Crisis". He wrote that most causes of low quality and low productivity belong to the system and thus lies beyond the power of the work force but it is controllable by management.

The major barriers that hold organizations back from greatness are mostly internal and self-inflicted. Operational Management decisions that are made and even the ones that are not made have massive repercussions throughout a manufacturing operation. Every manufacturing organization is made up of an invisible set of domino chain reactions. The chain reactions can be good, neutral or self-destructive. Operations Management controls the domino effects and silently pre-destines their organizations for a path towards excellence or puts their organization on a path of mediocrity, agony, frustration, customer dissatisfaction or dismal performance. Manufacturing organizations are subject to the laws of efficiency and the chain reactions that impact all employees and customers every day. Any successful business improvement effort should first address its 13 Reckless Management Behaviors and Attitudes (The Aces), when they are present and then focus on other obvious forms of waste and inefficiencies in the operations. These 13 top-tiered barriers to success are in line with the teachings and publications of Deming, Juran, Jack Welch and other successful consultants and executives.

There are 54 main forms of waste and inefficiency potentially present in operations, not just 7 or 8 as mentioned in the teachings of Lean Manufacturing. When an organization starts their official search for various forms of waste, this search must not be limited to waste identification just in the production processes. The identification of waste must be an enterprise-wide search that spans all levels of the organization and not just focuses on working level employees. If an operation strives to be "Lean", the behaviors and attitudes of all levels of the organization should be scrutinized.

The 54 forms of waste and inefficiency shown in Figure 1 are depicted on playing cards. They are aligned to 5 tiered domino groups of waste and inefficiency. These domino groups are listed here in rank order of their impact on an organization, from high impact to low impact.

13 Reckless MBAs (Management Behaviors and Attitudes), which can hold any organization back from greatness (These are the 13 Aces in the deck of Waste & Inefficiency cards).

11 inefficient aspects of the work environment (These are the 11 Kings in the deck of Waste & Inefficiency cards).

21 inefficient work habits (These are the 21 Queens in the deck of Inefficiency Icons). Most of the 7 classic forms of Lean waste are listed here.

7 key efficiency metrics (These are the 7 Jacks in the deck of Waste & Inefficiency cards). They are impacted by the intensity of inefficiencies in the organization mentioned in upstream domino waves.

2 resulting bad practices of not being able to prioritize important tasks correctly and applying ineffective and chaotic fire-fighting, which too often addresses the symptoms of a problem and not the true root causes (These are the 2 Jokers in the deck of Waste & Inefficiency cards).

Every manufacturing organization should launch a vigorous self-assessment of their organization to check if these inefficiencies are present or not. If they are present, they need to be addressed. William Deming, Joseph Juran, Jack Welch (GE), Larry Bossidy (Honeywell) and many other prominent executives and consultants have all stressed the need for excellence in an organization starting with its leadership. Any flaws in the efficiency or quality in a manufacturing organization can be traced back to self-inflicted reckless behaviors and attitudes of its top management.

Yasuhiro Monden in his book "The Toyota Production System" often stresses the mandatory roles that top management, not middle management, must play in rolling out innovation and process improvement efforts in an organization. This is why the 13 Aces, controlled by management, are deemed as the most dangerous inefficiencies in an organization.

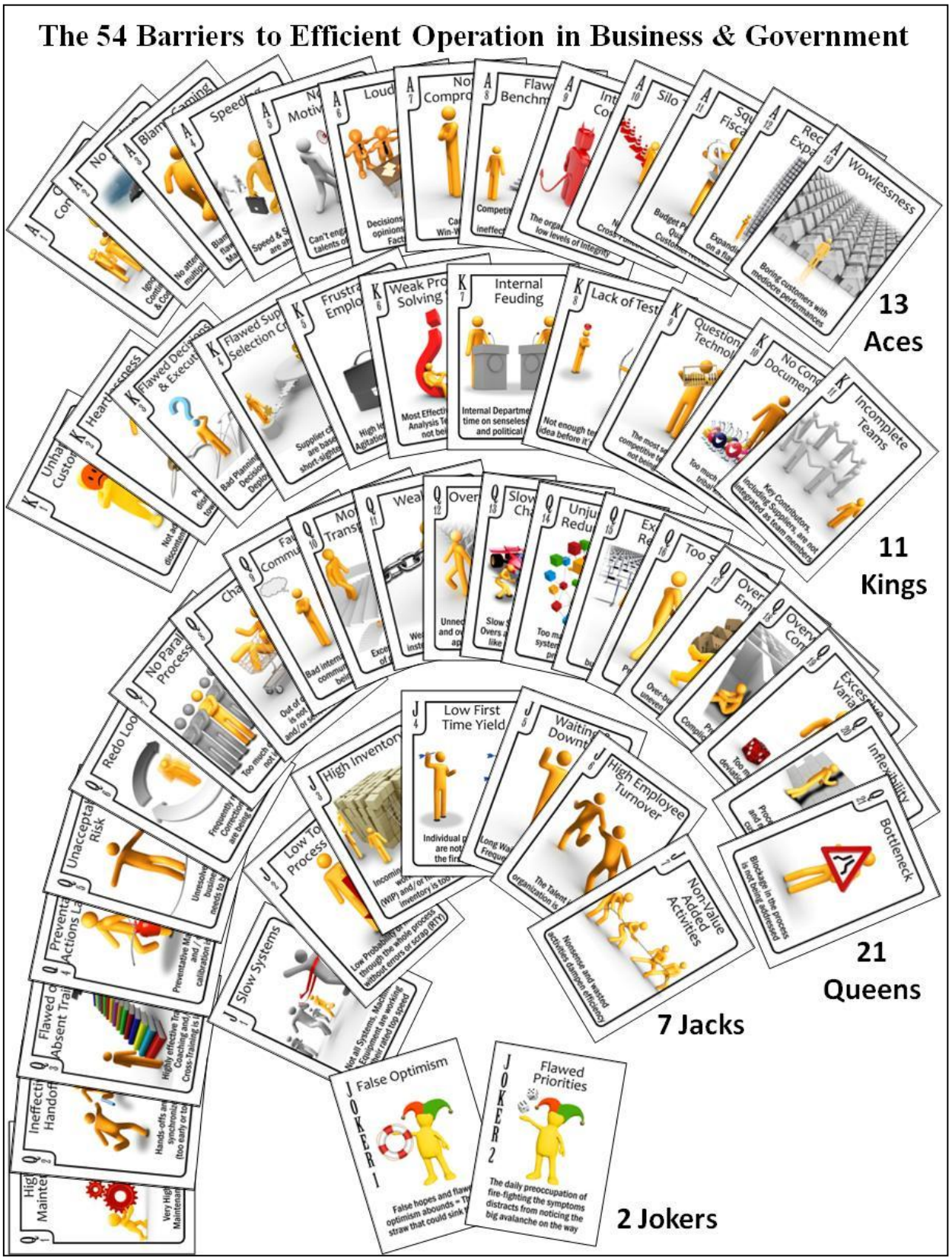

Figure 1: The 54 forms of waste and inefficiency that could be present in any manufacturing operation.

2 The 5 Major Domino Chain Reactions Present in Operations

These 54 forms of waste and inefficiency are timeless. They have existed since the beginning of manufacturing operations and they are a constant threat that must be taken very seriously today and in the future. Technology has done little to minimize these inefficiencies since they are just as common in high-tech companies as low tech companies. Each of these forms of waste occupies specific positions in the domino chain reactions that can be present in any organization. These chain reactions are poised to present major roadblocks and barriers to success and can create excessive levels of risk to any organization. Figure 2 shows the 5 domino chain reactions that can threaten any organization from within. If you fully understand your internal weaknesses, you have a chance at starting a battle against your own inefficiencies. If you live in a state of blissful and naive optimism, these internal roadblocks will hold you back from success and greatness.

While Lean Manufacturing techniques have been effective in identifying 7 valid forms of waste, it has not done a good job at identifying the root causes and domino effects leading up to these forms of waste. The chain reaction positions of the highly publicized "7 forms of waste" are also shown on Figure 2. As shown here, they are not the root causes of waste, they are the 3rd or 4th chain reaction down from the real root causes of waste and inefficiency in an organization. Deming also wrote that most causes of low quality and low productivity belong to the system and lies beyond the power of the work force to control.

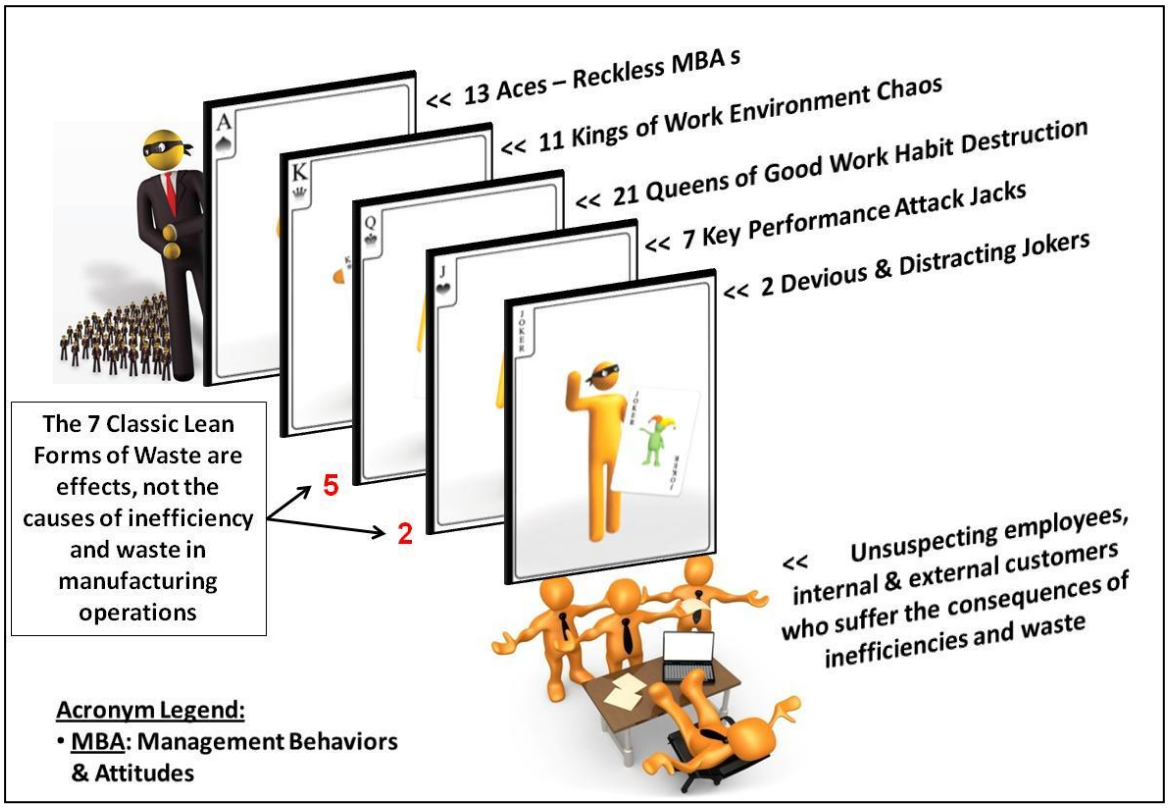

Figure 2: The 54 forms of waste & inefficiency are aligned to 5 domino chain reactions that can threaten any operation. The greatest threats and also the greatest hopes for any operation are its leaders who have the power and authority to create either greatness, mediocraty or chaos in an organization.

3 The 7 Classic Lean Forms of Waste

The following "seven wastes" were identified by Toyota's Vice President, Taiichi Ohno, and became part of the Toyota Production System, which he helped to create. These 7 forms of waste are activities in manufacturing processes that do not add value to the customer. An easy way to remember the 7 forms of wastes is to remember the term TIMWOOD.

The 7 classic Lean forms of waste follow:

- T: Transportation
- I: Inventory
- M: Motion
- W: Wait
- O: Over-processing
- O: Over-production
- D: Defect

The issue in following this attack on just 7 forms of waste is that at Toyota, many other cultural problems were already resolved over decades of hard work by top management. That is not true for the rest of the world. Lean manufacturing has helped very many companies reduce inefficiencies and waste in their processes but many other companies still struggle with implementing lean. Part of the problem in implementing Lean is the misconception that if your organization just addresses the 7 forms of waste, productivity and profits with soar. Lean requires enterprise-wide attitude changes from the top to the bottom of an organization before it can really have a positive effect on performance levels. Yasuhiro Monden in his book "Toyota Production System" (TPS) talks about the prerequisites required to implement TPS. He states: "Step 1: Upper management plays a key role". Yasuhiro confirms that the first step lies with top management, not in the identification of the 7 forms of waste at the worker level.

If top down attitude changes do not happen in an organization, progress to achieve a lean organization will not be easy. This is because the 7 forms of waste are the not the root causes of waste, they are the symptoms and effects of other lurking issues in the organization. A simple root cause analysis for each of the 7 forms of waste would yield many reasons for the presence of these lurking issues. An open and honest 5 Why brainstorm, which Taiichi Ohno was a big fan of at Toyota, would reveal that the 7 forms of waste are not the root causes of high costs but the symptoms of other wasteful management and cultural habits. This paper will demonstrate such an analysis to identify the real root causes of the Lean 7 forms of waste. Many companies in Japan are beyond that required work because they were trained and coached by Deming, Juran and others, which allowed them to create the Japanese quality revolution in the 1950s.

3.1 The Root Causes of Excessive Transportation and Motion Forms of Waste

Figure 3 shows that the Lean forms of waste called Excessive Motion & Transportation are represented by Queen 10 in the card deck of waste and inefficiencies. It is the card on the left of the illustration in Figure 3. These forms of waste are part of the 3rd domino wave of bad things that can happen to manufacturing operations, which are work habit related. The inefficiencies called Kings 3 & 6 in the next upstream domino, to the right of Queen 10, which are the causes of excessive transportation and motion. King 3 is named Flawed Decisions & Execution. King 6 is named Flawed Problem Solving Skills.

The root causes of these 2 work environment shortcomings (Kings 3 & 6) lie in the top tiered domino of waste chain reactions, which are the Aces 1, 6, 8 & 12 shown on the far right in Figure 3. They are the main root causes for the work environment shortcomings and the classic Lean forms of waste named: Excessive Transportation and Motion.

- Ace 1 is named Over-Confidence
- Ace 6 is named Loudness (Decisions based on the loudest opinions, not accurate Data and its Analysis).
- Ace 8 is named Flawed Benchmarking
- Ace 12 is named Reckless Expansion

Operations Management is responsible for the Aces and thus carries the responsibility for excessive transportation and motion. It is their responsibility to prevent it from happening and also initiate the actions required to eliminate it.

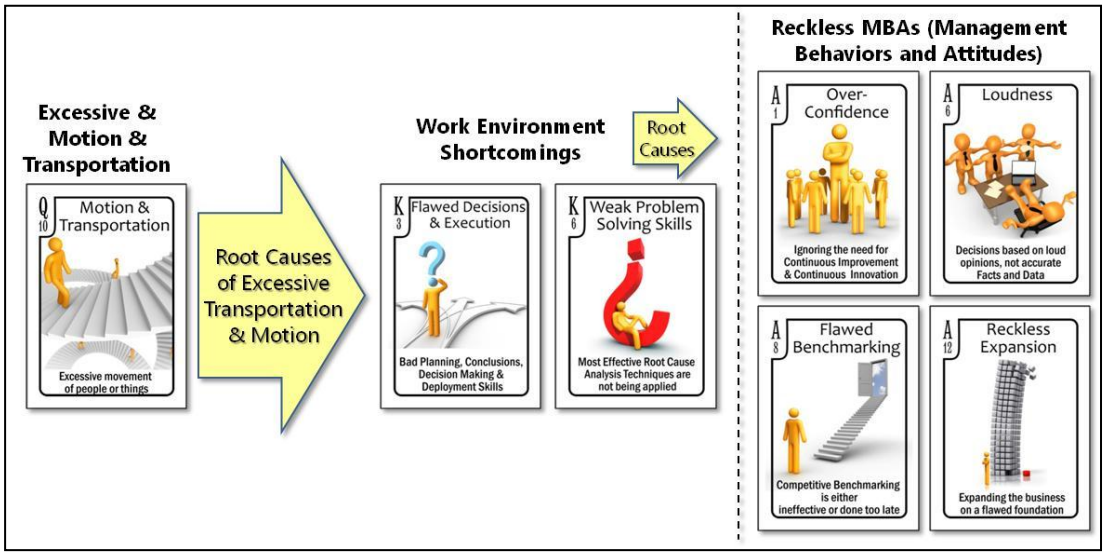

Figure 3: Two shortcomings in the work environment are responsible for the excessive transportation and motion forms of waste but the final and true root causes of this waste are 4 reckless MBAs (Management Behaviors and Attitudes) that only Operations Management has the power and authority to correct.

3.2 The Root Causes of Over-Production & Excessive Inventory Forms of Waste

Figure 4 shows that the Lean forms of waste called Over-Production & Excessive Inventory are represented by Jack 3 in the card deck of inefficiencies. It is the card on the left of Figure 4. These forms of waste are part of the 4th domino wave of bad things that can happen to manufacturing operations, which are key performance metrics. Two Queens in the next upstream domino to the right are inefficient work habits, which are to blame for these forms of waste. Two Kings in the next upstream domino to the right create inefficiencies in the work environment, which are the root causes of the inefficient work habits. Two Aces in the next upstream domino on the far right of the illustration are the root causes of the work environment shortcomings. These two Aces are the Management Behaviors and Attitudes responsible for the forms of waste to the far left on Figure 4, which is Over-Production & Excessive Inventory. Again we see that Operations Management has the responsibility to prevent and eliminate this form of waste. If they are not capable of doing the task, they should seek the expertise required to eliminate these major forms of waste.

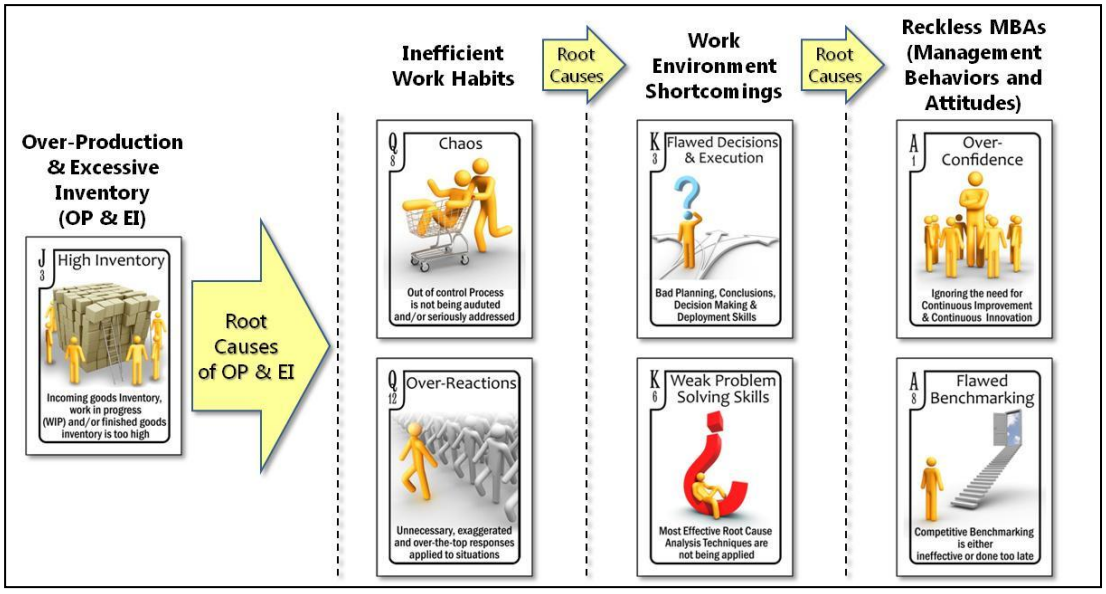

Figure 4: Two inefficient work habits and two shortcomings in the work environment are responsible for Over-Production & Excessive Inventory waste but the true up-stream root causes of this waste are 2 reckless MBAs (Management Behaviors and Attitudes) that Operations Management should address.

3.3 The Root Causes of the Waiting Form of Waste

Figure 5 shows that the Lean form of waste called Excessive Waiting is represented by Jack 5 in the card deck of waste and inefficiencies. It is the card on the left of the illustration in Figure 5. This form of waste is part of the 4th domino wave of bad things that can happen to manufacturing operations, which is part of the group that represents performance metrics. Nine Queens in the upstream domino to the right are inefficient work habits, which are to blame for this form of waste. Three Kings in the next upstream domino to the right, which include work environment shortcomings, are the root causes of the inefficient work habits. Seven Aces from the next upstream domino to the right are the root causes of the work environment shortcomings. These seven Aces are the Management Behaviors and Attitudes to blame for the form of waste to the far left on Figure 5, which is Excessive Waiting. Again we see that Operations Management has the responsibility to prevent and eliminate this form of waste.

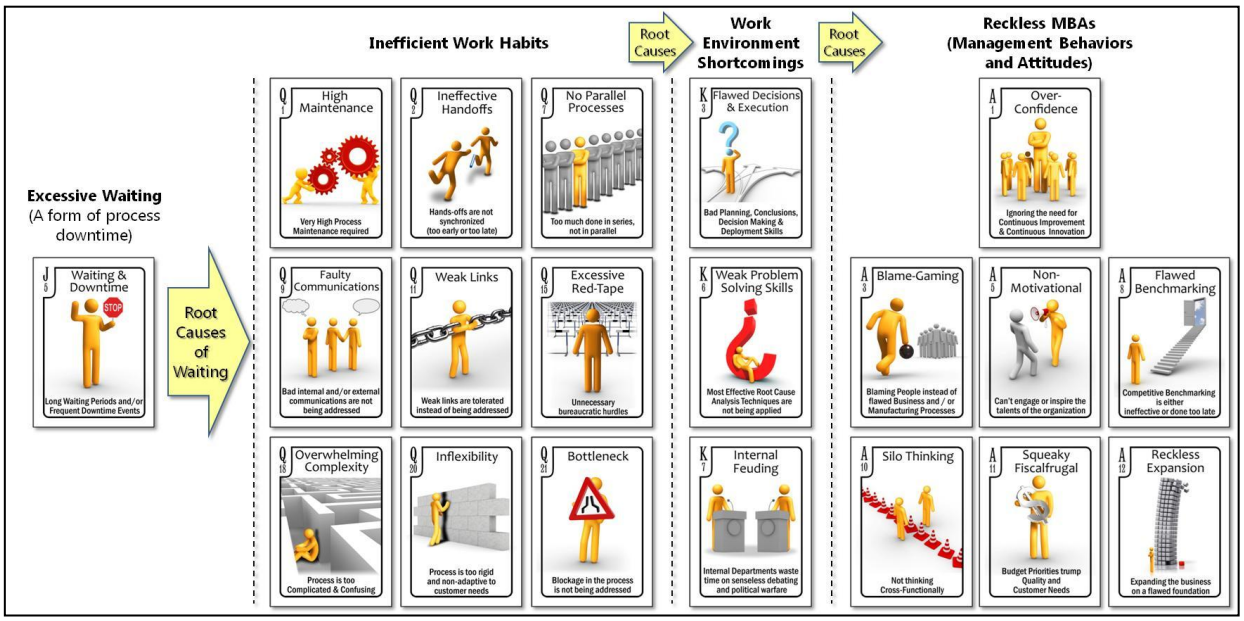

Figure 5: Nine inefficient work habits are responsible for waiting waste followed by three shortcomings in the work environment. Seven reckless MBAs (Management Behaviors and Attitudes) on the far right of the graphic are ultimately responsible for waiting waste, which only Operations Management has the authority to address.

5.4 The Root Causes of Over-Processing Form of Waste

Figure 6 shows that the Lean form of waste called Over-Processing is represented by Queen 12 in the card deck of waste and inefficiencies. It is the card on the left of the illustration in Figure 6. This form of waste is part of the 3rd domino wave of bad things that can happen and they are part of the inefficient work habits domino wave. One King from the upstream domino to the right, which includes work environment shortcomings, is the root cause of this form of waste. Four Aces from the upstream domino, which includes the Reckless MBAs, are to blame for the work environment shortcomings. These four Aces are the Management Behaviors and Attitudes that are ultimately responsible for the form of waste to the far left on Figure 6, which is Over-Processing. Again, Operations Management has to act first in order to eliminate this waste.

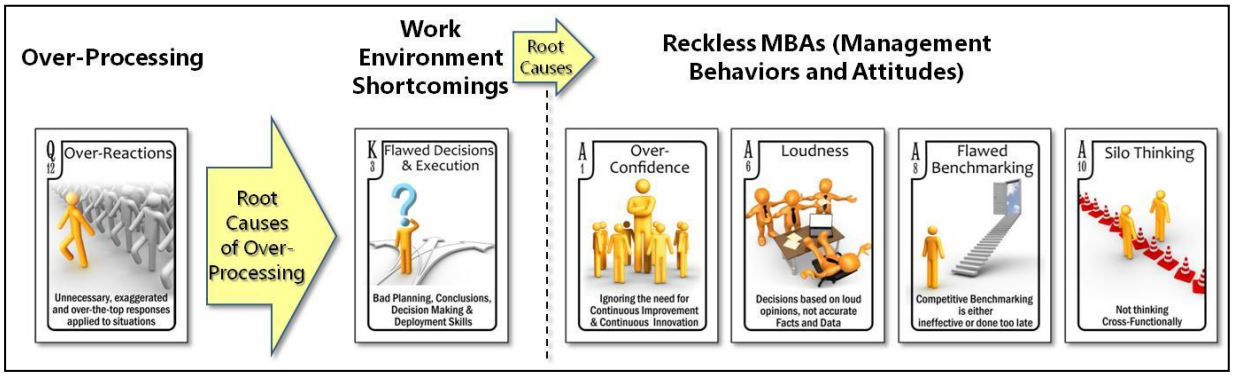

Figure 6: One shortcoming in the work environment is responsible for Over-Processing waste but the true root causes of this form of waste are 4 reckless MBAs (Management Behaviors and Attitudes) that Operations Management must address in order to stop Over-Processing from happening.

3.4 The Root Causes of the Defects Form of Waste

Figure 7 shows that the Lean form of waste called Defects, which is represented by Jack 4 in the card deck of waste and inefficiencies. It is the card on the left of the illustration in Figure 7. This form of waste is part of the 4th domino wave of bad things that can happen to manufacturing operations, which is part of the group that represents performance metrics.

Eight inefficiencies in the next upstream domino to the right, which are inefficient work habits (The Queens), are responsible for this form of waste. Five upstream work environment shortcomings (The Kings) on the right are the root causes of these inefficient work habits. Eight Aces from the next upstream domino on the right are the root causes of the work environment shortcomings. These eight Aces are the Management Behaviors and Attitudes responsible for the form of waste to the far left on Figure 7, which is Defects. Again we see that Operations Management has a variety of responsibilities that can prevent or eliminate this form of waste.

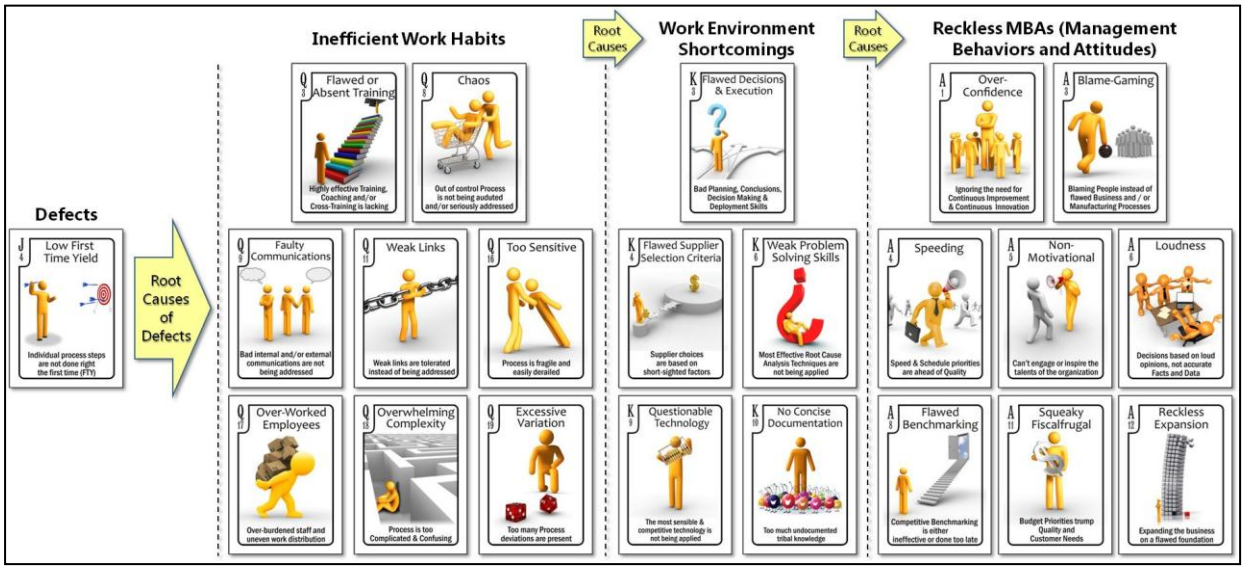

Figure 7: Eight inefficient work habits are responsible for defects in manufacturing operations but the root causes of those inefficient work habits are five shortcomings in the work environment. The root causes of the shortcomings in the work environment are eight reckless MBAs (Management Behaviors and Attitudes) shown on the far right of the graphic. Operations Management must address those reckless MBAs in order to stop Defects from happening.

3.5 Summary of the Root Causes of the 7 Lean Forms of Waste

Figure 8 shows a Frequency Diagram (Histogram) for the number of times that a certain work environment shortcoming was responsible for the 7 forms of waste in the previously shown analysis. Work environment shortcomings are the 2nd domino in the chain reactions of events that can harm an

organization. As shown here, the main work environment shortcoming in a manufacturing responsible for the 7 classic lean forms of waste is a lack of proper root cause analysis skills of the organization, followed in 2nd place by the root cause of flawed decision making, planning and deployment skills.

The good news is that the top 2 flaws in a work environment that allow the Lean 7 forms of waste to exist are preventable with the right training. If this training is flawed in its quality, success will not be achieved. If an internal or external expert coach does not lead the efforts and coach newly trained employees to eliminate waste, success will not be achieved.

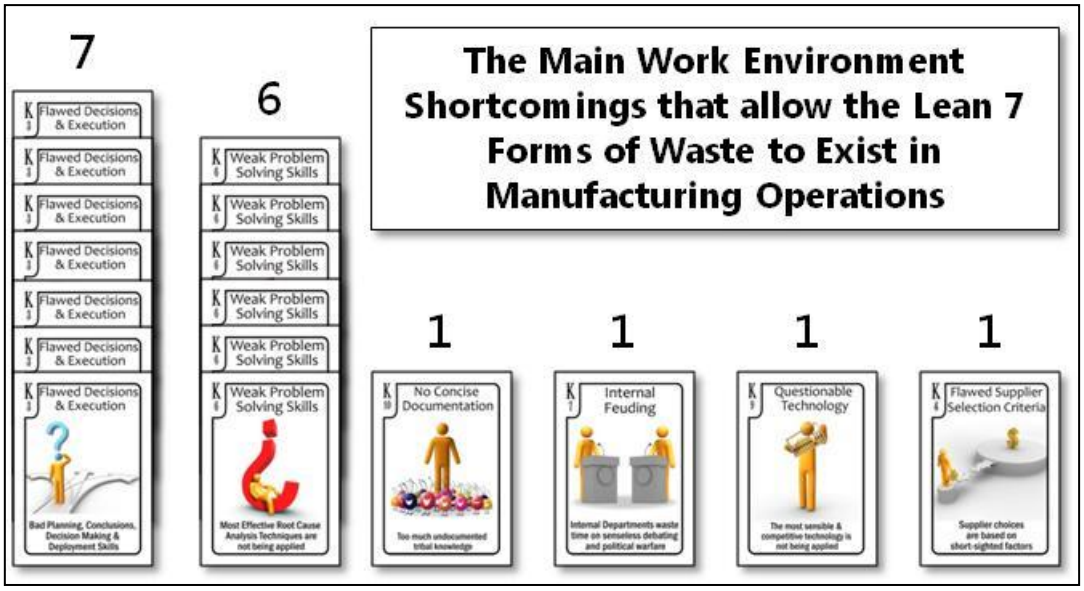

Figure 8: The top two flaws in the work environment responsible for the 7 forms of waste are flawed decisions & execution and weak problem solving skills.

Figure 9 shows a Frequency Diagram (Histogram) for the number of times that certain reckless MBAs (Management Behaviors and Attitudes) were responsible for the 7 forms of waste in the previously shown analysis. These MBAs control the work environment and are the #1 domino in the chain reactions of events that can harm an organization. As shown here, the main Management Behavior and Attitude in a manufacturing operation that is responsible for the 7 classic lean forms of waste is a 2-way tie. An arrogant and over-confident attitude that dismisses the need for continuous process improvements and continuous innovations is one of the two most common reasons for waste. It is tied with the fact that management has to have a greater appreciation for the need to efficiently benchmark the competition before it is too late. There is a 2-way tie for the 3rd biggest flawed Management Behavior and Attitude shown in Figure 9. First of all, decisions should not be allowed to be made by the loudest voices that do not have accurate data to back up their opinions. also, the business should not recklessly expand their operations based on a flawed foundation.

In total, 9 root causes were identified here as the main root causes of the 7 forms of Lean waste. If these top 9 flaws are present in the attitudes of Operations Management, Lean Manufacturing and other efforts to improve efficiency levels will be out of reach for those organizations. This would represent an unfortunate competitive handicap. The opposite is also true. The right attitudes exhibited by Operations Management can allow them to win great victories over the 54 forms of waste and inefficiencies. It must be understood that the battles against waste and inefficiencies are not won once. They have to be fought every day to prevent them from coming back.

Tom Peters states in his book "Re-Imagine": "My overall rant, in brief: People, in enterprise, in government are by and large well intentioned. They'd like to get things done. To be of service to others. But they are thwarted at every step of the way by absurd organizational barriers and by the egos of petty tyrants (be they corporate middle managers, or army colonels, or school superintendents)." Reckless organizational MBAs and a low performance work culture is the reason why companies have so much NVA in them, not because they do not focus on the 7 forms of Lean waste.

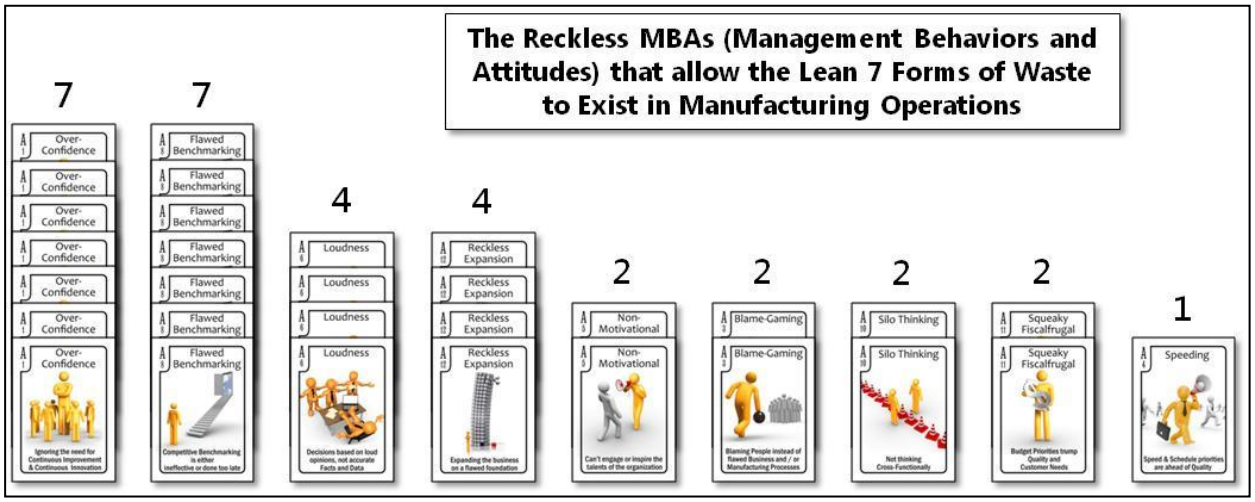

Figure 9: The top 2 Reckless MBAs (Management Behaviors and Attitudes) responsible for the 7 forms of waste are Over-Confidence, tied with Flawed Benchmarking. There is a 2-way tie for 3rd place: Loudness (Decisions based on loud opinions, not accurate facts & data) and Reckless Expansion of a business.

4 Conclusion

The author's independent research combined with his wide-ranging professional and consulting activities in manufacturing operations of companies from dozens of different industries have shown that 54 common forms of waste and inefficiency commonly plague manufacturing operations. These forms of waste hold organizations back from creating great value for their customers and great competitive value for themselves. Manufacturing Operations who just focus on the Lean 7 forms of waste will be addressing the symptoms of waste and not their true root causes. The presence of waste and inefficiency in operations is not always the fault of the workers; it is almost always the fault of management, when they lack the right attitudes, behaviors, skills and insights to create a continuously improving work environment to address waste and inefficiency. Employee training and empowerment are also important to identify and banish waste and inefficiencies but this is no substitute for management first addressing their reckless MBAs (Management Behaviors and Attitudes), when present. Deming was pivotal in helping Japan create their quality revolution in the 20th century. He did so by teaching their management what change they had to drive themselves and what other activities they should empower to employees. Employee empowerment only works if management exhibits healthy behaviors and attitudes and creates a work environment that can sustain high levels of performance and efficiency.

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