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## Managing Change in Safety Behavior at a Turkish-American Joint Venture Production Site

Version Nr. 1, 10 December 2019

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## Teaching Notes:

# Managing Change in Safety Behavior at a Turkish-American Joint Venture Production Site

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**Abstract.** TAJV is a Turkish-American joint venture production company located in the Turkish Marmara region. Since 2001, it has expanded rapidly due to its lean production system and high quality products. Triggered by a tragic accident in 2016, the EMEA (Europe/Middle East Africa) Safety Manager of the American parent company faces the challenge to quickly improve the safety behavior at the Turkish sites.

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## **Introduction**

The case describes a challenging situation in the career of the Safety Manager Kay Mueller in a cross-national organizational setting: as German specialist for occupational safety and manager of organizational safety within a globally active American company, he has to manage the improvement of safety behavior at a Turkish production site. The site is a joint venture between the American and a Turkish company.

The case is designed as a problem-solving case: it states facts related to a specific change management problem and offers hints for decision-making options. Yet, it also contains some elements of a field case as it presents insight into lean production, safety issues as well as occupational safety behavior and issues related to national cultural values.

### **1. Target Group and Learning Objectives**

The target group of the case study are students on a Bachelor level in a Business Administration program, and in particular those in an International Management/International Business program.

As a multifaceted case, it lends itself well to realizing multiple learning objectives depending on the main course topic and purpose as well as available time.

Regarding key learning objectives, students are able to ...

1. analyze a complex real-life situation at a production site regarding change management
2. understand interdependences of a lean structural setting, lateral as well as top-down leadership, cultural values and competing goals (e.g. efficiency vs. safety)
3. discuss theoretical concepts of change management taking into account organizational culture, motivation and leadership
4. develop options for decision-making and problem solving regarding change management

### **2. Teaching Method**

The case was used twice in 2018/19 with groups of 28 resp. 33 third semester students of a BSc in International Management program at a Swiss University of Applied Sciences. The module topic was „Organization Studies” and students were already familiar with case studies as a learning method. Students had basic skills in organizational culture, national cultural values, leadership, organizational change and change management approaches.

The following teaching plan was applied (90 minutes, incl. a buffer of 5 minutes):

#### **Preparation**

Students had to prepare the case with the following instructions:

1. Study the case (pay attention to the appendix!) and be ready to answer questions regarding facts mentioned in the text (who, where, what etc.) in class, for instance: what is “the Manufacturing Umbrella”?

2. The case describes a setting that required a change of safety behavior – highlight those passages in the text that a) refer to safety behavior as well as those that b) provide hints how to possibly change it.

### **Introduction to the Case: Safety Behavior at a Production Site (5')**

In order to familiarize students – who typically have no experience in manufacturing nor in safety behavior – with the case, a short YouTube film was shown. The 4½ min. video is a safety behavior awareness video made by automaker Ford (<https://www.youtube.com/watch?v=hQk5Bi-Ls6c>).

### **Case Review (10')**

A case review followed with cold calls: students had to answer knowledge questions on the case such as „Who owns TAJV?“, „What is the main cause for occupational accidents back in 2016?“, „Name 2 of the 7 types of waste that is eliminated in Lean Manufacturing“ etc.

### **Discussion (15'): Identification of Relevant Aspects**

Next was a class discussion to help students with the case analyses: „What are aspects of the organizational structure (lean manufacturing) and (national/corporate) culture and other facts we need to consider in this change project?“. Students were expected to mention aspects such as the organizational culture (traditional, hierarchical, metrics-driven), the organizational structure (the lean manufacturing system and work process, see exhibit), the national culture values (Turkish, German, U.S. American), occupational safety (critical role of leadership, and individual safety behavior) as well as the development of business and safety numbers in the recent years. Findings were noted on a white board.

### **Group Assignments (45')**

Then, three rounds of group work followed. Students were assigned the following three tasks to solve in small groups. For the first round, each group was assigned one or two of the previously identified aspects noted on the whiteboard:

1. Analyze the case focusing on one or two aspect(s) identified in the classroom discussion and answer the question: “How can the organizational structure (lean manufacturing) and (national/corporate) culture be considered appropriately in this change project?”
2. Develop management options: „What is an appropriate change management approach, how should the change be implemented?“ After the presentations and when time permits, instructors can let students vote on the best change management approach and have them defend their viewpoints.
3. Reflect: „What are key takeaways?“, „What can be transferred to other, similar situations?”

### **Final Classroom Discussion (10')**

General discussion about change management and issues that must be addressed when managing change.

What is an adequate change management approach, how should the change be implemented?

### 3. Experiences and Recommendations for Teaching

Overall, the case worked well with the students and learning goals were reached. Note that the case was used towards the end of the semester when the topics “Change”, “Organizational Culture”, “National Culture” and “Leadership” had already been taught. Should students not have knowledge regarding leadership or culture yet, question 1 of the case could be removed.

Feedback from the students revealed that they appreciated the case being rather short compared to other cases they have worked with. On the downside, some mentioned that when preparing the case prior to the session, they felt somehow distant from the world of manufacturing, the production system and the organization. This experience may be due to the requirement to disguise the company, the product and all names as per the request of the local managers. It is therefore highly recommended to present the safety video mentioned as it seems to work well to bridge this distance.

A few points should be noted by those using the case:

- As the case is rather complex, those students who have not prepared it as instructed prior to the session were hardly able follow the class. It is therefore recommended to advise students that case preparation is mandatory and/or use other incentives.
- The challenging situation the safety manager faces sparked students interest and they had quickly come up with various ideas and suggestions to set incentives for safer behavior. At this point, it is important to point out a) that it is not about single and isolated measures but that a Safe Behavior Management System (SBMS) is required and b) that the „how” to approach the required change (i.e. find the most appropriate change management approach) is as important as the „what” (the SBMS). As the main topic of the course is change management (and not occupational safety), students should focus on the „how”.
- The case provides various hints regarding change, especially in the section regarding safety, see below:

<p>Kay makes sure to stay ahead in his profession and is aware of the latest research in his field. This shows that incidents can be reduced by keeping unsafe behaviors under control just in time and place – and not by simply imposing „bureaucratic” regulations on workers and their supervisors (Page-Bottorff, 2016). Though typically perceived as competing, goals, performance and safety can be complementary and integrated, especially when ongoing system improvements include employee input (Williams &amp; Roberts, 2018 and McKinsey &amp; Company, 2019). Recent studies in the UK also indicate that hindrance stressors are associated with higher levels of injuries (Clarke, 2012) and that training of supervisors can lead to improvements in perceived employee safety climate (Clarke &amp; Tylor, 2018).¶</p> <p>Managers and direct supervisors, Kay is convinced, are key factors as a) their decision-making and allocation of resources affects the organizational safety culture, thus creating a climate that reflects the relative priority given to safety. And b) they have the power and means to support safety behaviors of workers and safety-related feedback among co-workers. Also, c) they serve as important role models for everyday safety behavior – if the supervisor of a team does not wear a hard hat in the hard hat-zone, why would a worker?¶</p> <p>Kay remembered previous visits: he had seen pedestrians on the plant site who used neither the pavement nor the zebra crossing on plant roads, although this was standard in AMC. Dialog with leadership had revealed that rules and expectations for safe pedestrian behavior is different in Turkey to what is known in Central Europe and America. Only strong intervention (video cameras were installed) as well as education and training for pedestrians and, of course, truck drivers led to improvements.¶</p>	<ul style="list-style-type: none"><li>• The change needs to address behavior in various specific situations and consider structural as well as social measures (possible solution: safety buddies)</li><li>• Machines that do not function properly (→ Kenan’s accident) are a typical hindrance stressor and must be considered</li><li>• Workers need to participate in the change</li><li>• The change should adequately address the crucial role of supervisors by a) special training (what is the role of supervisors/ leadership regarding safety etc.) and b) having their active participation in the change process</li></ul>
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As to solving the „how” problem, here are some key aspects students should consider for a viable change management in this situation:

1. Goal of the change: The change is a reaction to the increase in DART over the past years and the obvious goal is „Zero fatality and serious injury” as stated in the manufacturing system

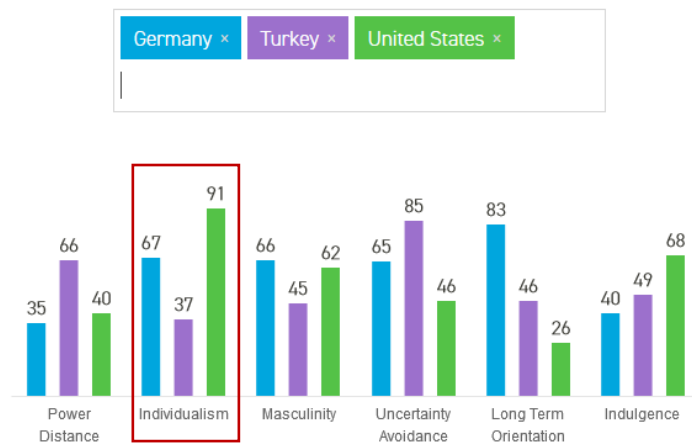
(exhibit). Students should have detected that the population with the biggest risk are those working in the workshops (80%), so the focus should be set on this group of workers.

2. Direction of change management approach: This is a top-down change.
3. Costs: No information regarding budget available is given in the text, but students can make an educated guess that the Safety Manager and the company have an appropriate budget and/or get management's approval for additional budget for such an important issue.
4. Time and timing: Immediate action is required and also results should be visible within a few months to be reflected in the metrics on plant level.
5. Scope of change: Safety is already one of the seven operating systems (see appendix) within the manufacturing system and part of the work process (WP) („Think Safety First”), therefore the scope of the actual change is moderate. Note: the scope of change is more than incremental, the existing continuous improvement (CI) model is apparently not sufficient enough to manage the change. Yet, it should be considered to make the new SMBS part of the existing CI, i.e. use CI as a vehicle for the SBMS.
6. Rollout: The rollout of the change will be local, on plant level but should potentially be applicable on regional and global level. The new system should be piloted, preferably at the workshop as this is where most DART originated. With a pilot, necessary adjustments can be made before plant-wide rollout which should help build trust into the new system.
7. Anticipated resistance and/or commitment: Commitment should be high and resistance rather low – at least in the beginning as long as the accident is fresh in everyone's mind. For ongoing commitment, it is essential to consider organizational culture of the company for instance by applying the OCAI framework (Cameron & Quinn, 1999): the better the change is in line with existing market-driven and competitive values, the higher the likeness for it to succeed.

Taking the abovementioned points into consideration, John Kotter's eight-step process for leading change seems most appropriate, especially since the first step “Create a Sense of Urgency” (Kotter, 1996) is given with the accident. By piloting the change in the workshop, the most risky area of the plant, „quick wins” are rather fast to achieve. In addition to Kotter, a change roadmap like the one suggested by Raffaelli (2016) may be included in the solution.

Especially students of a program in International Management or International Business should consider the relevant characteristics of the national Turkish culture and how it may work as a lever here: According to the GLOBE Studies, the Turkish culture shows high scores in „in-group collectivism” (House, Hanges, Javidan, Dorfman, & Gupta, 2004) and according to Hofstede (2001), Turkey can be considered a collectivistic society, indicated by a rather low score in “individualism” (see figure below, showing how Turkey's national culture compares to Germany and the U.S. according to Hofstede's country comparison tool).





**Fig. 1.** Hofstede's country comparison (<https://www.hofstede-insights.com/product/compare-countries/>)

For managing the change in safety behavior at the TAJV plant site, it can be inferred that working with the whole group of workers in large group events such as town hall meetings helps individuals to feel connected to the whole and the „We” and included to solve the shared problem.

#### 4. What Actually Happened

Most students are interested to learn what really happened, what the SBMS looked like and how it was implemented.

The EMEA Safety Manager, together with his local safety colleagues, piloted the new SBMS at the plant workshop within three months after the accident. After seeing successful results, the project was presented to Senior Management of the plant and won general approval. All departments started to work for plant-wide project replication under the leadership of the workshop and plant implementation process was completed within two months. As a result of the successful implementation and application, DART improved significantly by the end of the year and the following years. When members of AMC's EMEA board of directors visited the TAJV site, the SBMS was introduced and highly appreciated by them. One year after the accident, the SBMS became standard in all AMC's production plants – it had spread from local via regional to global level.

To understand the actual SBMS itself, a basic knowledge of lean production is helpful. Typically, third semester students do not have that (yet), so what follows is a simplified description.

At the heart of SBMS are workers, so-called “Safe Behavior Process Coaches” (SBPCs). SBPCs are the operators that audit and warn the other employees in the work group about safety. SBPCs are selected amongst employees:

- From each work group
- Up to one year experience
- Preferably from employees who are new to the working area

SBPCs conduct regular audits as part of the company's CI process using so-called „T-Cards” or „Kamishibai Cards”, a traditional element of a lean production system. The cards contain work instructions for auditing a process and are placed on the „Kamishibai Board”, which serves as a visual management tool for supervisors and line managers (GEMBA Academy, 2006).

Responsible Lead \_\_\_\_\_

**CARDS**

1<sup>st</sup> Shift

2<sup>nd</sup> Shift

**Line 1 Kamishibai Board**

PROBLEM/COUNTERMEASURE INFORMATION					
#	OK	NG	Problem Statement	Root Cause	Countermeasure
1	✓				
2	✓				
3	✓				
4		✓	No set-up tooling	Not sent to engring	Add visual stand
5					
6					
7					
8					
9					
10					

**Fig. 2.** Kamishibai board and cards (GEMBA Academy, 2006)

In this case, the „T-Cards” are process specific and prepared by local Occupational Health & Safety Specialists based on the incident history and potential/probable unsafe behaviors. Additionally, the SBPCs use „Unsafe Behavior Tracking Forms” and „Unsafe behavior Communication Forms” to monitor unsafe behavior and for immediate feedback. All SBMS tools and records are presented on the workshop floor and visible for everybody. At the end of each month, all findings are calculated by the SBPCs. Group month scores are distributed to each group and are always visible on SBMS boards which provides continuous motivation by creating competition environment.

To quote the Safety Manager regarding his lessons learned from this change:

*For a successful implementation of SBMS, employee involvement and continuous motivation is essential. Thus, it is a good idea to include 5% to 10% of total groups in the pilot study before launching area-wide. Also success rate depends on sustainable employee motivation which is triggered by competitive environment and strong endorsement/encouragement of leadership. Otherwise SBPCs will hesitate to take initiative and will not have operational efficiency since they are new to process and working area.*

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## Abbreviations

CI	continuous improvement
DART	days away, restricted, and/or transfer case incidence
EMEA	Europe, Middle East, Asia
OS	operational system
SBPC	safe behavior process coach
SBMS	safe behavior management system
TAJV	Turkish-American Joint Venture
WP	work process

# **Case Study:**

## **Managing Change in Safety Behavior at a Turkish-American Joint Venture Production Site**

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**Abstract.** TAJV is a Turkish-American joint venture production company located in the Turkish Marmara region. Since 2001, it has expanded rapidly due to its lean production system and high quality products. Triggered by a tragic accident in 2016, the EMEA (Europe/Middle East Africa) Safety Manager of the American parent company faces the challenge to quickly improve the safety behavior at the Turkish sites.

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## **Introduction**

It takes a lot to upset Kay Mueller<sup>1</sup>, a safety manager at American Manufacturing Company (AMC). January 20, 2016 was one of those rare moments in his career at AMC. His emotional reaction was triggered by an email message from his Turkish safety management colleague that had just reached him: at the Turkish-American Joint Venture (TAJV) Plant, Kenan Doğulu, a newly hired production worker had had a severe accident in the plant's workshop that morning. Apparently, Kenan had intended to quickly fix a malfunctioning assembly robot. He had entered the fenced robot zone without his safety key and without wearing his safety sleeves and was hit by this robot. The worker was taken to the local hospital immediately, but it was not certain whether the doctors could save his right arm. The entire shift was rattled; local management reacted with immediate actions (team supervisors were instructed to remind the workers of safety rules and regulations at the beginning of the next three shifts) but was looking for further guidance.

### **1. American Manufacturing Company**

The multinational AMC is one of the oldest and most influential manufacturer of durable consumer products worldwide. Headquartered in the USA, AMC produces and distributes its goods across six continents. Under the „4U” brand, it sells private and commercial products for the middle market segment; and under the „It” brand, it sells luxury products to private consumers.

How does AMC manage its business with more than 200'000 employees and 60 plants worldwide? AMC has a traditional corporate hierarchy that supports traditional business management approaches. It is also a metrics-driven organization. All key metrics are reviewed at the plant, regional and global level. The aim is effective top-down control. While ramping-up new locations and countries, the top and middle management is mainly recruited from North American / European internal management with further development of local top and middle management into leading positions.

AMC's main business functions are organized regionally, divided into three geographic divisions that cover all its markets around the world. AMC's main regional geographic divisions are (a) The Americas, (b) Europe, Middle East, Africa (EMEA) and (c) Asia Pacific.

Global business functions maintain global alignment in areas such as Manufacturing, Marketing, Sales and Service, Human Resources Management and Labor Relations, Quality Management, Product Development etc. A good example for global alignment is its production system which was adopted in all its global sites. AMC's production system works analog to the Ford Production System (FPS) and ensures an efficient, lean and safe production (see exhibit 1).

### **2. Kay Mueller and his role as Safety Manager**

Kay Mueller, based in Cologne at AMC Germany, is part of the regional EMEA division that includes Turkey and the TAJV. At AMC, he had spent the past 15 years and had worked his way up from Junior to now Senior Specialist. As „Coordinator of Safety & Ergonomics Processes EMEA”, he is confronted with health hazards of production and safety issues on a daily basis. His main responsibility is to manage

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<sup>1</sup> The names of all protagonists, companies and brands have been changed.

occupational safety and ergonomic systems throughout the EMEA region. He is responsible for providing expertise, clear direction, information and interpretation to all business units relating international regulatory and production safety standards. In his role, he drives compliance with safety regulatory requirements and company standards through ownership of the processes, objectives and operating discipline and management systems in all applicable regions. One of his biggest challenges is translating corporate goals into individual plant goals. Multiple variables need to be considered because individual plants vary (e.g. age, size, equipment) and regional differences (national safety behavior culture) exist. Kay regularly visits all sites in this region to drive local application of the processes and objectives and to ensure a high safety performance culture. He reports to the Safety and Ergonomics Manager EMEA, and he has functional authority to local Safety Management. The Safety Manager EMEA directly reports to the VP Manufacturing EMEA.

For his job, Kay is required to travel to AMC sites in the UK, Turkey, South Africa, Russia, France, Romania and Germany. This is the part of his job he likes best, as he is interested in and knowledgeable about other cultures, and enjoys the contact with colleagues from various parts of the world. He is well aware of the relevance of his role: his capabilities to influence and stimulate his local counterparts and line managers are as important as the quality of the corporate safety management system (Swuste & Arnoldi, 2003).

Kay makes sure to stay ahead in his profession and is aware of the latest research in his field. This shows that incidents can be reduced by keeping unsafe behaviors under control just in time and place – and not by simply imposing „bureaucratic” regulations on workers and their supervisors (Page-Bottorff, 2016). Though typically perceived as competing goals, performance and safety can be complementary and integrated, especially when ongoing system improvements include employee input (Williams & Roberts, 2018 and McKinsey & Company, 2019). Recent studies in the UK also indicate that hindrance stressors are associated with higher levels of injuries (Clarke, 2012) and that training of supervisors can lead to improvements in perceived employee safety climate (Clarke & Tylor, 2018).

Managers and direct supervisors, Kay is convinced, are key factors as a) their decision-making and allocation of resources affects the organizational safety culture, thus creating a climate that reflects the relative priority given to safety. And b) they have the power and means to support safety behaviors of workers and safety-related feedback among co-workers. Also, c) they serve as important role models for everyday safety behavior – if the supervisor of a team does not wear a hard hat in the hard hat-zone, why would a worker?

When it comes to promoting safety and pushing safety initiatives, Kay is aware that his local counterparts, the local safety managers play a key role. Those projects have made a sustainable difference, where the local safety managers acted as proper “change agents”. This is a challenging role as the person not only needs to be a safety specialist but also needs the abilities to handle complex and unpredictable change projects (Raffaelli 2016). Also, those of his colleagues who succeed well in the challenging projects are particularly good in building sustainable coalitions (Hasle & Jensen, 2006).

### 3. TAJV Plant, Turkey

The TAJV Plant is located in the Turkish Marmara region and is the main global production center for two lines of goods of the AMC 4U brand. TAJV Plant is equally owned by AMC and the Turkish Marmara Holding. The plant was launched in 2001 and consists of two large production compounds, one of which opened in 2001 and the second in 2014. The plant is situated next to the sea and has its own port.

Having started with a production capacity of 40'000 units back in 2001, it has continued to expand over the years and produced 440'000 units as of 2017 year-end.

The TAJV Plant, at the beginning of 2016, was a growing production site which had almost doubled the numbers of employees over the three previous years. Management had invested in the site and was proud not only of its up-to-date machinery but also of its lean „just in time” production methods and the modern job design approaches that included job rotation and a continuous improvement process (CIP) that allows workers to initiate and participate in important decisions regarding their work (see exhibit).

Before its rapid growth, TAJV Plant was leading in safety with a stable production system that integrated occupational safety: safety issues were part of the CIP and figures indicated safety improvements (measured in DARTS<sup>2</sup>) and a reduction in the number of accidents. Then, approximately two years prior to early 2016, the safety numbers showed first a stagnation and then even an increase in accidents. The latest numbers (4th quarter 2015) showed:

- The main reason of occupational work accidents was unsafe behaviors: 85% of injuries were caused by unsafe behaviors.
- Most accidents (80%) at the TAJV Plant occurred in the workshop

Kay remembered previous visits: he had seen pedestrians on the plant site who used neither the pavement nor the zebra crossing on plant roads, although this was standard in AMC. Dialog with leadership had revealed that rules and expectations for safe pedestrian behavior is different in Turkey to what is known in Central Europe and America. Only strong intervention (video cameras were installed) as well as education and training for pedestrians and, of course, truck drivers led to improvements.

### 4. The Challenge

Kay sighed deeply. Just an hour earlier, he had anticipated joining his wife and friends for the traditional joyful Cologne Carnival festivities in the evening, but now suddenly safety statistics and numbers had turned into blood. Neither safety regulations, nor education/training efforts had prevented that tragic accident. He was well aware that his next steps as well as a sound approach to effective change of the safety behavior at the TAJV plant would be crucial for the future compliance and trust in the safety system and him as the manager – and that he would be watched closely by his colleagues in Turkey and his manager in Cologne. Kay pondered his next steps. He knew, he had to fly to Turkey as soon as possible and then invite production supervisors and the safety people to a meeting. He would review the

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<sup>2</sup> acronym for Days Away, Restricted, and/or Transfer Case Incidence; amount of time an injured employee is away from his or her regular job as defined by the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (2019)

official instructions and the positive record in the past, ask for analyses and explanations for the sudden upsurge as well as for their suggestions for improvement.

His main question was how to help the TAJV Plant establish a safe behavior management system (SBMS) that contributes to a safer work environment and help deliver the metrics required. In particular:

1. How can the organizational structure (lean manufacturing) and (national/corporate) culture be considered appropriately in this change project?
2. What is an adequate change management approach, how should the change be implemented?



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## **Appendix: Lean Manufacturing**

The lean manufacturing system at the TAJV Plant is highly orientated toward the Ford Production system (FPS). Here is an illustration of FPS as described in the blog Supply Chain Management (<http://cmuscm.blogspot.com/>):

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*Tuesday, February 19, 2013*

### ***Ford Production System: A Successful Adoption of Lean Manufacturing***

#### *Lean manufacturing history – The Ford System*

*As we known, lean manufacturing, which also refers as Toyota Production System (TPS), is created at Toyota. However, the roots of TPS can be found in Henry Ford's system of line assembly and manufacturing process. In the Ford system they manufactured automobiles in large quantities of standard designs, which made the system highly efficient, delivering a product with low cost.*

*Main idea of the Ford system is the standardized product, which lead to the standard processes. Training of workers became easily, and anyone can work in the Ford plant within no time. All workers have their own duty and only need to perform a specific small part of the full job like tightening a screw or oiling a part. Moving assembly line made it possible to manufacture in the way Ford expects, like workers had to adapt to the speed of the conveyer. This will remove the personal element from the production line. The full system was in a harmonization with the rhythm of the assembly line.*

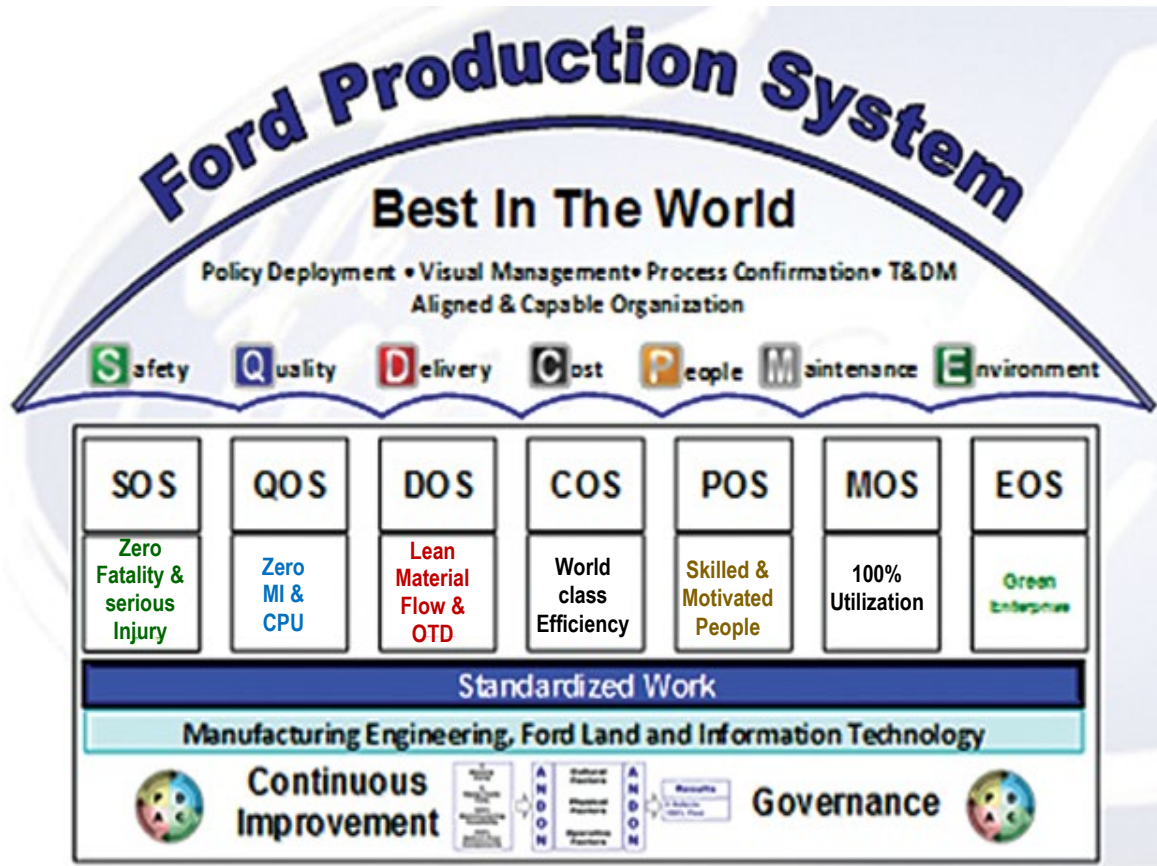
*After learning from Ford system, Toyota identified the problem that standard products could not meet the all customer demands, and then generated the unique Toyota Production System (TPS). Instead of the Ford push system, Toyota created a unique pull system, which then became the backbone of lean manufacturing, to avoid overproduction and meet the diversified customer demands.*

*Lean's fundamental principles developed by Toyota are universally accepted but commonly adapted to each organization or industry. One example of these transformations is Ford Motor Company, indicating the Ford Production System.*

#### *Ford Production System*

*In January 1995, Ford started to develop and implement a new manufacturing system called the Ford Production System (FPS). According to Ford's website, „The vision of FPS is a lean, flexible and disciplined common production system, defined by a set of principles and processes, that employs groups of capable and empowered people, learning and working safely together, in the production and delivery of products that consistently exceed customers' expectations in quality, cost and time.“ By implementing FPS, Ford attempted to transform itself from mass production system to lean manufacturing system.*

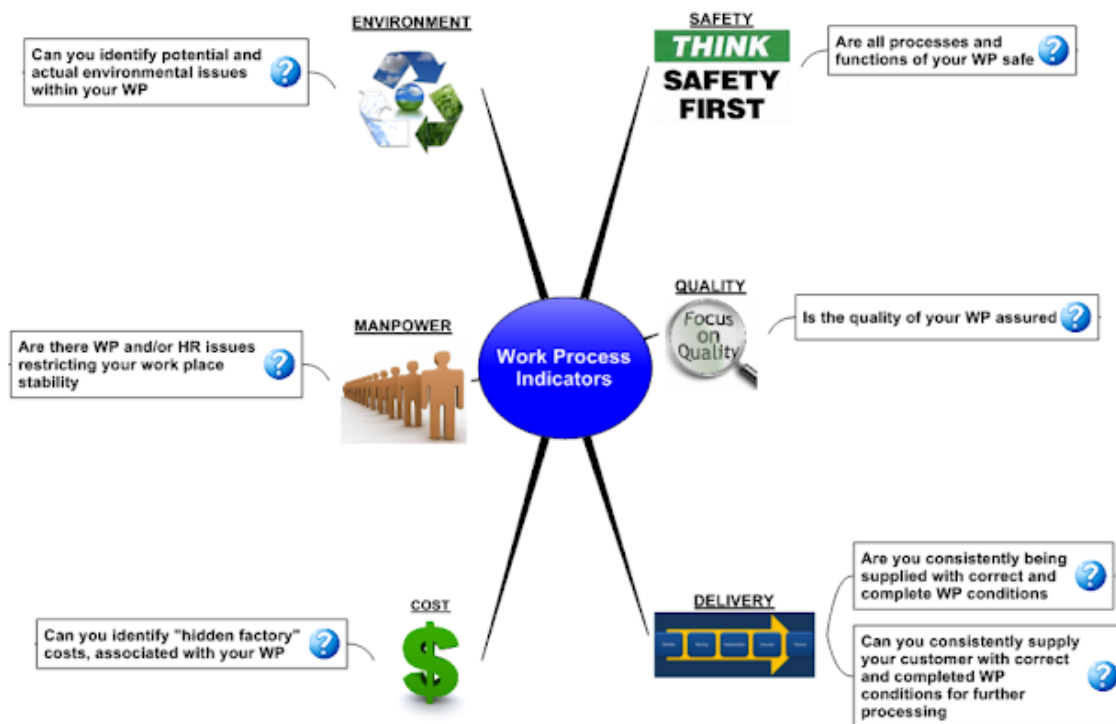
By utilizing policy deployment, visual management, process confirmation as well as time and data management, FPS promises a more aligned and capable organization, which will be continually improving and ultimately building better manufacturing environments in the future. The image below is the revised Manufacturing Umbrella.



**Fig. 1.** The FPS Manufacturing Umbrella overarching its 7 Operating Systems (OS)

The FPS Continuous Improvement Model is the foundation for all manufacturing operations. It is a ten step process that is aimed at continually improved processes through standardization and recognition. The model looks for creating stability to inputs, normalize processes, and seeking change (if necessary) for outputs. The ten FPS Continuous Improvement Model Processes are:

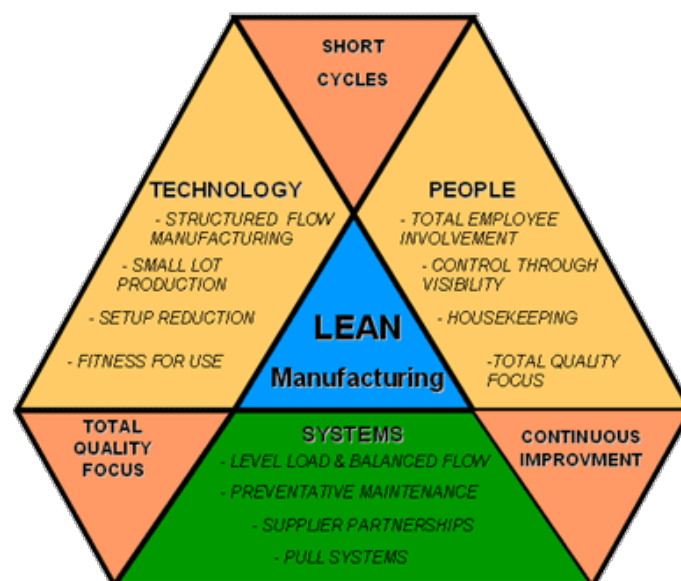
1. Continuous Improvement Board
2. Start-up Confirmation
3. Results Process
4. Support Process
5. Time Management
6. Data Management
7. Basic Administration
8. Kaizen
9. Standardized Work
10. Star Points



**Fig. 2.** Indicators for assessing the work process (WP)

### *Lean Manufacturing in Practice*

Lean manufacturing aimed at bringing together people, material and mechanical resources at the right time to accomplish the job, while reducing cost and bring continuous improvement. It strived to eliminate seven kinds of waste including waste from over production, waste of waiting time, transportation waste, processing waste, inventory waste, waste of motion and waste from product defects.



**Fig. 3.** Key aspects of Lean Manufacturing