FOUR PRINCIPLES
An Abdul Latif Jameel Company

LEAN INDUSTRY 4.0

WHAT IS INDUSTRY 4.0?

Industry 4.0 refers to the fourth industrial revolution. It is the use of advanced digital technologies to radically improve both efficiency and effectiveness of industrial and non-industrial operations.

The foundation of 'Jidoka' or Automation is laid by Sakichi Toyoda in 1896 and moved forward by Lean practitioners applying new technologies

自働化*

Lean progression through industrial evolution

1896

1784
Initial mechanisation through water and steam powered machines

1870
Mass production, interchangeable parts and assembly powered machines

1969
Individualized production through computer automation and/or automated machines

2011
Cyber physical systems capable of real-time planning and control of production plants, along with dynamic self-optimization through the Internet of Things with minimum human intervention

*Jidoka or Automation is a pillar of Lean and the Toyota Production System that puts humans in the center, using technology to enable customers & employees who serve them.

WHY DOES COMBINING LEAN AND INDUSTRY 4.0 MAKE SENSE?

Lean provides the essential elements for enabling the successful implementation of Industry 4.0, while Industry 4.0 provides the tools to maximize the impact of Lean improvements.

INDUSTRY 4.0 ELEMENTS

- Real-time information
- Unique specifications per product
- Intra-machine communication
- Adaptive demand and supply planning
- SMART OPERATOR
- SMART PRODUCT
- SMART MACHINE
- SMART PLANNER

LEAN ELEMENTS

- VALUE FOCUS — Focus on customer value
- PEOPLE CENTRIC — Jidoka (human centered approach)
- TRANSPARENCY — Performance made transparent by all
- CONTINUOUS IMPROVEMENT — Culture backed by process

40%

INDUSTRY 4.0 ONLY	LEAN INDUSTRY 4.0	LEAN WITHOUT AUTOMATION & DIGITIZATION
13%	48%	18%
Low implementation	Leans on Industry 4.0	Only implemented lean

Extra 9% through mutually enabling integrated approach

Combining the elements of both Industry 4.0 and Lean increases the return on investment and decreases implementation risks.

WHAT IS THE RATE OF INDUSTRY 4.0 ADOPTION IN KSA COMPARED TO OTHER COUNTRIES?

Even though the worldwide market is advancing, the investment in digitalization in KSA currently lags the leading markets by between 25% and 50%.

+4.1%

By implementing Industry 4.0, companies in leading markets increase manufacturing efficiency by an average of 4.1% annually

*Year over year

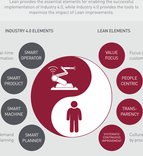
HOW IS INDUSTRIAL DEMAND IN KSA EXPECTED TO DEVELOP IN THE COMING YEARS?

There will be a shortfall of more than 5% in expected consumer spending growth up to 2020, consumer spending being a good proxy for industrial demand

-1.7%

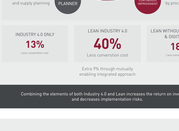
Research products that due to recent changes in KSA consumer spending growth will be only 1.8% up to 2020 falling short of the previously expected 7%

*Year over year



WHAT DO THESE TRENDS MEAN FOR INDUSTRIAL COMPANIES IN KSA?

Due to the compound effect of efficiency gains from applying Industry 4.0 and increasing market competition, non adopters will very quickly find themselves left behind



WHICH COMPANIES HAVE SUCCEEDED USING A LEAN INDUSTRY 4.0 APPROACH?

The biggest challenges in implementing Lean Industry 4.0 center around internal issues such as culture, organization, leadership and skills rather than external and funding issues.

adidas

Using Lean Industry 4.0, Adidas reduced the time-to-market every year by 50%

1st	160	15%
In company now to utilize robotics and 3D printing in the footwear Industry 4.0	Machines now producing 1,000 pairs of shoes a day or 500,000 annually	Expected increase in sales due to Lean Industry 4.0 processes

Lean Industry 4.0 helped in the turn-around of the company to achieve the highest growth rates and profitability metrics in the sector

Harley-Davidson

97%	50%	91%
Reduced manufacturing lead time from 21 to just days cycle in 6 hours	Reduced Industry 4.0 the efficiency achieved flexibility to handle 30% fluctuation in production annually	Improvement in overall manufacturing productivity over 5 years

GE

GE invested $2 billion in reshaping it's plants using Lean Industry 4.0 with six sigma tools and processes.

80%*	30%*	100M*
Reduced required production area by 80% and increased efficiency per sqm on plant production line	Increased labour efficiency by 30% on plant production line	Yearly savings in production worldwide

*Performance improvements 2014 vs. 2016

General Electric

Factory budgets have been increased by 20% to modernize production according to Lean Industry 4.0 standards

25 years	21M	3.7M
Our 25 year operations have been made to ensure the company is 'connected enterprises' level	Achieved USD 21M savings from reduction of waste material after modernization to Industry 4.0	Evaluating Lean and Industry 4.0 approached energy savings of 4% resulting in USD 3.7M annual savings

SIEMENS

'sandbuoyantes', paperless data exchange reduced lead times & increased quality within processes

75%	100%	96%
Automation rate in pilot factory producing over 12 million units per year	99 PRIMERS of produced products are made using the quality standards	Reduced lead time in production process from 120min to 5min due to improved data exchange

HOW CAN FOUR PRINCIPLES HELP WITH THE CHALLENGES IN IMPLEMENTING LEAN INDUSTRY 4.0?

Four Principles has both the methods and experience to support companies in both laying the groundwork, applying the technology and driving the change to get the maximum benefit from Lean Industry 4.0.

7 INDUSTRY 4.0 COMMON CHALLENGES

- Lack of digital culture, training and skills
- Large investment without clear financial benefits
- Hidden costs due to digitizing waste
- Lack of adequate maintenance programs
- Machine centric, Excluding the human factor
- Unclear digital operations management and standards
- Incapability to integrate with business partners
- Silo mentality
- Lack of systematic continuous improvement

LEAN INDUSTRY 4.0 FRAMEWORK

THE FOUR PRINCIPLES PHASES OF LEAN INDUSTRY 4.0 IMPLEMENTATION

1. MATURITY ASSESSMENT	2. DEFINE REQUIREMENTS & SOLUTIONS	3. PILOT & BUILD RESILIENCE	4. IMPLEMENT & ADAPT SOLUTIONS
Assess each Industry 4.0 element against each Lean element	Define how & where Lean Industry 4.0 'Use Cases' can support both customer and staff	Develop solutions and challenge them in pilot phases and use cases	Successful solutions are implemented and assessed continuously to ensure efficiency and effectiveness

WHAT RESULTS HAS FOUR PRINCIPLES ACHIEVED IN IMPLEMENTING LEAN INDUSTRY 4.0?

Using our Lean Industry 4.0 framework and implementation approach, Four Principles has enabled clients in the region to achieve significant results.

Projects averages of Lean Industry 4.0 implementation success stories

-37%
Overall Time to Market Reduction

32%	41%	85%
Supplier to factory and factory to customer	Factory conversion	Data transfer and migration

+28%
Overall Productivity Increase

19%	34%	27%
Reporting cycles and real-time data availability	Standardization	Digitalization and automation of necessary non-value added activities

+56%
Overall Capacity Increase

43%	46%	27%
Centralized processes and touchpoints	Mechanical and digital changeover reduction	Stoppage time, layout, and material/informational flow

-14%
Overall Realized Cost Savings

43%	21%	13%
New product development	Conversions productivity, FTE and lead time	Maintenance and quality