ITMAM Reports

Report No. 8

ITMAM Consultancy

Fourth Industrial Revolution (Industry 4.0) Report 2-4

The impact of adopting emerging technology solutions in the industrial sector and logistics services

Title of the first report 1-4

The Fourth Industrial Revolution (Origin and Future)

Title of the second report 2-4

The impact of Emerging Technologies Adoption in Industrial and Logistics Sector

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An analytical study on the Fourth Industrial Revolution (facts and opportunities)

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Study of the readiness of the industrial sector for the fourth industrial revolution

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Introduction to Emerging Technologies Adoption in Industrial and Logistics Sector

Adoption of emerging technologies in the industrial and logistics sector represents a vital part of Industry 4.0, where companies and factories seek to exploit technological innovation to improve productivity, quality, and reduce costs. The Kingdom, through Saudi Vision 2030, supports and empowers the industrial and logistics sector through the National Industrial Development and Logistics Program (NIDLP).

The National Industrial Strategy was also launched, which secures global supply chains and exports high-tech products to the world, through programs such as "Made in Saudi", which enhances local content in oil and non-oil sectors, and paves the way for industry 0.4 in the Kingdom, where new technologies are harnessed to serve society.

SAUDI MADE

Overview of Made in Saudi Program

“Made in Saudi” program encourages local companies and factories to expand their business, take advantage of the program's benefits to market their products to a larger number of customers, and connect with consumers interested in Saudi products and companies.

The industrial and logistics sector is witnessing a massive digital revolution known as the "Fourth Industrial Revolution" or "Industry 4.0". This revolution relies on emerging technologies such as AI, IoT, and robotics, and it is causing disruptive changes across all sectors, including the industrial and logistics sector. Therefore, defining digital transformation is necessary for Saudi companies and factories to keep pace with these developments and take advantage of the opportunities they provide.

An overall mechanism for enhancing adoption of emerging technologies in the industrial and logistics sector has been identified, including a simplified explanation of the methodologies that would enable utilizing it and practical examples that help enrich the results of technology adoption across five phases:

01 Phase 1: Learning about emerging technologies:

At this phase, companies and factories conduct research to identify the most pressing and impactful challenges at the level of internal operations aiming to define the required emerging technologies that may be beneficial to their industrial processes using the following methods and methodologies:

Gap Analysis: Gap analysis helps define the gap between current and desired state in relation to adoption of emerging technologies. Areas for improvement can be defined and a plan can be developed to bridge the gap.

Fishbone diagram: The methodology helps define the root causes hindering the flow of internal processes in the factory by defining the general problem, then delving into its causes until reaching the problem origin.

Five Whys (5Whys): Through this methodology, the key causes of a malfunction or challenge can be identified by asking "why" five times to reach the root cause.

For example, after identifying the challenges and their causes, companies and factories can use tools such as industrial magazines, tech conferences, and communication with tech companies and factories to obtain information about the latest developments in specific areas to solve and address these challenges, such as artificial intelligence, big data analytics, and smart manufacturing.

02 Phase 2: Evaluation and testing:

At this phase, companies and factories evaluate the potential benefits and impact of applying emerging technologies in their operations based on the challenges they identified in the previous phase, such as using the following methodologies:

Cost & Benefits Comparison: An assessment of the impact resulting from the implementation of technical solution and comparison of benefit rate with the costs incurred by companies and factories before and after technical solution implementation.

ROI Analysis: ROI analysis is an important process for evaluating viability of investment in emerging technologies.

For example, a manufacturing company conducts feasibility studies to define if technologies such as 3D printing can reduce production costs and shorten lead times.

03 Phase 3: Investment and implementation:

At this phase, companies and factories make the decision to invest in application of emerging technologies that have been studied and tested.

For example, companies and factories purchase new tools such as 3D printers or AI software and implement them in their daily operations.

04 Phase 4: Training and development:

At this phase, companies and factories train employees to use the newly adopted technologies and understand how they integrate into the company's operations.

For example, companies and factories organize training courses for employees on how to use robots in manufacturing operations or how to analyze data using AI techniques.

05 Phase 5: Performance monitoring and continuous improvement:

At this phase, companies and factories monitor the performance of implemented technologies and analyze data to identify areas for improvement.

For example, companies and factories can use techniques like data analysis to track the performance of 3D printers and define areas that can be improved to increase productivity and reduce waste.

These steps represent a comprehensive path for adoption of emerging technologies in the industrial and logistics sectors, focusing on analysis, evaluation, training, and continuous improvement to ensure success and ongoing development.

Key factors of need for the industrial and logistics sector to adopt emerging technologies

1. Increase efficiency and improve productivity:

By utilizing digital technologies such as AI, IoT, and big data analytics, companies and factories can significantly improve their operations and increase productivity, leading to resource conservation and cost reduction.

2. Cost reduction:

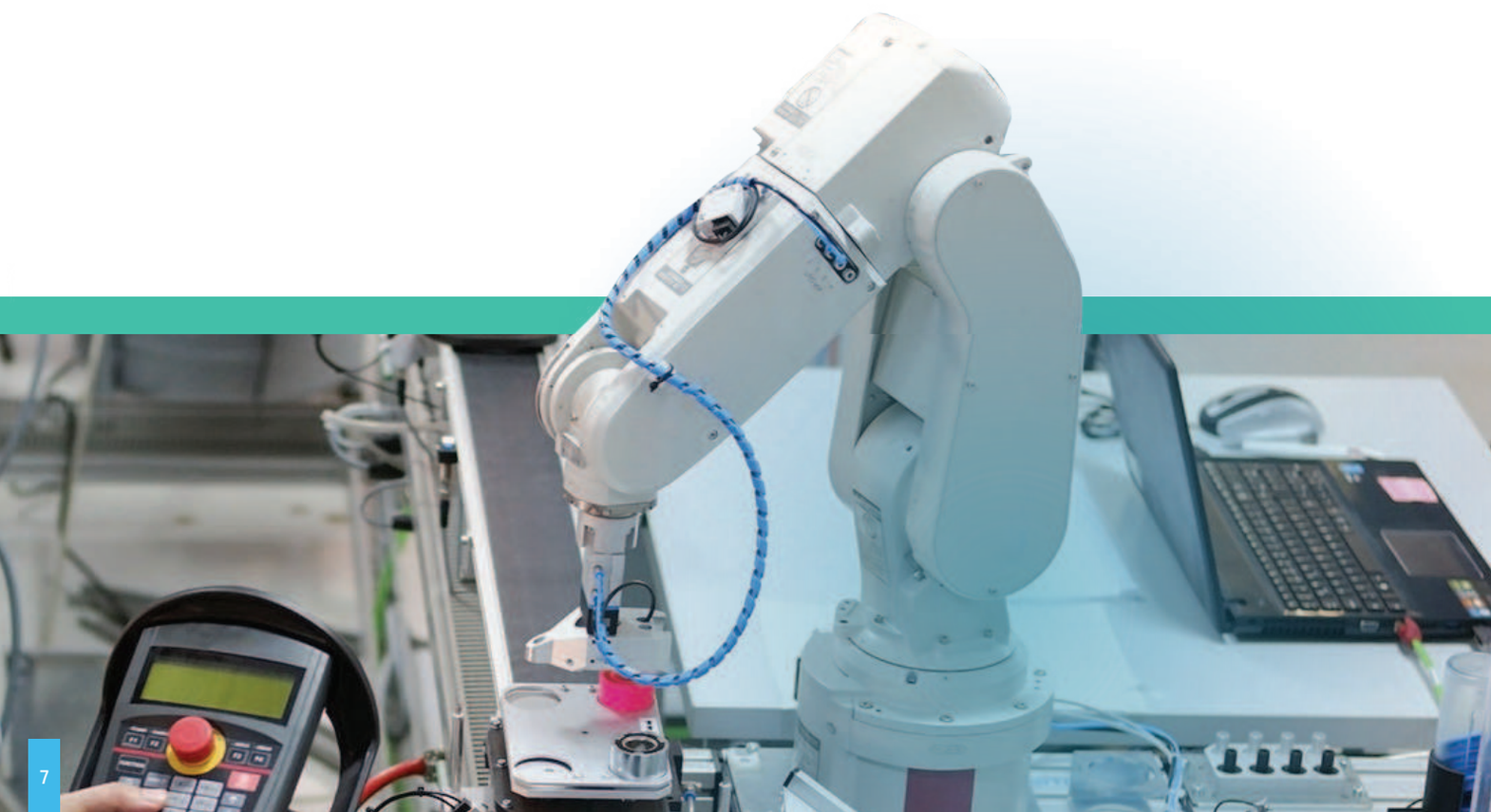
By utilizing digital technologies, companies and factories can reduce operational costs, whether through intelligent automation of processes, reduction of production waste or management.

3. Improve quality and operations control:

By utilizing digital transformation, companies and factories can better monitor and analyze operations, enabling them to enhance products quality and reduce errors or defects.

4. Meeting customer expectations:

Today, customers expect high-quality and personalized products and services, and digital transformation can help companies and factories meet these expectations by providing customized products based on data analytics and customer needs.



5. Improving competitiveness:

Digital technologies are a critical factor in enhancing companies and factories' competitiveness in a rapidly changing market. Companies and factories that better adopt digital transformation are often more adaptable and successful.

6. Environmental sustainability trends:

Digital transformation can contribute to improving sustainability of industrial operations and reducing negative environmental impact by monitoring resource consumption and improving energy efficiency.

7. Better use of data:

Digital transformation can allow the efficient collection and analysis of massive amounts of data, enabling companies and factories to make more accurate and intelligent decisions based on data and analytics.

> In general, digital transformation represents a significant opportunity for industrial companies to increase their competitiveness and operations, and better meet market needs.

Examples of the most prominent challenges in the industrial and logistics sectors that can be solved using emerging technologies

The industrial and logistics sector face many challenges that can be overcome through usage of modern technologies. Below are some of the biggest challenges and how to address them using technology:

1. Improve productivity and efficiency:

Technologies such as AI, recycling, and IoT can help improve worker productivity and enhance efficiency of industrial operations by analyzing data and operating processes more effectively.

Siemens

Application: Siemens has developed its "Amberg" factory in Germany to be a fully integrated digital factory that uses IoT and AI to improve efficiency and productivity.

Results: Increase productivity by 75% and reduce costs by 20%.

2. Cost reduction and profit maximization:

By using big data analytics, companies and factories can analyze data to identify factors that affect production costs and develop strategies to reduce them and increase profitability.

General Electric "GE"

Application: GE utilizes digital twin technology to analyze and provide accurate digital models of machines and equipment.

Results: These technologies helped reduce unplanned downtime and improve process efficiency, resulting in annual savings of millions of dollars.

3. Rapid changes in demand and market:

Big data analytics and machine learning can help industrial companies understand market trends and demand forecasts more accurately, helping them adapt to rapid market changes.

Dassault Systèmes

Application: Dassault Systèmes uses big data analytics and predictive models to analyze big data and identify future trends.

Results:Dassault Systèmes was able to improve forecast accuracy by 20% and quickly adapt to market changes.

4. Meeting customer expectations:

Through analyzing customer data and using smart technology such as augmented reality and virtual reality, industrial companies can better meet customer expectations by offering customized products and excellent experiences.

Volkswagen

Application: Volkswagen uses machine learning to analyze production data and improve predictive maintenance operations.

Results:T his helped improve customer experience and increase customer satisfaction by 25%.

5. Reducing errors and defects in production:

By using technologies such as robotics and automated data processing, errors and defects in production can be reduced and quality of products can be improved.

6. Supply Chain Security:

By utilizing big data analytics and blockchain technologies, supply chain management can be improved and products can be tracked from their sources to their customers more securely and

7. Lack of skills and training:

Virtual reality and augmented reality can provide realistic training and educational experiences for employees in the industrial sector, facilitating the training operation and increasing its effectiveness.

Bosch

Application: Bosch utilizes virtual reality and augmented reality technologies to train new employees on how to use machinery and equipment safely and effectively.

Results: This led to a 40% reduction in training time and a 30% increase in trainee efficiency.

Use cases and global success stories of emerging technologies

Tesla

Tesla is a leading electric vehicle and emerging technology company. Tesla utilizes big data analytics and AI to enhance the performance of car batteries and provide innovative driving experiences through the Autopilot feature.

SpaceX

SpaceX utilizes emerging technologies like 3D printing and AI in development and manufacturing of space rockets and spacecraft. This helps reduce costs and increase the efficiency of space launch operations.

Volkswagen

Volkswagen uses machine learning to analyze production data and improve predictive maintenance operations. Smart robots are also used in production lines to increase efficiency.

Results: This led to a significant reduction in operational costs and a significant increase in productivity.

General Electric (GE)

GE uses digital twin technology to analyze and provide accurate digital models of machinery and equipment. This enables them to perform predictive maintenance and improve equipment performance.

Results: These technologies have helped reduce unplanned downtime and improve operational efficiency, resulting in annual savings of millions of dollars.

BMW

In BMW factories, advanced robots and 3D printing are used to manufacture parts with high precision and efficiency. Machine learning techniques are also used to analyze production data and continuously improve processes.

Results: These innovations have helped reduce production time and increase the quality of final products.

Royal Dutch Shell

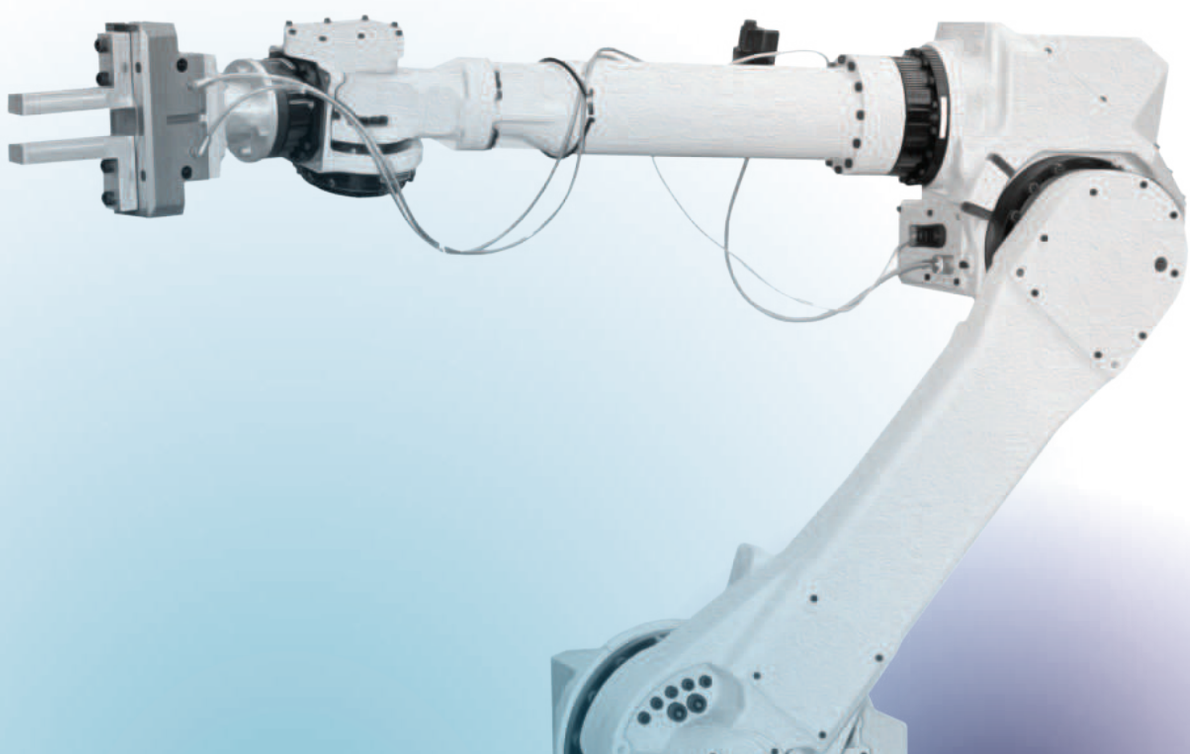
Shell uses augmented reality technologies to train employees at upstream sites. In addition, AI is used to analyze big data related to upstream operations.

Results: These technologies have helped improve safety, productivity and significantly reduce operating costs.

Bosch

Bosch applies the concept of "Industry 4.0" in its factories, where machines and systems are connected via IoT and data is analyzed using AI to improve operational efficiency.

Results: These efforts have resulted in improved production flexibility, increased energy efficiency and reduced waste.



Local use cases and success stories of emerging technologies 2-1

Case study: Automation transformation at Maram Feed Mill

Background

Maram Feed Mill was established in 2009 with an initial production capacity of 7.5 tons, aiming to meet the growing demand for animal feed. Over the years, Maram Feed Mill has undergone significant expansion, with its production capacity increasing to 150 tons per hour, equivalent to more than 300,000 tons of fish feed and more than one million tons of livestock feed annually. This expansion has solidified Maram's position as a major supplier, meeting more than 90% of the needs of fish farms in the Kingdom and exporting its products to GCC, Arab, African and Asian countries.

Challenge

Despite this expansion, the manual filling process remained a bottleneck for efficiency, requiring two shifts to meet daily production targets and relying heavily on labor. This limited efficiency in manual processes highlighted the need for modernization to maintain competitiveness and align with Vision 2030, which focuses on innovation and industrial advancement.

Solution

Recognizing the potential benefits of automation, the Factory Management decided to automate the Packaging Department. This project was completed within three months and included the implementation of automated systems for filling, packaging and transporting products. The transformation resulted in reducing the number of workers in the packaging area by 96% and eliminating the costs of a full shift, enabling the factory to achieve its daily production targets in one shift instead of two.

Results

Automating the packaging operation in Maram Feed Mill led to significant improvements in operational efficiency and economic feasibility with a 25% increase in profit. Technology utilized not only reduces labor costs but also improves the accuracy and speed of packaging operations, thereby boosting overall productivity. The Mill's success in automating the packaging area is a model for industrial innovation and supports the broader goals of Vision 2030.

Local use cases and success stories of emerging technologies 2-2

Case study: Quality Control and Operations Management at Riyadh Cables Group Company

Background

The Company is considered one of the leading companies in the manufacture of electrical, power, and telecommunications cables. The Company employs more than 1,000 Saudi male and female employees, and it is committed to meeting the needs of local and global markets with local content reaching 39%.

Challenge

Initially, Riyadh Cables was facing challenges in achieving production efficiency and reducing human errors, which affected product quality and customer satisfaction. In addition, there was a need to increase planning efficiency and improve the overall performance of resources and equipment.

Solution

1. Operations Automation:

- Comprehensive development projects were implemented within the Factory to automate the production process, resulting in a 7% improvement in quality.
- Adoption of advanced planning systems like APO, a part of SAP system, has contributed to a 16% increase in equipment efficiency and a 70% reduction in customer processing requests.

2. Investment in technology:

- Investment in high and low voltage systems up to 500 kV with 11% increase in productivity while reducing unskilled labor.
- Investment in world-class laboratories to ensure product quality and reduce waste.

3.Employees development:

- Provide training programs to upskill employees and enable them to manage, operate, and develop new solutions.
- Develop a stimulating work environment that encourages innovation and development.

4. Improve data management:

Provide accurate and up-to-date reports to employees to improve decision making.

Results

The solutions at Riyadh Cables led to significant improvements in production quality, waste reduction, increased equipment efficiency and customer satisfaction, in addition to enhancing employee skills and their ability to innovate.

Introduction to the mechanism for assessing the factory's need for digital transformation (SIRI)

Introduction to the mechanism for assessing the factory's need for digital transformation

Smart Industry Readiness Index

A comprehensive framework designed to help companies and factories assess their readiness for digital transformation and adopt Industry 4. This index was developed by Singapore Economic Development Board (EDB), in collaboration with industry experts, and aims to provide a structured approach through which companies and factories can assess their current capabilities and identify areas that need improvement in their digital transformation journey.

Components of Smart Industry Readiness Index

It consists of three foundations:

Organization

Examines human and organizational aspects, including workforce skills, leadership, and company culture.

Technology

Evaluates digital and technological infrastructure, such as automation, data analytics, and connectivity.

Operations

This section focuses on the operational aspects of manufacturing, including production processes, supply chain management, and quality control.

Assessment Framework

Smart Factory Readiness Assessment (SIRI)

Main themes

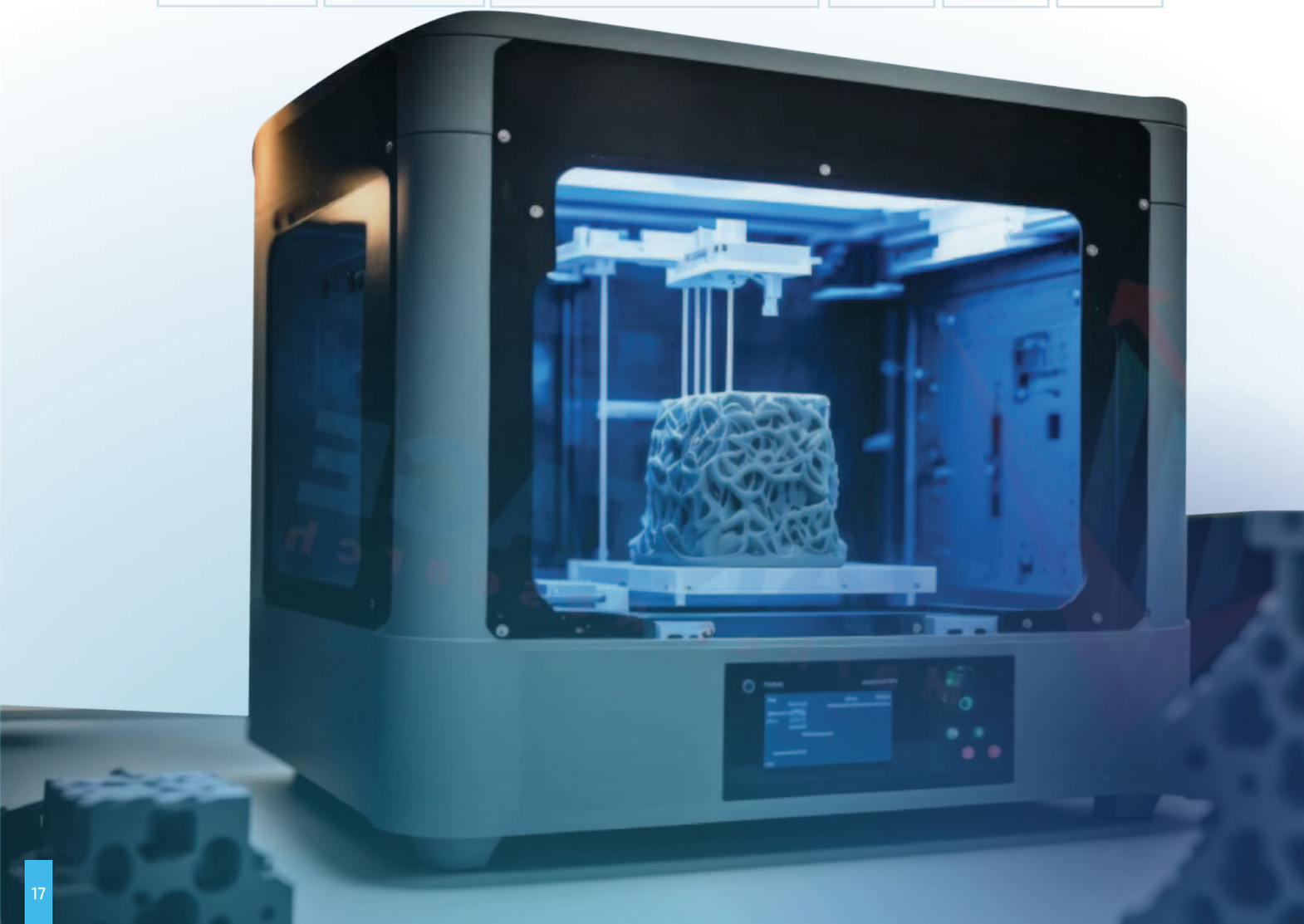
- Organization
- Technology
- Operations

Sub-sections

- Structure and management
- Workforce readiness
- AI
- Connectivity
- Automation
- Product lifecycle
- Supply chains
- Operation

Dimensions

- Facility's internal and external cooperation
- Workforce training and development
- Manufacturing area
- Management
- Facilities
- Strategy and governance
- Leadership competence
- Product lifecycle integration
- Horizontal integration of operations
- Vertical integration of operations



The usefulness of Smart Industry Readiness Index methodology

01 **Comprehensive evaluation of different aspects:**

Helps companies and factories evaluate their level of readiness for digital transformation across various dimensions of manufacturing.

02 **Identify strengths and weaknesses:**

The Index provides companies and factories with the ability to identify the strengths and weaknesses of their current infrastructure and operations.

03 **Roadmap for Digital Transformation:**

It allows companies and factories to develop a clear and customized roadmap for digital transformation, including practical steps and implementation phases based on the results obtained from the evaluation.

04 **Decision making support:**

The Index provides accurate data and benchmarks that support strategic decision-making related to investments in technology and operational improvements.

05 **Compliance with international standards:**

Companies and factories can utilize SIRI to align their operations with global best practices and standards in the field of smart manufacturing.

06 **Strategic guidance:**

SIRI helps companies and factories identify strategic priorities and invest in areas having the most positive impact on production efficiency and digital transformation.

07 **Performance comparison:**

SIRI enables companies and factories to compare their performance with global industry standards, providing a clear view of their market position.

08 **Stimulating innovation:**

Siri encourages companies and factories to adopt new technologies and innovate in their operations, helping them to remain competitive in the global market.

09 **Risk Management:**

SIRI helps identify potential risks related to the digital transformation, enabling companies and factories to take appropriate preventive measures.

10 **Effective integration:**

SIRI enables companies and factories to understand how to integrate digital processes with traditional processes, contributing to a smooth and efficient transformation

This report is provided by:

ITMAM Consultancy

iiot solutions

Through its partnership with **IIOT**, Itmam Consultancy has the first platform to evaluate factories and provide a detailed transformation plan based on SIRI evaluation results in an automated manner and as part of the services provided to customers.

Itmam Consultancy, in partnership with **IIOT** , has evaluated more than 500 factories since the beginning of 2023. The two companies also aspire to contribute to achieving the target of the industrial and logistics sector strategy by evaluating more than 1500 factories by the end of 2025.

References

This report was translated with the professional support of Tarjama.

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About Tarjama:

Founded in 2008, Tarjama is the leading localization and language solutions technology provider in MENA, serving over 700 clients. We combine AI, advanced machine translation, and human expertise to deliver top-quality services. By developing large language models (LLMs) and leveraging cutting-edge technology, we bridge language barriers and create seamless communications, making us the go-to partner for businesses aiming to thrive in a global market.

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