

Industry 4.0 Knowledge Assessment Questionnaire

Prepared by the Shyfte Project Team

A. Company Information

1. Name of your company

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2. Category of the company (You can select more than one)

Agriculture, hunting and forestry	
Mining and quarrying	
Manufacturing	
Electricity, gas and water supply	
Construction	
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	
Hotels and restaurants	
Transport, storage and communications	
Financial intermediation	
Real estate, renting and business activities	
Public administration and defence; compulsory social security	
Education	
Health and social work	
Others (Please specify)	

3. Where is your company located? Select country

Malaysia	
China	
Thailand	

4. Please select your Company Capital

1 = (< €0.5 Million)	
2 = (> €5 < €15 Million)	
3 = (> 15Million)	

5. The size of your company (number of employees)

1 = (Up to 20 employees)	
2 = (From 20 to 99 employees)	
3 = (More than 100 employees)	

B. Information About Interviewee

6. Select your position in the company

Chief Executive Officer	
Chief Information Officer	
Chief Finance Office	
Chief Operating Officer	
Director	
Manager	
Engineer	
Developer	
Designer	
Others (Please Specify)	

C. Digital transformation

7. Rank the vision of the digital transformation of your company

1 = (There is no vision)	
2 = (Low)	
3 = (Medium-high)	
4 = (Medium-Low)	
5 = (Broad)	

D. Adoption Plan of Industry 4.0

8. Have you heard the term Industry 4.0?

Yes	
No	

9. Level of importance of these Industry 4.0 technologies for your organization
(1 = No; 2 = Basic; 3 = Intermediate; 4 = High; 5 = Advanced)

Technology	Level				
	1	2	3	4	5
Virtual/Augmented Reality					
Robotics/Automation					
Cyber Physical Systems					
Collaborative robotics					
Internet of Things					
Wireless Technologies					
Big Data/Data Science					
Cloud computing					
Cybersecurity					
Additive manufacturing (3D printing)					
Simulation systems					
Nanotechnology					
Smart materials					

10. To what extent is Industry 4.0 technologies established and implemented in your company's strategy?

1 = (Not at all)	
2 = (Low Level)	
3 = (Medium - Low Level)	
4 = (Medium - high Level)	
5 = (High Level)	

11. In the case of no Industry 4.0 technology has been adopted, rank the level of willingness of your company to adopt one or more of it.

1 = (There is no vision)	
2 = (Low)	
3 = (Medium-Low)	
4 = (Medium-high)	
5 = (High Level)	

12. How would you rate the importance on the following Skills among your employees (1 = not important; 2 = less important; 3 = just important; 4 = very important; 5 = very very important)

COMPETENCE	VALUE				
	1	2	3	4	5
Interdisciplinary					
Team building					
Leadership					
Autonomy, responsibility, adaptability, proactivity					
Fast and focused decision making / problem solving					
Interpersonal relationship / empathy					
Intrapersonal relationship / emotional intelligence					
Ability to work in a group					
Infographic communication					
Digital communication					

E. Experts and Their Skills

13. What can be the importance of deploying a team of experts for adopting Industry 4.0 technologies?

1 (Yes)	
2 (Decided but not deployed yet)	
0 (No)	

14. How do you assess the skills of your employee of the industry 4.0 technologies (1 = Not relevant; 2 = Non-existent; 3 = Existing but inadequate; 4 = Adequate 5 = Substantial)

	VALUE				
	1	2	3	4	5
Virtual/Augmented Reality					
Robotics/Automation					
Cyber Physical Systems					
Collaborative robotics					
Internet of Things					
Wireless Technologies					
Big Data/Data Science					
Cloud computing					
Cybersecurity					
Additive manufacturing (3D printing)					
Simulation systems					
Nanotechnology					
Smart materials					

G. Wireless Networks and Analytics:

15. What is the most frequent technologies you use in wireless networks?

5 = 5G and beyond	
4 = IoT	
3 = LoRa or NB-IoT	
2 = Satellite communications	
1 = Not applicable	

H. Data Engineering and Data Analytics Questions

16. Select the type of data your company have.

Structured data (e.g., tables)	
Unstructured data (e.g., image, text)	
Quasi-structured data (e.g., clicks on website)	
Semi-structured data (XML)	
Graph data (e.g., RDF graph)	

17. Select the type of technology your company uses/needs for data management and governance?

Data Warehouse (E.g., Oracle Exadata for data warehouse)	
Data Lake (e.g., Hadoop)	
Others (Please Specify)	

18. What type of data engineering tasks your uses/needs?

Data Acquisition (Collection) in a batch	
Data Acquisition (Collection) in real-time	
Pre-Processing	
Processing Data in Realtime	
Processing Data in a batch	

19. What types of data analytics your company uses/needs?

Descriptive Analytics (E.g., looking backward, detecting pattern,)	
Exploratory Analytics (E.g., Spot Anomalies,)	
Causal/Diagnostic analytics (E.g., Discover a cause or causal relationship)	
Predictive Analytics (E.g., forward looking, forecast future state relationship,)	
Prescriptive analytics (E.g., optimal decision for future decision, optimization and decision rules for future events)	

20. What is the programming language your company uses/needs for data engineering and development of analytics?

Python	
Java	
C++	
Scala	
R	
Other (Please Specify)	

I. Industrial Engineering and Management

21. Select the type of technology/software your company currently uses and needs to implement?

Industry 4.0	Technology/Software	Use (Existing implementation)		Need (Willing to implement in the future)	
		Yes	No	Yes	No
1. IoT and related technologies	RFID				
	Wireless Sensor Networks				
	Ubiquitous computing				
2. Cloud computing	Virtualization technology				
	Manufacturing as a service				
3. Cyber-physical systems	Seamless integration of computational algorithms and physical components				
	Internet of Things (IoT)				
	Smart & Connected Communities (S&CC)				
4. Additive manufacturing (Industrial integration, enterprise architecture and enterprise application integration)	Service-oriented architecture				
	Business process management				
	Information integration and interoperability				
5. Others (Please Specify)					

Source: adapted from Xu et al. (2018)

22. In which parts of your company have you invested in the implementation of industry 4.0 in the past 2 years, and what are your plans for the future in the next 5 years?

	In in the past 2 years				Investments in the next 5 years			
	Small	Medium	Large	None	Small	Medium	Large	None
R&D								
Production/Manufacturing								
Purchasing								
Logistics/transportation								
Marketing & Sales								
Service								
IT								
Human resource management								

23. What are the skills requirement for skills development regarding Industry 4.0 for industrial engineering and management domain?

Skills	Very Low	Low	Moderate	High	Very High
1. Knowledge about ICT					
1.1 Basic information technology knowledge					
1.2 Ability to use and interact with computes and smart machines like robots, tablets etc.					
1.3 Understanding machine to machine communication, IT security & data protection					
2. Ability to work with data					
2.1 Ability to process and analyze data and information obtained from machines					
2.2 Understanding visual data output & making decisions					
2.3 Basic statistical knowledge					
3. Technical know-how					
3.1 Inter-disciplinary & generic knowledge about technology					
3.2 Specialized knowledge about manufacturing activities and processes in place					
3.3 Technical know-how of machines to carry out maintenance related activities					

4. Personal Skills					
4.1 Adaptability and ability to change					
4.2 Decision making					
4.3 Working in a team					
4.4 Communication skills					
4.5 Mindset change for lifelong learning					

L. Artificial Intelligence (AI)

24. Select the type of Artificial Intelligence (AI) system that your company have.

e-Commerce (placing/receiving/processing order)	
Autonomous trucks/robot picking/packing system	
Human Resource Management (Personnel data)	
Biometrics attendance	
Robot involvement for repetitive/dangerous task	
Others: please specify	

25. Select the type of technology your company uses/needs to implement Artificial Intelligence (AI)?

Natural Language Generation	
Speech Recognition	
Virtual Agents	
Machine Learning Platforms	
AI-optimized Hardware	
Decision Management	
Deep Learning Platforms	
Biometrics	
Robotic Process Automation	
Text Analytics and Natural Language Processing (NLP)	
Image Recognition	
Others: please specify	

26. What types of Artificial Intelligence (AI) algorithm that your company uses/needs?

Machine Learning	
Deep Learning	
Convolutional Neural Networks (CNNs)	
Recurrent Neural Networks (RNNs)	
Reinforcement Learning	
Generative Adversarial Network	
Others : Please specify:	

27. What is the programming language your company uses/needs for Artificial Intelligence (AI)?

Python	
Java	
C++	
Prolog	
Lisp	
Others: please specify	

F. Final Thoughts

28. What are the effects of Industry 4.0 and, more generally, of the digitization of manufacturing? (from 1 = total disagreement to 4 = total agreement)

EFFECTS	VALUE				
	1	2	3	4	5
It will increase labor productivity					
Capital productivity will increase					
Total factor productivity will increase					
It will allow you to increase your market share					
It will allow you to defend your market share					
It will increase the quality of your products/services					
It will allow you to place your product in a higher and more profitable area					
It will allow you to develop different business models					

29. Express your judgment on the following statements (from 1 = total disagreement to 4 = total agreement)

STATEMENTS	VALUE
Industry 4.0 is not suitable for small businesses	
Industry 4.0 requires huge investments	
Industry 4.0 allows large companies to be more agile and therefore threatening for SMEs	
Industry 4.0 allows SMEs to be more efficient and competitive on the market, thus threatening large companies	
Industry 4.0 allows product customization that can amplify my competitive strength	
Industry 4.0 is important but requires skills that I do not have	
Those who fail to seize the opportunities offered by these innovations risk being excluded from the market	