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# Curriculum Development of Master's Degree Program in Industrial Engineering for Thailand Sustainable Smart Industry -MSIE4.0

**TASK 1.3 APPENDIX 2**  
**(THAI+EU Student Questionnaire Analysis)**

Chiang Mai University | 17<sup>th</sup> November 2018



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Revision Sheet

Version	Date	Author (Partner/Person)	The revision reason
0.1	23/08/2018	Wichai Chattinnawat	First draft of WP1 Task1.3 on student questionnaire analysis
0.2	9/10/2018	Wichai Chattinnawat	Second draft of WP1 Task1.3 on student questionnaire analysis with more EU students added
1	17/11/2018	Wichai Chattinnawat	Final draft of WP1 Task1.3 in student questionnaire analysis with different graphical analysis on student



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## WP1

WP1 is aimed to provide comparative analysis of the actual situation concerning the MSc curricula in Industrial Engineering offered in Thai and EU partner countries universities, the identification of the gaps between the real needs of the industry, the student needs and the actual offered curricula. The recommendations for the new curriculum development, are the most important deliverable working elements for the first year of the project in WP1.

Throughout the entire first year the WP1 will

- 1) identify the strengths and weaknesses , the common points, the differences and the good practices concerning curricula, teaching methods and tools in Thai and EU universities
- 2) identify the gap between the needs of industry, for being ready for Thailand 4.0, especially in capacity building, and the competence of MSc graduates from current curricula offered by Thai and EU universities
- 3) Recommend the specifications and focus areas of the new proposed MSIE curriculum.

The WP1 will be led by CMU close collaboration with UMinho that will co-lead and be the WP1 coordinator for EU partners. All partners will also participate and be responsible for tasks related to their geographical regions.

***This analysis working plan is now revised after the approval of PEC the project executive committee-PEC.***



### WP1-1.3: Assessing needs of student

The comprehensive analysis of needs of industry and students (all partners will conduct a survey with companies assigned in their regions in the list and with the help of the Associated Partners. They will also conduct survey with prospective students in their regions. The outcome of this activity will be classified as following

- Task 1.3.1 Preparing a survey form for identifying the needs of industry for MSIE graduates to support their success in Thailand 4.0 and Industry 4.0
- Task 1.3.2 Preparing a survey form for the needs of prospective students for preparing them for Thailand 4.0 and Industry 4.0
- Task 1.3.3 Conducting survey for companies and organizations in the list
- Task 1.3.4 Conducting survey from students
- Task 1.3.5 Identifying the needs of industry and students

The finding of statistics shows that the total number of program being reviewed is 28. So the total estimation of student population is at least 375 for M.S. students from all 9 partners. Therefore to have minimal 10% error margin of error, the total sampling size to be 385. Then each partner should have at least 40 students for each partner.

The final questionnaire collected consists of 450 students from Thai and EU universities.

Table 1 List of Student Assessment

University	No.Student responses	
Chiang Mai University (CMU)	47	10.4%
AIT	43	9.6%
Thammasat University (TU)	23	5.1%
King Mongkut's University of Technology North	67	14.9%
Prince of Songkla University (PSU)	21	4.7%
Khon Kaen University (KKU)	31	6.9%
CUT (Poland/France)	54	12.0%
Uminho (Portugal)	93	20.7%
UPB (Spain/Romania)	71	15.8%

Total 450

The level of study of the responses can be classified as follows

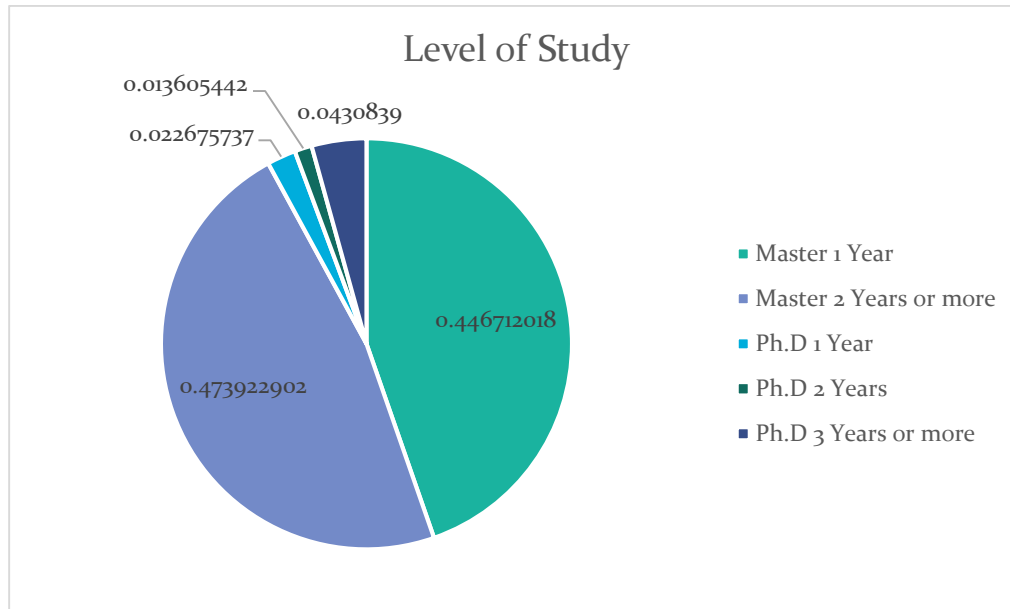


Figure 1 Level of study of the responses

The TL has adopted, modified the questionnaires from the following sources

- The report New Vision for Education: Unlocking the Potential of Technology (WEF, 2015)
- Industry Expectations of New Engineers: A Survey to Assist Curriculum Designers by JAMES D. LANG, SUSAN CRUSE, FRANCIS D. MCVEY, JOHN MCMASTERS, Journal of Engineering Education, 1999, 43-51
- This “Industry 4.0 Readiness” study was commissioned by the IMPULS Foundation of the German Engineering Federation (VDMA) and conducted by IW Consult (a subsidiary of the Cologne Institute for Economic Research) and the Institute for Industrial Management (FIR) at RWTH Aachen University. <https://i4o-self-assessment.pwc.de/>

The student questionnaires has 15 pages consists of 3 parts with total of 25 questions

- Definitions of Industry 4.0, Competence, Industry 4.0 Readiness Scheme

- Student Background

- Question 1-8 Part 1: Industry 4.0 Adoption Literacy

1. Business strategy, Business Models

2. Transversal & Domain related Competences: Student as Employee

- Question 9-19 Part 2 : Industry 4.0 Readiness Competence

1. Smart products & Co-created Design:

-To what extent can student understand the concept that products be controlled with IT, making it possible for them to communicate and interact with higher-level systems along the value chain?

2. Smart factory (Intelligence Manufacturing System):

-To what extent can student understand the concept that digitally integrated and automated production based on cyber-physical systems?

3. Smart operations (Controlling, Adjusting & Monitoring Process Real Time):

-To what extent can student understand the concept that the processes and products in your company digitally modeled and capable of being controlled through ICT systems and algorithms in a virtual world?

4. Data driven services (Integrated Business&Operational Data Management):

-To what extent can student understand the concept that business can offer data-driven services that are possible only through the integration of products, production, and customers?

- Question 20-25 Part 3 : Character Quality



## Student Assessment Questionnaire

### UNIVERSITY

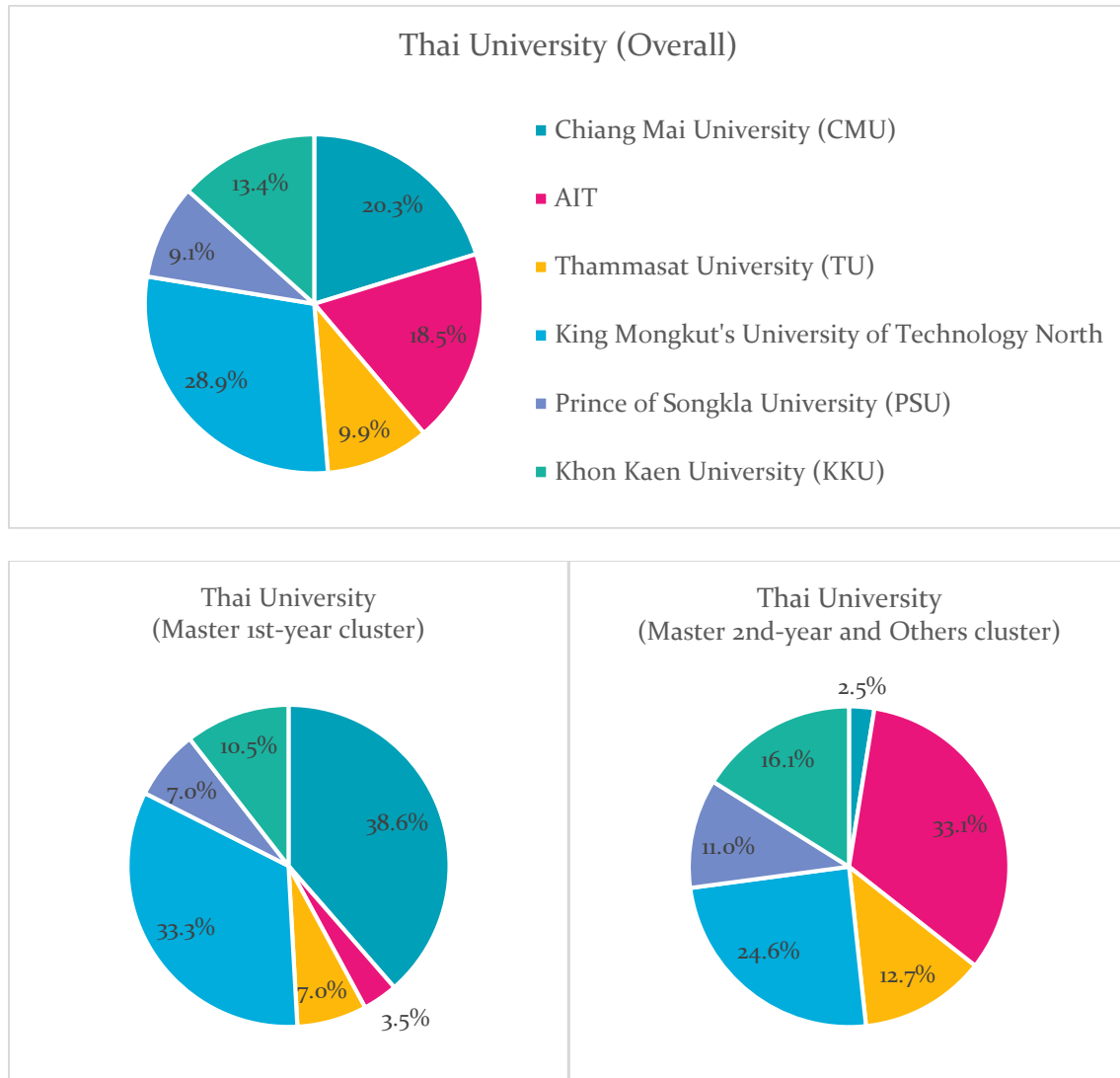


Figure 1 Thai University

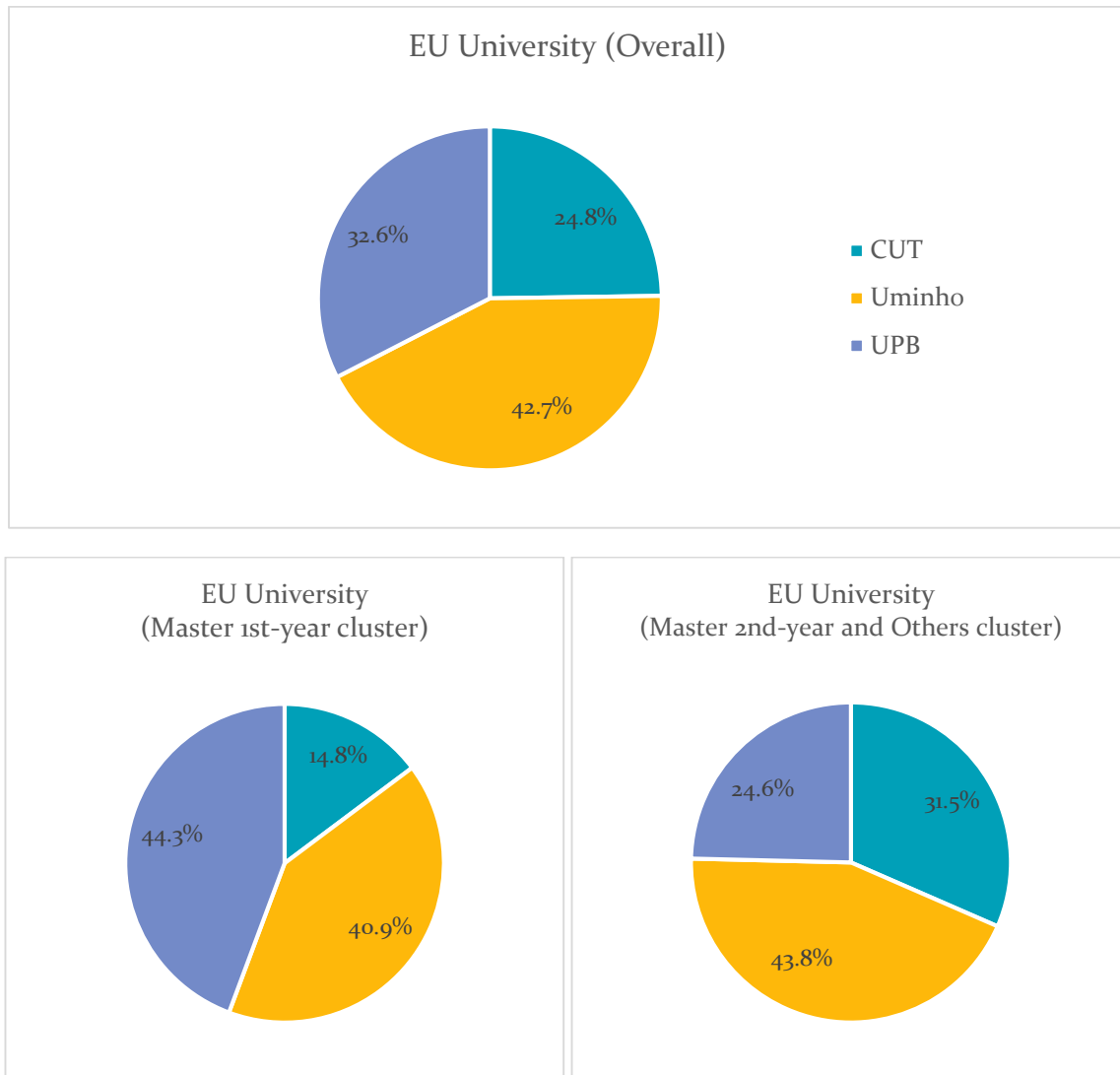


Figure 2 EU University



### SEX OF STUDENT

Table 2 Sex of student

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
THAI	<p>48.7% Female, 51.3% Male</p>	<p>53.5% Female, 46.5% Male</p>	<p>44.1% Female, 55.9% Male</p>
EU	<p>49.1% Female, 50.9% Male</p>	<p>46.6% Female, 53.4% Male</p>	<p>50.8% Female, 49.2% Male</p>

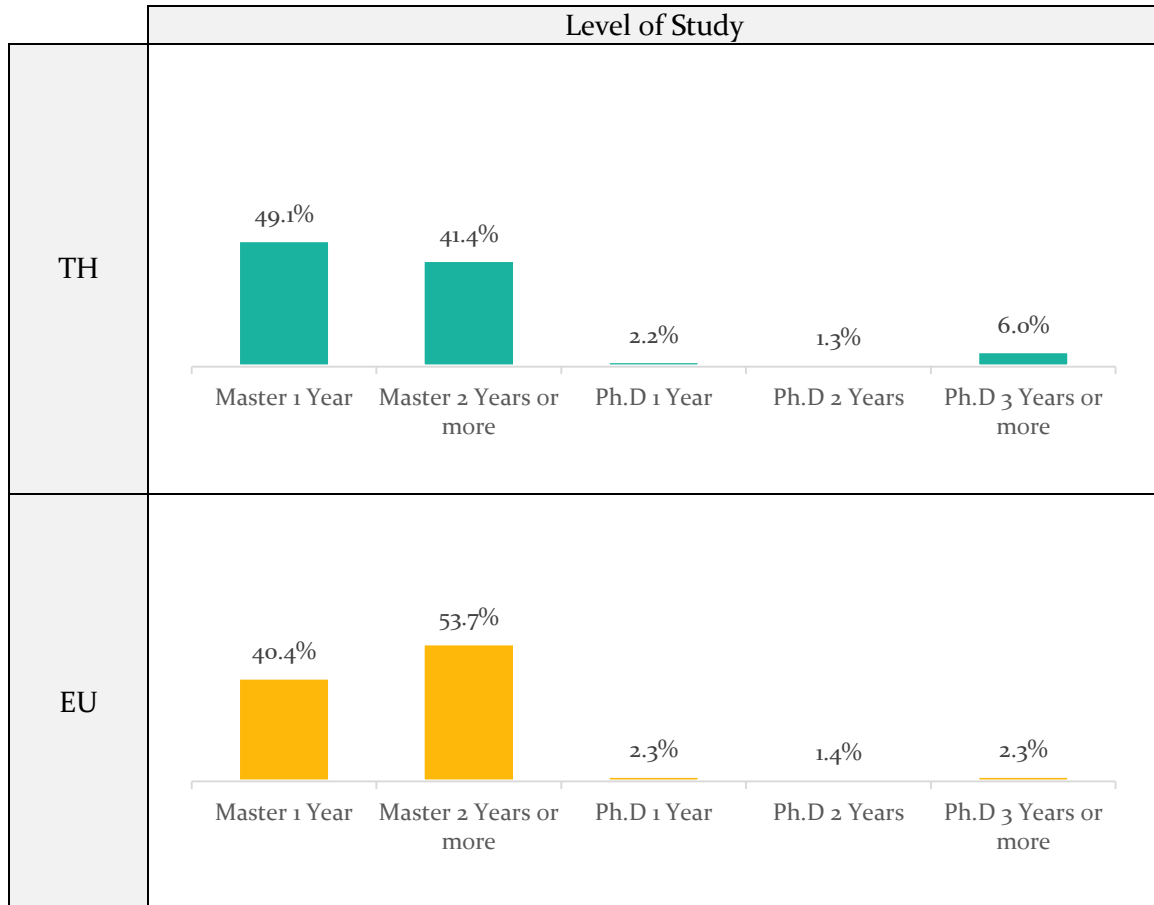
Note: ■ Male ■ Female





LEVEL OF STUDY

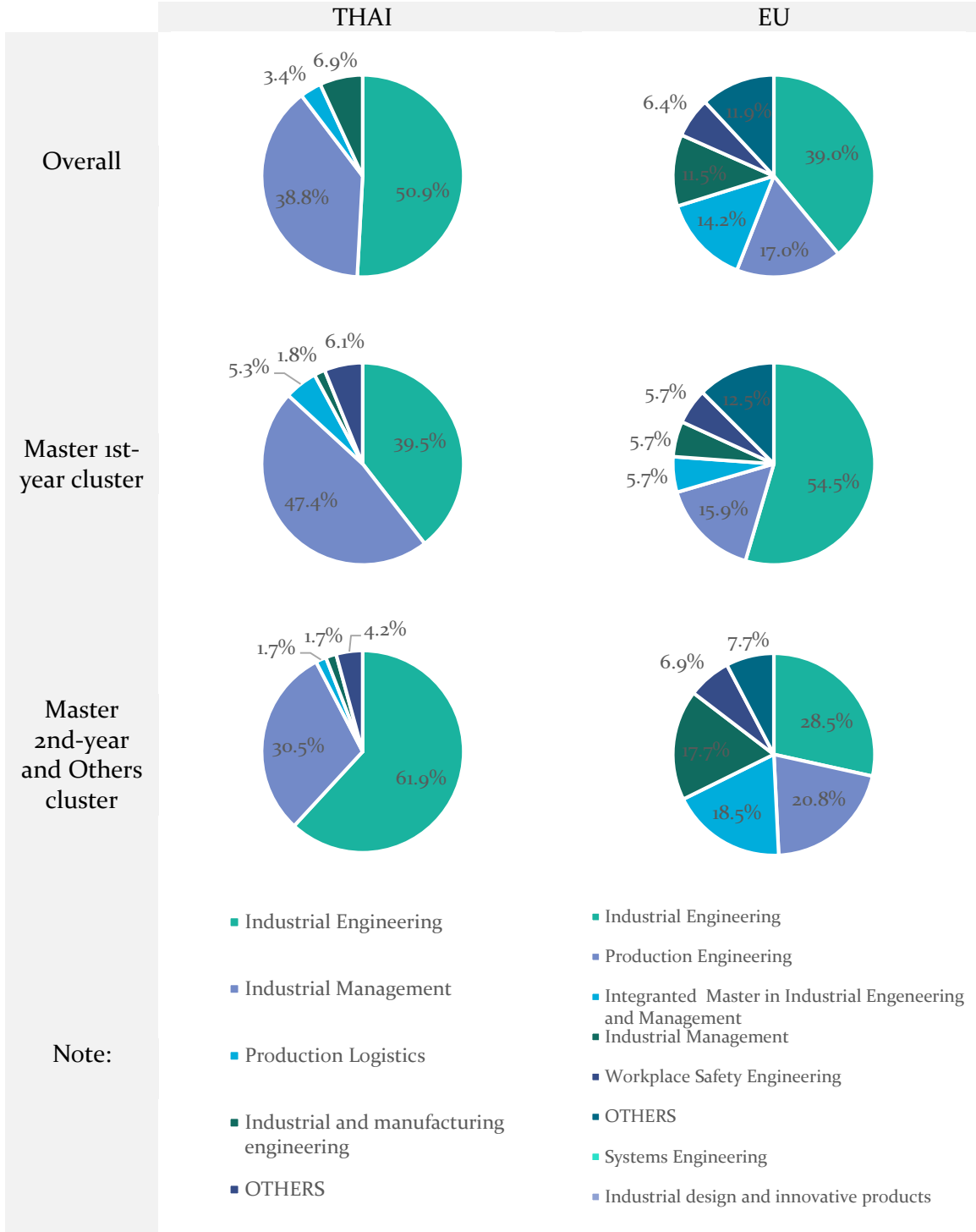
Table 3 Level of Study





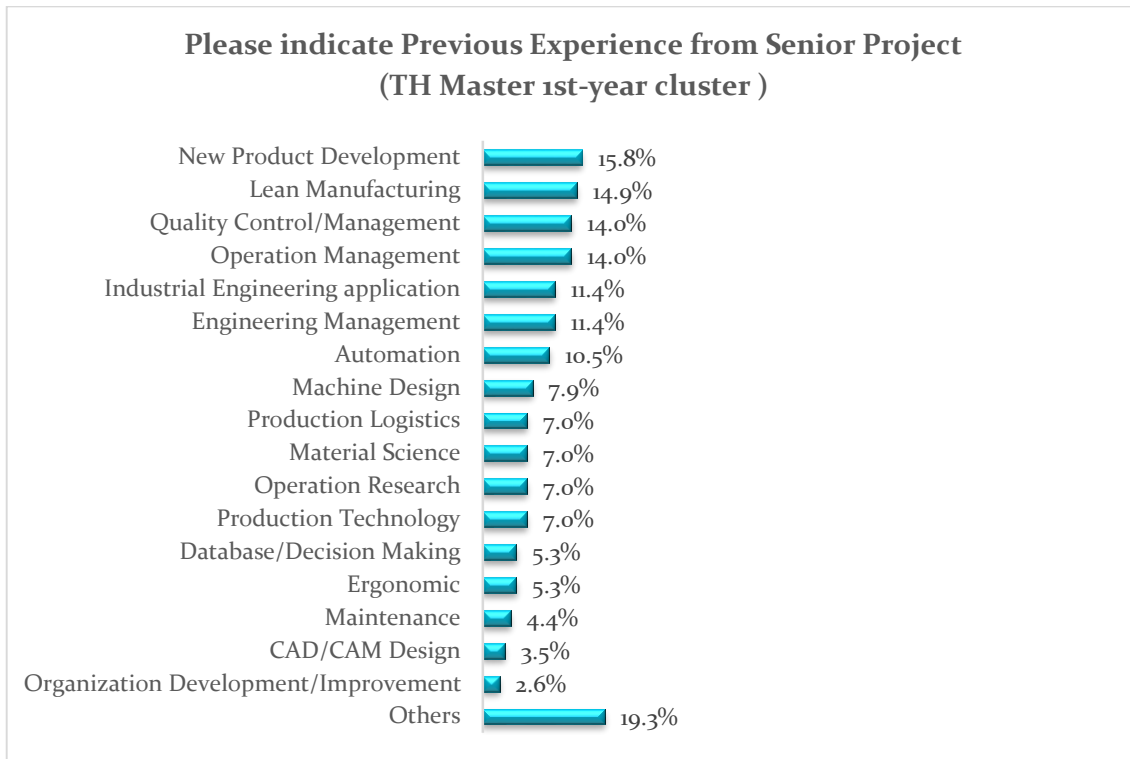
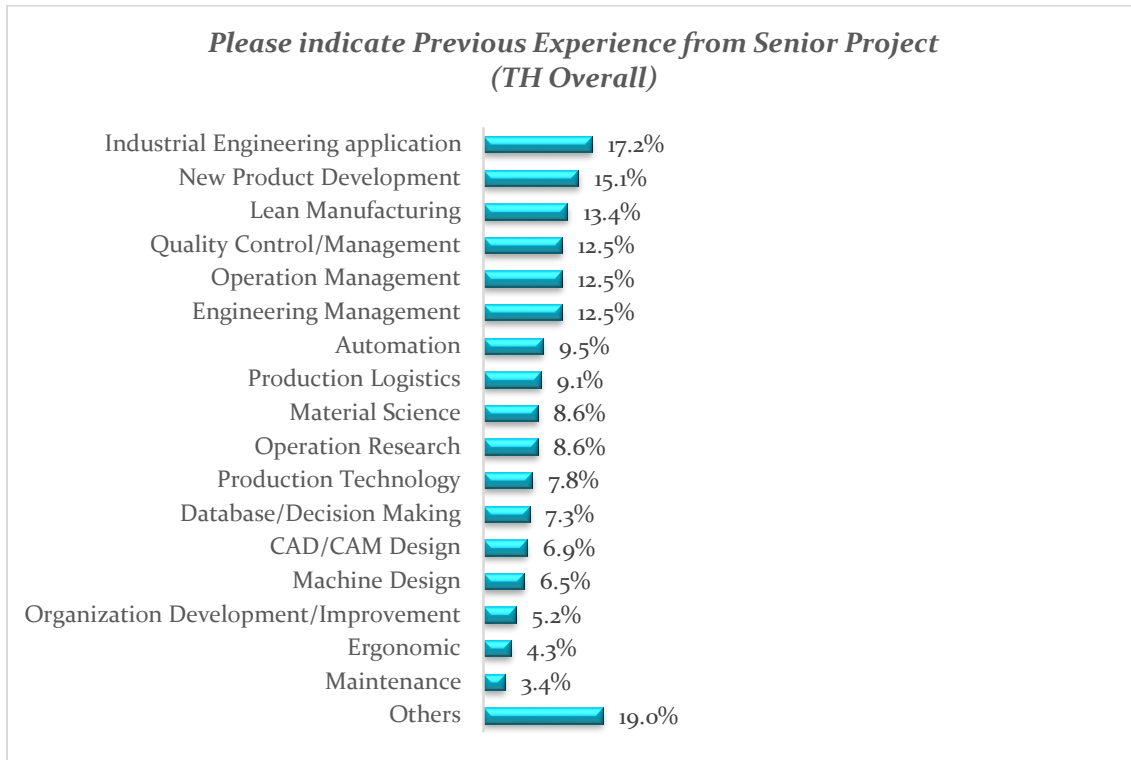
### PROGRAM OF STUDY

Table 4 Program of Study





**PLEASE INDICATE PREVIOUS EXPERIENCE FROM SENIOR PROJECT**

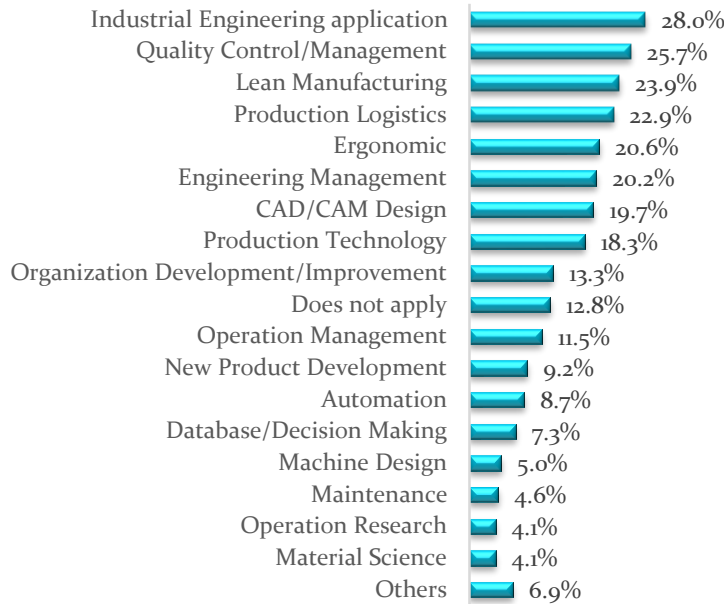


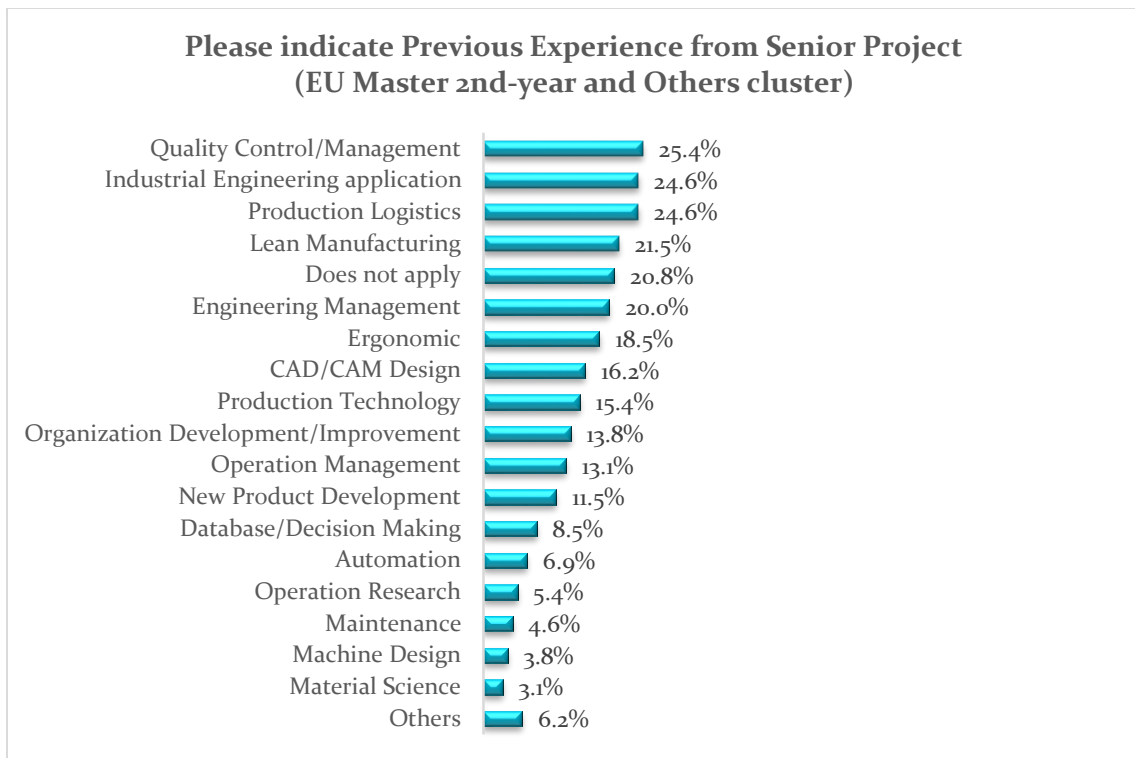
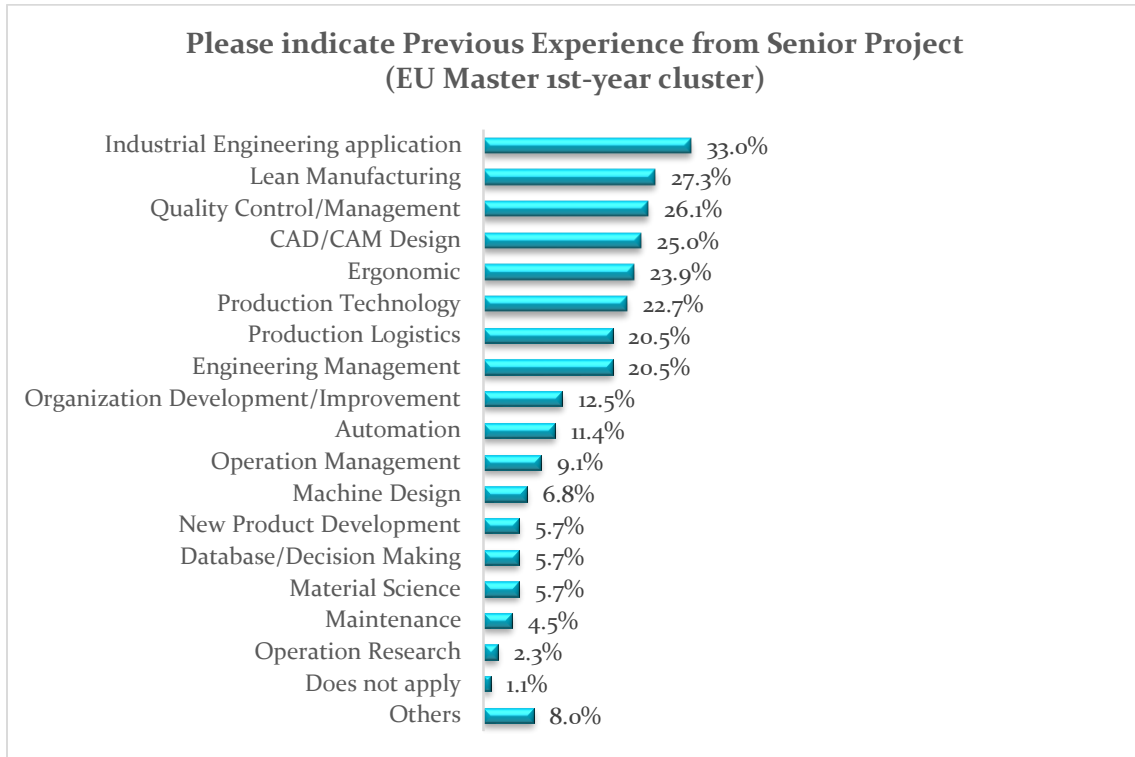


**Please indicate Previous Experience from Senior Project  
(TH Master 2nd-year and Others cluster )**



**Please indicate Previous Experience from Senior Project  
(EU Overall)**





*Figure 3 Previous Experience from Senior Project*



### PREVIOUS EXPERIENCES FROM INDUSTRY

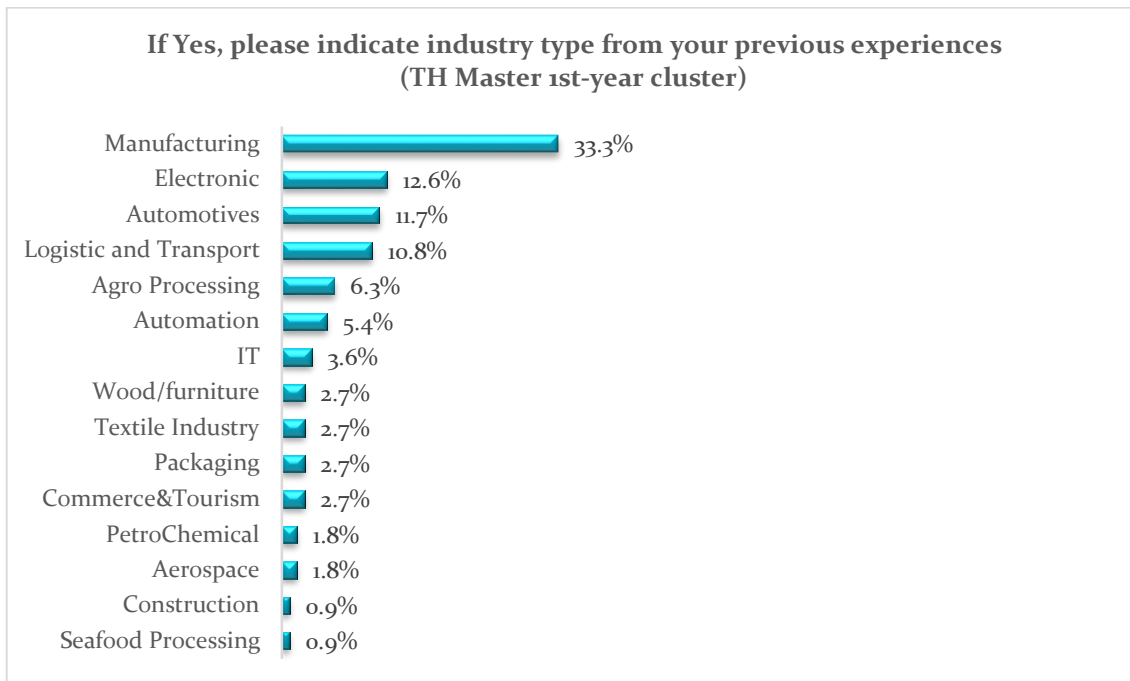
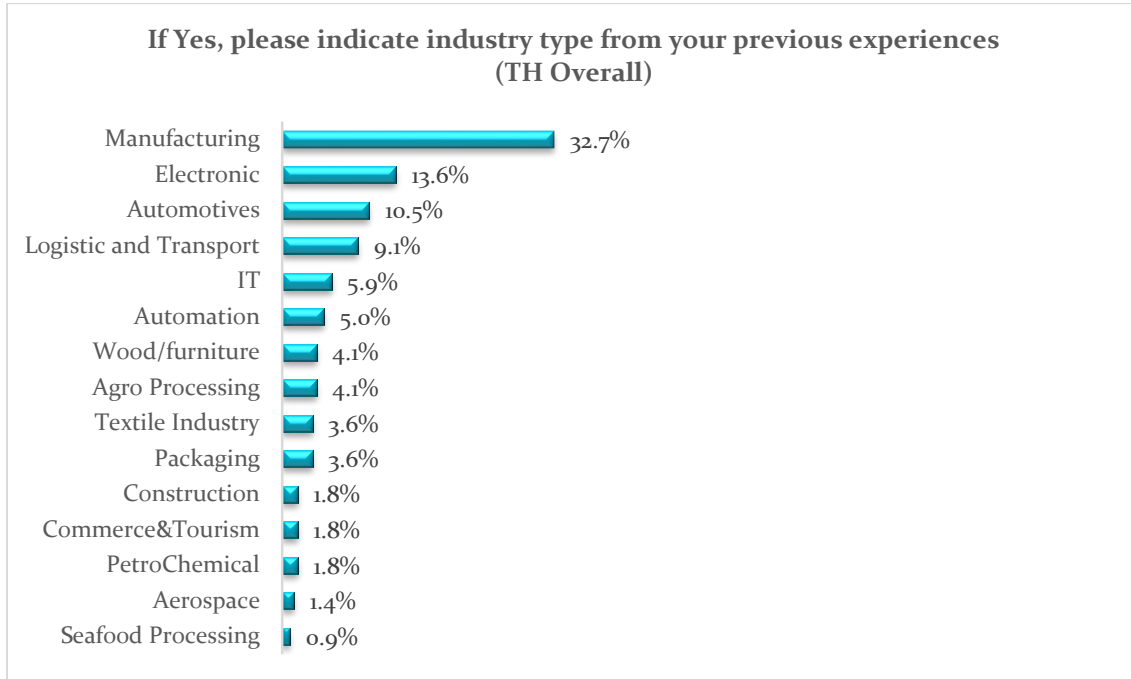
Table 5 Previous experiences from industry

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>40.1% YES, 59.9% NO</p>	<p>36.0% YES, 64.0% NO</p>	<p>44.1% YES, 55.9% NO</p>
EU	<p>48.6% YES, 51.4% NO</p>	<p>58.0% YES, 42.0% NO</p>	<p>42.3% YES, 57.7% NO</p>

Note: ■ YES ■ NO



**IF YES, PLEASE INDICATE INDUSTRY TYPE FROM YOUR PREVIOUS EXPERIENCES**

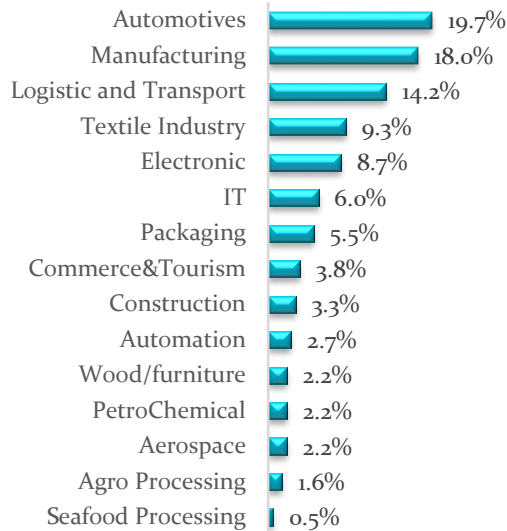




If Yes, please indicate industry type from your previous experiences  
(TH Master 2nd-year and Others cluster)



If Yes, please indicate industry type from your previous experiences  
(EU Overall)





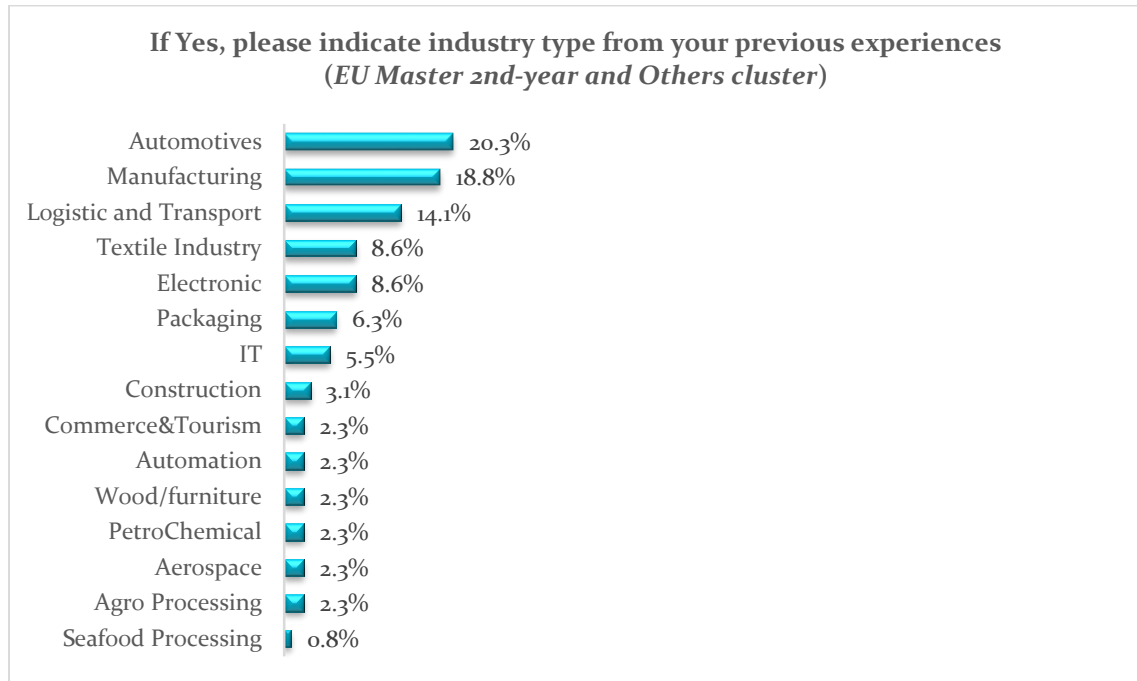
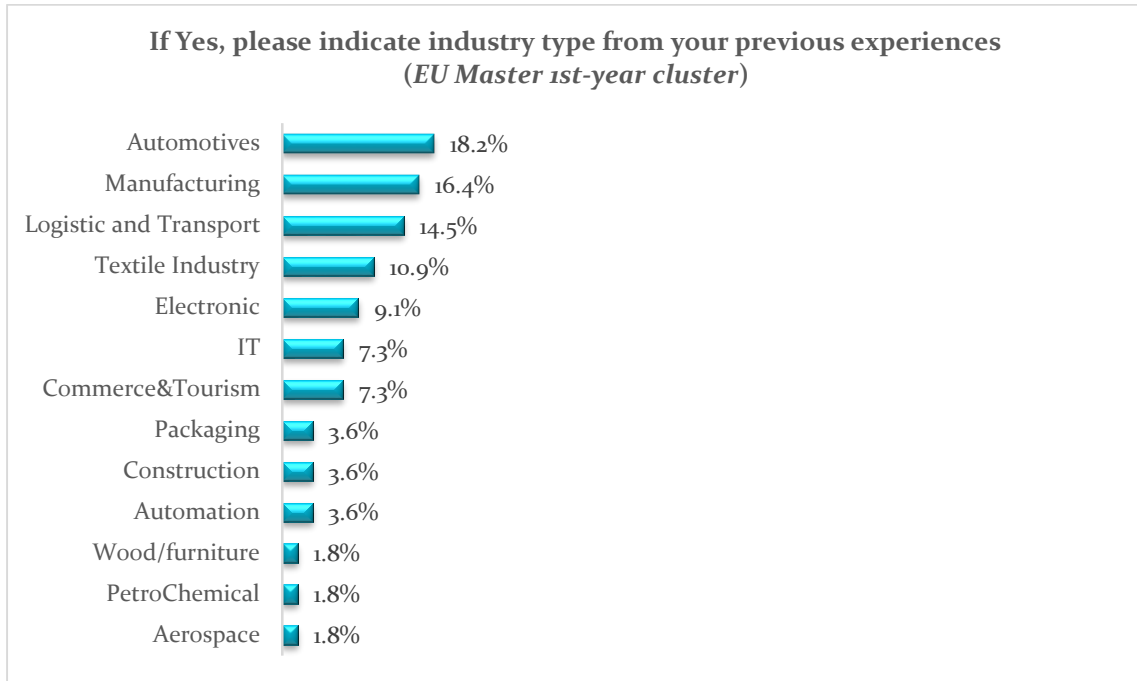


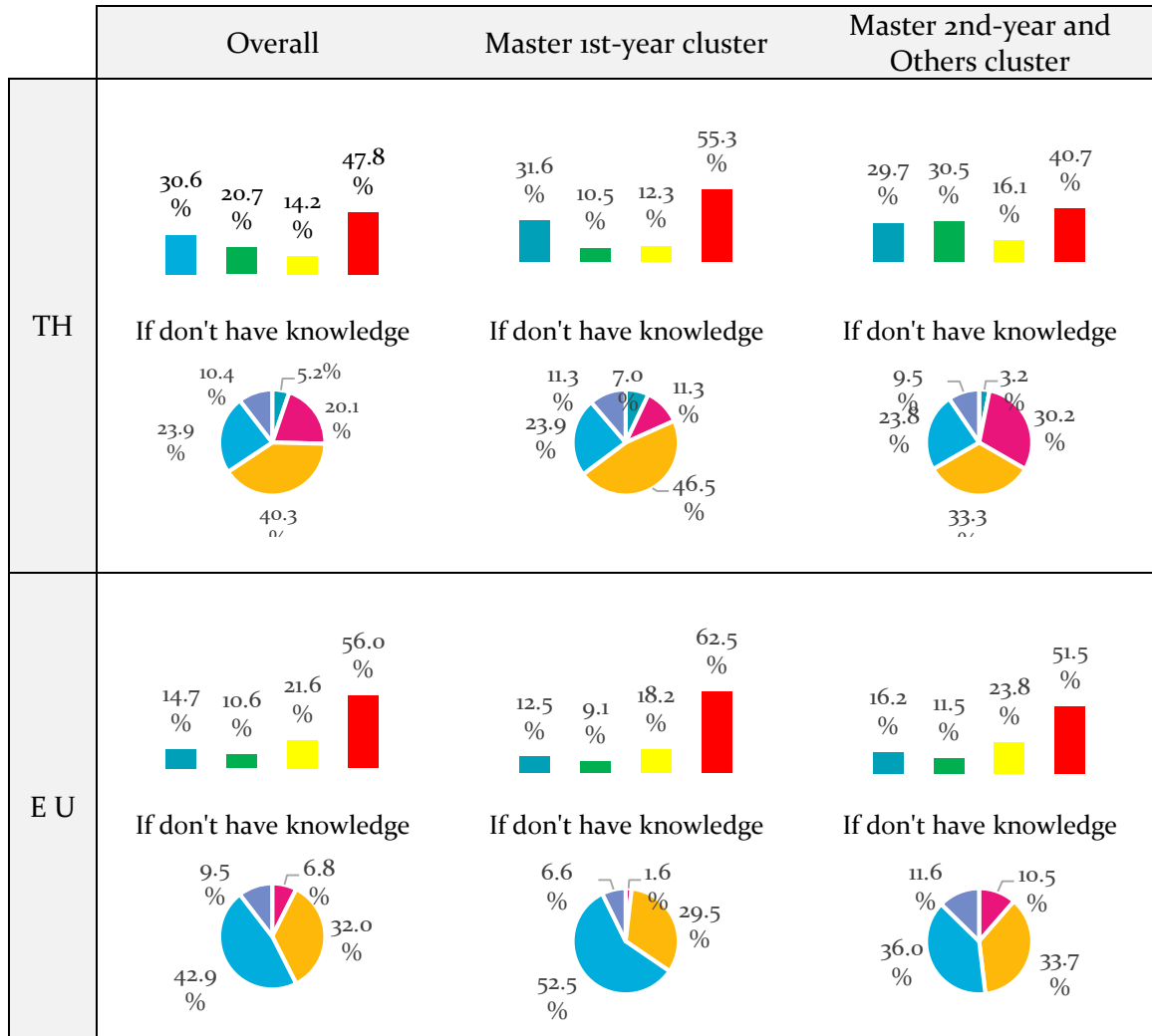
Figure 4 If Yes, please indicate industry type from your previous experiences



**PART 1: INDUSTRY 4.0 ADOPTION LITERACY (CAN SELECT >1 ANSWER)**

Q1. How would you describe your ability to define/implement Industry 4.0 strategy?

Table 6 Q1. How would you describe your ability to define/implement Industry 4.0 strategy?



Note:

- (a) I have ability to apply my knowledge to formulate Industry 4.0 strategy
- (b) I have ability to design a system, component, or process to meet Industry 4.0 strategy
- (d) I have ability to setup, function and communicate on Multi-Disciplinary Teams
- I don't have knowledge, competences to define/implement Industry 4.0 strategy



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)



Q2. What is the level of your understanding of IT Knowledge and technology with respect to Industry4.0 that you need in order to increase the your competences, competitiveness after graduation?

### 2.1 Sensor technology

Table 7 Q2.1 Sensor technology

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>50.0 %</p> <p>If don't have knowledge</p>	<p>44.7 %</p> <p>If don't have knowledge</p>	<p>55.1 %</p> <p>If don't have knowledge</p>
EU	<p>67.0 %</p> <p>If don't have knowledge</p>	<p>62.5 %</p> <p>If don't have knowledge</p>	<p>70.0 %</p> <p>If don't have knowledge</p>

Note:



- I don't have knowledge, competences to define/implement Sensor technology
- (a) I have ability to apply my knowledge to formulate Sensor technology
- (c) I have ability to design a system, component, or process the Sensor technology
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Sensor technology
- (e) I have ability to identify, formulate, and solve Sensor technology problems
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



2.2 Mobile devices

Table 8 Q2.2 Mobile devices

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>45.3% 26.3% 13.4% 6.5% 15.5%</p> <p>If don't have knowledge</p>	<p>36.8% 35.1% 11.4% 6.1% 19.3%</p> <p>If don't have knowledge</p>	<p>53.4% 17.8% 15.3% 6.8% 11.9%</p> <p>If don't have knowledge</p>
EU	<p>55.0% 12.8% 6.0% 10.1% 19.7%</p> <p>If don't have knowledge</p>	<p>46.6% 20.5% 4.5% 11.4% 19.3%</p> <p>If don't have knowledge</p>	<p>60.8% 7.7% 6.9% 9.2% 20.0%</p> <p>If don't have knowledge</p>

Note:

- I don't have knowledge, competences to define/implement Mobile devices
- (a) I have ability to apply my knowledge to formulate Mobile devices
- (c) I have ability to design a system, component, or process the Mobile devices
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Mobile devices
- (e) I have ability to identify, formulate, and solve Mobile devices problems



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)

### 2.3 RFID

Table 9 Q2.3 RFID

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>59.9 %</p> <p>If don't have knowledge</p>	<p>57.0 %</p> <p>If don't have knowledge</p>	<p>62.7 %</p> <p>If don't have knowledge</p>
EU	<p>77.5 %</p> <p>If don't have knowledge</p>	<p>77.3 %</p> <p>If don't have knowledge</p>	<p>77.7 %</p> <p>If don't have knowledge</p>

Note:



- I don't have knowledge, competences to define/implement RFID
  - (a) I have ability to apply my knowledge to formulate RFID
  - (c) I have ability to design a system, component, or process the RFID
  - (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding RFID
  - (e) I have ability to identify, formulate, and solve RFID problems
- 
- 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)





2.4 Realtime Location System

Table 10 Q2.4 Realtime Location System

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>53.0% 22.8% 13.4% 5.6% 13.4%</p> <p>If don't have knowledge</p> <p>13.7% 20.9% 35.3% 11.5% 18.7%</p>	<p>48.2% 26.3% 16.7% 2.6% 14.9%</p> <p>If don't have knowledge</p> <p>6.2% 27.7% 40.0% 10.8% 15.4%</p>	<p>57.6% 19.5% 10.2% 8.5% 11.9%</p> <p>If don't have knowledge</p> <p>20.3% 14.9% 31.1% 12.2% 21.6%</p>
EU	<p>71.1% 8.3% 4.6% 5.5% 11.9%</p> <p>If don't have knowledge</p> <p>9.3% 7.6% 20.3% 27.3% 35.5%</p>	<p>67.0% 11.4% 5.7% 8.0% 10.2%</p> <p>If don't have knowledge</p> <p>9.0% 9.0% 32.8% 19.4% 29.9%</p>	<p>73.8% 6.2% 3.8% 3.8% 13.1%</p> <p>If don't have knowledge</p> <p>9.5% 6.7% 21.0% 23.8% 39.0%</p>

Note:

- I don't have knowledge, competences to define/implement Realtime Location Systems
- (a) I have ability to apply my knowledge to formulate Realtime Location Systems
- (c) I have ability to design a system, component, or process the Realtime Location Systems
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Realtime Location Systems
- (e) I have ability to identify, formulate, and solve Realtime Location Systems problems



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)

### 2.5 Big data technology

Table 11 Q2.5 Big data technology

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>55.2% 23.3% 10.3% 5.6% 10.3%</p> <p>If don't have knowledge</p>	<p>51.8% 24.6% 10.5% 6.1% 11.4%</p> <p>If don't have knowledge</p>	<p>58.5% 22.0% 10.2% 5.1% 9.3%</p> <p>If don't have knowledge</p>
EU	<p>70.6% 9.2% 4.1% 7.8% 9.6%</p> <p>If don't have knowledge</p>	<p>68.2% 11.4% 4.5% 8.0% 10.2%</p> <p>If don't have knowledge</p>	<p>72.3% 7.7% 3.8% 7.7% 9.2%</p> <p>If don't have knowledge</p>

Note:



- I don't have knowledge, competences to define/implement Big data technology
- (a) I have ability to apply my knowledge to formulate Big data technology
- (c) I have ability to design a system, component, or process the Big data technology
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Big data technology
- (e) I have ability to identify, formulate, and solve Big data technology problems
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



### 2.6 Cloud technologies as scalable IT infrastructure

Table 12 Q2.6 Cloud technologies as scalable IT infrastructure

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>57.3% 19.8% 11.6% 5.2% 10.8%</p> <p>If don't have knowledge</p> <p>9.1% 18.2% 39.6% 22.1% 11.0%</p>	<p>54.4% 20.2% 14.0% 4.4% 12.3%</p> <p>If don't have knowledge</p> <p>20.0% 5.3% 44.0% 22.7% 8.0%</p>	<p>60.2% 19.5% 9.3% 5.9% 9.3%</p> <p>If don't have knowledge</p> <p>12.7% 16.5% 35.4% 21.5% 13.9%</p>
EU	<p>71.6% 9.6% 4.6% 6.4% 9.6%</p> <p>If don't have knowledge</p> <p>7.4% 8.6% 35.6% 33.7% 14.7%</p>	<p>68.2% 14.8% 4.5% 10.2% 4.5%</p> <p>If don't have knowledge</p> <p>10.8% 7.7% 33.8% 33.8% 13.8%</p>	<p>73.8% 6.2% 4.6% 3.8% 13.1%</p> <p>If don't have knowledge</p> <p>5.1% 9.2% 36.7% 33.7% 15.3%</p>

Note:

- I don't have knowledge, competences to define/implement Cloud technologies
- (a) I have ability to apply my knowledge to formulate Cloud technologies
- (c) I have ability to design a system, component, or process the Cloud technologies
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Cloud technologies
- (e) I have ability to identify, formulate, and solve Cloud technologies problems



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)

### 2.7 Embedded IT systems

Table 13 Q2.7 Embedded IT systems

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>69.8%</p> <p>If don't have knowledge</p>	<p>64.9%</p> <p>If don't have knowledge</p>	<p>74.6%</p> <p>If don't have knowledge</p>
EU	<p>78.9%</p> <p>If don't have knowledge</p>	<p>73.9%</p> <p>If don't have knowledge</p>	<p>82.3%</p> <p>If don't have knowledge</p>

Note:



- I don't have knowledge, competences to define/implement Embedded IT systems
- (a) I have ability to apply my knowledge to formulate Embedded IT systems
- (c) I have ability to design a system, component, or process the Embedded IT systems
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Embedded IT systems
- (e) I have ability to identify, formulate, and solve Embedded IT systems problems
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



2.8 M2M communications

Table 14 Q2.8 M2M communications

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>72.0% 14.2% 6.9% 3.4% 8.2%</p> <p>If don't have knowledge</p>	<p>64.9% 18.4% 7.9% 1.8% 12.3%</p> <p>If don't have knowledge</p>	<p>78.8% 10.2% 5.9% 5.1% 4.2%</p> <p>If don't have knowledge</p>
EU	<p>79.4% 6.9% 2.3% 6.0% 6.4%</p> <p>If don't have knowledge</p>	<p>73.9% 9.1% 2.3% 8.0% 9.1%</p> <p>If don't have knowledge</p>	<p>83.1% 5.4% 2.3% 4.6% 4.6%</p> <p>If don't have knowledge</p>

Note:

- I don't have knowledge, competences to define/implement M2M communications
- (a) I have ability to apply my knowledge to formulate M2M communications
- (c) I have ability to design a system, component, or process the M2M communications
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding M2M communications
- (e) I have ability to identify, formulate, and solve M2M communications problems



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)





### 2.9 Automation Technology

Table 15 Q2.9 Automation Technology

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>39.7% 31.0% 19.0% 9.9% 16.8%</p> <p>If don't have knowledge</p> <p>8.7% 21.7% 42.6% 19.1% 7.8%</p>	<p>33.3% 33.3% 21.9% 8.8% 15.8%</p> <p>If don't have knowledge</p> <p>3.8% 30.2% 35.8% 20.8% 9.4%</p>	<p>45.8% 28.8% 16.1% 11.0% 17.8%</p> <p>If don't have knowledge</p> <p>12.9% 14.5% 48.4% 17.7% 6.5%</p>
EU	<p>48.6% 17.4% 10.1% 6.0% 20.2%</p> <p>If don't have knowledge</p> <p>12.6% 29.6% 34.8% 9.6% 13.3%</p>	<p>47.7% 20.5% 8.0% 5.7% 20.5%</p> <p>If don't have knowledge</p> <p>11.5% 17.3% 30.8% 26.9% 13.5%</p>	<p>49.2% 15.4% 11.5% 6.2% 20.0%</p> <p>If don't have knowledge</p> <p>9.6% 28.9% 39.8% 8.4% 13.3%</p>

Note:

- I don't have knowledge, competences to define/implement Automation Technology
- (a) I have ability to apply my knowledge to formulate Automation Technology
- (c) I have ability to design a system, component, or process the Automation Technology
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding Automation Technology
- (e) I have ability to identify, formulate, and solve Automation Technology problems



- 1 (But I don't think I need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)

### 2.10 CAD/CAM/CAE Technology

Table 16 Q2.10 CAD/CAM/CAE Technology

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH			
	<p>If don't have knowledge</p>	<p>If don't have knowledge</p>	<p>If don't have knowledge</p>
EU			
	<p>If don't have knowledge</p>	<p>If don't have knowledge</p>	<p>If don't have knowledge</p>

Note:



- I don't have knowledge, competences to define/implement CAD/CAM/CAE Technology
- (a) I have ability to apply my knowledge to formulate CAD/CAM/CAE Technology
- (c) I have ability to design a system, component, or process the CAD/CAM/CAE Technology
- (d) I have ability to setup, lead the Multi-Disciplinary Teams regarding CAD/CAM/CAE Technology
- (e) I have ability to identify, formulate, and solve CAD/CAM/CAE Technology problems
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



**Part 2: Industry 4.0 Readiness Skill & Competence (Can select >1 answer)**

Q3. What is the level of your understanding of Computer programming/coding abilities with respect to Industry4.0 that you need in order to increase the your competences, competitiveness after graduation?

Table 17 Q3. What is the level of your understanding of Computer programming/coding abilities with respect to Industry4.0 that you need in order to increase the your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>40.9% 32.3% 17.2% 9.9% 17.2%</p> <p>If don't have knowledge</p> <p>12.2% 26.0% 35.0% 8.9% 17.9%</p>	<p>39.5% 35.1% 16.7% 9.6% 16.7%</p> <p>If don't have knowledge</p> <p>12.1% 22.4% 44.8% 5.2% 15.5%</p>	<p>42.4% 29.7% 17.8% 10.2% 17.8%</p> <p>If don't have knowledge</p> <p>12.3% 29.2% 26.2% 12.3% 20.0%</p>
EU	<p>65.1% 14.2% 4.1% 6.0% 14.2%</p> <p>If don't have knowledge</p> <p>13.6% 9.1% 24.0% 14.3% 39.0%</p>	<p>63.6% 14.8% 4.5% 9.1% 12.5%</p> <p>If don't have knowledge</p> <p>7.8% 12.5% 31.3% 9.4% 39.1%</p>	<p>66.2% 13.8% 3.8% 3.8% 15.4%</p> <p>If don't have knowledge</p> <p>14.4% 10.0% 18.9% 17.8% 38.9%</p>



Note:

- I don't have knowledge, competences to define/implement Computer programming/coding abilities
- (a) I have ability to apply my knowledge to formulate Computer programming/coding abilities for Industry4.0
- (c) I have ability to design a system, component, or process the Computer programming/coding abilities for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Computer programming/coding abilities for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Computer programming/coding abilities
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q4. What is the level of your understanding of Data and information processing and analytics with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 18 Q4. What is the level of your understanding of Data and information processing and analytics with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>47.4 %</p> <p>If don't have knowledge</p>	<p>45.6 %</p> <p>If don't have knowledge</p>	<p>49.2 %</p> <p>If don't have knowledge</p>
EU	<p>63.8 %</p> <p>If don't have knowledge</p>	<p>61.4 %</p> <p>If don't have knowledge</p>	<p>65.4 %</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Data and information processing and analytics
- (a) I have ability to apply my knowledge to formulate Data and information processing and analytics for Industry4.0
- (c) I have ability to design a system, component, or process Data and information processing and analytics for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Data and information processing and analytics for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Data and information processing and analytics
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q5. What is the level of your understanding of Data Analytic/Statistical knowledge with respect to Industry4.0 that you need in order to increase the your competences, competitiveness after graduation?

Table 19 Q5. What is the level of your understanding of Data Analytic/Statistical knowledge with respect to Industry4.0 that you need in order to increase the your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>41.8% 28.4% 14.7% 9.1% 18.5%</p> <p>If don't have knowledge</p> <p>10.2% 7.8% 17.2% 34.4% 30.5%</p>	<p>43.0% 28.1% 14.0% 7.0% 19.3%</p> <p>If don't have knowledge</p> <p>7.4% 7.4% 17.6% 39.7% 27.9%</p>	<p>40.7% 28.8% 15.3% 11.0% 17.8%</p> <p>If don't have knowledge</p> <p>13.3% 8.3% 16.7% 28.3% 33.3%</p>
EU	<p>57.3% 16.1% 5.5% 6.9% 16.1%</p> <p>If don't have knowledge</p> <p>10.2% 10.9% 32.8% 35.0% 10.9%</p>	<p>61.4% 13.6% 6.8% 8.0% 12.5%</p> <p>If don't have knowledge</p> <p>13.1% 6.6% 13.1% 27.9% 39.3%</p>	<p>54.6% 17.7% 4.6% 6.2% 18.5%</p> <p>If don't have knowledge</p> <p>13.2% 9.2% 36.8% 31.6% 9.2%</p>





Note:

- I don't have knowledge, competences to define/implement Data Analytic/Statistical knowledge
- (a) I have ability to apply my knowledge to formulate Data Analytic/Statistical knowledge for Industry4.0
- (c) I have ability to design a system, component, or process Data Analytic/Statistical knowledge for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Data Analytic/Statistical knowledge for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Data Analytic/Statistical knowledge
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q6. What is the level of your understanding of IT security and data protection with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 20 Q6. What is the level of your understanding of IT security and data protection with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>58.2 %</p> <p>If don't have knowledge</p>	<p>50.9 %</p> <p>If don't have knowledge</p>	<p>65.3 %</p> <p>If don't have knowledge</p>
EU	<p>77.5 %</p> <p>If don't have knowledge</p>	<p>70.5 %</p> <p>If don't have knowledge</p>	<p>82.3 %</p> <p>If don't have knowledge</p>



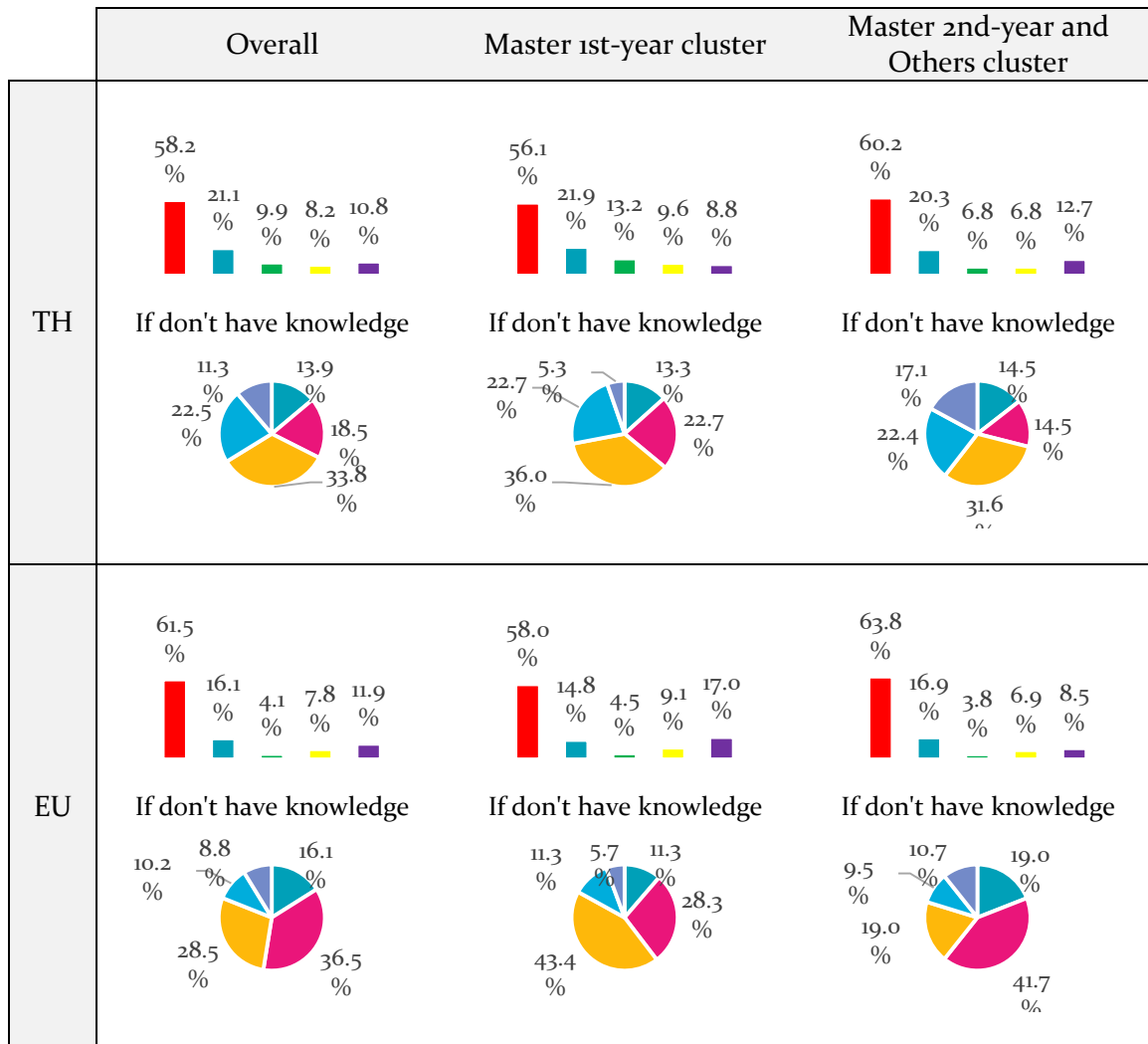
Note:

- I don't have knowledge, competences to define/implement IT security and data protection
- (a) I have ability to apply my knowledge to formulate IT security and data protection for Industry4.0
- (c) I have ability to design a system, component, or process IT security and data protection for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop IT security and data protection for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using IT security and data protection
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q7. What is the level of your understanding of ability to interact with modern interfaces (human-machine/human-robot) with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 21 Q7. What is the level of your understanding of ability to interact with modern interfaces (human-machine/human-robot) with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?





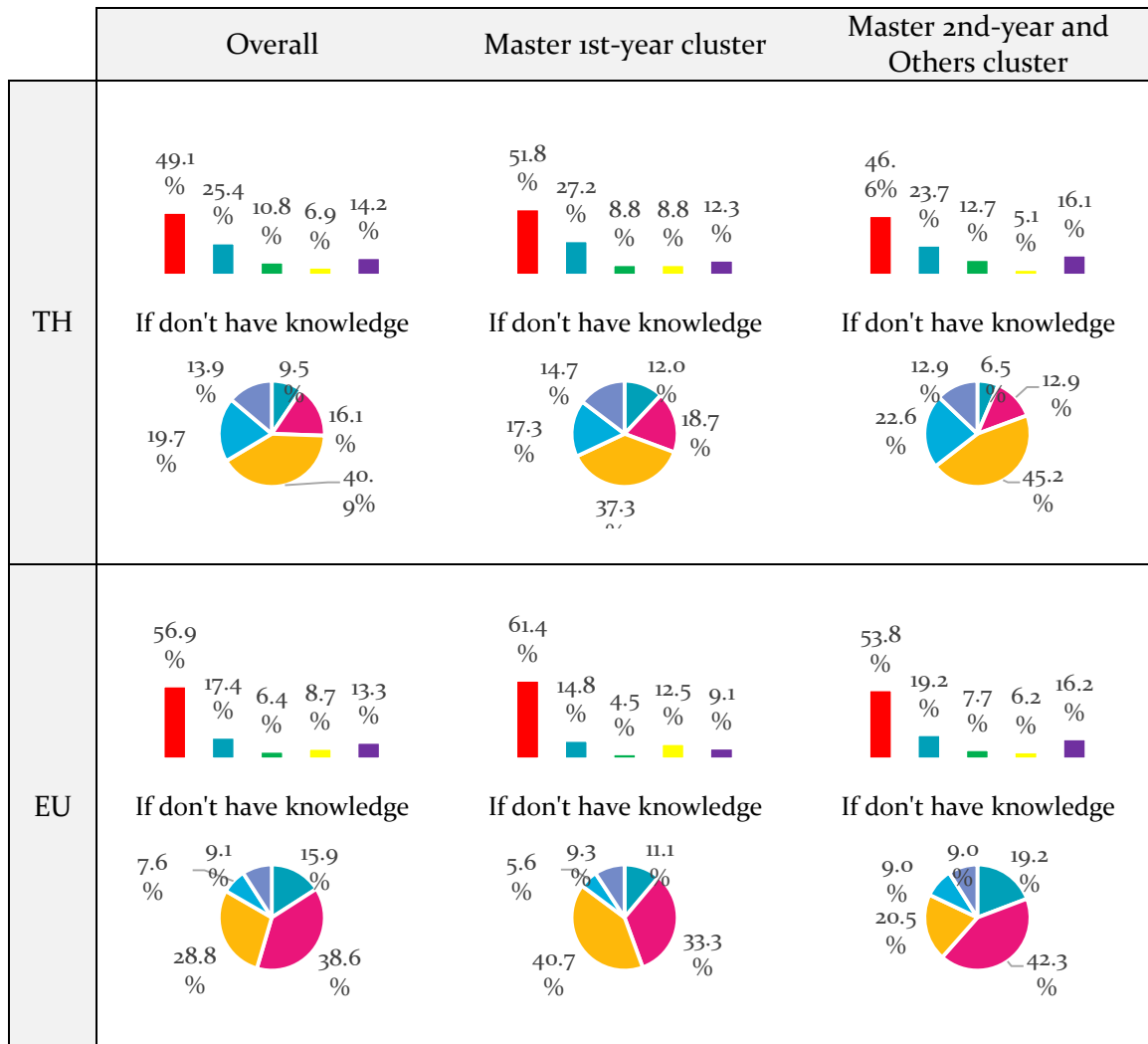
Note:

- I don't have knowledge, competences to define/implement interaction with modern interfaces (human-machine/human-robot)
- (a) I have ability to apply my knowledge to formulate interaction with modern interfaces (human-machine/human-robot) for Industry 4.0
- (c) I have ability to design a system, component, or process interaction with modern interfaces (human-machine/human-robot) for organization to achieve or sustain industry 4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop interaction with modern interfaces (human-machine/human-robot) for organization having industry 4.0 context
- (e) I have ability to identify, formulate, and solve industry 4.0 related problems of interaction with modern interfaces (human-machine/human-robot)
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q8. What is the level of your understanding of Smart Work & Ergonomics with respect to Industry4.0 that you need in order to increase the competences, competitiveness after graduation?

Table 22 Q8. What is the level of your understanding of Smart Work&Ergonomics with respect to Industry4.0 that you need in order to increase the competences, competitiveness after graduation?





Note:

- I don't have knowledge, competences to define/implement Smart Work&Ergonomics
  
- (a) I have ability to apply my knowledge to formulate Smart Work&Ergonomics for Industry4.0
  
- (c) I have ability to design a system, component, or process Smart Work&Ergonomics for organization to achieve or sustain industry4.0 context
  
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Smart Work&Ergonomics for organization having industry4.0 context
  
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Smart Work&Ergonomics
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q9. What is the level of your understanding of Smart Product with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 23 Q9. What is the level of your understanding of Smart Product with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>39.2% 24.6% 12.9% 10.3% 19.4%</p> <p>If don't have knowledge</p>	<p>37.7% 26.3% 14.0% 10.5% 19.3%</p> <p>If don't have knowledge</p>	<p>40.7% 22.9% 11.9% 10.2% 19.5%</p> <p>If don't have knowledge</p>
EU	<p>56.9% 18.3% 5.0% 10.6% 11.9%</p> <p>If don't have knowledge</p>	<p>56.8% 18.2% 4.5% 13.6% 9.1%</p> <p>If don't have knowledge</p>	<p>56.9% 18.5% 5.4% 8.5% 13.8%</p> <p>If don't have knowledge</p>





Note:

- I don't have knowledge, competences to define/implement Smart Product
  
- (a) I have ability to apply my knowledge to formulate Smart Product for Industry4.0
  
- (c) I have ability to design a system, component, or process the Smart Product for organization to achieve or sustain industry4.0 context
  
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop organization having industry4.0 context by using Smart Product
  
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Smart Product
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q10. What is the level of your understanding of Co-created Design with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 24 Q10. What is the level of your understanding of Co-created Design with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>56.5 %</p> <p>If don't have knowledge</p>	<p>61.4 %</p> <p>If don't have knowledge</p>	<p>51.7 %</p> <p>If don't have knowledge</p>
EU	<p>69.3 %</p> <p>If don't have knowledge</p>	<p>60.2 %</p> <p>If don't have knowledge</p>	<p>75.4 %</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Co-created Design
- (a) I have ability to apply my knowledge to formulate Co-created Design for Industry4.0
- (c) I have ability to design a system, component, or process the Co-created Design for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop organization having industry4.0 context by using Co-created Design
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Co-created Design
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q11. What is the level of your understanding of Smart Digital Factory with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 25 Q11. What is the level of your understanding of Smart Digital Factory with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>57.3 %</p> <p>If don't have knowledge</p>	<p>54.4 %</p> <p>If don't have knowledge</p>	<p>60.2 %</p> <p>If don't have knowledge</p>
EU	<p>65.6 %</p> <p>If don't have knowledge</p>	<p>65.9 %</p> <p>If don't have knowledge</p>	<p>65.4 %</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Smart Digital Factory
  
- (a) I have ability to apply my knowledge to formulate Smart Digital Factory for Industry4.0
  
- (c) I have ability to design a system, component, or process the Smart Digital Factory for organization to achieve or sustain industry4.0 context
  
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop organization having industry4.0 context by using Smart Digital Factory
  
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Smart Digital Factory
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q12. What is the level of your understanding of Smart operations - Controlling, Adjusting & Monitoring Process Real Time with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 26 Q12. What is the level of your understanding of Smart operations - Controlling, Adjusting & Monitoring Process Real Time with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>53.9% 21.6% 12.1% 7.8% 11.2%</p> <p>If don't have knowledge</p> <p>9.5% 25.7% 33.1% 20.3% 11.5%</p>	<p>53.5% 25.4% 10.5% 9.6% 9.6%</p> <p>If don't have knowledge</p> <p>9.6% 27.4% 28.8% 24.7% 9.6%</p>	<p>54.2% 17.8% 13.6% 5.9% 12.7%</p> <p>If don't have knowledge</p> <p>9.3% 24.0% 37.3% 16.0% 13.3%</p>
EU	<p>60.6% 16.1% 4.6% 10.6% 11.0%</p> <p>If don't have knowledge</p> <p>10.5% 9.0% 32.3% 32.3% 15.8%</p>	<p>58.0% 17.0% 3.4% 13.6% 10.2%</p> <p>If don't have knowledge</p> <p>2.0% 8.0% 50.0% 30.0% 10.0%</p>	<p>62.3% 15.4% 5.4% 8.5% 11.5%</p> <p>If don't have knowledge</p> <p>9.6% 15.7% 21.7% 33.7% 19.3%</p>



Note:

- I don't have knowledge, competences to define/implement Smart operations
- (a) I have ability to apply my knowledge to formulate Smart operations for Industry4.0
- (c) I have ability to design a system, component, or process the Smart operations for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop organization having industry4.0 context by using Smart operations
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Smart operations
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q13. What is the level of your understanding of Data-driven services-Integrated Business and Operational Data Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 27 Q13. What is the level of your understanding of Data-driven services-Integrated Business and Operational Data Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>61.2 %</p> <p>If don't have knowledge</p>	<p>58.8 %</p> <p>If don't have knowledge</p>	<p>63.6 %</p> <p>If don't have knowledge</p>
EU	<p>71.1 %</p> <p>If don't have knowledge</p>	<p>67.0 %</p> <p>If don't have knowledge</p>	<p>73.8 %</p> <p>If don't have knowledge</p>





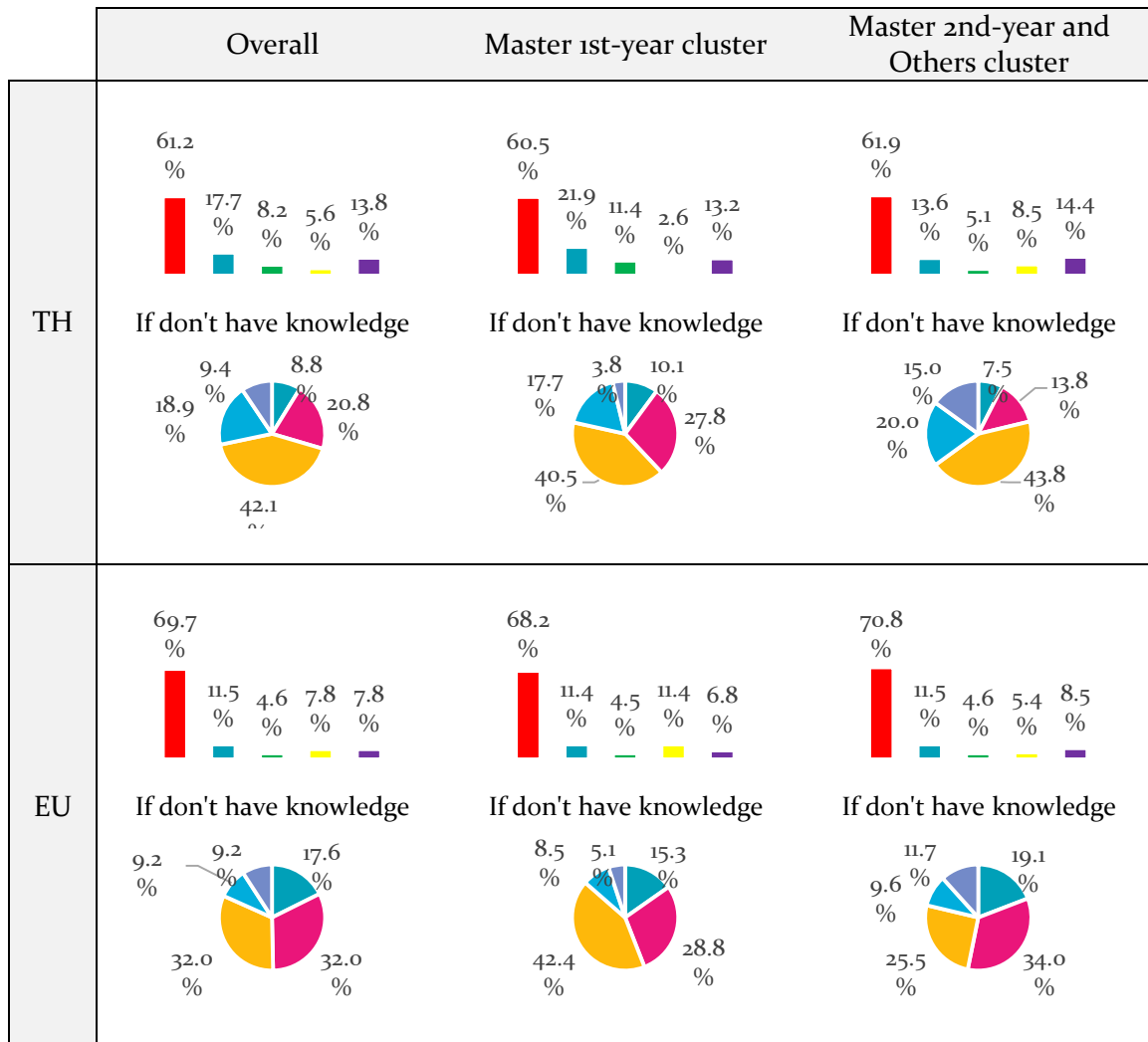
Note:

- I don't have knowledge, competences to define/implement Data-driven services-Integrated Business
- (a) I have ability to apply my knowledge to formulate Data-driven services-Integrated Business for Industry4.0
- (c) I have ability to design a system, component, or process the Data-driven services-Integrated Business for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop organization having industry4.0 context by using Data-driven services-Integrated Business
- (e) I have ability to identify, formulate, and solve industry4.0 related problems using Data-driven services-Integrated Business
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q14. What is the level of your understanding of Centralized integrative production operation management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 28 Q14. What is the level of your understanding of Centralized integrative production operation management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?





Note:

- I don't have knowledge, competences to define/implement Centralized integrative production operation
- (a) I have ability to apply my knowledge to formulate Centralized integrative production operation management for Industry4.0
- (c) I have ability to design a system, component, or process Centralized integrative production operation management for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Centralized integrative production operation management for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Centralized integrative production operation management
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q15. What is the level of your understanding of Digitization life cycle production management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 29 Q15. What is the level of your understanding of Digitization life cycle production management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>62.9 %</p> <p>If don't have knowledge</p>	<p>58.8 %</p> <p>If don't have knowledge</p>	<p>66.9 %</p> <p>If don't have knowledge</p>
EU	<p>67.0 %</p> <p>If don't have knowledge</p>	<p>61.4 %</p> <p>If don't have knowledge</p>	<p>70.8 %</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Digitization life cycle production management
- (a) I have ability to apply my knowledge to formulate Digitization life cycle production management for Industry4.0
- (c) I have ability to design a system, component, or process Digitization life cycle production management for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Digitization life cycle production management for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Digitization life cycle production management
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q16. What is the level of your understanding of Modern Quality Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 30 Q16. What is the level of your understanding of Modern Quality Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>55.2% 22.4% 10.3% 8.2% 12.9%</p> <p>If don't have knowledge</p> <p>13.6% 21.8% 34.0% 23.1% 7.5%</p>	<p>54.4% 24.6% 13.2% 8.8% 11.4%</p> <p>If don't have knowledge</p> <p>10.8% 24.3% 33.8% 23.0% 8.1%</p>	<p>55.9% 20.3% 7.6% 7.6% 14.4%</p> <p>If don't have knowledge</p> <p>16.4% 19.2% 34.2% 23.3% 6.8%</p>
EU	<p>56.9% 18.8% 4.6% 6.9% 14.2%</p> <p>If don't have knowledge</p> <p>10.6% 7.6% 31.1% 39.4% 11.4%</p>	<p>54.5% 19.3% 4.5% 9.1% 14.8%</p> <p>If don't have knowledge</p> <p>10.4% 2.1% 41.7% 39.6% 6.3%</p>	<p>58.5% 18.5% 4.6% 5.4% 13.8%</p> <p>If don't have knowledge</p> <p>10.7% 10.7% 25.0% 39.3% 14.3%</p>



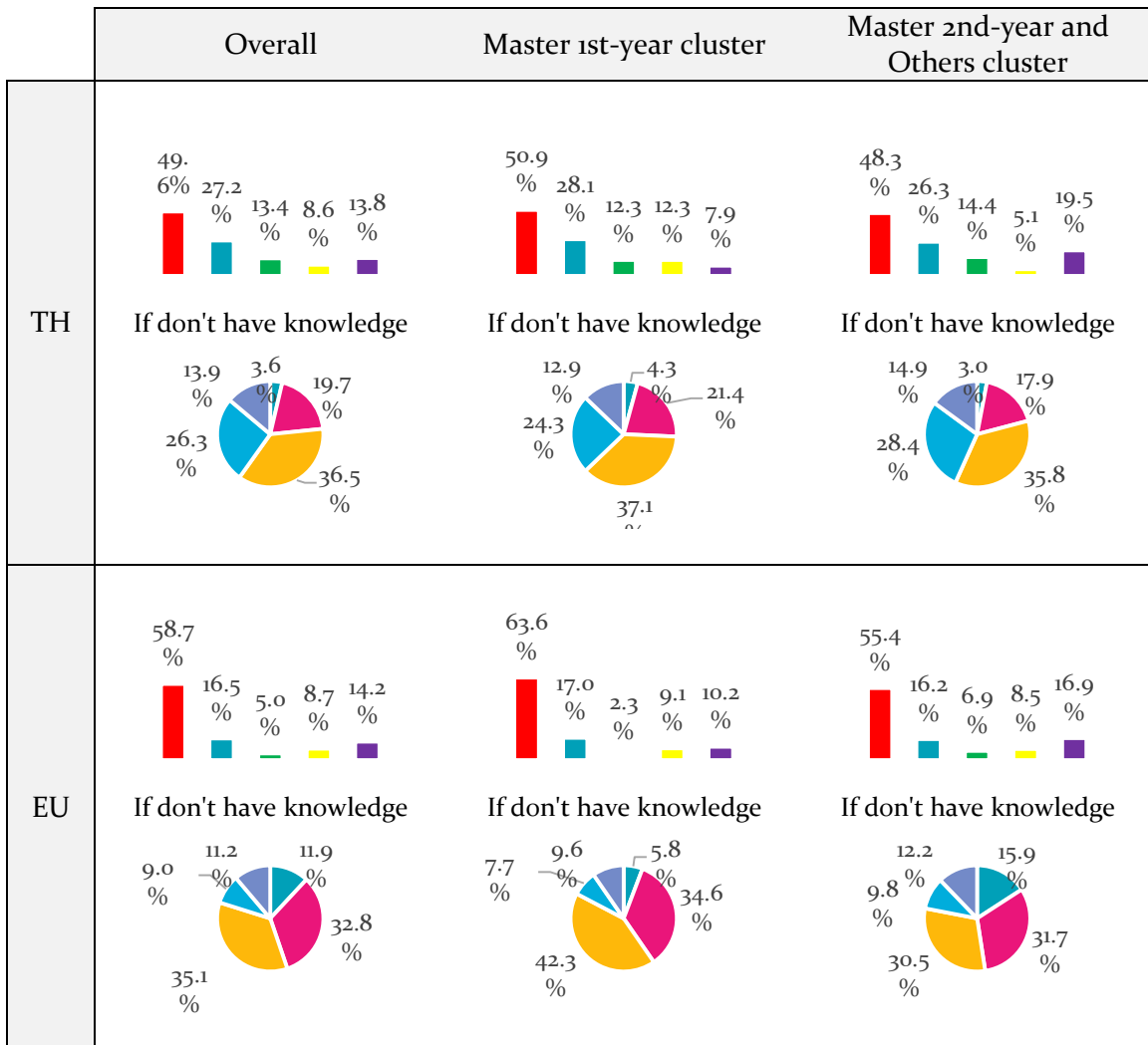
Note:

- I don't have knowledge, competences to define/implement Modern Quality Management
  
- (a) I have ability to apply my knowledge to formulate Modern Quality Management for Industry4.0
  
- (c) I have ability to design a system, component, or process Modern Quality Management for organization to achieve or sustain industry4.0 context
  
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Modern Quality Management for organization having industry4.0 context
  
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Modern Quality Management
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q17. What is the level of your understanding of Modern Supply Chain & Logistics Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 31 Q17. What is the level of your understanding of Modern Supply Chain & Logistics Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?







Note:

- I don't have knowledge, competences to define/implement Modern Supply Chain & Logistics Management
- (a) I have ability to apply my knowledge to formulate Modern Supply Chain & Logistics Management for Industry4.0
- (c) I have ability to design a system, component, or process Modern Supply Chain & Logistics Management for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Modern Supply Chain & Logistics Management for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Modern Supply Chain&Logistics Management
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q18. What is the level of your understanding of Modern Preventive/Predictive Maintenance Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 32 Q18. What is the level of your understanding of Modern Preventive/Predictive Maintenance Management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>54.7% 21.1% 15.5% 10.8% 6.5%</p> <p>If don't have knowledge</p>	<p>55.3% 23.7% 17.5% 7.9% 6.1%</p> <p>If don't have knowledge</p>	<p>54.2% 18.6% 13.6% 13.6% 6.8%</p> <p>If don't have knowledge</p>
EU	<p>60.6% 17.0% 5.0% 14.7% 6.0%</p> <p>If don't have knowledge</p>	<p>67.0% 11.4% 5.7% 11.4% 8.0%</p> <p>If don't have knowledge</p>	<p>56.2% 20.8% 4.6% 16.9% 4.6%</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Modern Preventive/Predictive Maintenance Management
- (a) I have ability to apply my knowledge to formulate Modern Preventive/Predictive Maintenance Management for Industry4.0
- (c) I have ability to design a system, component, or process Modern Preventive/Predictive Maintenance Management for organization to achieve or sustain industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Modern Preventive/Predictive Maintenance Management
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Modern Preventive/Predictive Maintenance Management for organization having industry4.0 context
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



Q19. What is the level of your understanding of Modern Business & Organizational Management for sustainability with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 33 Q19. What is the level of your understanding of Modern Business & Organizational Management for sustainability with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH	<p>55.6 %</p> <p>If don't have knowledge</p>	<p>51.8 %</p> <p>If don't have knowledge</p>	<p>59.3 %</p> <p>If don't have knowledge</p>
EU	<p>59.6 %</p> <p>If don't have knowledge</p>	<p>60.2 %</p> <p>If don't have knowledge</p>	<p>59.2 %</p> <p>If don't have knowledge</p>



Note:

- I don't have knowledge, competences to define/implement Modern Business & Organizational Management for sustainability
- (a) I have ability to apply my knowledge to formulate Modern Business & Organizational Management for sustainability for Industry4.0
- (c) I have ability to design a system, component, or process Modern Business & Organizational Management for sustainability for organization to achieve or sustain industry4.0 context
- (d) I have ability to setup, lead the Multi-Disciplinary Teams to develop Modern Business & Organizational Management for sustainability for organization having industry4.0 context
- (e) I have ability to identify, formulate, and solve industry4.0 related problems of Modern Business & Organizational Management for sustainability
  - 1 (But I don't think I need to learn it in next 3 years)
  - 2 (somewhat need to learn it in next 2 years)
  - 3 (need to learn it in next 1 years)
  - 4 (very need to learn since past 1 years)
  - 5 (strongly need to acquire this since past 2 years)



**PART 3: CHARACTER QUALITY (SELECT ONLY 1 ANSWER)**

Q20. What is the level of your needs to understand Legal affairs and sustainability with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 34 Q20. What is the level of your needs to understand Legal affairs and sustainability with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH			
EU			

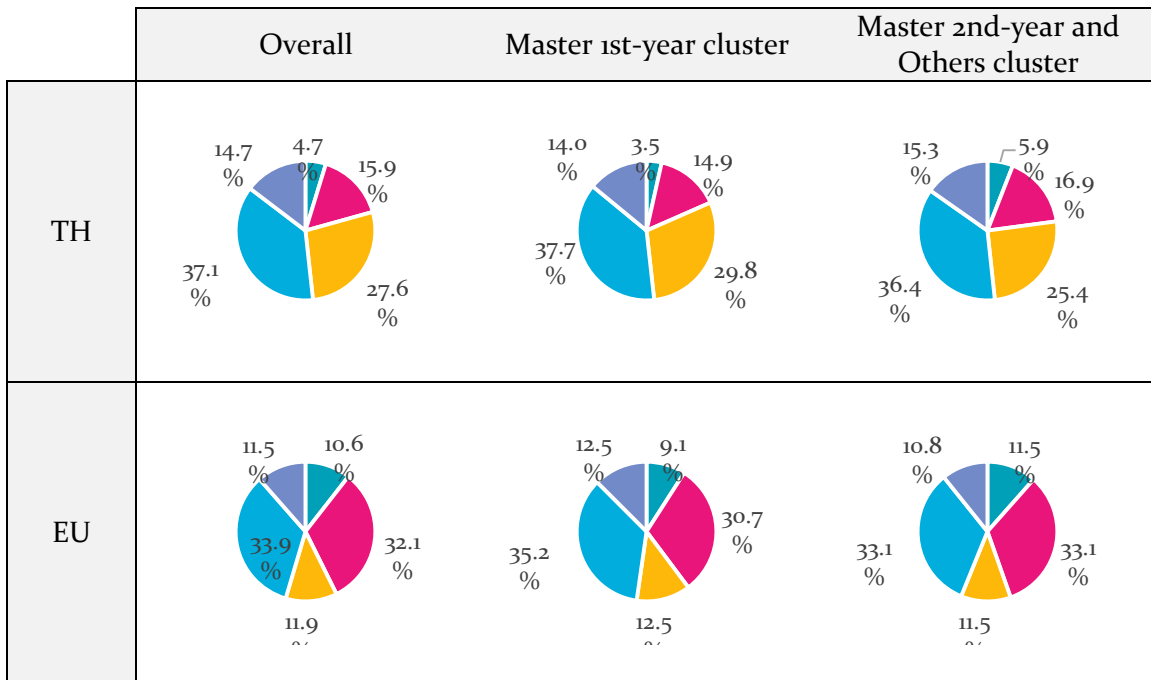
Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)



Q21. What is the level of your needs to understand self and time management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 35 Q21. What is the level of your needs to understand self and time management with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?



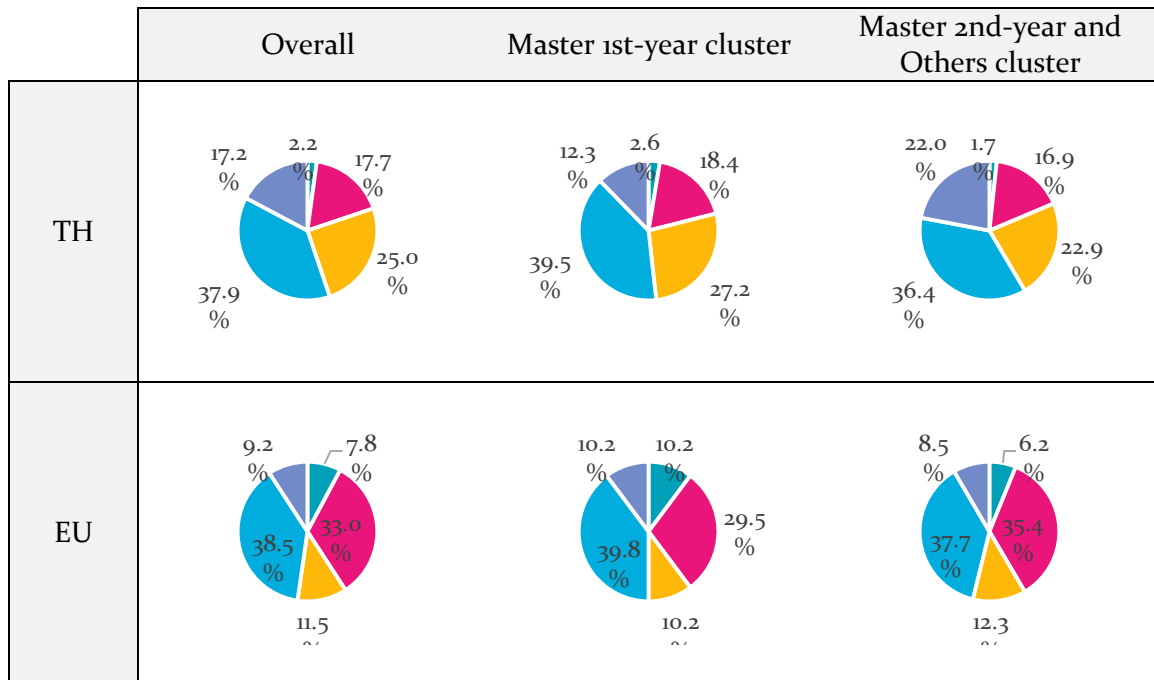
Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)



Q22. What is the level of your needs to understand adaptability and ability to change in new technologies with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 36 Q22. What is the level of your needs to understand adaptability and ability to change in new technologies with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?



Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)





Q23. What is the level of your needs to understand team working abilities with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 37 Q23. What is the level of your needs to understand team working abilities with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH			
EU			

Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)



Q24. What is the level of your needs to understand social skills with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 38 Q.24 What is the level of your needs to understand social skills with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH			
EU			

Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)



Q25. What is the level of your needs to understand Communication skills with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

Table 39 Q25.What is the level of your needs to understand Communication skills with respect to Industry4.0 that you need in order to increase your competences, competitiveness after graduation?

	Overall	Master 1st-year cluster	Master 2nd-year and Others cluster
TH			
EU			

Note:

- 1 (we are not need to learn it in next 3 years)
- 2 (somewhat need to learn it in next 2 years)
- 3 (need to learn it in next 1 years)
- 4 (very need to learn since past 1 years)
- 5 (strongly need to acquire this since past 2 years)