DOCUMENT TITLE:

CRITICAL FACTOR SME DIAGNOSIS REPORT FOR GERMANY

Project: Improving RD and business policy conditions for transnational cooperation in the manufacturing industry

Acronym: Smart Factory Hub

Work package	WP3: Benchmark and RIS3 based SFH model definition
Activity	A 3.2: Regional mapping and classification
Deliverable	D 3.2.2: Critical factor SME Diagnosis Report (SDR)
Date of issue	04.07.2017
Document issued by	USTUTT
Contributors	NA
Version	A1.0
Number of Pages	17

Dissemination level		
PU	Public	X
PP	Restricted to other Programme participants	
RE	Restricted to a group specified by the consortium	
CO	Confidential, only for members of the consortium	

Project co-funded by European Union funds (ERDF, IPA)

TARGET GROUP ASSESSMENT

Has this deliverable addressed any of the target group indicated in the application form?

Yes / No

If yes, please describe the involvement of each individual target group in the table below.

Target group	Number reached by the deliverable	Description of target group involvement
SME	*16*	SMEs have offered their answers to the questionnaire
Regional public authority		
National public authority		
Higher education and research		
Business support organisation		

CONTENT

1 Introduction

The survey for Germany has been executed from the 16th of March until end of May 2017. Especially we have been aimed at smaller production oriented SME's from southern Germany. More than 100 SME participated at the survey. The success rate was close to 15%, which means that we finally got 16 completed questionnaires.

Response rate (?) Base: Entered intro

Status	Frequency	State
Entered intro	106	100%
Entered first page	37	35%
Started responding	19	18%
Partially completed	19	18%
Completed	16	15%
Breakoffs		
Introductory breakoffs	87	82%
Questionnaire breakoffs	3	3% (neto 16%)
Total breakoffs	90	85%

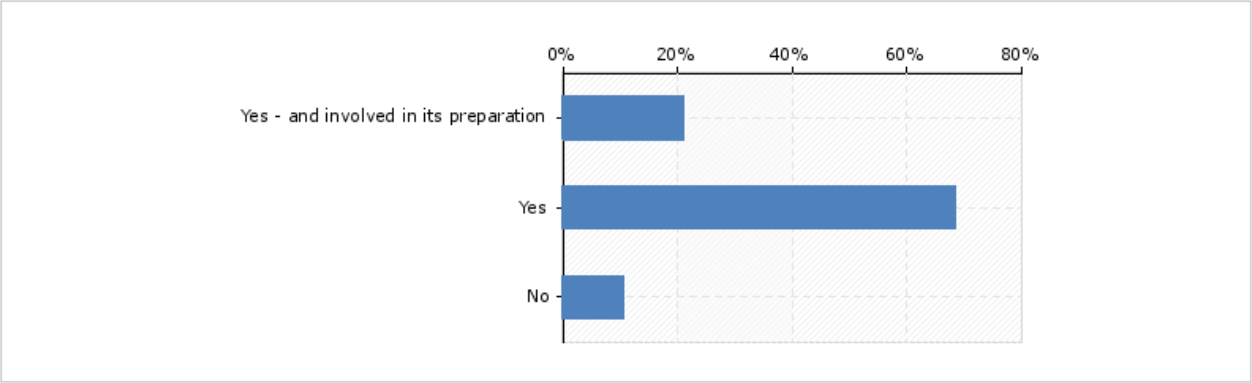
Below we are presenting the analysis of the results based on the key questions set out in the questionnaire development.

2 Survey results for Germany

2.1 KEY QUESTION 1: How well are SMEs familiar with the Smart Specialization strategy or related policy and what was their involvement in creating it?

With this measure, the share of SMEs, who are familiar with the Smart Specialization strategy is provided, alongside with the share of SMEs involved in preparing it. Moreover, by summarizing the answers, we are able to determine the share of SMEs involved in preparation of Smart Specialization strategy.

Q3 - Are you familiar with the national Smart Specialization strategy* or related policy initiative defining Smart Manufacturing? *Also known as Smart manufacturing policy, RIS3 strategy, Industry 4.0 policy, Regional Innovation Strategy for Intelligent specialization, Smart Factory.



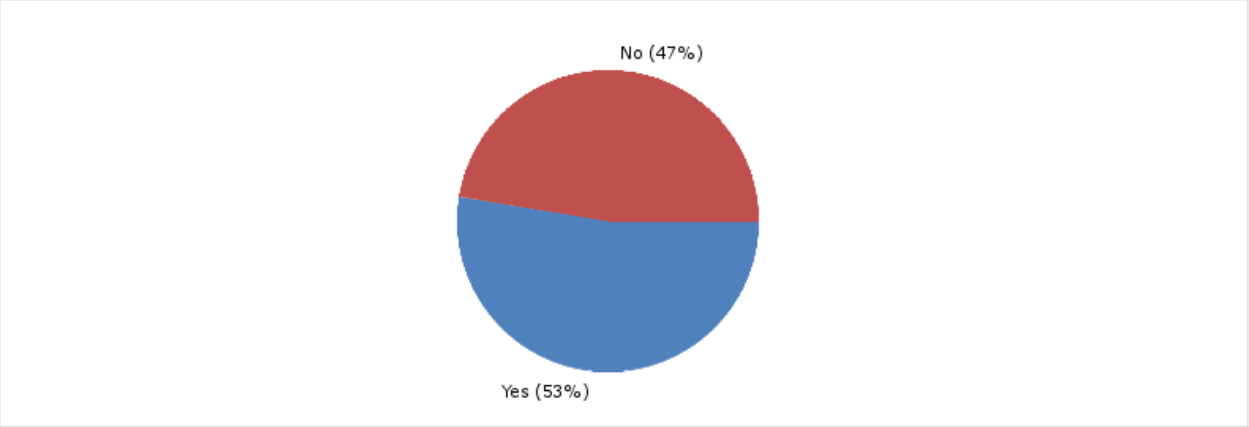
The answers of the first question show us that more than 60% of the companies are familiar with the Smart Specialization and even 20% are involved in its preparation. Only about 10% of the companies are not familiar with this strategy. This shows that Germany has a good awareness distribution in the industry of the smart manufacturing theme.

KEY MESSAGE:
SMEs have mainly been involved in development of the Smart Specialization strategy, while also the Strategy is well recognised by the SMEs.

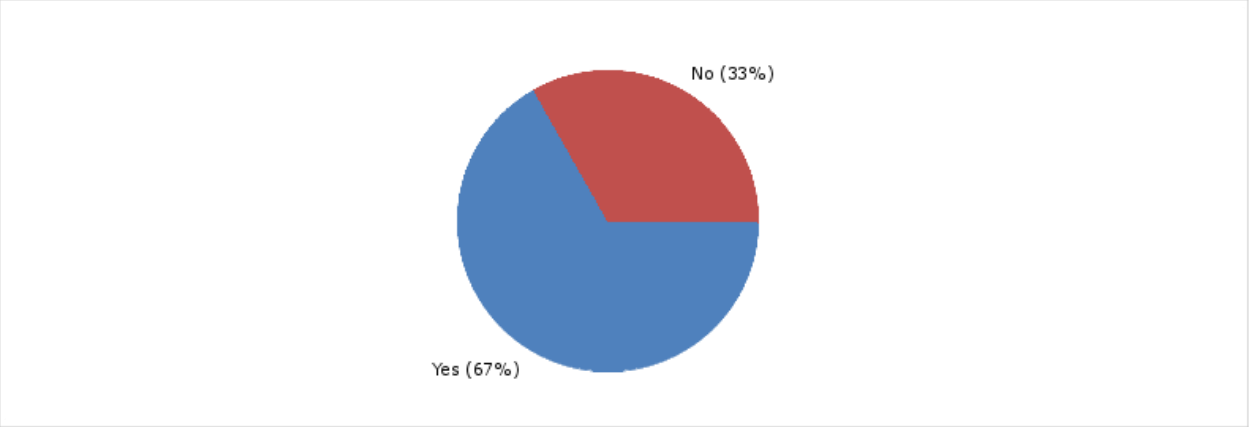
2.2 KEY QUESTION 2: How well is Smart Manufacturing perceived at strategic and spread at operational level (maturity of Smart Manufacturing in the SMEs)?

This measure will give us the answer to the question about how well is Smart Manufacturing understood at strategic level, by giving us the share of SMEs that understand the impact of Smart Manufacturing for their organisation. The second measure is used for determining how well the Smart Manufacturing is implemented in targeted region, by giving us the share of SMEs that currently use Smart Manufacturing systems/solutions in their organisations.

Q4 - Do you understand what are benefits/impacts of ''Smart manufacturing'' for your organization?



Q6 - Do you currently use Smart Manufacturing systems/solutions in your organisation?



Based on the answers of the question 4 we are able to summarize that 47% of the SMEs have problems in understanding the benefits of Smart manufacturing for their organisation, while 53% understand the benefits brought by Smart manufacturing in their organisation. Moreover, 67% of the companies currently use Smart manufacturing systems/solutions in their organisation.

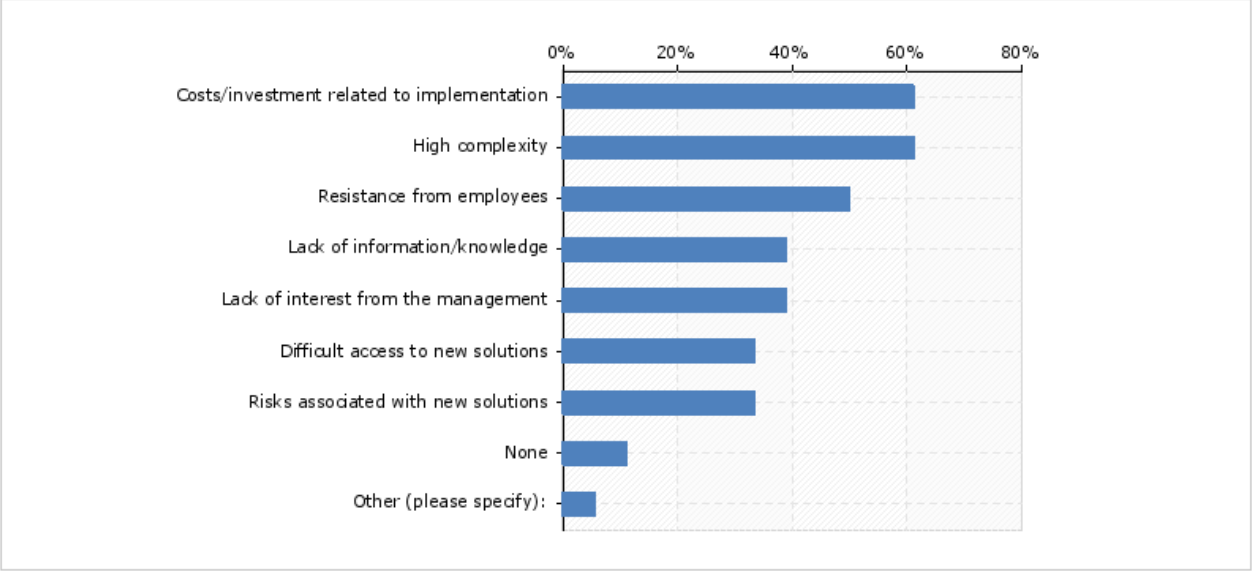
A general statement could be that activities and impulses towards smart manufacturing a partly seen in German industries. However, since the values are not clear to half of the survey participants (against two thirds that already apply these technologies) the low maturity of this technology field is obvious. A requirement for future activities in knowledge transfer could be to focus on technology decisions based on the companies' requirements.

KEY MESSAGE:
Looking on first steps and implementation Smart Manufacturing is well known and approached by German SMEs. However, the implementation is by far not mature. Two thirds are unsure or not aware about the value of these technologies.

2.3 KEY QUESTION 3: What kind of challenges are SMEs facing in implementing Smart Manufacturing technologies and solutions?

This measure is one of the most important ones and will provide information on different challenges and obstacles SMEs are facing in implementing Smart Manufacturing technologies and solutions.

Q7 - What challenges are you facing in implementing Smart Manufacturing technologies?



Based on the answers of question 7 we are able to conclude that more than 60% of the companies believe that the biggest challenges for implementing Smart manufacturing technologies and solutions are Costs/Investment related to implementation and the high complexity linked to Smart manufacturing. With about 50%, a half of the companies see a challenge in the resistance from employees, followed by the lack of information/knowledge (39%) and the lack of interest from the management (39%). Only 34% of the interrogated companies

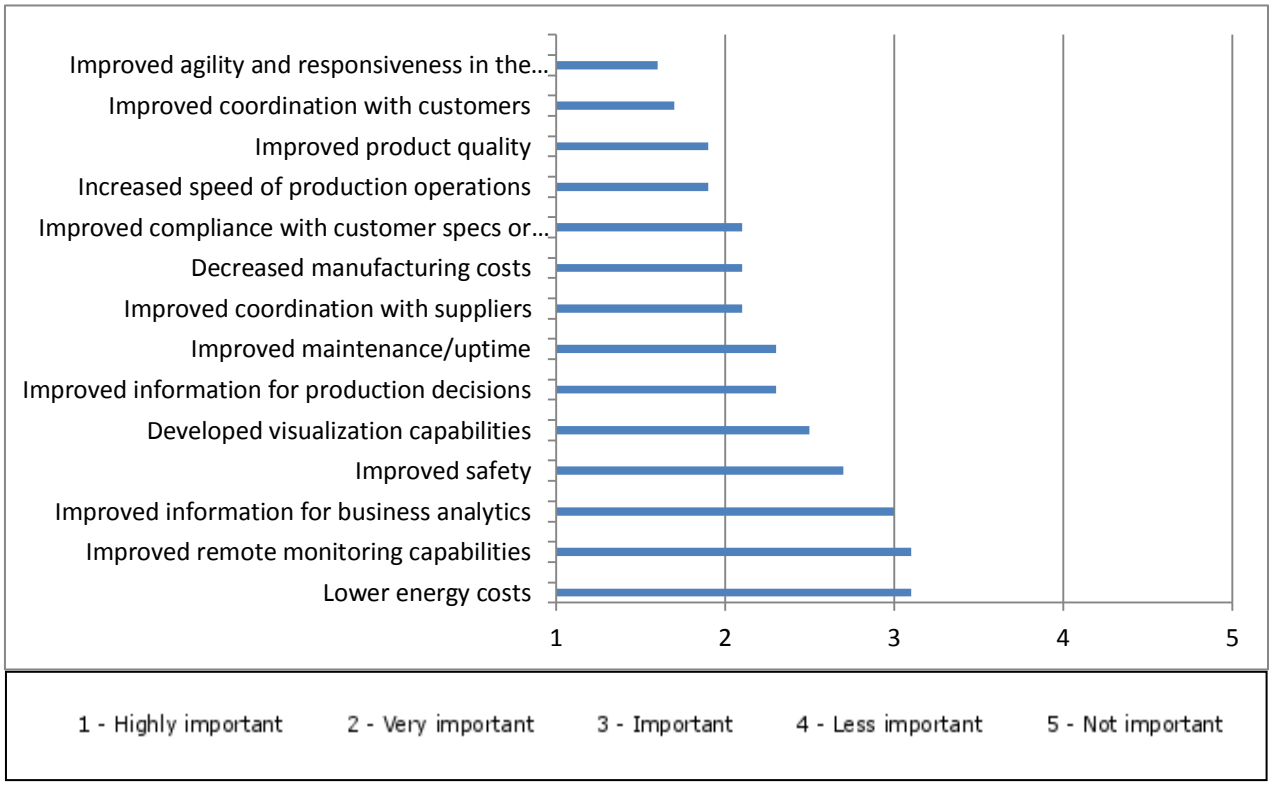
believe that a challenge is the difficult access to new solutions and the risk associated with new solutions. It is interesting to notice that nearly 15% of the companies see no challenge at all.

KEY MESSAGE:
SMEs are facing variety of challenges when it comes to the implementation of Smart Manufacturing technologies or solutions in companies, but the most important two are related to the investment and the high complexity.

2.4 KEY QUESTION 4: Which areas influenced by the Smart Manufacturing are most important for increasing the competitiveness of SMEs.

This measure is providing the overview of areas, influenced by the Smart Manufacturing, for which SMEs believe, will be essential for their competitiveness in the next three to five years.

Q8 - How much do you think the following areas of improvement will be essential for your company's competitiveness in the next three to five years?



Based on all the answers on question 8, we can outline that the most important area of improvement for the company's competitiveness will be the improved agility and responsiveness,

followed by the improved coordination with customers and improved product quality. Also important is the increased speed of production operations. These results show that the most fundamental focus for SME's competitiveness will be agility and responsiveness, coordination with customers, product quality and production costs and speed, while other areas like suppliers, safety, energy and business analytics are less important.

KEY MESSAGE:
The most influential areas for increasing SME's competitiveness in the future can be summed up as "competence to react on customer need": (i) agility and responsiveness, (ii) coordination with customers, (iii) product quality and (iv) speed of production.

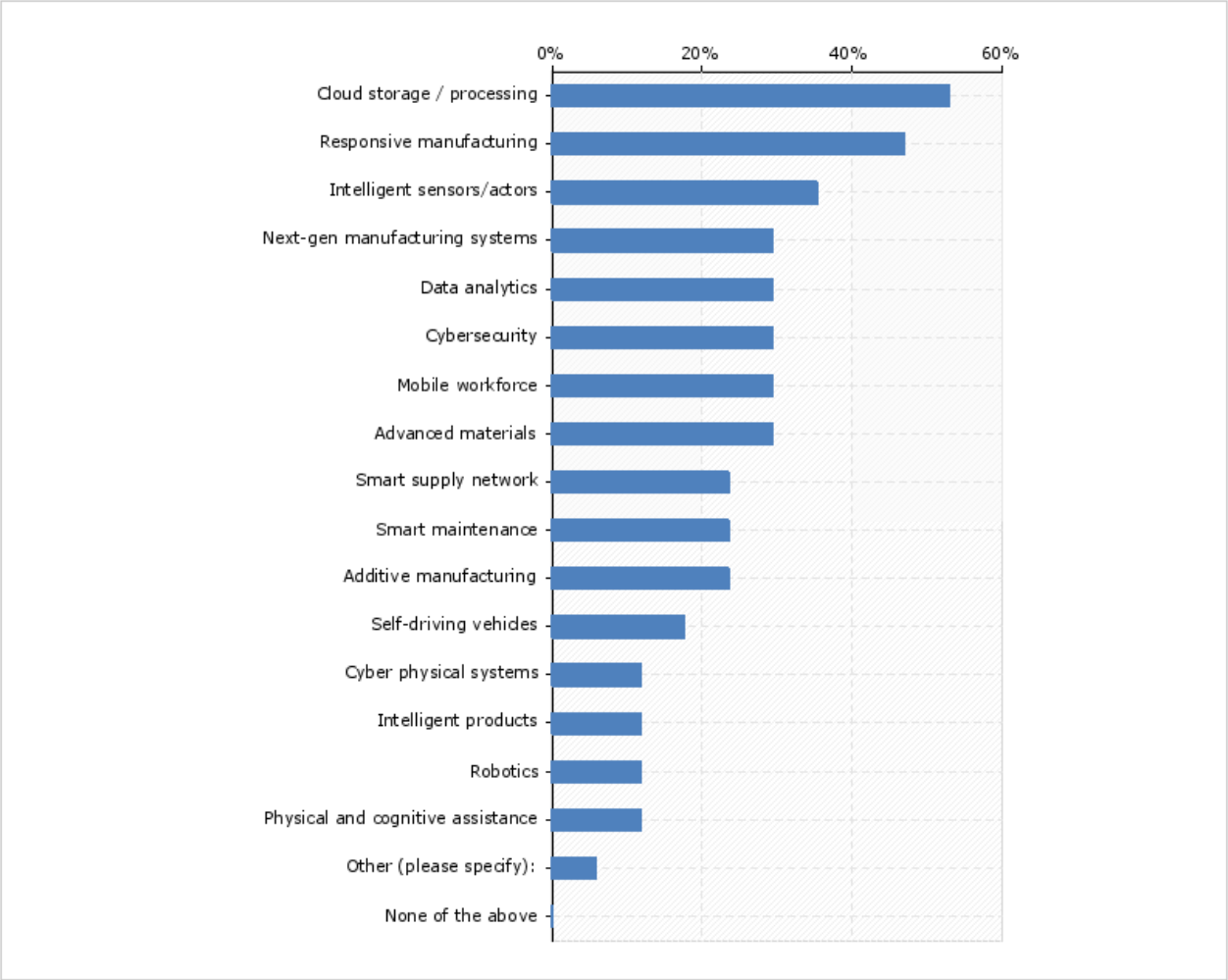
2.5 KEY QUESTION 5: What are the current state-of-art and future plans/strategic orientation for implementation of SMEs in relation to all three areas of intervention?

This measure gives in-depth overview of SMEs current state-of-art and future plans/strategic orientation for implementation in relation to:

- *Novel technologies*
- *Production processes*
- *Human resource management*

This will provide insight and mapping possibility between the existing technologies solutions and good practices and future areas of interest.

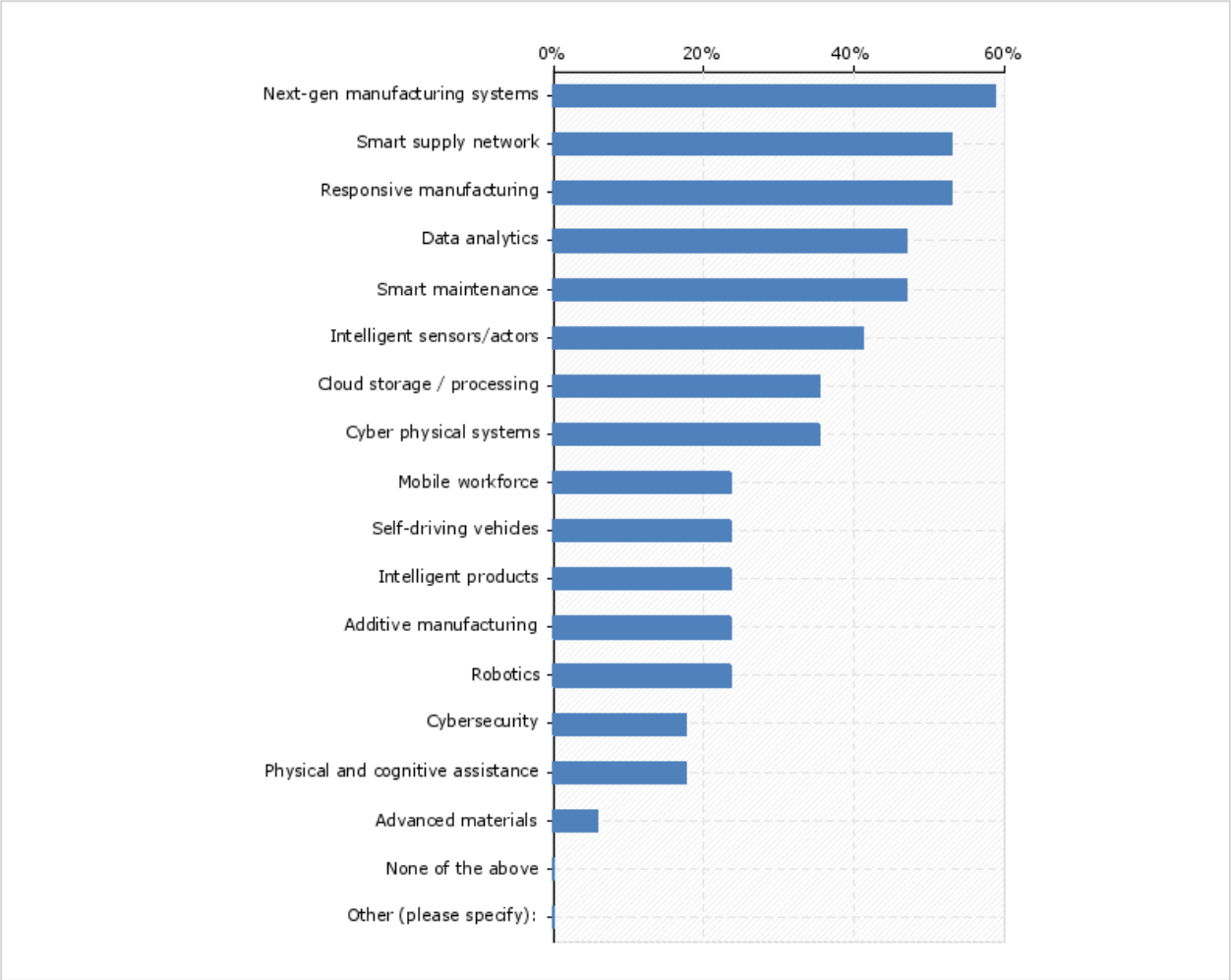
Q10 - What kinds of novel technologies are currently implemented in your company?



As seen in the bar chart, about 50% of SMEs in Germany are currently using cloud storage and responsive manufacturing. Intelligent sensors, next-gen manufacturing, data analytics, cybersecurity, mobile workforce and advanced materials are used by more than 30% of the

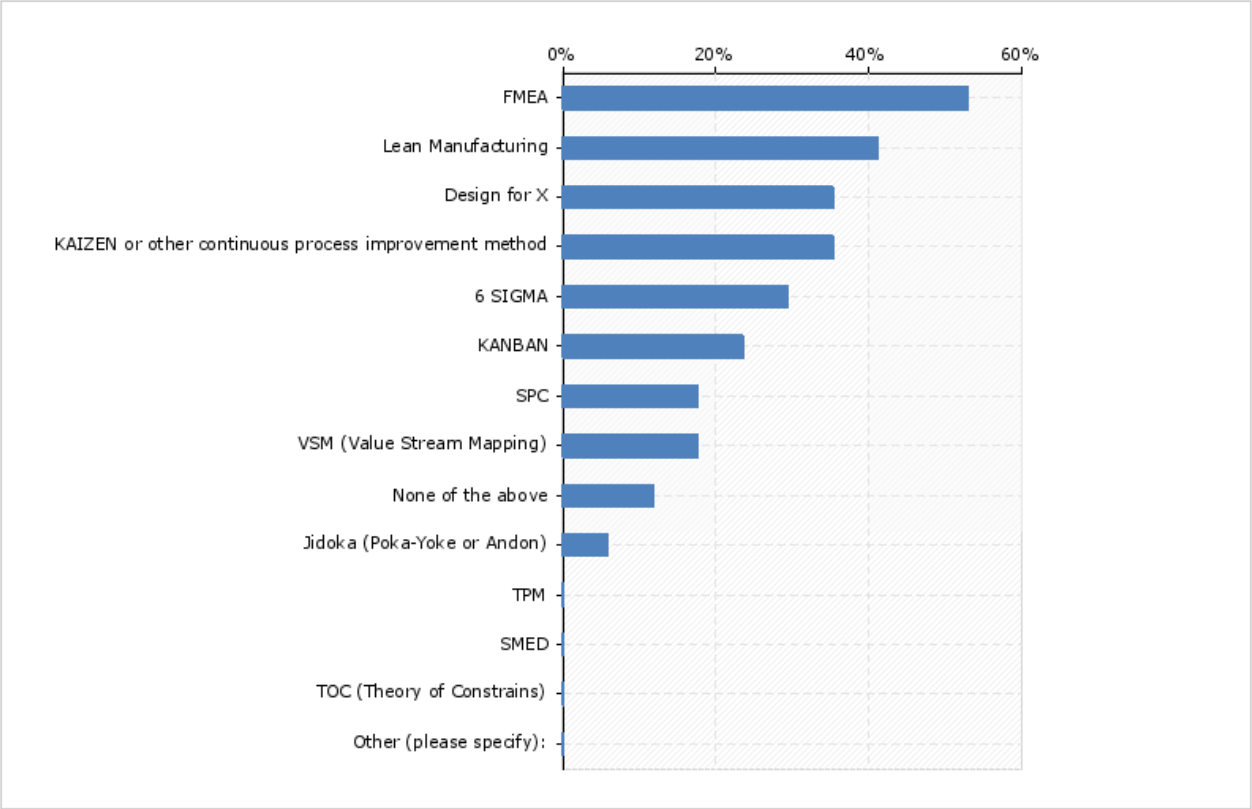
companies. It is interesting to see that every SME utilize a smart manufacturing system/solution, which shows that German SMEs are advanced in implementation of novel technologies.

Q11 - What kinds of novel technologies are relevant and/or planned to be implemented in the future?



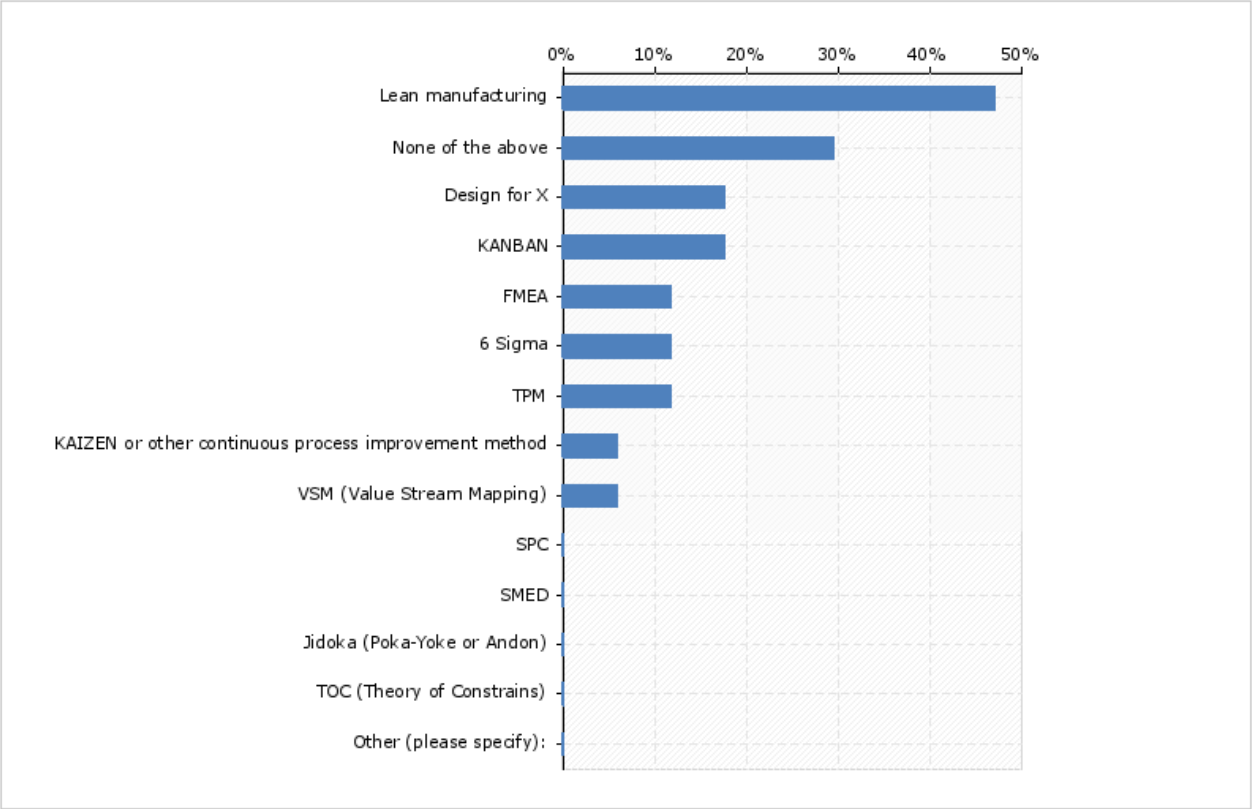
As seen above, all companies answered that they are targeting to implement some new technologies. Nearly 60% of the organisations are planning to implement next-gen manufacturing systems, which is followed by the implementation of smart supply network and responsive manufacturing with more than 50%. In addition, data analytics, smart maintenance, intelligent sensors/actors, cloud storage/processing and cyber physical systems are relevant to be implemented in the future.

Q13 - What kinds of solutions/methods related to production processes are currently implemented in your company?



Based on the answer of question 13, more than 50% of the companies are using FMEA. Lean Manufacturing follows with 42%. Design for X and KAIZEN or other continuous process improvement method are currently implemented in 35% of the organisations. Followed by 6 SIGMA and KANBAN, with about 30%. Less than 20% have implemented SPC, VSM and Jidoka. Other than the technologies, solutions/methods related to the production process are currently not implemented in around 15% of the organisations. Out of this we can see that the German SMEs are very traditional and not that innovative concerning the kinds/solutions related to production processes.

Q14 - What kinds of solutions/methods related to production processes are planned to be implemented in the future?

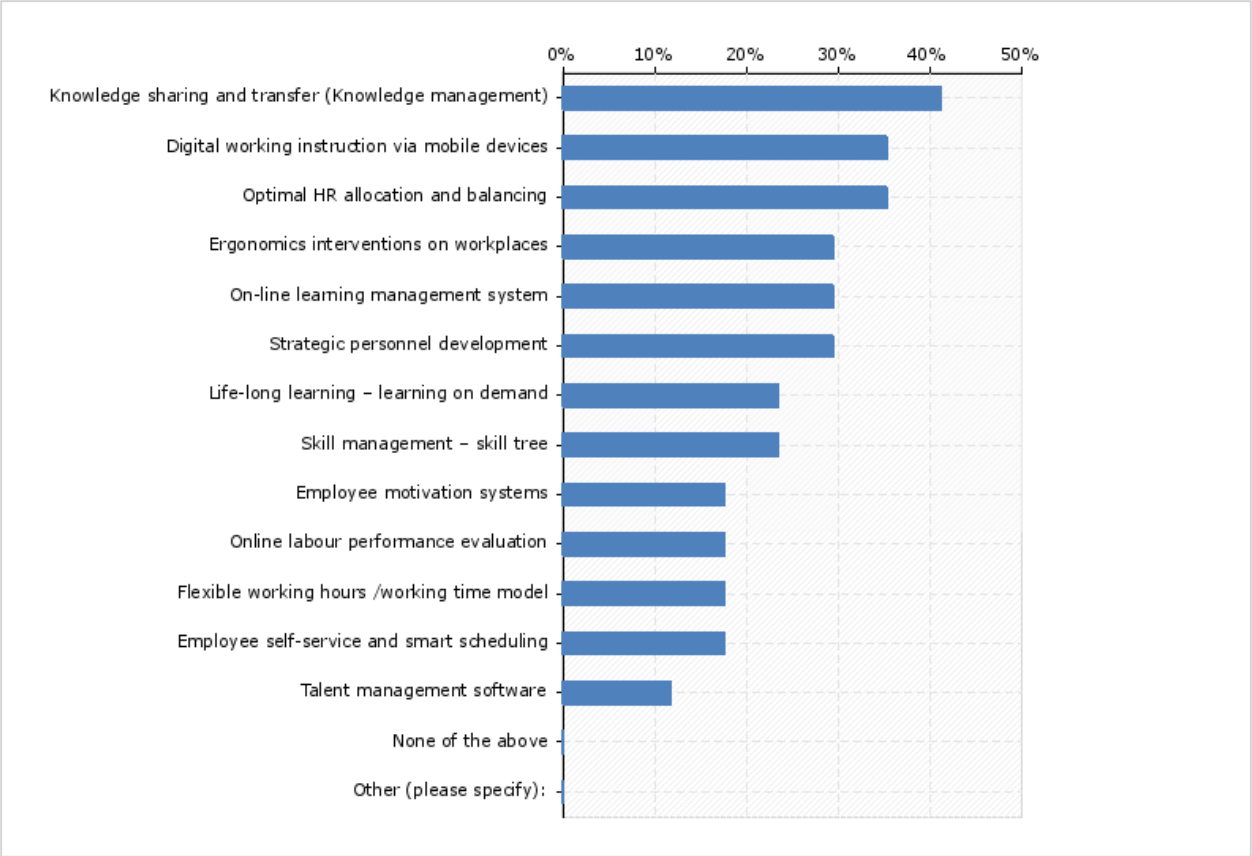


The plans of the companies conclude many different kinds of solutions/methods. Lean manufacturing is planned to be implemented by 45% of the organisations. Remarkable is that nearly 30% of the companies will not be implementing new solutions for the production process. The reason for that can be that they already use for example Lean Management and the change to another solution/method is difficult. The ones, who will implement new solutions/methods but not Lean Management, choose Design for X, KANBAN, FMEA, 6 Sigma, TPM, KAIZEN and VSM.

Q16 - What kinds of solutions/methods related to human resource management are currently implemented in your company?

The most used solutions/methods related to human resource management are ergonomics interventions on workplaces, employee motivation systems and flexible working hours/working time model each with nearly 60%. Followed by knowledge sharing and transfer, digital working instruction via mobile devices, talent management software, online labour performance evaluation and strategic personnel development, every SME has implemented a human resource management.

Q17 - What kinds of solutions/methods related to human resource management are planned to be implemented in the future?



In the future, the organisations will be mostly looking to implement Knowledge sharing and transfer (42%), digital working instruction via mobile devices (35%) and optimal HR allocation and balancing (35%). Every company is planning the implementation of some kind of solutions/methods related to human resource management.

KEY MESSAGES:

Nearly every of the survey participants from Germany is approaching solutions or methods related to production processes or HR management in the realm of smart factories.

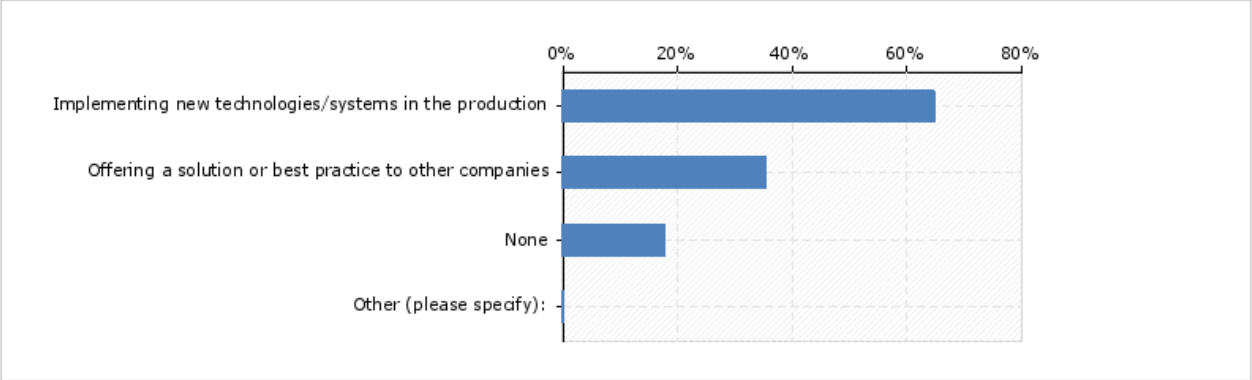
In the future the companies are planning to be even more active with next-gen manufacturing systems, smart supply network and responsive manufacturing, which are the top three areas of interest.

Lean Manufacturing is the most favourite production process optimisation system, while Knowledge sharing and transfer is the most selected HR management system to be implemented in the future.

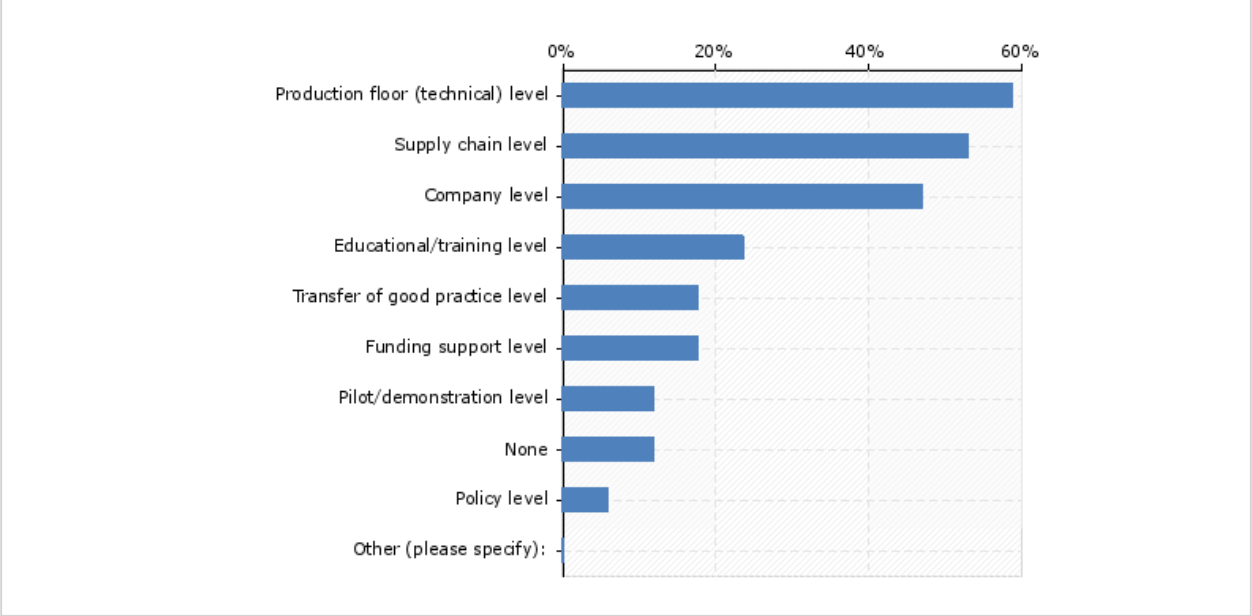
2.6 KEY QUESTION 6: Would SMEs be willing to cooperate, in which areas and at what levels?

This measure will give a share of SMEs that would be willing to cooperate in implementation of Smart Manufacturing technologies and solutions. Moreover, the measure will provide in-depth view on which are the most favourable areas and levels of cooperation.

Q19 - In which cooperation area would you be interested?



Q20 - At what level would you be interested in cooperation?



The bar chart shows that more than 60% of the SME's are interested in the cooperation area new technologies/systems in the production, so that shows that most of the companies are production-orientated organisations, while close to 20% answered that they are not interested in such a cooperation. Around 35% of the companies answered that they would like to offer a solution or best practice to other companies.

As seen in the diagram nearly 60% of the companies are interested in cooperation at the production floor (technical) level, followed by the supply chain level with more than 50%. Other preferred levels are the company level, the educational/training level, the transfer of good practice level and the funding support level.

KEY MESSAGE:
More than 80% of German SME's are willing to cooperate in the future, especially in implementing new technologies/ systems in the production. They are mostly interested in the production floor (technical) level and the supply chain level.

3 Conclusion

SMEs in Germany were strongly involved in preparation of the smart specialisation strategy, so that is why currently more than two thirds approach Smart Manufacturing systems/solutions in their organisation. The attempt to implement these new technologies is strong and most of the SMEs are familiar with the new technologies and trends in the industry. The awareness of urgency for adapting smart manufacturing is big. However, the majority of companies are not aware of the benefits smart manufacturing technologies bring. This can be a further research field to create strategies for smart manufacturing solutions based on the companies' needs.

There are major problems related to the implementation, since many consider costs/investments related to implementation challenging, while other have difficulties with high complexity and resistance from employees. Despite that, German SMEs are still very interested in the introduction of new technologies. Most important fields for their competitiveness are improved agility and responsiveness, improved coordination with customers, improved product quality, and increased speed of production.

Concerning the solutions/ methods, 15% of the SMEs are still not implementing novel technologies related to smart manufacturing, while there are better trends when it comes to the human resource management where no company is not implementing any of the new trends. The participants were strongly engaged in optimizing the workspaces. Human centred and employee related trends seem more mature than smart manufacturing/ production.

More than 80% of the survey participants are willing to engage in collaborations in the future, especially regarding the implementation of new technologies or in offering a solution or best practice for other companies.