

Making factories smart: Capturing value in Swiss manufacturing



Introduction

Deloitte in cooperation with the Manufacturer's Alliance for Productivity and Innovation (MAPI) established a joint [Smart Factory Study](#) to evaluate the business case for investment.

The focus was to identify the top use cases of smart factory technology, common adoption patterns, gains manufacturers are already seeing and how value from smart factory initiatives is being measured.

Major findings of the study included the following:

- every manufacturer independent of size, maturity or sub-sector can harvest business value from smart factory initiatives and
- associated transformation risks are generally outweighed by the overall value created.

Using the global study as a basis for further investigation, Deloitte Switzerland spoke to key stakeholders in the Swiss manufacturing industry to get their views on the potential impact of smart factory initiatives in Switzerland and whether these could significantly boost competitiveness and productivity levels within the Swiss manufacturing industry.

Whilst these interviews were conducted just before the COVID-19 also hit Switzerland, the dramatic acceleration of digitalisation we are seeing in light of COVID-19 makes these findings even more relevant.

The term **Smart Factory** refers – in the context of Industry 4.0 – to the vision of a production environment in which manufacturing plants and logistics systems are largely self-organising without human intervention. The networking of embedded production systems and dynamic business and engineering processes enables the profitable manufacture of products even for individual customer requirements up to batch size one. The technical basis is provided by cyber-physical systems that communicate with each other using the Internet of Things (IoT).

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Boosting competitiveness

Our investigation revealed that considering smart factory initiatives as a way to remain competitive will be important for Swiss businesses to offset the locational disadvantages of high costs and salaries. The inherent potential of smart factory concepts is increasingly being realised by Swiss manufacturers who are already testing and implementing different versions of the smart factory.

According to [Patrik Wermelinger, Head of Investment Promotion at Switzerland Global Enterprise \(S-GE\)](#), 'With its many leading research institutes, Switzerland is an innovation hub for emerging technology such as artificial intelligence and robotics.' He goes on to add that 'the country's long tradition in precision engineering and manufacturing excellence serves as a winning combination for not only keeping the Swiss manufacturing industry competitive in the future, but also for attracting foreign companies to develop their smart factory initiatives in Switzerland.'

Similar to the global study, the Swiss market also has its early adopters who are already actively implementing the advanced technology that drives smart factory initiatives. By way of example, [Robert Rudolph, Head of Digitalization and Innovation at Swissmem](#), referred us to ABB's

digital semiconductor factory in Lenzburg, known as 'The factory of the year 2028.' It comprises many advanced technologies from automated guided vehicles (AGV) to handling robots and manufacturing execution systems (MES). There is also the encouraging example of smaller contractors who have managed to fully interconnect their shop floor to monitor and optimise production processes to such an extent that they are now able to offer their clients customised pricing and timing for specific orders.

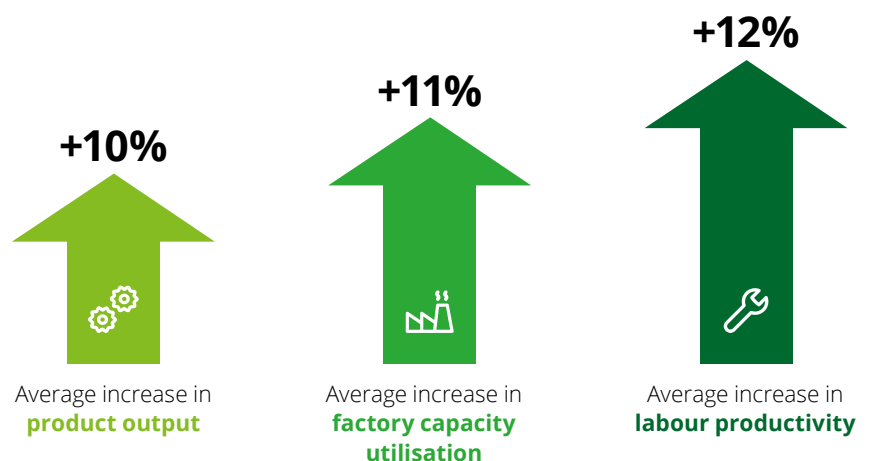
We are also seeing a clear trend of increased customer centricity accelerating the implementation of concepts such as the smart factory. This means that delivering

increased value to the customer will need to be an important component of any new or adapted business models. However, there are also clear cost benefits. According to the global study, companies running smart factory initiatives have seen a 10% increase in production output and an 12% increase in labour productivity over the past three years (see figure 1). If similar figures are achievable for companies in Switzerland, S-GE's Patrik Wermelinger thinks that 'Reduced production time could result in refreshed business models and, depending on the percentage of Swiss companies applying and exporting smart manufacturing, exports could grow as well.'

Figure 1

Smart factory initiatives triggered double-digit growth in key performance indicators between 2015 and 2018

Over the past three years, companies running smart factory initiatives have seen encouraging results:



Source: Deloitte analysis of the 2019 Deloitte and MAPI Smart Factory Study data.

People first

We've seen, from our global survey, that the ultimate success of a smart factory initiative often lies in the hands of the people involved – from the key stakeholders to the initiative leaders and, importantly, those at the grassroots who work with the new technology and processes every day. Findings show that ninety percent of the solution is getting the right leader with the right experience and passion thereby emphasising the importance of including a broad spectrum of people with diverse skills and perspectives.

The Swiss market is no different in this regard and achieving success requires the right people at all levels of the organisational landscape. S-GE's Patrik Wermelinger makes the point that Board members will need to create the right organisational mindset and management will need to attract digitally skilled talent and also set up reskilling programmes for existing employees. Helping employees to realise the benefits of adopting new technologies in their workflow processes will be critically important to transform scepticism into trust.

Generally, the high skills level in Switzerland as a result of the dual education system means that most employees should be able to participate on some level in the digital journey. However, for the moment, sourcing implementation skills still remains a challenge, especially for Swiss SME's. Robert Rudolph of Swissmem points out that while SME's may have the skills required to operate and maintain smart factories, the current scarcity of broader data and computer science skills in the workforce means that the implementation of more complex digital projects will require flexible approaches to resourcing and attracting the right talent.

[Dr Jürg Meierhofer of ZHAW School of Engineering](#) observes that people with a combination of both specialist and generalist knowledge (T-shaped people) are required to drive digitalisation projects. Fortunately, the education of such specialists is already well underway in Switzerland, with continuing education on an extensive range of digitalisation topics also being offered. This should go some way towards addressing skills and capability gaps.



Targeted investments

Another key finding of the global report is that smart factory initiatives require targeted investments which link directly to business value and are specifically able to show both financial and operational benefits. With this in mind, most initial investments are targeted at existing facilities rather than building new factories.

In the Swiss market, business areas like logistics, production and services can clearly benefit from targeted investment in advanced technology. Also the strong mechanical and electrical sector could profit from focused investments in the smart factory concept since it could help alleviate cost pressures.

Traditional automation efforts in Switzerland and elsewhere are being increasingly supported by data analytics systems. Data aggregation and engineering collaboration are also on the rise and show great potential to lower production cost and increase customer value. It is predicted that factory asset intelligence and performance management are also areas where targeted investment in advanced technology could deliver measurable business results.



Some challenges, but many opportunities

Globally, one of the biggest challenges to smart factory adoption is that many factories simply do not take any action on smart factory investment and initiatives, mainly due to a lack of experience. The operational risks of disrupting day to day business and incurring potential losses resulting from unsuccessful implementation of change, were also highlighted. Furthermore, cyber risks were seen as one of the most daunting risks globally. It is therefore of critical importance to have a robust cyber risk strategy in place to enable any smart factory implementation.

More specifically for Switzerland, one of the main challenges is the effective implementation of smart factory initiatives. This includes having the right skillset, processes and technology and, going through the transformation journey in the right stages. A shift in mindset and culture will be key for the successful navigation of this digital journey. According to Robert Rudolph of Swissmem, SME's in particular will be challenged by both sufficiency

of dedicated resources and gathering the right information to decide which opportunities to leverage and which advanced technologies can be realistically implemented.

As the Deloitte and MAPI Smart Factory Study results reveal, the promise of the Fourth Industrial Revolution can be delivered through smart factory initiatives, and smart factories are beginning to pay off for early adopters. The results also appear to reinforce the potential upside of factory transformation by using digital technologies and changing the very way work is done. Dr Jürg Meierhofer of ZHAW School of Engineering concludes that 'the potential of innovative offerings such as 'smart services' and 'smart products' is far from being exhausted.'

In line with these findings, and despite the challenges, smart manufacturing is already happening in Switzerland and continued early adoption of initiatives will play a major role in strengthening Switzerland's attractiveness as an investment destination. S-GE's Patrik Wermelinger is convinced that 'Switzerland has all the ingredients to be a smart factory location of choice for international companies.'



Interview with Patrik Wermelinger, Head of Investment Promotion at Switzerland Global Enterprise (S-GE)



Deloitte: The 2019 Deloitte Smart Factory Study showed that 86% of manufacturers globally believe that smart factory initiatives will be the main driver of manufacturing competitiveness in five years. What is your view on the potential of smart factory initiatives to significantly boost competitiveness and productivity levels within the manufacturing industry in Switzerland?

Patrik Wermelinger: Switzerland is an innovation hub, with many leading research institutes for emerging technology such as artificial intelligence and robotics. The country also has a long tradition in precision engineering and manufacturing excellence, i.e. in the watch-making or the medical technology industry. This is a winning combination for not only keeping the Swiss manufacturing industry competitive in the future, but also for attracting foreign companies to develop their smart factory initiatives in Switzerland.

Deloitte: The study also showed that people are key to the success of the smart factory. What sort of mindset, talent and skills will Swiss businesses need to successfully implement advanced technologies and drive smart factory initiatives?

Patrik Wermelinger: Boardrooms of companies with smart factories look different. Board members need to create the right organisational mindset in order to leverage the full effect of productivity gains. Also, in a technology driven company, CTO's have a stronger say. The company's management, supported by its corporate culture, needs to attract digitally skilled talents and set up reskilling programs for existing employees. Training on how to integrate emerging technologies will help

employees to understand how technology can make the job more interesting. Scepticism needs to be transformed into trust and employees should see the benefit of adopting new technologies into their workflow and into manufacturing processes which ultimately, will make the company more successful in the future.

Deloitte: Smart factory transformation requires targeted investments to deliver measurable business results. In which part of the value chain do you see the biggest need for investment for Swiss businesses to achieve the best results? Which advanced technologies do you consider most effective for smart factory transformation?

Patrik Wermelinger: I see a high potential in factory asset intelligence and performance management as well as in robotic process automation. Augmented reality and machine learning are powerful technologies if the company's workforce has the right skillset and the management has addressed cyber security issues.

Deloitte: In your view, what are the main challenges to the effective implementation of smart factory initiatives for Swiss businesses?

Patrik Wermelinger: It starts with the analysis of where the biggest pain points are and which emerging technologies can help to solve them. Effective implementation is always a combination of skillset, processes and technology. Skillset and processes contribute over 80% to an effective implementation so it will be important for these dimensions to be in place. Swiss businesses should also always manage their cyber risks, a topic which, in recent months, became the most important risk to be managed.

Deloitte: Within the Swiss manufacturing landscape, what role could the early adoption of smart factory initiatives play in strengthening Switzerland's attractiveness as an investment destination?

Patrik Wermelinger: Smart manufacturing is already happening and will play a major role in the future for Switzerland as an investment destination. Switzerland has all the ingredients to be a smart factory location of choice for international companies. Some of them can even manufacture at a lower unit cost in Switzerland compared to other manufacturing locations around the world thanks to the locally skilled workforce and the engineering excellence in Switzerland. Together with our regional and cantonal economic development partners we already focus on promoting Switzerland as a leading advanced manufacturing location to international companies.

Deloitte: According to the 2019 Deloitte Smart Factory Study, companies running smart factory initiatives have seen a 10% increase in production output and an 12% increase in labour productivity over the past three years. What could this mean for Swiss exports, if similar figures are achievable for companies in Switzerland?

Patrik Wermelinger: In the medium term, it could lead to better margins that can be reinvested in innovation. If smart manufacturing can reduce production time, companies can rethink their business model and offer more personalised products to their Swiss and global clients. Exports could then grow as well, depending on what percentage of Swiss companies apply and export smart manufacturing.

Interview with Robert Rudolph, Head of Digitalization and Innovation at Swissmem



Deloitte: The 2019 Deloitte Smart Factory Study showed that 86% of manufacturers globally believe that smart factory initiatives will be the main driver of manufacturing competitiveness in five years. What is your view on the potential of smart factory initiatives to significantly boost competitiveness and productivity levels within the manufacturing industry in Switzerland?

Robert Rudolph: First of all, as I see it, there are different understandings of the concept of 'smart factory' amongst companies. This is understandable since, as with digital journeys in general, a company has to adapt such concepts to their specific and likely evolving environment, taking into account factors like company culture, core competencies, business model, position in value chain and maturity of markets. Swiss manufacturing companies usually have a large share of turn-over in the global markets. To overcome locational disadvantages such as high costs and salaries, they have to constantly be on the lookout for ways to remain competitive. Smart factory initiatives will play a critical role in this endeavour. The potential of smart factories is increasingly being realised by manufacturers who are already testing and implementing different versions of the smart factory in an effort to increase competitiveness.

Deloitte: The study also showed that people are key to the success of the smart factory. What sort of mindset, talent and skills will Swiss businesses need to successfully implement advanced technologies and drive smart factory initiatives?

Robert Rudolph: It all starts with establishing the right mindsets and

appropriate level of digital skills across the workforce of a company. The high skills level in Switzerland as a result of the VET system (Vocational Education and Training), means that generally all employees are able to and should participate in the digital journey. However, SME's in particular will usually not be able to implement advanced technologies and smart factory concepts on their own. Whilst they can focus on skills that are required to operate and maintain smart factory concepts, implementation skills will be a challenge. They will have to consider make-or-buy strategies for their specific requirements. The current scarcity of data and computer science skills means companies have to find flexible approaches.

Deloitte: Smart factory transformation requires targeted investments to deliver measurable business results. In which part of the value chain do you see the biggest need for investment for Swiss businesses to achieve the best results? Which advanced technologies do you consider most effective for smart factory transformation?

Robert Rudolph: Switzerland has a strong base in mechanical and electrical contracting. This sector is under very high cost pressure and the smart factory concept can be used to leverage both skills and flexibility, leading to increased value for customers and lock-in effects. OEM manufacturers in the capital goods sector often create their competitive advantage through innovation and performance. Advanced technologies can increase their cost competitiveness and strengthen their market position. While automation, increasingly assisted by data analytics systems, remains a strong path, we also see engineering collaboration and data aggregation taking off. Routing

processed data from manufacturing, assembly and operations into engineering has huge potential to lower production cost, in respect of both product design and optimised supply chain/manufacturing processes, as well as increasing customer value. Process monitoring, including condition monitoring of production equipment will increase transparency within the factory, helping to optimise operations even further.

Deloitte: In your view, what are the main challenges to the effective implementation of smart factory initiatives for Swiss businesses?

Robert Rudolph: In my opinion, the biggest challenge – which will be faced particularly by SME's, which comprise 95% of companies in the Swiss manufacturing sector – is to collect sufficient and adequate information on both the technologies and opportunities for the smart factory concepts. Another challenge according to our own survey is insufficient resources. Employees are usually absorbed by the daily business and such projects in a complex and demanding environment, in a dynamic technological field need dedicated, skilled resources and will fail if executed simply alongside business as usual. Dedicated capacity is required, which are both hard to find and finance.

Deloitte: Are there any early adopters in the Swiss manufacturing industry, who are already actively implementing the advanced technology that drives smart factory initiatives and are they realising productivity gains as a result?

Robert Rudolph: ABB implemented project Genesis a digital semiconductor factory, at their Lenzburg location. It is known as 'The factory of the year 2028' and comprises many advanced technologies from automated guided vehicles (AGV), handling robots and manufacturing execution systems (MES). But, there are also smaller scale examples amongst contractors who managed to fully interconnect their shop floor to monitor and optimise production processes to the extent that they can now offer their clients customised pricing and timing for specific orders. Other implementations in more manual production processes include fully automated job planning with parts commissioning, assembly instructions, visual assembly monitoring and automated product documentation.

Deloitte: Are Swiss manufacturing companies taking an integrated approach across the entire ecosystem of the business, including suppliers, partners and customers or is the implementation of advanced technologies limited to production processes only?

Robert Rudolph: During the last few years when the Industry 4.0 concept gained momentum, the focus was clearly

on production processes. Continuous optimisations and implementation of new technologies is what manufacturing companies know best and are familiar with. But now, we see a clear trend, also evidenced in our survey results, that customer orientation is featuring strongly. Companies understand that delivering increased value to the customer provides a competitive edge. Whether this value is achieved through new or adapted business models, new service offerings or better tailored product performance – understanding and mastering the processes to create customer value is increasingly important.

I never really came across integrated approaches. Whilst companies may have roadmaps of their journey, integrated approaches are highly complex and challenging to achieve given the broad field of methodologies and technologies which are often still in the development stages. Phased approaches which take into account available resources and competencies, as well as proper risk management are recommended. In this way competitive promise can be verified earlier and learnings accumulated to inform the next stages of the digital journey.

Interview with Dr Jürg Meierhofer of ZHAW School of Engineering



Deloitte: The 2019 Deloitte Smart Factory Study showed that 86% of manufacturers globally believe that smart factory initiatives will be the main driver of manufacturing competitiveness in five years. What is your view on the potential of smart factory initiatives to significantly boost competitiveness and productivity levels within the manufacturing industry in Switzerland?

Jürg Meierhofer: Overall, digitalisation and Industry 4.0 offer many opportunities for Swiss industry. In particular, there are opportunities to further improve and strengthen the already high quality and reap additional benefits in production efficiency. Also, the potential of innovative offerings such as 'smart services' and 'smart products' is far from exhausted. In the industrial sector, this results in so-called 'Smart Product Service Systems' (PSS) with which suppliers can create additional benefits for both their customers and themselves.

Deloitte: The study also showed that people are key to the success of the smart factory. What sort of mindset, talent and skills will Swiss businesses need to successfully implement advanced technologies and drive smart factory initiatives?

Jürg Meierhofer: In the future, highly specialised knowledge will still be required. As digitalisation projects are typically interdisciplinary, professionals with diverse specialisations come together. They should also have a common generalist knowledge to understand one another. In this context, we speak of 'T-shaped people' whereby the vertical bar represents specialised knowledge and the horizontal bar generalist knowledge.

Deloitte: Smart factory transformation requires targeted investments to deliver measurable business results. In which part of the value chain do you see the biggest need for investment for Swiss businesses to achieve the best results?

Jürg Meierhofer: Many steps in the value chain offer opportunities for smart factory concepts, in particular, in logistics, internal production and service. With service, it is not only after-sales service, but also the management of the customer relationships over the entire life cycle.

Deloitte: In your view, what are the main challenges to the effective implementation of smart factory initiatives for Swiss businesses?

Jürg Meierhofer: For industries, one of the main challenges is following the right steps on the transformation journey. This includes questions of where in the entire ecosystem the first transformation steps will be taken and how the journey will progress. Cultural change is also essential, i.e. the transformation of so-called 'soft skills'. For such questions, there is no universal recipe. The answers depend on the context and the current state of each company; however, there are of course typical patterns to keep in mind.

Deloitte: The 2019 Deloitte Smart Factory Study underscored the importance of having the right people driving smart factory initiatives. What role can universities and technical colleges play in skilling, reskilling and upskilling the Swiss workforce?

Jürg Meierhofer: Universities are strongly promoting the training of specialists with generalist knowledge as mentioned above. For example, ZHAW is already training

specialists who can successfully design and drive smart factory concepts. For a number of years, we've offered continuing education programmes on digitalisation and Industry 4.0, for example, in the areas of [data science](#), [Industry 4.0](#) or [additive manufacturing \(3D printing\)](#). Additional programmes are being planned.

Deloitte: The study also reported certain operational benefits of using advanced technologies in existing processes and workstreams. These technologies included quality sensing and detecting, factory synchronisation and real-time asset tracking, amongst others. In which operational areas do you think Swiss manufacturing companies can make the biggest productivity improvements, as a result of implementing advanced technologies?

Jürg Meierhofer: In principle, there are opportunities and possibilities to introduce smart factory concepts in many parts of the value chain. Due to the cost situation (including the current strength of the Swiss Franc) at Swiss companies there are of course greater levers to further increase the degree of production automation. However, special attention needs to be paid to the interaction between human and machines. Additionally, new opportunities for value creation with smart services and smart product service systems should be considered. These not only open up new benefits and sales opportunities for customers and suppliers, but also help form digital ecosystems with increased added value and stronger customer loyalty.

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