



Digital Workforce Transformation: Integrating Human and Automated Operations in SAP-Driven Smart Factories

Sachin Deoram Chaudhari
Accenture LLP, USA

* Corresponding Author: **Sachin Deoram Chaudhari**

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Abstract

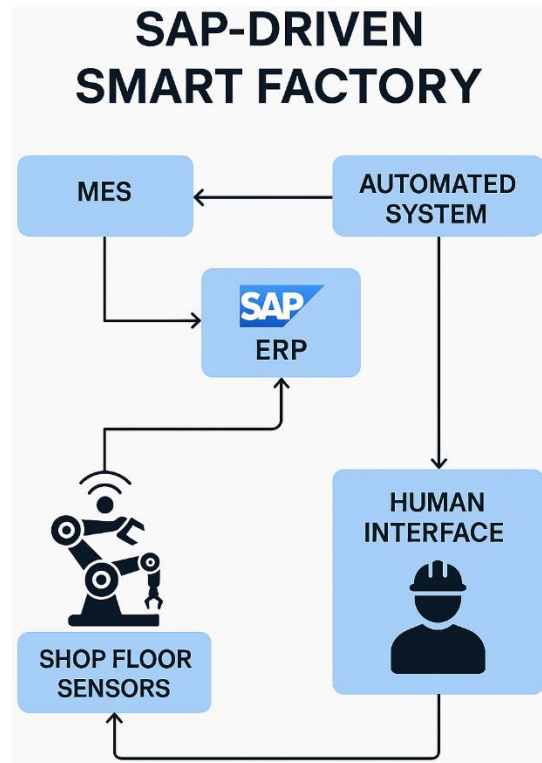
The manufacturing sector is going through a big and long-lasting change right now, thanks to the Industry 4.0 movement, which combines advanced technologies in a way that makes them work better together. The banner called for a complete rethinking of how people and automated systems work together in this advanced ecosystem. As businesses make this change, the hard part is figuring out how to best use the strengths of both human workers and automated systems to create a symbiotic operational model. This is especially important in manufacturing settings that use Enterprise Resource Planning systems like SAP. The main goal of this change is not just to automate tasks, but to make a smart, flexible, and responsive manufacturing environment where people and machines work together to reach levels of productivity, quality, and flexibility that were not possible before. This means that we need to move away from traditional automation methods that see human workers as just supervisors or maintainers of automated systems. Instead, we need to use a more integrated and collaborative approach that combines the creativity and decision-making skills of people with the speed, accuracy, and scalability of automated technologies. This paper talks about how Manufacturing Execution Systems and ERP systems like SAP work together to make manufacturing and business operations more in sync. This leads to better decision-making, better use of resources, and a faster response to changing market needs.

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Introduction

The manufacturing sector is going through a big and long-lasting change right now, thanks to the Industry 4.0 movement, which combines advanced technologies in a way that makes them work better together. The banner called for a complete rethinking of how people and automated systems work together in this advanced ecosystem. As businesses make this change, the hard part is figuring out how to best use the strengths of both human workers and automated systems to create a symbiotic operational model. This is especially important in manufacturing settings that use Enterprise Resource Planning systems like SAP. The main goal of this change is not just to automate tasks, but to make a smart, flexible, and responsive manufacturing environment where people and machines work together to reach levels of productivity, quality, and flexibility that were not possible before. This means that we need to move away from traditional automation methods that see human workers as just supervisors or maintainers of automated systems. Instead, we need to use a more integrated and collaborative approach that combines the creativity and decision-making skills of people with the speed, accuracy, and scalability of automated technologies. This paper talks about how Manufacturing Execution Systems and ERP systems like SAP work together to make manufacturing and business operations more in sync. This leads to better decision-making, better use of resources, and a faster response to changing market needs.



Investigating Human-Automation Collaboration in SAP-Integrated Factories

This study suggests looking into the design and use of human-automation interfaces in SAP-driven manufacturing settings to find out how to make them work better so that people and automated systems can work together and share information more easily. The study should look into creating adaptive automation systems that can change how much automation is used based on the worker's skills and mental load, as well as how hard and varied the task is. The investigation should also look into how augmented reality and virtual reality can be used to give workers real-time information and direction, which would help them do complicated tasks and make smart choices. The point of automation is not to get rid of jobs, but to make them easier so that workers can use their skills, smart tools, and assistive systems to focus on making decisions and keeping things under control. One thing to think about is how to deal with the key human factors that affect how well people and machines work together, like trust, awareness of the situation, and cognitive workload. This can be done through training, interface design, and company policies.

To do this, you need to know a lot about which tasks are best for automation and which ones need human help, as well as the skills and abilities that workers need to work well with automated systems.

Literature Review and Research Gap

Current research stresses the need to connect MES with ERP systems in order to make manufacturing more competitive and raise the quality of information on the plant floor. MES connects ERP with tools on the shop floor. MES helps turn production plans into specific tasks on the shop floor, giving the company important key performance indicators that help

it make business decisions. But there is still a big gap in research on how to effectively integrate human workers into these highly automated environments. This is important to make sure that they can not only operate and maintain the systems, but also use their unique skills and knowledge to make things better. Technology acceptance models have been used to figure out how much people like technology, but more research is needed on how to adapt these models to look at automation and figure out what makes an operator more likely to rely on and follow automation.

Methodology

This study will use a mixed-methods approach, which means it will look at both numbers and words to get a full picture of how people and machines work together in SAP-driven smart factories.

The first step will be to look at all the research that has already been done on how people and machines work together, how to set up a MES, and how to change the way manufacturing works digitally. The goal of this review is to find the best ways to combine human workers and automated systems in SAP environments, as well as the problems and gaps in research that need to be filled. The second phase will look at real-life examples of manufacturing companies that have successfully set up smart factories using SAP. To see how well different models of human-automation collaboration work, these case studies will include observations on site, interviews with workers and managers, and analysis of production data. Finally, the study will create a framework for creating and using effective strategies for human-automation collaboration in smart factories that use SAP, taking into account the unique needs and situations of different manufacturing settings.

A high-level look at the research method,

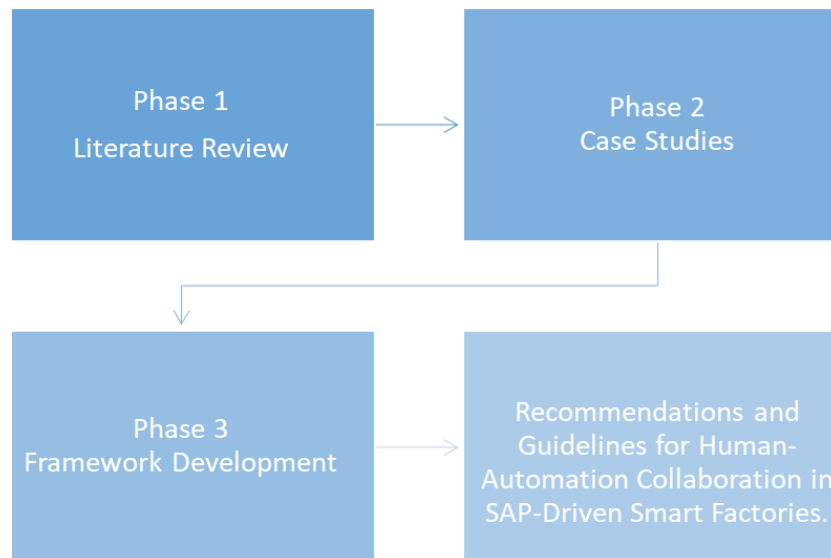
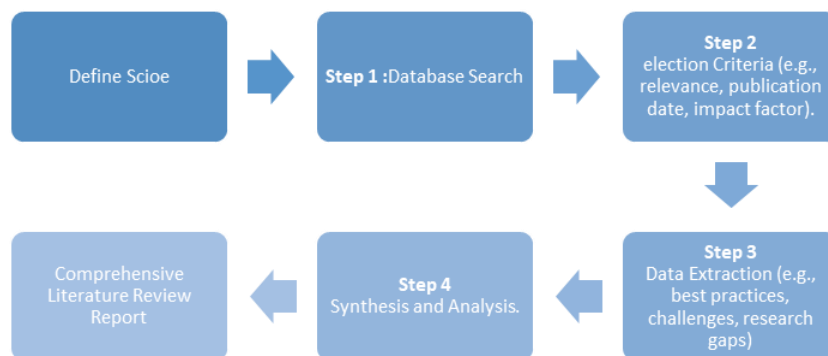


Fig 1: Research Design Flowchart illustrating the three phases of the study.

Phase 1- Literature Review

Looking over what has already been written about how people and machines work together, how to set up a MES, and how to change the way manufacturing works digitally.

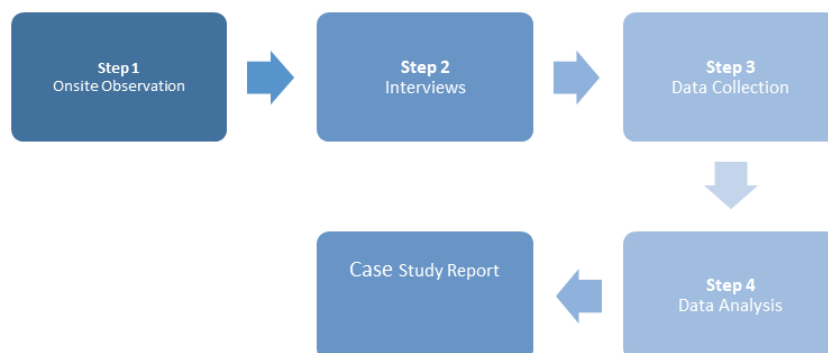
We need to figure out how workers are currently using human automation. For instance, any way to sync data in real time between SAP and MES or a manual program that syncs data in an external system.



Phase 2- Case Studies

Observations on the job, interviews with workers and

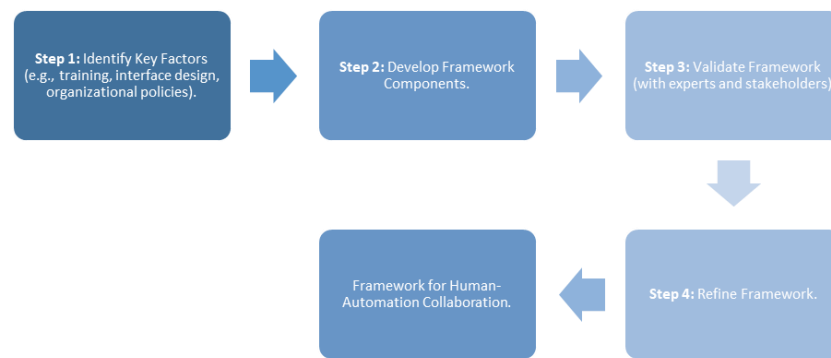
managers, and looking at production data.



Phase 3 -Framework Development

Making a plan for how to design and put into action good ways for people and machines to work together. The focus is

on the specific needs and circumstances of different manufacturing settings.



Results

The study's findings will help us understand how to design and use human-automation interfaces in factories that use SAP.

The investigation should also look into how augmented reality and virtual reality technologies can be used to give workers real-time information and direction, which will help them do more difficult tasks and make better choices. Using statistical analysis and machine learning, the study will make specific suggestions for how to best divide up tasks between people and machines. This will help create a smart factory of the future where people and machines work together in a way that benefits both. After that, these results will be combined into a list of useful suggestions for manufacturing companies that want to improve how humans and machines work together in SAP environments. expected to give manufacturing companies useful information on how to improve their operations by combining human workers and automated systems in SAP-driven smart factories. The results of the study will help create training programs, interface designs, and company policies that make it easier for people and machines to work together. This will lead to higher productivity, better quality, and happier workers. This study will help advance knowledge in the field of digital workforce transformation by finding the key factors that affect the success of human-automation collaboration. It will also give manufacturers useful advice on how to deal with the challenges and opportunities of the Industry 4.0 era. A look at academic articles and research papers shows that there are a few main ideas that come up when talking about MES implementation in SAP environments. Using MES can help companies save a lot of money on operating costs, make their capital turnover more efficient, speed up inventory turnover, increase production capacity, and get more economic and social benefits. In a business, MES is very important because it connects the upper-level planning management with the lower-level control. It can not only carry out the detailed scheduling, control, and execution of the production plan, but it can also manage the whole production process in real time.

Discussion

The discussion section will go into more detail about what the research results mean for the manufacturing industry as a whole. It will also stress how important it is to take a human-centered approach to automation. The study also hopes to help create new theories and models that can explain how people and machines work together in smart factories. Human Resources' job should be in line with Industry 4.0, and it should include training programs to help people learn how to use technology better. Choosing the right automation

technologies is an important step. This should be based on a careful look at the tasks that need to be automated and the technologies that are available. To see if the suggested method can work in certain situations, a full set of rules for expert interviews should be made. The discussion will also cover the moral issues that come with automation, like how it could lead to the loss of jobs for people and the need for programs to teach people new skills and improve their current ones to get ready for the future of work.

Conclusion

In conclusion, this study will give a full look at the pros and cons of combining people and machines in SAP-driven smart factories. Manufacturers can get the most out of their digital workforce and make big improvements in productivity, quality, and worker satisfaction by focusing on developing effective ways for people to work together and putting people at the center of automation. The recommendations that come out of this will give manufacturers a useful guide for dealing with the challenges of changing their digital workforce and making their manufacturing business stronger, more flexible, and more competitive.

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