

## Industry 4.0 Platforms as 'Cluster' ecosystems for small and medium enterprises (SMEs)

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**Abstract :** Industry 4.0 is a global mega-trend revolutionizing the world of advanced manufacturing, but also bringing up challenges for SMEs. In response, many regional, as well as digital Industry 4.0 Platforms, have been set up to boost the competencies of established enterprises as well as SMEs. The concept of 'Clusters' is a policy tool that aims to be a starting point to establish sustainable and self-supporting structures in industries of a region by identifying competencies and supporting cluster actors with services that match their growth needs. This paper is motivated by the idea that Clusters have the potential to enable firms, particularly SMEs, to accelerate the innovation process and transition to digital technologies. In this research, the efficacy of Industry 4.0 platforms as Cluster ecosystems is evaluated, especially for SMEs. Focusing on the Baden Wurttemberg region in Germany, an action research method is employed to study how SMEs leverage other actors on Industry 4.0 Platforms to further their Industry 4.0 journeys. The aim is to evaluate how such Industry 4.0 platforms stimulate innovation, cooperation and competitiveness. Additionally, the barriers to these platforms fulfilling their promise to serve as capacity building cluster ecosystems for SMEs in a region will also be identified. The findings will be helpful for academicians and policymakers alike, who can leverage a 'cluster policy' to enable Industry 4.0 ecosystems in their regions. Furthermore, relevant management and policy implications stem from the analysis. This will also be of interest to the various players in a cluster ecosystem - like SMEs and service providers - who benefit from the cooperation and competition. The paper will improve the understanding of how a dialogue orientation, a bottom-up approach and active integration of all involved cluster actors enhance the potential of Industry 4.0 Platforms. A strong collaborative culture is a key driver of digital transformation and technology adoption across sectors, value chains and supply chains; and will position Industry 4.0 Platforms at the forefront of the industrial renaissance. Motivated by this argument and based on the results of the qualitative research, a roadmap will be proposed to position Industry 4.0 Platforms as effective clusters ecosystems to support Industry 4.0 adoption in a region.

**Keywords :** cluster policy, digital transformation, industry 4.0, innovation clusters, innovation policy, SMEs and startups

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