Chapter 16
Adoption of Design Thinking in Industry 4.0 Project Management

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ABSTRACT

Management of Industry 4.0 projects needs to have a distinct discourse, be flexible, iterative and creative. These projects are tightly linked with the way people work which is directly related to both their capabilities and their ways of thinking. Challenging Industry 4.0 projects entail out-of-the-box thinking. The basic premise of this research is that the complex transformation accompanying Industry 4.0, which involves various dimensions, requires extensive and effective project management that can leverage novel approaches and techniques such as design thinking. This new approach may overcome the limitations of the dominant model of standard project management and has the potential to bridge the gap between a refreshed project management perspective and the tools/techniques in practical use. Deciding whether, and to what extent, design thinking needs to be adopted in practice in Industry 4.0 project management is a challenge. However, it is time to start exploring the challenges governing the interface between agile approaches such as design thinking and Industry 4.0 project management.

INTRODUCTION

In the last decade, society is increasingly surrounded by a socio-technical-digital ecosystem involving manufacturers, service providers, customers and users, in which more interactions occur between people, machines and digital technologies to meet the needs of society and deliver added value for all involved in the ecosystem. From an agriculture society through an industrial revolution towards a smart industrial and service driven society, the ecosystem represents an industrial structural transformation (Gerlitz, 2015).

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The fourth industrial revolution, "Industry 4.0" initiated in Germany as a roadmap was later promoted in other countries (Brettel et al., 2014). The roadmap was designed by the German Ministry of Education and Research to promote the German high technology industry and its strategy.

Broadly, the linking of the virtual world with the physical world is associated with Industry 4.0. Intra-company linking of intelligent products and systems and their cross-company integration into industry value networks in manufacturing is referred to as Industry 4.0 (Kagermann, 2015). Many companies especially in the manufacturing industry (i.e. automotive, machine) compete on product quality, manufacturing costs and time to market performance. Offering customized products of remarkably high quality at competitive prices can be realized through intelligent automation and the rearrangement of people in manufacturing systems.

On one hand, Industry 4.0 facilitates increased flexibility, mass customization, acceleration, improved quality, and enhanced productivity in manufacturing, on the other hand it requires firms deal with various challenges such as individualized products, shortened lead time to market, and high product quality. For instance; typical issues for smart manufacturing system in Industry 4.0 involve complex problems of design, machining, monitoring, control, scheduling, industrial applications, sensor and actuator deployment, data collection, data analysis, and decision making (Zheng et al., 2018).

In manufacturing firms, increasing speed of technological capabilities, development and diffusion, in terms of robotics, advanced manufacturing technologies, integration of information and communication technologies (such as artificial intelligence, big data analytics, industrial Internet of Things) and sensors into the manufacturing process have high impacts on business/operations, people and culture. Indistinct boundaries of virtual and real worlds force manufacturing firms to master the cyber-physical interface. Shifting and accelerating customer preferences cause manufacturing firms to shift from being reactive to proactive (Roos, 2016). Shepherd and Ahmed (2000) introduce that manufacturers should evolve from product-driven to customer-driven approaches by moving from the conventional new-product business model to a solutions-innovation business model.

At various stages of product life cycle maturity, there are various manufacturing approaches to improve business performance. Supply chains are being forced to turn into supply networks which constitute concurrent processes necessitating higher levels of agility, flexibility and wide range of soft skills (interpersonal and communication) across the labor force. Higher levels of employee responsibility, autonomy and managerial delegation are demanded at all levels in the organization (Davis et al., 2012).

One of the key problems in Industry 4.0 projects is that, Industry 4.0 solutions require a comprehensive approach both on technical and on organizational/processual level. Due to required scope of the solution it is not possible for single manufacturing company to build new solutions due to knowledge and accessibility barriers on either technical or processual level (Albers et al., 2016). Projects become more complex and ambiguous in Industry 4.0. Project management becomes more challenging. Furthermore, projects are regarded as highly dependent on stakeholders but require cooperative processes among them. These project characteristics require special skills and competences in human.

In this context, inclusion of prospective innovative approaches in project management such as design thinking is likely to be underrepresented in the Industry 4.0 transformation. That is, researchers believe that the extent to which design thinking is adopted in Industry 4.0 project management is a relevant and persistent research issue. Referring to this research gap, through this chapter, the researchers expect to open a discussion on the conceptual and empirical basis of design thinking and project management within the Industry 4.0 context.