

## Chapter 4

# A Framework Development Effort for Using Online Communities in an Open Innovation Understanding

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### ABSTRACT

*This chapter brings online communities, open innovation, and Industry 4.0 concepts together to build a framework for using online communities in an open innovation understanding in Industry 4.0 context. While online community and open innovation field of studies are being studied for a period of time, Industry 4.0 is rather a new topic which needs further understanding. Literature lacks studies that suggest a framework, especially integrating cloud-based design manufacturing and social product development concepts which are related to Industry 4.0. This study tries to fill in this gap by explaining how online open innovation communities can be created in Industry 4.0 context, what is needed for user participation, motivation, interaction, and what concepts that a company can use to build a collaborative culture and innovative outcomes.*

### INTRODUCTION

In the past, innovation in an organizational setting was considered as closed innovation approach. A firm would innovate with its own resources in its own boundaries by relying on its own employees. Nowadays, open innovation (OI) became a hot topic which boundaries between a firm and its innovation environment is more porous (Chesbrough, 2003). It allows ideas, information, knowledge and technologies to flow in and out of companies. It is different from linear innovation model; rather it can be identified as a systemic, open and user-centric innovation model which builds on highly interactive multi-actor

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innovation networks (Hafkesbrink and Schroll, 2011) that connects technology and people around an innovation ecosystem (Hafkesbrink, Hoppe and Schlichter, 2010). OI is different from closed innovation which the focus is on protecting knowledge, not allowing any knowledge leakage. A company who adapts OI approach doesn't solely rely on their own knowledge base and capabilities, they also look actively for knowledge outside of its own boundaries and if applicable, they use others' capabilities.

Web 2.0 is defined as "a collection of open-source, interactive and user-controlled online applications expanding the experiences, knowledge and market power of the users as participants in business and social processes for supporting the creation of informal users' networks, facilitating the flow of ideas and knowledge by allowing the efficient generation, dissemination, sharing and editing/refining of informational content" (Constantinides and Fountain, 2008:232-233). It has changed customers' roles from passive objects to active participants (Tapscott and Williams, 2006). An online (virtual) community (OC) is "a group of people who exchange words and ideas through the mediation of computer bulletin boards and networks (Rheingold, 1994:57-58). In these types of communities, there are valuable interactions which might have a big impact on business strategy and operations by being a source of threats and/or opportunities (Williams and Cothrel, 2000). Companies can use online communities to bring in new resources to accelerate the open innovation process (Lee, Bahgeri and Jin, 2016). External contributors (e.g., experts, scientists, potential customers) in OCs can provide both market-related and scientific knowledge. These platforms are important for companies, because there is an opportunity to access valuable knowledge at a low cost or without any cost (i.e. open source). To achieve this, companies need various analytics tools to support design, manufacturing and services (ibid) which can be developed by Industry 4.0 (I40) practices and tools.

I40 refers to the computerization of industrial products, services and processes. It is a collective term for technologies and concepts of horizontal and vertical value chains which covers the connection of people, machines and systems (Gilchrist, 2016). It grounds on a revolution idea. Historically, there are three main industrial revolutions. First one was triggered by steam engine and mechanical production was the main outcome. Second one was fostered by electricity and assembly line. It enabled mass production which resulted as industrial growing. Third one was catalysed by the computation and internet. It is defined as a digital revolution which enabled on-time interactions by nearly removing the boundaries between people and organizations. The fourth industrial revolution term, namely industry 4.0, was coined in Hannover Fair in Germany in 2011. It creates a world in which virtual and physical systems of manufacturing globally cooperate with each other in a flexible way by enabling smart factories (Schwab, 2016). OI might be addressed as a sub-concept of I40 which is a new system in the development of products and services (Lasi et al., 2014). For instance, Schumacher et. al (2016) measured I40 maturity of industrial enterprises which consist open innovation under culture dimension.

The aim of this chapter is to suggest a framework for companies on how to use OCs in OI understanding in I40 context. The remainder of this study is as follows: First, OC is defined in a Web 2.0 setting. After that, OI is explained in I40 context, regarding its knowledge sourcing concept. Finally, Creation-Participation-Motivation-Interaction-Collaboration-Innovation (CPMICI) Framework is defined and explained. In this framework, first, how to create an online OI community and what is needed for user participation, motivation, interaction are addressed. Then, what concepts that a company can use to build a collaborative culture and innovative outcomes are explained.

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