



6th International Conference on Applied Human Factors and Ergonomics (AHFE 2015) and the  
Affiliated Conferences, AHFE 2015

## Taxonomy of knowledge management in open innovations

Päivi Haapalainen\*, Jussi Kantola

University of Vaasa, P.O.Box 700, 651010 Vaasa, Finland

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### Abstract

This paper discusses knowledge management in an open innovation context. Open innovation is one of the most popular topics in innovation literature at the moment. Knowledge management is needed to enable inbound and outbound knowledge flows that define open innovation and to make sure that knowledge provided by an open innovation process can be used for successful business. The importance of knowledge is highlighted in the open innovation literature but the majority of the current literature only takes a narrow viewpoint of the issue and does not deal with knowledge management on the whole. The objective of this paper is to present a taxonomy of knowledge management in open innovation to provide an encompassing depiction of the phenomenon. The taxonomy was built on the basis of a broad literature review. The taxonomy will enrich academic discussion on the topic and could help companies to better design their open innovation strategy and process.

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Peer-review under responsibility of AHFE Conference

*Keywords:* Open innovation; Knowledge management; Taxonomy

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### 1. Introduction

Product development and innovations is without a doubt one of the most crucial elements for a company to survive in the face of today's fierce competition. On one hand new products should be introduced to the market rapidly, and on the other scarce resources are limiting the possibilities that a single company has for innovating new products, for a small company especially. One way to face this dilemma is open innovation. Chesbrough [1] introduced the concept of Open Innovation in 2003 in his book *Open Innovation: The New Imperative for Creating*

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\* Corresponding author. Tel.: +358 40 718 4582

E-mail address: [paivi.haapalainen@uva.fi](mailto:paivi.haapalainen@uva.fi)

*and Profiting from Technology*. Open innovation refers to external knowledge flowing into the company (inbound open innovation) and internal knowledge flowing out from the company (outbound open innovation) that the company can use when innovating new products and when introducing their own innovations to market [1, 2].

By the definition of open innovation knowledge lies in the heart of it [1–4]. Thus, knowledge management is a fundamental part of managing open innovations. Various writers state that information and knowledge flows between different parties are the key elements in open innovation [e.g., 5–8]. However, they do not further explain how to manage this knowledge and these flows, or look at this issue only from a certain point of view. There still seems to be a lack of more holistic view to the debate on knowledge management in an open innovation context.

The objective of this paper is to introduce a taxonomy of knowledge management in open innovation. The purpose of taxonomy is to classify and label items into categories that share common characteristics [9]. Thus it builds a holistic view to the phenomenon, but in a way that reduces its complexity and makes the real life incident easier to comprehend.

The rest of this paper is organized as follows: after a brief literature review in Section 2, the empirical study method is reported in Section 3. The results are then presented and discussed in Section 4, with the final conclusion in Section 5.

## 2. Theoretical background

Huizingh [10] provides an interesting review about open innovation literature. He states that open innovation “*comes in many forms and tastes, which adds to the richness of the concept but hinders theory development*”. Openness of innovation, financial issues of knowledge transfer, different knowledge processes, inbound and outbound knowledge flows as well as the effectiveness of the open innovation process are discussed in the review. Huizingh [10] further presents that open innovation consists of two parts: first, is the way from closed to open innovation, and second are various open innovation practices.

Dahlander et al. [11] also provide a broad literature review while they explore the openness of innovation. They conclude that internal capabilities and external relations are complementing rather than substituting each other. Based on inbound and outbound knowledge flows and the pecuniary/non-pecuniary nature of innovation they introduce four categories of openness: 1) acquiring, 2) sourcing, 3) selling, and 4) revealing. Acquiring and sourcing are related to inbound open innovation, and the former requires processes like licensing or buying, while the latter is more about “taking and using”. In the case of outbound open innovation a company can sometimes sell knowledge to others, but in other cases may simply reveal it to others. [11]

Wallin et al. [3] introduced a process model for integrating knowledge in open innovation. This model consists of five states: defining the innovation process steps, identifying relevant innovation knowledge, choosing an appropriate integration mechanism, creating effective governance mechanisms, and balancing incentives and controls. Each of these states is described thoroughly in the paper. [3]

Hurmelinna et al. [12] bring another important issue into the discussion of open innovation: protecting knowledge and thus innovation. The appropriability regime depends on the nature of knowledge (explicit or tacit) and the efficacy of legal protection. The tacit nature of knowledge as such provides fairly good protection as such and if there is also strong legal protection (patents, copyrights etc.) then the appropriability regime is very strong. If the nature of knowledge is explicit then good legal protection is needed; otherwise, it is easy for others to use that knowledge. [12]

Another interesting view to open innovation are open innovation strategies. Simeth et al. [13] explore what makes companies use an open science strategy, which means adopting academic principles for sharing knowledge. They conclude that companies that need scientific knowledge themselves are also more willing to share it with others. Kyläheiko et al. [14] research technology strategies in different knowledge regimes, stating that the choice of a strategy depends on the appropriability regime, technological opportunities faced by the company, and the degree of cumulativeness and complexity of technological knowledge in the industry. Companies can choose an offensive or aggressive strategy, an opportunistic or specialized technology strategy, a defensive or dependent strategy or an imitative strategy. [14] Different technology strategies require different methods of using both inbound and outbound open innovation. Schuhmacher et al. [15] present a case study from the pharmaceutical industry. They define four innovation strategies that companies are using: knowledge creator, knowledge integrator, knowledge

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