

An Informational Model of Open Innovation

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Abstract The chapter proposes an outline of an informational model of open innovation. This model can be a foundation for establishing an innovation facility by a production or service provider entity. The pillars of the model are: (i) access to and extensive use of up-to-date information, knowledge, and best practices; (ii) the use of efficient and user friendly knowledge management systems based on advanced semantic tools; (iii) extensive use of ICT business intelligence tools, including web 2.0 facilities and web services, and social networks; (iv) a customer experience management system and customers' participation in identifying new products and/or value-added services (prosumerism); (v) close collaboration with academia and relevant non-governmental organizations; (vi) access to a collaborative work platform any-time and from anywhere, implemented as a cloud computing facility. It seems that the proposals included in this chapter can contribute to the research within new areas and trends in management, in particular with respect to modeling innovation processes and their evaluation.

Keywords Informational model · Innovation · Open innovation · ICT

1 Introduction

Today, for a company or institution to achieve competitiveness or comparative advantage in a crammed and widely competitive world without being innovative in terms of its internal processes and offered products and/or services is nearly impossible. Therefore, innovation has become a core element of survival and development strategies. It combines technology, management, business, and what is equally important, psychology; it is usually born in a multifaceted environment

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where the minds of technologists, managers, researchers, and marketing specialists meet and collaborate towards a common objective.

Despite a myriad of chapters, books, conferences, declarations, collections of best practices, and ordinary conversations innovation still remains an untamed concept that tends to spin out of control of practitioners and researchers. There is no satisfactory theory of innovation that has proved its general validity and practical applicability. There are but successful and unsuccessful cases of innovativeness that are hardly prone to generalizations and abstractions. This is because innovation and innovativeness are more an art than a craft, more a matter of ingenuity than rigorous procedures. Indeed, on the groundwork of any innovation lie such intangible elements as knowledge, creativity, and intellectual (sometimes also physical) prowess. However, in spite of its subjective ingredients innovativeness is a process that can be managed and accounted; it is not merely an act of creativity or a result of serendipity. Theodore Levitt, editor of the *Harvard Business Review*, was credited to say: "Creativity is thinking up new things. Innovation is doing new things." Incidentally, this is why although a lot of people are creative, yet they are not innovative, for the road from thinking to doing is certainly not straightforward. Usually, an innovation endeavor is framed by organized efforts and purposeful activities driven by a pre-defined goal. Moreover, more and more often innovation does not happen in walled gardens. Should a company or institution want to innovate in a systematic way, it needs to collaborate, exchange and share intellectual efforts with the external world, it has to open to and share the innovation cycle with other stakeholders.

The chapter proposes an outline of an informational model of open innovation. This model can be a foundation for establishing an innovation facility by a production or service provider entity. The pillars of the model are: (i) access to and extensive use of up-to-date information, knowledge, and best practices; (ii) the use of efficient and user friendly knowledge management systems based on advanced semantic tools; (iii) extensive use of ICT business intelligence tools, including web 2.0 facilities and web services, and social networks; (iv) a customer experience management system and customers' participation in identifying new products and/or value-added services (prosumerism); (v) close collaboration with academia and relevant non-governmental organizations; (vi) access to a collaborative work platform any-time and from anywhere, implemented as a cloud computing facility. In the course of the discourse we compare two approaches to innovation, i.e. closed and open innovation methodologies. It seems that the proposals included in this chapter can contribute to the research within new areas and trends in management, in particular with respect to modeling innovation processes and their evaluation.

2 Open Innovation

Classically, innovation is considered a bolster of comparative advantage, and therefore, work on innovative products or services is carefully concealed from actual and potential competitors. This is in a nutshell the philosophy of the Closed

Innovation paradigm within which a company maintains full control on an innovation project from its start, to research, to concept development and prototyping, to production, and to marketing and distribution. However, in an increasingly complex world and a growing sophistication of new products and services self-reliance and a walled-garden approach to innovation become a suboptimal strategy. These days less and less companies can rely on their own resources only in order to carry out innovation projects. Innovation requires a well-managed and focused mobilization of creative human resources, funds, and organizational and managerial measures. It is on the overall a resources and time-consuming process loaded with various types of risks. An operational risk is due to company's constraints and includes, among others, failure in meeting the specification of the product/service, failure in matching a final deadline delivery, or exceeding the allocated budget. The company is also exposed to a financial risk when the return on investment is less than planned. In addition, the company has to take into account a market and commercial risk when competitors have launched a competing product/service at the same time, or when prospective costumers abstain from purchasing the product/service; In [1] one can find striking innovation statistics that read: "(i) over 90 % of innovations fail before they reach the market; (ii) over 90 % of those innovations that do reach the market will also fail; (iii) over 90 % of innovations are delivered late, over-budget or to a lower quality than was originally planned." A solution to reduce the risks and courageously face the above mentioned statistics is to open the innovation cycle, and thereby to strengthen the capacity of the innovation team and to distribute the risks among the stakeholders. This was in the main the rationale behind the Open Innovation approach proposed in [2]. The Open Innovation scheme elaborated by Professor Henry Chesbrough combines indigenous and external concepts and ideas as well as company's own and external research facilities and resources, and paths and access points to market for advancing the development and establishment of new technologies, products and services. The comparison of both Closed and Open Innovation approaches is given in Table 1 [2].

By accepting the open approach to innovation one has instantly wider access to experienced top-notch experts and developers, to venture capital, to university research, to the networking potential of non-governmental organizations (NGO), and to the market access points. Agents seeking competitive advantages cannot neglect such gains.

Within the Open Innovation paradigm many business models are possible. In [3] we presented an open approach to innovation that was established by the Faculty of Electronics and Technology of Warsaw University of Technology, Polska Telefonii Cyfrowa (then rebranded to T-Mobile Polska), the Foundation of Mobile Open Society through wireless Technology operating in Central Europe, and Polish eMobility Technological Platform that associates over 40 mobile technology companies. The site where innovative projects have been executed by students and young researchers is the BRAMA Laboratory located at the Faculty, <http://brama.elka.pw.edu.pl/home>. The Lab is a success story of bridging industry, business, academia and NGOs since its start in the year of 2006 BRAMA has been a host of some 120 projects.

Table 1 Comparison of closed and open innovation

Closed innovation principles	Open innovation principles
The smart people in the field work for us	Not all the smart people in the field work for us. We need to work with smart people inside and outside the company
To profit from R&D, we must discover it, develop it, and ship it ourselves	External R&D can create significant value: internal R&D is needed to claim some portion of that value
If we discover it ourselves, we will get it to the market first	We don't have to originate the research to profit from it
The company that gets an innovation to the market first will win	Building a better business model is better than getting to the market first
If we create the most and the best ideas in the industry, we will win	If we make the best use of internal and external ideas, we will win
We should control our IP, so that our competitors don't profit from our ideas	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our business model

3 An Informational Model of Open Innovation

Architecting models is an enterprise loaded with subjectivity, mainly expressed by a set of adopted assumptions regarding the modeled reality and the choice of attributes characterizing the modeled situation and entities.¹ The model we propose in this chapter is also constrained by our arbitrary assumptions and qualifies for what Professors S. Hawking and L. Mlodinow dubbed the model-dependent-realism principle, which reads *There may be different ways in which one could model the same physical situation, with each employing different fundamental elements and concepts* [4]. The readers interested in innovation models are referred to surveys [5, 6], and the books [7, 8]. Here, to establish our model we assume three major premises:

- (a) The innovation model is focused on informational aspects of innovativeness.
- (b) The concept of open innovation is embedded in the model.
- (c) The model substantially and extensively exploits state-of-the-art ICT facilities.

In so far as premise (c) is self-explanatory in the digital age we live in, premises (a) and (b) require a justification. The reason why we confine the borders of our model to informational aspects is twofold. First, we are convinced that out of the three canonical constituents of innovation mentioned at the outset of this chapter, i.e. knowledge, creativity, and prowess, knowledge is the most perceptible and measurable; and secondly, most of the innovation models one can find in literature

¹ Perhaps, it would be more appropriate to use the wording 'knowledge model of open innovation' instead of 'informational model of open innovation'; on the other hand side, it seems that the term 'informational' better resorts to common mindsets.

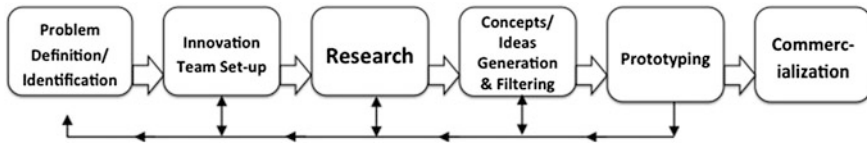


Fig. 1 A General scheme of innovation cycle

deal with processual aspects of innovation considering information and knowledge as given for granted. As to justifying premise (b) we are convinced that the paradigm of openness increasingly gains importance and recognition as a methodology to solve complex problems that require an engagement of many agents. This methodology is present in science, culture, lifestyle, and to a growing extent in economy. Its spectacular and successful incarnations are the FLOSS movement (Free/Libre/Open Source Software) with the most eminent and known instance of the Linux operating system, the Open Access model of scientific publishing that is practiced by leading universities and even to a certain degree by private publishers, and the famous case of Wikipedia in the area of producing high-quality content. Open Innovation attempts to tap into best practices of these experiences while trying to respect the constraints dictated by competition and market requirements.

Before we enter upon any further details of the informational model of innovation let us sketch the general scheme of innovation cycle. Its main stages are depicted in Fig. 1. After having identified and defined the subject to innovation efforts and setting up or hiring the execution team a research on the subject matter is commenced with the aim to collect as much as possible information, including IPR (Intellectual Property Rights), on the topic at hand. The collected information is an essential input to the next stage during which ideas and concepts are generated by the members of the execution team, and then filtered against various feasibility constraints determined by such factors as the state-of-the-art of technology, business conditions, or resources available to the company. After a filtering scrutiny one or more of the generated ideas move to the phase of prototyping, and then after evaluation go to the hands of marketing specialist and are prepared for commercialization. Noteworthy, the innovation process includes loops because iterations, i.e. returns to previous stages, might be necessary as a result of assessments and decisions made during the work.

This fact is depicted in Fig. 1 by means of a feedback loop represented by a thin line with arrows indicating the direction of information flow. For the sake of comprehensiveness, as a supplement to our sketchy scheme of innovation, we quote a more elaborating model picked up from [8], which is displayed in Fig. 2. Note this model also features certain openness whose identification we left to the reader.

In [3] we proposed the concept of Innovation Factory where we drafted the core of a generic model of innovation, which prioritized the role of information and knowledge in organizing and executing an innovation cycle in high-tech

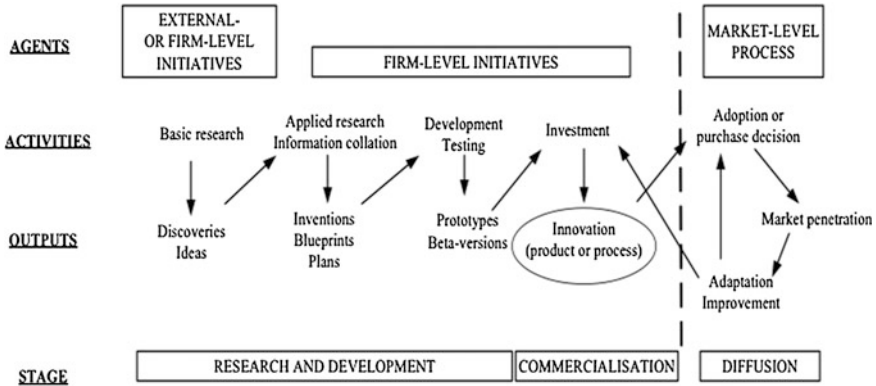


Fig. 2 Innovation process by Greenhalgh and Rogers [8]

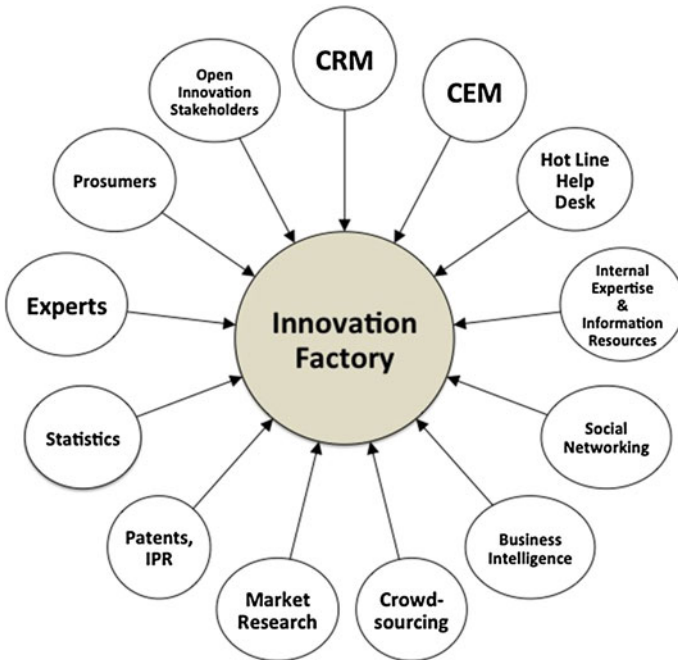


Fig. 3 Knowledge framework of innovation

companies. Now, we add to that a Knowledge Framework that is schematically depicted in Fig. 3.

The sources of knowledge that supply the Innovation Factory are very much diversified and multifold. Company's 'Internal Expertise and Information Resources' are the first assets to tap into while carrying out an innovation project.

Part of internal information resources is ‘Customer Relationship Management System’ (CRM) that is already a classic and widely used tool, especially by larger companies, for working out and implementing company’s customer-centered philosophy and marketing strategies. In [9] the following concise definition of CRM can be found: “CRM involves all of the corporate functions (marketing, manufacturing, customer services, field sales, and field service) required to contact customers directly or indirectly”. A survey of CRM methodologies and a proposal of a CRM architecture focused on informational aspects can be found in [10]. In the year of 2003 Professor B. Schmitt came out with a more advanced approach to managing customers and maintaining links with them. He dubbed his approach ‘Customer Relationship Management’ (CEM) and defined it as “the process of strategically managing a customer’s entire experience with a product or a company” [11]. In [12] the CEM concept was further elaborated as “a process-oriented satisfaction concept aimed at establishing wide and rich interactive relations with customers. It takes into account not only the product and functionality, but also lifestyle, aesthetics, and social aspects such as prestige, networking, etc. In order for CEM to work it has to be embedded in the company culture and be a unification platform of the company’s business processes.” Both CRM and CEM are tremendous sources of comprehensive information on company’s customers, and therefore we include them in the Knowledge Framework of our innovation model. The same is true for knowledge that can be collected from the archives of the company ‘Help Desk and Hot Line’ that has a direct and constantly updated contact with actual and prospective customers who through their questions and problems provide incessant feedback information on the products and services of the company.

In our approach we emphasize the need for extensive use of information and knowledge, and that knowledge management systems are essential for feeding and managing the Knowledge Framework. This applies to both explicit and tacit knowledge and non-codified knowledge that are available both in the company and outside the company. Therefore, as far external sources of knowledge are concerned such classic methods as ‘Business Intelligence’ and ‘Market Research’ and experts’ opinions and advice provide inputs to the Knowledge Framework. To collect information and knowledge from the outside world a company or an organization makes use of ICT business intelligence tools, including web 2.0/3.0 facilities and web services. In particular, useful are the tools based on artificial agents (small programs) whose task is to penetrate the web in order to search new information and update the information stored in the company’s archive as well as the application of cloud computing platforms for efficient organization of collaboration among the stakeholders [13].

From [14] one can learn how knowledge can be extracted by means of advanced semantic tools and data and text mining techniques from social networks that are plenty throughout the web. ‘Social Networking’ systems such as Facebook, Groupon, MySpace, Allegro, Nasza Klasa or Twitter are included as vital and viable information sources to supply the Knowledge Framework, but also contributions via ‘Crowdsourcing’, the phenomenon identified and presented in [15]

that taps into a collective intelligence of customers, suppliers, and a general public in order to collect creative, unbiased, and unexpected solutions is added as a knowledge and expertise source to the Innovation Factory. Official ‘Statistics’ regularly issued by national statistics bureaus and produced by various professional research and analytical agencies as well as NGOs may turn out really helpful in devising new products and services, especially when it comes to demographic data and data characterizing the standards and conditions of living.

Needless to argue about the importance of ‘Patents’ and ‘Intellectual Property Rights (IPR)’ in the process of working out innovative solutions. The analysis of patents can be an inspiring exercise guiding and boosting the process of generating ideas and concepts. Note that IPR is particularly a sensitive topic since any omissions in this respect can cause various undesirable implications such as court summons to face charges of infringing patents, financial penalties, and if worse comes to worst, can severely hamper the image of the company.

Our approach is based on the openness assumption. Therefore the Knowledge Framework includes as a source of knowledge ‘External Experts and Consultants’. Owing to its mobility and involvement in many different projects throughout the world this folk is a natural carrier of the cutting-edge best practices and experiences, therefore, while applying a non-disclosure agreement hiring external specialists can bring up a valuable contribution to the innovation project. We also need to observe one of the latest tendencies to implicitly or explicitly involve some customers for identifying new products and/or value-added services or to get them involved in prototyping or evaluation, which transforms them into ‘Prosumers’. Although the concept of prosumerism refers to the old works by Alvin Toffler done in the 1980s of the previous century, it only recently has gained popularity owing to the web 2.0 and progress in e-commerce and social networking. In our approach protagonists of the Knowledge Framework, which supply the Innovation Factory with knowledge, are also the stakeholders of the open innovation arrangement for according to our innovativeness model innovation is developed in open shops. Figure 4 presents schematically the mapping of sources of knowledge belonging to the Knowledge Framework of Factory of Innovation (see Fig. 3) onto the stages of the innovation process (see Fig. 1). The directed lines linking sources of knowledge to corresponding stages of the innovation process should be interpreted as informational contributions to the respective stages for supporting the activities performed within these stages.

4 Final Remarks

Undoubtedly, innovation has an idiom of its own yet, as already mentioned, in spite of a number of attempts to capture its very nature and dynamics these efforts are like the unavailing pursuit of the Holy Grail. It is well possible that we still are not able to ask the right questions with respect to innovativeness. Of the three basic elements

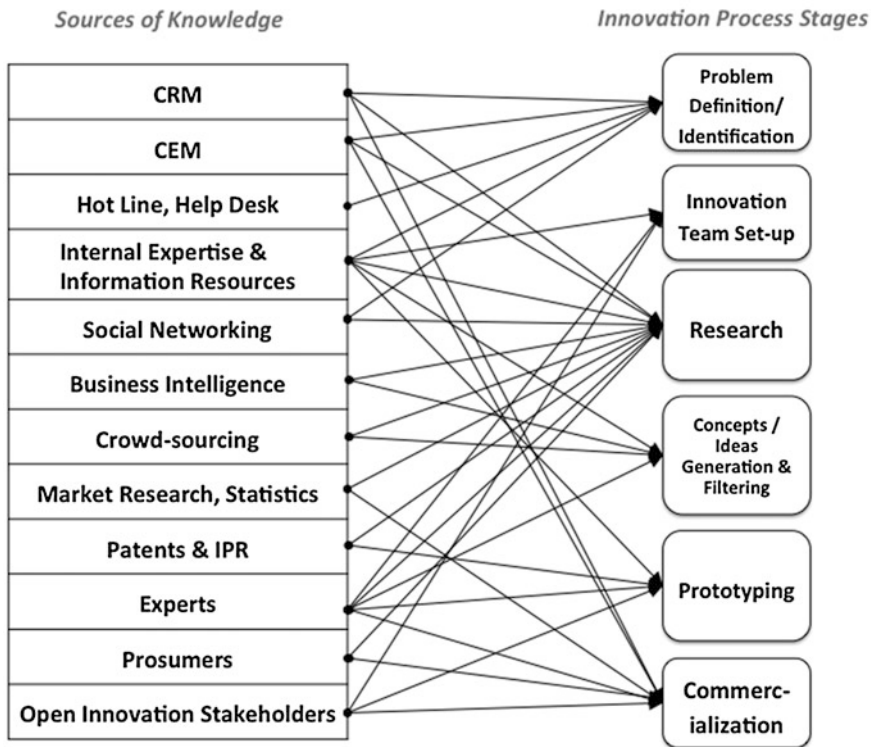


Fig. 4 Mapping of knowledge sources onto innovation process stages

underlying innovation, i.e. knowledge, creativity, and prowess we have a fairly good control of the first one, whereas the two latter ones are difficult to theorize and predict. This is why, for instance, we can hardly make proper use of incentives and understand the role of monetary rewards and their efficiency vis-à-vis other motivators such as satisfaction, team spirit, prestige, and self-improvement. Another example of an unsolved issue is where to host the Innovation Factory: should it be on the premises of the company integrated with its business processes or placed outside the company as an autonomous or even substantive entity. In [16] Professor C. Christensen provides interesting pros and cons arguments to address this issue. Notwithstanding, the more aspects and cases of innovation are recorded and analyzed the more likely is success while implementing business processes aimed at achieving innovative products or services. Let us note that the lack of a general theory of innovation and innovativeness that would be sound and pervasively applicable seems to account for false dilemmas and myths related to innovation itself and innovation endeavors, many of which were depicted in [17]. Whatever the future theory of innovation it has to contain the knowledge component and thoroughly elaborate on it. This chapter is an attempt towards this direction.

References

1. Mann, D.: Systematic Improvement & innovation. Myths & Opportunities (2009), <http://www.systematicinnovation.com/download/management%20brief%2009.ppt>. Accessed 12 March 2013
2. Chesbrough, H.: Open innovation: the new imperative for creating and profiting from technology. Harvard Business School Press, Boston (2003)
3. Jacobfeuerborn, B.: A generic informational model of innovation for high-tech companies. In: Z.E. Zieliński (ed.) Rola informatyki w naukach ekonomicznych i społecznych. Innowacje i implikacje interdyscyplinarne, pp. 240—248. Wydawnictwo Wyższej Szkoły Handlowej, Kielce (2010)
4. Hawking, S., Mlodinow, L.: The great design. Bantam, London (2010)
5. Dubberly Design Office (2006). Innovation, http://www.dubberly.com/wp-content/uploads/2008/06/ddo_book_innovation.pdf. Accessed 12 March 2013
6. Tidd, J.: Innovation models. Imperial College London, London (2006)
7. Allen, T.J., Henn, G.W.: The organization and architecture of innovation. Managing the flow of technology. Elsevier, Burlington (2007)
8. Greenhalgh, Ch., Rogers, M.: Innovation, intellectual property, and economic growth. Princeton University Press, Princeton (2010)
9. Gray, P., Byun, J.: Customer Relationship Management, Report of University of California, Center for Research on Information Technology and Organizations, March (2001)
10. Jacobfeuerborn, B.: Information systems for boosting competence and management in high-tech organizations, MOST Press, Warsaw (2005)
11. Schmitt, B.: Customer experience management: a revolutionary approach to connecting with your customers. Wiley, New York (2003)
12. Jacobfeuerborn, B.: From customer experience to customer involvement management. In: B. Jacobfeuerborn (ed.) Customer Experience Management. Informational Approach to Driving User Centricity, pp. 43–46. MOST Press, Warsaw, IINiSB Uniwersytet Warszawski (2009)
13. Sosinsky, B.: Cloud computing bible, Wiley, Indianapolis (2011)
14. Russell, M.A.: Mining the social web: analyzing data from Facebook, Twitter, LinkedIn, and other social media sites. O'Reilly Media, Sebastapol (2011)
15. Surowiecki, J.: The wisdom of crowds. Anchor, New York (2005)
16. Christensen, C.: The innovator's dilemma, Collins Business Essentials New York (2006)
17. Berkun, S.: The Myths of innovation. O'Reilly Media, Sebastapol (2010)