Open Innovation and Co-Creation as Drivers for Valorisation Opportunities in the Care Sector

Paul GEMMEL[1], An JACOBS[2,] Ann ACKAERT [3,] Piet VERHOEVE[4,]
Jan VANOOTHEGEM[5,] Chris DE ROOCK[6] Freek VAN BAELEN[7]

[1]Ghent University, Tweekerkenstraat 2, Ghent, 9000, Belgium
Tel: +32 92643518, Email: paul.gemmel@ugent.be
[2] IBBT SMIT Vrije Universiteit Brussel, Pleinlaan 2, Brussel, 1050, Belgium
Tel: +32 629 18 98, Email: an.jacobs@vub.ac.be
[3] IBBT-IBCN/UGent, Gaston Crommenlaan 8 – bus 201, 9050 Gent, Belgium
Tel. +32 9 331 49 35, Email: ann.ackaert@intec.ugent.be
[4]Televic Healthcare N.V., Leo Bekaertlaan 1, 8870, Belgium
Tel: +32 51 30 30 45, Email: p.verhoeve@televic.com
[5] IBBT-IBCN/UGent, Gaston Crommenlaan 8 – bus 201, 9050 Gent, Belgium
Tel. +32 9 331 49 35, Email: jan.vanooteghem@intec.ugent.be
[6]Optimo VZW, Hof-ter-Vleesdreef 5, bus 1, 1070 Brussels, Belgium
Tel: +02/528 58 31, Email: chris@optimo.be
[7]Ghent University, Tweekerkenstraat 2, Ghent, 9000, Belgium
Tel: +32 92643493, Email: freek.vanbaelen@ugent.be

Abstract: Today firms increasingly acknowledge that new streams of knowledge are generated outside the borders of their own organization through open innovation and co-creation. This increasingly leads to more complex networks of firms collaborating in a voluntary and informal way. Using a case study research method, we investigate in this paper a network of 16 firms which were able to bring together their knowledge and capabilities and bundle it in a very tangible product, i.e. a prototype of the 'Patient room of the Future' (PRoF 1.0). The governance structure of this voluntary network has grown in an organic way. The further development of the PRoF 1.0 initiative and the commercialization of the final prototype introduce several questions about which type of network governance is required to make the project successful. The results of this case study show that the distribution of (decision taking) power between the firms in the network and the legitimacy of the network towards the individual firms are two important governance issues which are changing when the open innovation network evolves from the initiation to the valorization stage.

1. Introduction

Researchers have argued that radical innovations are crucial for companies in order to remain competitive in the long run [1] [2]. A radical technological innovation involves methods and materials that are novel to the established firms. These novel methods and materials are derived from either an entirely different knowledge base or from the recombination of parts of the established firms' knowledge base with a new stream of knowledge [3]. How to source this new knowledge is an important question. Today firms increasingly acknowledge that these new streams of knowledge are generated outside the borders of their own organization, sometimes by 'unobvious others'. Identifying, capturing and leveraging the potential knowledge of unobvious others as input for innovations

through formal and informal relationships is the fundamental idea behind 'open innovation' [4]. Open innovation can be defined as "the formal discipline and practice of leveraging the discoveries of unobvious others as input for the innovation process through formal and informal relationships" [5] These are the informal relationships that constitute the "innovativeness" of open innovation. In a more recent article, Chesbourg and Garman [6] also make the distinction between 'outside-in open innovations' and 'in-side out open innovations'. In the 'outside-in' open innovations, firms put emphasis on the inbound flow, bringing in contributions from other enterprises to create offerings [7]. 'In-side out' open innovations "refers to processes whereby a business places some of its assets or projects outside its own walls" [8]. In this way companies are able to develop new relationships with suppliers and customers and to grow their ecosystem. Recently, the term "co-creation" has been introduced to address open innovation when customers and users are involved in the ecosystem. Co-creation and open innovation are two sides of the same coin – but demand different tools and responsibilities [9].

The number of examples of 'inside-out' open innovations through a network of firms are still limited and the understanding how these 'inside-out' innovations are leading to successful valorization is missing. Although many different aspects are determining the success of such innovations, we focus in this paper on the governance of a network of firms using an example of the making of the Patient room of the Future (PRoF 1.0) through a network of firms. The PRoF 1.0 has been started up by a group of 16 Flemish SMEs with the objective to create living solutions (rooms) with more added value for the professional care sector. The PRoF 1.0 case focuses on the patient room of the future in hospital settings, starting from the patients' needs. The purpose of PRoF 1.0 was to create a healing environment for the patient, allowing for the professional staff to deliver the care process as effective as possible and thus alleviating the workload. The knowledge base to develop such a room is spread over many different industries such as information technology, textile, furniture, … A first e-intelligent room was build, focusing at this stage on clever and patient centric design and integration of different e-services. At this moment the IBBT ACCIO project investigates the inclusion of ontology based nurse call systems, including environmental sensors and actuators, in order to optimize the care process delivery in this new patient room of the future concept [10]. This research work will be integrated as a Proof of Concept at a later stage. At the same time the currently existing PRoF 1.0 prototype is now ready for commercialization.

Up to now the different firms in the network are collaborating in a voluntary way and the relationships are quite informally based on trust. The increasing pressure to bring the PRoF 1.0. room faster to the market bring forward some questions about the governance structure of this open innovation network. Unfortunately, the voluntariness in an open innovation network can be mistakenly interpreted as 'collaboration without governance'. Given the amount of resources involved in this kind of open innovation networks, it is recommended to better understand the working of these networks.

2. Network Governance of an Open Innovation Network

PRoF 1.0 can be considered as a flexible and non-hierarchical form of voluntary collaboration of firms. In the literature such a form of collaboration is known as a network [11]. Governance can be defined as the collaborative decision-making structures to reach collaborative activities and goals through shared power arrangements [12]. Provan and Kenis [13] explain that governance in networks "involves the use of institutions and structures of authority and collaboration to allocate resources and to coordinate and control joint actions across the network as a whole". Hence, network governance is about structures for collaboration.

In the literature different categorization of network governance are proposed. Agranoff [14] categorizes networks according to the level of involvement and engagements that are required to reach the network's objective. The first category, informational networks, requires only the sharing of information, e.g. on policy programs. Developmental networks add education and services to information sharing to help partners in the network. The third type, outreach networks, share also resources; while the fourth group of networks, the action networks, take action or deliver services together

Provan and Kenis [15] identify three main types of network structures or forms of network governance with each a different kind of structure and decision-making. The first form of network governance is the participant-governed or shared governance network form which has no separate governance entity and governance is the responsibility of each organization in the network. Power is more or less equally spread among the organizations. Trust is important in this form. The second form, the lead organization form is characterized by a dominant organization in the network that takes responsibility for the governance in the network. In the third form, the network administrative organization, a separate entity is created for governance reasons. In the lead organization and network administrative forms, organizations in the network give up part or all decision-making power to respectively the lead organization or the administrative entity. These leading organizations or entities develop some authority over the other organizations and a kind of hierarchy might be established.

The governance choice is related to decision-making power and legitimacy. For instance, in the network administrative organization and in the lead organization network types of Provan and Kenis [16], formal power is asymmetric and decision-making is centralized. Whether network membership is considered as legitimate, and thus whether the network will continue to exist, depends on the legitimacy of the network (Human & Provan, 2000) [17]. Related to the discussion on legitimacy is flexibility in networks in terms of composition, decision-making and governance. Traditional network theory emphasizes flexibility as an important benefit of network governance [18].

3. Objectives

Until now the PRoF 1.0 initiative can be considered as a voluntary network of SMEs with a focus on inbound open innovation [19]. The network was able to bring together the knowledge and capabilities of many different firms and bundle it in a very tangible product, i.e. a prototype of the 'Patient room of the Future'. The governance structure of this voluntary network has grown in an organic way. The further development of the PRoF 1.0 initiative and the valorization of the final prototype introduce several questions about which type of network governance is required to make the project successful. First, who is governing or what network structure (shared, lead or network administrative organization) exist determining the governing roles in the network? Second, to what degree are networks governed based on trust? Third, to what extent are network structure and network governance mode affecting power (a)symmetry in the networks? Fourth, are structure and governance mode affecting internal and external legitimacy? Insights into these questions about the governance of a network can help managers dealing with the initialization and the valorization of open innovation initiatives created in a network of firms.

4. Methodology

To understand the governance of the PRoF 1.0 open innovation network, we used a case study research methodology. The case study was chosen as the research method primarily due to the nature of the research question. Yin [20] considers this method to be the most appropriate when amongst others the contextual conditions are believed to be highly

pertinent to the phenomenon under study. The 'open innovation' context in this study creates some new questions about network governance. Furthermore, case research is particularly appropriate for areas where research and theory are in their formative stages [21]. Therefore, it is an appropriate method to develop first insights into a new phenomenon of study for which no specific hypotheses can yet be proposed.

The case study includes multiple consecutive waves of study including retrospective and prospective research. In this paper, we report on the retrospective part looking at the realization stage (the inbound open innovation) and the start of the prospective part looking at the valorization stage (the outbound open innovation) of PRoF 1.0 (patient room of the future).

To acquire a thorough overview and understanding of the governance of the PRoF 1.0 network, data gathering was guided by a data-collection protocol [22]. With reference to Eisenhardt [23], the protocol comprised a topic list (based on our literature study) with all research variables to be addressed concerning the process of 'inside-out' open innovation. The most important topics related to this paper are: governance, influencing, (decision) power, affect-based trust, cognition-based trust, internal and external legitimacy, network flexibility and effectiveness. Multiple sources of evidence were used for data collection to facilitate a process of triangulation [24]. Semi-structured interviews were conducted; group discussions were performed and the meetings of the PRoF 1.0 firms were observed.

5. Results

In this part, we report the results of the retrospective part of the case study findings. We immediately put the results in a logical framework, discussing first the challenges of open innovation and second the conditions for future success and looking in both parts at how this affects the different aspects of network governance.

5.1 The Challenges of Open Innovation as Perceived by the PRoF 1.0 Members

As described earlier, PRoF 1.0 is a network of SMEs with the objective of creating value through open innovation in the healthcare market. Several of these firms already have some business in the healthcare market, but they understand that innovative concepts such as the patient room of the future require complex solutions with the following characteristics:
- Multi-dimensional: a (re-)combination of technological and non-technological features;
- Interdisciplinary: an integration of resources and dynamic capabilities out of different competence areas;
- Multi-actor: the interaction between many different partners, including the customer;
- Multi-site: the (co-)creation with customers in different locations.

The PRoF 1.0. initiative tries to accommodate the complexity of these innovations by increasing the number of participating firms in the network. New firms are allowed to join the network as long as (1) they can prove a complementary value for the PRoF 1.0 network, (2) they are not a direct competitor of one of the current PRoF 1.0 member firms and (3) the products which are integrated into the PRoF 1.0 prototype should have the potential of commercialization within a time-frame of 3 years.

Dependent on the level of engagement, different types of membership are recognized. 16 SMEs (the so-called ad hoc consortium firms) are directly involved in the realization of the PRoF 1.0 solution. These firms share resources and contribute directly to the open innovation. According to Agranoff [25] these firms form an action network. Many more firms and organizations are member of the larger PRoF 1.0 network and are invited for some meetings; these include user organisations (e.g. representing nurses and patients) and higher education/academic organisations (e.g. doing research on the technology used). These are part of the developmental network [26].

Most of the PRoF 1.0. firms also understand that to be successful, the network needs to create value through identification and realization of synergies between these firms. Moreover, they are well aware that agility (a fast response to the needs of the healthcare market) is crucial to win a fair share of the market potential. Although in the initiation stage (inbound open innovation), the large number of participants is considered as a strength, several managers fear that the complexity of a larger network will not result in the realization of the hoped results. Several challenges are brought forward in the discussions:

- The complexity of the network of firms is increasing, which makes the process of decision-making increasingly difficult.
- The competitive environment and the fast growing needs for solutions put pressure on the PRoF 1.0 network to avoid delays in the realization and valorization of these solutions.
- The individual firms participating in the PRoF 1.0 network expect some business value to be created through the synergy of the network, i.e. the valorisation and "the commercialisation of technological knowledge exclusively or in addition to its internal application" [27].
- The realization and valorization of the patient room of the future should not underestimate the role of customers and users. This means that the 'open innovation' model of the PRoF initiative should include customers and users and should include the other side of the coin, i.e. co-creation. Co-creation processes can be considered as a means to stimulate smart product and service concepts leading to increased valorization opportunities. But co-creation also increases the complexity of the open innovation network and thus the network governance.

The challenges are related to the questions about which type of network governance is required to make the project successful. Until now the network has no separate governance entity and governance is the responsibility of each organization in the action network of the 16 firms (and not in the larger developmental network). The 16 firms are participating in a steering committee, although it becomes clear throughout the interviews that not every of the 16 firms is participating to the same extent in the decision-making process. In other words some of the firms have some more 'power' than others and are more involved in the decision-making process. Although the current network applies the principles of shared-governance [28] , it wouldn't be a surprise that in the future one or more dominant partners will emerge, certainly in the commercialization stage where fast response on the market needs is important.

The third challenge where the individual firms in the PRoF 1.0 network expect business value is clearly an aspect of 'internal' legitimacy. The extent that PRoF 1.0 network members consider the network as a legitimate way of providing services and working together depends in a first instance on the extent to which this PRoF 1.0 initiative is able to create business value for the individual firms. Whether the network will continue to exist, depends on the legitimacy of the network [29]. But by including other organizations such as user groups and government in the larger network, the PRoF 1.0 network creates expectations which are the basis for external legitimacy. In other words the legitimacy of the network not only depends on business value the network is able to create for the individual firms, but also on the value to fulfill the needs of external parties. An important external party are the end-users (the patients). During the interviews it was recognized that the inclusion of the patient representatives in the design and development of the Patient Room of the Future 1.0 was not always straightforward.

Several of the discussed challenges are related to the 'openess' and the 'informal nature' of the relationships between the participants in the PRoF 1.0 network. These are typical characteristics of 'open innovation' in a shared governance model. One core question of the firms in the PRoF 1.0 network is whether this governance mode which has

worked until now in the initiation stage, will continue to work in the commercialization stage of the innovative solutions.

5.2 The Conditions for Further Success

The PRoF 1.0. network firms are worried about how the current complex network will create value. The value can be measured as the sum of acquired knowledge (business and market intelligence) and the valorization (revenue generated through participation in the open innovation network. PRoF 1.0 was able to create an increasing amount of value through the (re-) combination of knowledge from different sources. In this perspective, PRoF 1.0 was really an inbound open innovation accelerator. This 'inbound open innovation' stage resulted in a prototype of the patient of the room of the future . This prototype is a very tangible output of the added value of this 'open innovation' network. It is also a tangible 'product' to show to potential customers (hospitals). In the valorization stage (the outbound open innovation), the PRoF-room must be marketed and sold. One of the specific questions today in the commercialization of the room is whether or not customers will be able to buy modules or components of the PRoF-room. Although all firms contribute to the realization of the room, there is a risk that not all of them will be able to valorize their contribution. This will lead to discussion on the legitimacy of the network for some firms and can have an impact on the further existence of the network.

It is also clear that in the evolution of the network, the governance structure is changing in terms of the power of the different firms in the network. O'Toole [30] mentions the distributional consequences of network actions for the different stakeholders because of the potential power shifts within the networks. A large power imbalance resulting in strong influencing from one partner over other partners can decrease trust and willingness to collaborate, but it can as well be functional to allow decision-making. Agranoff and McGuire [31] thus argue that power has a dual role, either facilitating or preventing actions in networks. Veto power is a type of power typical for networks. Each partner in the network has veto power to object to a decision or even to exclude partners from the network (because they don't want to include potential competitors). Such power can be dysfunctional for the performance of the network. Power can be beneficial if it helps decision-making in an environment with many different goals and contradictory interests. For instance, the dominant player in the network can impose decisions and prevent the network from paralyzed decision-making due to too many opposite interests or due to the use of veto rights. This more productive power is labeled as power 'to' (get things done). By consequence this leads to the question if the current shared-participant governance structure is the most optimal governance form for PRoF 1.0 to enter the stage of commercialization. Is a governance structure with a more dominant firm not a better way to face the challenges of the future ?

6. Conclusions

Today firms increasingly acknowledge that new streams of knowledge are generated outside the borders of their own organization, sometimes by 'unobvious others'. These 'unobvious' others can be other firms or customers. Co-creation and open innovation are two sides of the same coin – but demand different tools and responsibilities [32].

Within the PRoF 1.0 case these two important dynamics are being combined. The PRoF 1.0 case is an example of an 'inside-out' open innovation whereby a complex network of firms (out of different businesses) place some of their assets or projects outside their own walls [33]. Studies about the governance of this kind of 'inside-out' open innovations involving many firms in an informal and voluntary network are still limited. Developing a new solution such as PRoF 1.0 and bringing it to the market creates some particular

governance challenges. To understand these challenges we need to make the distinction between the realization stage (the inbound open innovation) and the valorization stage (the outbound open innovation).

The realization stage seems to benefit from a loose-coupled network of firms where it is easy to enter or leave the network and where relationships are built on trust. After all the objective in this realization stage is to support sourcing and acquisition of external ideas and knowledge to the innovative process. The development of a prototype of the patient room of the future is very helpful in making the output of this stage tangible for all participating firms. This tangible output supports the legitimacy of the project.

In the valorization stage, the complexity of a loose-coupled PRoF 1.0 network introduces some challenges in terms of decision-making, management and governance. These challenges risk to delay the commercialization process of the PRoF 1.0 solutions and have a negative impact on the value and legitimacy of the initiative. The prospective part of the research study should further confirm what kind of governance structure should give the best results: a shared-governance model (as it is now) or a governance model with the dominance of one of the PRoF 1.0 firms. Another question which has not been looked after in the current research is whether more formal contractual governance in complement of trust-based relationships [34] is not a condition sine qua non for survival. Because PRoF 1.0 will go through several sequential stages of inbound and outbound open innovation in the next years, the prospective part of the case study will further give insights in how to govern such 'in-side out open innovation'. In this way we hope to advance our knowledge about how to govern and manage complex solutions in a voluntary network of firms working in an open innovation context.

Acknowledgement

References

[1] Christensen C. & Bower J. (1996) "Customer power, strategic investment, and the failure of leading firms". *Strategic Management Journal*, 17(3) pp. 197-218

[2] Freeman C. & Soete L. (1997) The economics of industrial innovation. Cambridge MA: MIT Press

[3] Markides C. (1999) "All the right moves: a guide to crafting breakthrough strategy". *Harvard Business School Press* Boston.

[4] Chesbrough H (2001)., MIT Technology Review, Spring 2001 and a presentation of Henry Chesbrough to the OECD Conference on New Business Strategies for R&D, October 22, 2001.

[5] Chesbrough, Henry and Adrienne Kardon Crowther (2006) "Beyond high tech: early adopters of open innovation in other industries," *R&D Management*, 36 (3): 229-236

[6] Chesbourg and Garman (2009), "How open innovation can help you in lean times", *Harvard Business Review,* December 2009.,

[7] Chesbourg and Garman, 2009,

[8] Chesbourg and Garman, 2009, p. 70

[9] Piller Frank T.(2011), on 'Open Innovation Services' and 'Open Service Innovation', RWTH Technology and Innovation Management Group, RWTH Aachen and MIT Smart Customization Group, Bentley College, February

[10] / F. Ongenae, A. Ackaert, A. Jacobs, A. Veys, M. Van Gils, P. Verhoeve, and F. De Turck (2010) "User-driven design of an ontology-based ambient- aware continuous care platform," in Proc. 4th Int. Conf. Pervasive Computing Technologies for Healthcare 2010, Munich, pp. 1-4.

[11] Ekbia, H. R., & Kling, R. (2005). Network Organizations: Symmetric Cooperation or Multivalent Negotiation? *The Information Society, 21*, 155-168.

[12] Thomson, A. M., & Perry, J. L. (2006). Collaboration processes: Inside the black box. *Public Management Review*(December-Special Issue), 20-32.

[13] Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory, 18*, 229-252.

[14] Agranoff, R. (2007). *Managing within networks*. Washington: Georgetown University Press.

[15] Kenis, P., & Provan, K. G. (2009). Towards an exogenous theory of public network performance. *Public Administration, 87*(3), 440-456.

[16] Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of public administration research and theory, 18*, 229-252.

[17] Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm networks: A comparative study of success and demise. *Administrative Science Quarterley, 45*, 327-365.

[18] Brass, D. J., Galaskiewicz, J., Greve, H. R., & Tsai, W. (2004). Taking stock of networks and organizations: A multilevel perspective. *Academy of Management Journal, 47*(6), 795-817.

[19] Chesbrough et al.2006.

[20] Yin, R.K. (1993), Applications of Case Study Research, Sage, Newbury Park, CA.

[21] Bensabat, I., Goldstein, D.K. and Mead, M. (1987), "The case research strategy in studies of information systems", *MIS Quarterly*, Vol. 11 No. 3, pp. 369-86.

[22] Yin, R.K. (1989), Case Study Research: Design and Methods, Sage, Newbury Park, CA.

[23] Eisenhardt, K.M. (1989), "Building theories from case study research*", Academy of Management Review*, Vol. 14 No. 4, pp. 532-50

[24] Eisenhardt, K.M. (1989),

[25] Agranoff, R. (2007).

[26] Agranoff, R. (2007).

[27] Lichtenthaler, U. (2009) "Outbound open innovation and its effect on firm performance: examining environmental influences". *R&D Management*, 39(4): 317-330.

[28] Provan, K. G., & Kenis, P. (2008) "Modes of network governance: Structure, management, and effectiveness." *Journal of public administration research and theory, 18*, 229-252

[29] Human, S. E., & Provan, K. G. (2000).

[30] O'Toole, L. J., & Meier, K. J. (2004). Desperately seeking Selznick: Cooptation and the dark side of public management in networks. *Public Administration Review, 64*(6), 681-693.

[31] Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. *Journal of public administration research and theory, 11*(3), 295-326.

[32] Piller, 2011

[33] Chesbourg and Garman, 2009, p. 70

[34] Vandaele, Darline; Rangarajan D., Gemmel, Paul; Lievens, A (2007) How to govern business services exchanges: Contractual and relational issues, *International Journal o Management Reviews*, 9(3), pp.237-258