

Managing Innovation in a Globalised Economy: Defining the Open Capital

Adli Abouzeedan
University of Gothenburg, Sweden

Michael Busler
The Richard Stockton College of New Jersey, USA

Thomas Hedner
University of Gothenburg, Sweden

Abstract: Economies develop different levels of entrepreneurial capacity depending on the degree of availability of tangible as well as intangible resources. In an earlier work by Abouzeedan and Busler (2006), a new type of capital, that is, *innovation capital*, has been suggested to serve as an indicator for the degree of richness of the entrepreneurial environment in an economy. Innovation capital incorporates the concepts of *human capital*, *financial capital* and *system capital*. However, the issue of accessibility and openness in the innovation process also need to be reflected in the innovation capital concept. Innovation activities in the modern economies are growing to become more interconnected and open in their nature. In this paper, we defined and incorporated a new component within the innovation capital, namely *open capital*. We also reflected on how the four components of the innovation capital concept, including the open capital, are interconnected.

Keywords: Open Capital, Human Capital, Financial Capital, System Capital, Innovation Capital, Open Innovation, Open Innovation Management

1 Introduction

Societies and their economies vary in their degree of support to the development and maintenance of an entrepreneurial culture and environment. There are different types of capital which enhance the entrepreneurial capacity of a society. These include three basic ones: *human capital*, *financial capital* and *system capital*. These types of capital constitute vital ingredients of the complex input of activities in a society and in creating its entrepreneurial culture and environment. The combined capital formed by these three components is defined as the 'innovation capital' (see Abouzeedan and Busler, 2006). Other researchers suggested alternative components to define the innovative capacity of society. Corely et al. (2002) discussed physical, research and development (R&D) and human capital. They argued that variation across countries and industries in the rate of investment in the three types of capital explains the variation in productivity levels across the European Union and U.S. industries. Moreover, expenditures in R&D may be a waste of resources if the firm does not have the skills to transform them into commercial success (see Ballot and Taymaz, 1997). One way to enhance transaction capacities of firms is by investing in information and communication technologies (ICTs).

To understand how innovation could be managed in the era of information technology (IT), it is essential to consider issues related to transaction costs. In the open business model, such transaction costs are far less than in the closed model. Awazu et al. (2009) stressed that ICTs facilitate and enhance the innovation process from idea creation to the commercialisation. As pointed out, for example, by Turban et al. (1999), IT has become the major facilitator of global business activities. IT catalyses fundamental changes in the structure, operations and management of organisations by

facilitating and enhancing a variety of functions and capacities. Such capacities include performance of high-speed high-volume calculations; generation of fast, accurate and inexpensive communication between organisations; storage of easily accessible amounts of information and increasing the efficiency of the working force. Such enhanced capacities are of great significance when creating an open innovation management routines. Awazu et al. (2009) argued that the information and communication technologies are gaining more significance in the era of open and distributed innovation, as they must be leveraged by organisations and businesses to reach, record and review ideas from internal and external sources, ranging from vendors, suppliers and customers to employees. The writers described in their work how the ICTs are being used to support open innovation. According to Fredberg et al. (2008), *open innovation* has merged into a system model where enterprises commercialise their internal and external ideas and technologies and use, for that purpose both their external and internal sources. The authors pointed out to three significant roles of the ICTs. The first role is to help organisations to *understand the sources* of ideas; the second role is to help capturing ideas from the sources – the *documentation* role and the third role is to enable the *distribution* of ideas.

One development out of the IT era is the creation of the Internet. Dana et al. (2002) introduced the term *internetisation* to describe and capture ‘the process of adoption and diffusion of e-business systems and Internet technologies by innovative entrepreneurs’. As such, this new term is set to be of significance in understanding the open innovation system. Dana et al. (2002) argued that there are six stages in ‘internetisation’. These include *non-adoption*, *trial Internet use*, *reactive Internet trading*, *active exploration of Internet*, *integration of operations with the Internet* and finally *Internet portal development*. Related to the paradigm, internetisation is the issue of openness in the innovation activities. Using full capacities of the ICTs, firms and organisations can easily coordinate their innovation efforts via an open innovation management system using the techniques and tools of *internetisation management*.

This paper opens with an introduction. In Section 2, we are looking at the human capital, whereas in Section 3, we are discussing the financial capital. In Section 4, we are shedding light on the concept of system capital, and in Section 5, we are investigating the traditional concept of *innovation capital* relating it to the entrepreneurial economy paradigm. In Section 6, we are exposing the reader to the open innovation management and discuss shortly the concepts of *e-globalisation* and *internetisation management* and relate that to openness covering issues of *open source*, *open access* and *open innovation*. In Section 7, we are introducing the new paradigm ‘open capital’ as the fourth component of innovation capital. We close the paper by a short conclusion section.

2 Human Capital

The human capital quality can be expressed in different ways, one of them being labour productivity. Essentially this means that better quality of labour would result in more productive organisation. Abouzeedan and Busler (2006) argued that innovation expressed as R&D can be incorporated with human capital. Romer (1986) postulated that R&D leads to the creation of knowledge which may have a direct impact on technological change because investment in R&D can create spillovers. Empirical evidence shows that countries with higher R&D per employee have higher levels of total factor productivity growth (see Coe and Helpman, 1995). According to Adams (1980), technical change increases the relative productivity of human capital if education and other skills assist in a more rapid application of new technology. Referring to Ballot and Taymaz (1997), typically R&D and human capital are merged under the categories of ‘receiver competence’ (Eliasson, 1990), ‘knowledge base’ or ‘absorptive capacity’ (Cohen and Levinthal, 1989, 1990). Understanding the value of investments in education as a way to enrich human capital in societies resulted in studies deriving methods to estimate private returns from knowledge (Becker, 1975).

3 Financial Capital

According to Corely et al. (2002), some early studies assumed that short-term growth was largely driven by capital investment, whereas growth in the long-run was assumed to be due to exogenous technological change. Lichtenberg (1992) explained the productivity differences between countries by using investment in physical, R&D and human capital. Lichtenberg’s perspective, however, is limited to the manufacturing sector and does not take into consideration cross-country effects. Other studies have shown that even when tangible and intangible investment is taken in consideration, there are still cross-country differences in productivity. Hall and Jones (1999) found that such tangible and intangible factors may be institutional and related to differences in social structures. These differences affect the economic environment and the ability to acquire skills and accumulation of the different forms of capital. In agreement with this, Abouzeedan and Busler (2006) pointed out that availability of financial capital is of great importance to firm survival and growth of small and medium-sized enterprises.

4 System Capital

The third type of capital, *the system capital* (see Abouzeedan and Busler, 2006), is an indicator of the level of support that individual firms receive from various governmental and non-governmental sources. The non-governmental institutions include public establishments, private firms, unions, associations, etc. The form of such support is varying in accordance with the structure and aims of such institutions. However, Abouzeedan and Busler (2006) emphasised that their definitions of system capital are excluding any financial support coming to the individual firm, as this is covered within the financial capital concept. In short, this type of capital looks at the macro-environment of the society and its ability to secure the non-financial needs of the firms.

5 Traditional Innovation Capital

The innovation capital represents a combined concept which encompasses the three previous types of capital, that is, human capital, financial capital and system capital (see Abouzeedan and Busler, 2006) as presented graphically in Figure 1. Hypothetically, when the components of the innovation capital are in balance, contributing in optimal proportion to the total input, such an environment is likely to foster an entrepreneurial economy.

6 Open Innovation Management

6.1 IT and Open Organisational Structures

ICT is causing the organisations to adapt an open structure, in contrast to the classical closed structure (see Scott, 2003).

According to Fink and Kazakoff (1997), the potential benefits that an organisation can obtain when it uses ICT may be extensive and include efficiency gains, increased management effectiveness and improved business performance. IT developments are able to reduce transaction costs for firms and organisations.

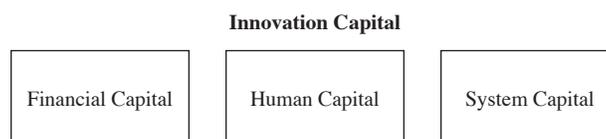


Figure 1 - Traditional components of the innovation capital

The falling costs of computer hardware, software and telecommunications and associated performance improvements have enabled organisations to re-examine the way they conduct business and come up with more cost-effective practices. This leads firms and organisations to be more open in running daily activities including innovation ones. As pointed out by Fink and Kazakoff (1997), in the small business domain, IT systems would prove invaluable in tracking customer orders, correspondence, delivery and payments. According to Globberman et al. (2001), Internet has dramatically reduced the transaction costs in respect to costs of 'point to multipoint' communication, making it easier for brokers and other information providers to supply information to their customers. Allarakhia (2009) argued that the vertically integrated organisational structure facilitates innovation activities which are internally focused, whereas the new forms of organisational structures are more fluid and open, allowing for the integration of the internal and external sources of innovation. Abouzeedan and Busler (2007) borrowed the terminology 'internetisation' (see Dana et al., 2002) to propose and anticipate another type of firm management which is more suitable to open organisational structures and called it 'internetisation management'. In such management, the market place is the whole globe, and there are no geographical borders or physical barriers for exchanging ideas and resources except for the ability of the firm to absorb the 'internetisation' technologies. It is worth stressing that internetisation management is more concerned with management techniques and tools in the IT era and not the philosophy of management embedded in other paradigms such as open innovation management. Such innovation paradigm stresses openness and cooperation in the innovation activities. It demands the usage of an open business model. Researchers indicate that the new successful biotechnology start-ups, such as Genentech, Amgen and Genzyme, are using such a model rather than the older closed business model (see Chesbrough, 2003a). Lakhani and von Hippel (2003) listed types of incentives which are driving the firm to use open-source management.

6.2 IT and Open Innovation Management

Recently and due to escalating costs of R&D, the life science industry has started to seek collaboration with academic institutions to stimulate and enhance their innovation activities through what is described as an 'open innovation system' (Melese et al., 2009). The term 'open innovation' was proposed by Chesbrough (2003b) to describe how useful knowledge and technology was becoming increasingly widespread when newly developed technologies and products are benefiting from the integration of knowledge and expertise from multiple sources. Using external knowledge relations more extensively as a complement to in-house research influences the way firms are organising and managing its innovation activities (Teirlinck and Spithoven, 2008). The nature of the innovation has changed, from using linear models of innovation to adopting non-linear innovation models (Kline and Rosenberg, 1986). The non-linear innovation model incorporates the nature of change of technology and is focusing on the learning processes within and between firms (Teirlinck and Spithoven, 2008).

The nature of the open innovation model facilitates for the firms to adapt their business model in favour of R&D activities and technical change that take place outside the firm. As such, the innovation effort is distributed between various parties (von Hippel, 1988). Many notions and concepts were introduced to the innovation literature in relation to the rise of the spatial organisation. Among such notions are *innovative environments* (Aydalot, 1985), *clusters* (Porter, 1990), *innovative milieu* (Camagni, 1991), *regional innovation systems* (Cooke, 1992) and *learning regions* (Florida, 1995). Laven (2008) identified the three theories of innovation systems, clusters and triple helix as theories of innovation-producing arrangements. This is because these theories emphasise the interaction between organisations in innovation production. Open-source R&D is another approach to conduct research allowing scientists and academicians to join forces across organisations offering their competence freely to facilitate the solving of various common problems (Munos, 2006).

The emergence of the open innovation concept and its promotion as a new notion comes as a result of the increasing complexity of innovation processes as well as how innovation management should cope with this complexity (Teirlinck and Spithoven, 2008). In open innovation, external knowledge relations

are considered as vital elements and being complementary to the internal research (Chesbrough et al., 2006; Cohen and Levinthal, 1990; Veugelers, 1997). Traditionally, business models tended to be closed systems. However, there are emerging concepts of how open business models do support open innovation (Chesbrough, 2006). The openness of innovation brings the issue of reaching to the most reliable decision by reducing the variability and risk in the decision-making process.

One way to achieve that is through involving more individuals in such decision-making processes. This is termed in new wording as ‘The Wisdom of Crowds’ by James Surowiecki (2009). He saw advantages of using the disorganised decision or, if expressed freely, *The Wisdom of Crowds*. These are expressed in three terms: *cognition*, *coordination* and *cooperation*. *Cognition* has to do with thinking and information processing, whereas *coordination* has to do with the optimising of the utilisation of decision input from many actors. *Cooperation* is related to forming networks of trust without the need of central system of control (Surowiecki, 2009). The author stressed the need to have four elements or key criteria to form a wise crowd and separate them from irrational subjects in the sample. These are *diversity of opinion*, *independence*, *decentralisation* and *aggregation*. He gave three areas of applications for the Wisdom of Crowds: *prediction markets*, *delphi methods* and *extensions of the traditional opinion poll*. Openness in the innovation process brings up the discussion of the fourth component of the innovation capital in the coming section of this paper.

7 Open Capital: The Fourth Component of Innovation Capital

7.1 Definition of Open Capital

As we have suggested earlier in this work, innovation richness of an economy requires a more open and interactive attitude. In the traditional definition of innovation capital as proposed by Abouzeedan and Busler (2006), this component is absent. Clearly and based on the previous discussions such an aspect of innovation can be introduced as a fourth component of the innovation capital, naming it *open capital*. We define open capital such that ‘the open capital includes, and not restricted to, all the networking resources which facilitates for the various actors to share and fully benefit from each others’ tangible and intangible assets in a trust-worthy and open manner. This type of capital thus represents the texture that binds the other components within the innovation capital and gives them the ability to impact the innovation processes’.

Based on this definition, we can deduct two projections. First, open capital operates both at the micro and at the macro levels of economy. In this way, it differs from the human capital and financial capital forms which are active at the micro level and from the system capital which has its impact apparent at the macro level of economy. Second, open capital as a term should not be confused with the open capital concept known in the financial management literature. The new innovation capital with its four components is represented in Figure 2. It is important to emphasise that the four components of innovation capital are in reality

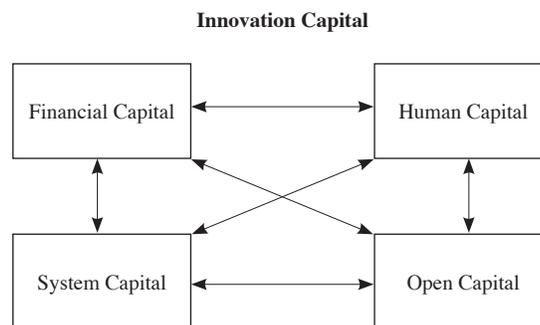


Figure 2 - Components of the innovation capital including the open capital

Table 1 Important dimensions of open capital

Dimension	What that open capital dimension measures?
Diversity	The level of variations in the ethnicity, culture and values of actors active in the innovation activities
Integration	The extent to which the actors merging their efforts in the innovation activities
Intrinsic variability	The level of alternation in the decisions making of various actors in relation to the innovation activities
Collective knowledge	The level of the aggregate knowledge maintained by all the actors in the innovation process
Collective experience	The level of the aggregate experience maintained by all the actors in the innovation process
Tacit knowledge	The level of embedded, hidden and non-documented knowledge maintained by each actor in the innovation process
Tacit experience	The level of embedded, hidden and non-documented experience maintained by each actor in the innovation process
Intellectual input	The level of intellectual and mental effort contributed by the actors to the innovation process
Feedback richness	The level of richness of the contributions resulting from the innovation activities by the actors
Interconnectivity	The level of interactions and cooperation activities between the actors involved in the innovation processes
Networking input	The level of relationships spreading and coverage between the actors involved in the innovation processes
Aggregate output	The level of achievements in the innovation system based on the total number of actors
Openness ingredient	The level of exchange of information in the innovation system perceived by the actors as the resource of profit-making out of the innovation activities
Actors open mindset	The level of belief in and appreciation of the openness as a profit-creating value in the innovation processes
Actors trust	The level of mutual relational reliance between actors in the innovation process
Aggregate dynamics	The level of alternation and changes in the innovation processes based on the activities of all the actors of the innovation system

well-connected and they feed to each other enriching, in a total way the innovation activities. To emphasise the nature of this new open capital, we propose specific dimensions related to it.

7.2 Important Dimensions of Open Capital

In this paper, we argue that there is couple of dimensions connected to the new paradigm open capital. These include *diversity*, *integration*, *intrinsic variability*, *collective knowledge*, *collective experience*, *tacit knowledge*, *tacit experience*, *intellectual input*, *feedback richness*, *interconnectivity*, *networking input*, *aggregate output*, *openness ingredient*, *actors' open mindset*, *actors' trust* and *aggregate dynamics*. The explanation of each of these dimensions is stated in Table 1.

8 Conclusion

Economies of different societies develop diverse levels of entrepreneurial activities depending on the degree of availability of tangible as well as intangible resources and how they use these resources in their innovation activities. In an earlier work by Abouzeedan and Busler (2006), a new type of capital, i.e. innovation capital, has been suggested to serve as an indicator for the degree of richness of the entrepreneurial environment in an economy. However, the issue of accessibility and openness in the innovation process was not reflected in the innovation capital concept as presented earlier. Innovation activities in the modern economies tend to be more interconnected and open in their nature, and our understanding for the innovation process has to reflect on that. In this paper, we first looked at the traditional innovation capital structure. We proceeded and incorporated a new component within the innovation capital, namely open capital. We also reflected on how the four components of the innovation capital, including open capital, are interconnected. To distinguish the concept of open capital within the context of innovation from the one used in the classic financial management literature, we introduce a number of dimensions related to open capital as a component of the innovation capital.

Finally, this paper is a conceptual in its nature, and its aim is to introduce the concept of open capital to the literature concern with innovation and innovation systems.

References

- Abouzeedan, A. & Busler, M. (2006). 'Innovation balance matrix: an application in the Arab countries', *World Review of Entrepreneurship, Management and Sustainable Development* Vol. 2, No. 3, pp. 270-280.
- Abouzeedan, A. & Busler, M. (2007). 'Internetisation management: the way to run the strategic alliances in the e-globalization age', *Global Business Review* Vol. 8, No. 2, pp. 303-321.
- Adams, J.D. (1980). 'Relative capital formulation in the United States', *Journal of Political Economy* Vol. 88, No. 3, pp. 561-577.
- Allarakhia, M. (2009). 'Open source biopharmaceutical innovation – a mode of entry for firms in emerging markets', *Journal of Business Chemistry* Vol. 6, No. 1, pp. 11-30.
- Awazu, Y., Baloh, P., Desouza, K.C., Wecht, C.H., Kim, J. & Jha, S. (2009). 'Information-communication technologies open up innovation', *Research Technology Management* Vol. 52, No. 1, pp. 51-58.
- Aydalot, P. (1985). 'Economie Regionale et Urbaine', *Economica*, Paris.
- Ballot, G. & Taymaz, E. (1997). 'The dynamics of firms in a micro-to-macro model: the role of training, learning and innovation', *Journal of Evolutionary Economics* Vol. 7, pp. 435-457.
- Becker, G. (1975). 'Human Capital', 2nd ed., Columbia University Press for the NBER, New York.
- Camagni, R. (1991). 'Innovation Networks: Spatial Perspective', Bellhaven-Pinter, London.
- Chesbrough, H., Vanhaverbeke, W. & West, J. (2006). 'Open Innovation: Researching a New Paradigm', Oxford University Press, Oxford.
- Chesbrough, H.W. (2003a). 'The era of open innovation', *MIT Sloan Management Review* Vol. 44, No. 3, pp. 35-41.
- Chesbrough, H.W. (2003b). 'Open Innovation: the New Imperative for Creating and Profiting from Technology', Harvard Business School Press, Boston.
- Chesbrough, H.W. (2006). 'Open Business Models: How to Thrive in the New Innovation Landscape', Harvard Business School Press, Boston.
- Coe, D. & Helpman, E. (1995). 'International R&D spillovers', *European Economic Growth* Vol. 39, No. 5, pp. 859-887.
- Cohen, W.M. & Levinthal, D.A. (1989). 'Innovation and learning: the two faces of R&D', *Economic Journal* Vol. 99, pp. 569-596.
- Cohen, W.M. & Levinthal, D.A. (1990). 'Absorptive capacity: a new perspective on learning and innovation', *Administrative Science Quarterly* Vol. 3, pp. 128-152.
- Cooke, P. (1992). 'Regional innovation systems: comparative regulation in the new Europe', *Geoforum* Vol. 35, pp. 365-382.

- Corely, M., Michie, J. & Oughton, C. (2002). 'Technology, growth and employment', *International Review of Applied Economics* Vol. 16, No. 3, pp. 265-276.
- Dana, L.P., Etemad, H. & Wilkinson, I. (2002). 'Internetisation: A New Term for the New Economy'. In the Proceedings of The Third Biennial McGill Conference on International Entrepreneurship, Researching New Frontiers. McGill University, Montreal, Canada, September 13-16, Vol. 2, Paper no. 3.
- Eliasson, G. (1990). 'The firm as a component team', *Journal of Economic Behavior and Organization* Vol. 13, pp. 273-298.
- Fink, D. & Kazakoff, K. (1997). 'Getting IT right', *Australian Accountant* Vol. 67, No. 10, pp. 50-52.
- Florida, R. (1995). 'Toward the learning region', *Futures* Vol. 27, pp. 527-536.
- Fredberg, T., Elmquist, M. & Ollila, S. (2008). 'Managing open innovation – present findings and future directions', Vinnova Report, VR 2008:02, Chalmers University of Technology, Gothenburg, Sweden.
- Globerman, S., Roehl, T.W., & Standifird, S. (2001). 'Globalization and electronic commerce: inferences from retail brokering', *Journal of International Business Studies* Vol. 32, No. 4, pp. 749-768.
- Hall, R.E. & Jones, C.I. (1999). 'Why do some countries produce so much output per worker than others?' *Quarterly Journal of Economics* Vol. 114, No. 1, pp. 83-116.
- Kline, S. & Rosenberg, N. (1986). 'An Overview of Innovation', In: R. Landau and N. Rosenberg (Eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth*, National Academy Press, Washington, DC, pp. 275-305.
- Lakhani, K.R. & von Hippel, E. (2003). 'How open source software works: free user-to-user assistance', *Research Policy* Vol. 32, No. 6, pp. 923-943.
- Laven, F. (2008). 'Organizing Innovation: How Policies are Translated Into Practice', PhD Thesis, BAS Publishing, School of Business, Economics and Law, Gothenburg University, Gothenburg, Sweden.
- Lichtenberg, F. (1992). 'R&D Investment and International Productivity Differences', NBER Working Paper No. 4161.
- Melese, T., Lina, S.M., Chang, J.L. & Cohen, N.H. (2009). 'Open innovation networks between academia and industry: an imperative for breakthrough therapies', *Nature Medicine* Vol. 15, No. 5, pp. 502-507.
- Munos, B. (2006). 'Can open-source R&D reinvigorate drug research', *Nature Reviews Drug Discovery*, Outlook, Advanced Online Publication, 18 August, pp. 1-7, DOI: 10.1038/nrd2131.
- Porter, M. (1990). 'The Competitive Advantage of Nations', The Free Press, New York.
- Romer, P. (1986). 'Increasing returns and long-run growth', *Journal of Political Economy* Vol. 94, No. 5, pp. 1002-1037.
- Scott, W.R. (2003). 'Organizations: Rational, Natural, and Open Systems', 5th ed, Pearson Education, Inc., New Jersey.
- Surowiecki, J. (2009). 'The Wisdom of Crowds', *Wikipedia*. http://en.wikipedia.org/wiki/The_Wisdom_of_Crowds (retrieved 19th June, 2009).
- Teirlinck, P. & Spithoven, A. (2008). 'The spatial organization of innovation: open innovation, external knowledge relations and urban structure', *Regional Studies* Vol. 42, No. 5, pp. 689-704.
- Turban, E., McLean, E. & Wetherbe, J. (1999). 'Information Technology Management: Making Connections for Strategic Advantages', 2nd ed, John Wiley & Sons Inc, New York.
- Veugelers, R. (1997). 'Interval R&D expenditures and external technology sourcing', *Research Policy* Vol. 26, pp. 303-315.
- von Hippel, E. (1988). 'The Sources of Innovation', Oxford University Press, New York.