



HHL LEIPZIG
GRADUATE SCHOOL
OF MANAGEMENT

Dissertation

Employee Involvement in Open Innovation

The Role of New Technologies, External Employees and Trust Issues

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Abstract:

This dissertation consists of three independent studies - two empirical studies and one literature review - that examine different issues regarding the involvement of employees in innovation within the growing open innovation environment. In particular, I focus on the different facets and vital enablers that influence involving the general workforce in innovation, among which trust plays a critical role for their active involvement and their decision to contribute to innovation. In the first study, the focus is on a powerful set of enablers of high involvement innovation, namely; the new corporate web technologies, and their role in accelerating a wider base of collective innovation. The second study then examines the involvement of a very specialized category of the workforce in innovation which is the highly qualified external workforce. Those employees represent a rich yet underexplored resource of employee innovation. Finally, in the third study, I focus on exploring the different roles played by innovation intermediaries and argue that intermediaries could take a more active role in open innovation, through proposing the 'trust incubator' role. New insights coming from this thesis advance the current discussion of actively and effectively involving employees in innovation, as well as uncover important and current related issues and allow us to draw conclusions that are useful for both research and practice.



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Publication-based dissertation submitted in partial fulfillment of the requirements for the degree

Doctor of Economics ***(Dr. rer. oec.)***

at
HHL Leipzig Graduate School of Management
Leipzig, Germany

submitted by

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Leipzig, October 12, 2014

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Acknowledgement

Despite the great effort I have personally invested in this work, there is hardly anything that gets done as a solo venture. I am grateful for all the support I received during the past three years, which eventually led to this dissertation. This dissertation would not have been possible without the great support of several people.

Firstly, I would like to express my gratitude to my supervisor, Prof. Dr. Andreas Pinkwart, for the opportunity to join HHL and starting the exciting trip of my PhD. I am really thankful for all the insightful discussions and enriching ideas that have nurtured this work along the way. His great experience as a professor as well as in life has not only helped me in my research, but has also contributed to my own personal development.

I also sincerely thank my co-supervisor Prof. Dr. John Bessant for his continuous support, valuable input and great help, and also for being always there. Working with him has always been very inspiring and fun, and I have learnt a lot.

Thirdly, I would like to thank the HHL staff members that have helped me in any way, and special thanks to my personal friends in Leipzig who have advised me often: With you moving to Leipzig has been quite a delightful step!

Fourthly, I would like to thank all the people from practice who have supported me to gather valuable data for accomplishing this research.

Last but not least, I want to thank my family, especially my fabulous mother and my late father, for their unconditional support, love and understanding. Without all what they have done for me, and my inner drive to be worthy of all of that, completing this work would have been impossible. To Nouran and Ahmed: No one in this world could ever hope for a better sister or brother, so thank you! To my gorgeous little Maya: you are the reason why everything perfectly makes sense.

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List of Abbreviations

Abbrev	Abbreviation
CEO	Chief Executive Officer
CIO	Chief Information Officer
CSN	Corporate Social Networks
DAX, MDAX, TECDAX	Stock indices which list German companies
EDI	Employee Driven Innovation
EI	Employee Involvement
HII	High Involvement Innovation
HM	Honorable Merchant
HQEE	Highly Qualified External Employees
HRM	Human Resource Management
ICT	Information and Communications Technology
ILM	Internal Labor Market
IP(R)	Intellectual Property (Rights)
ISS	Intranet Suggestion Systems
KMS	Knowledge Management Systems
KPI	Key Performance Indicator
NDA	Non-Disclosure Agreements
OB/OS	Organizational Behavior/Organizational Strategy
OEM	Original Equipment Manufacturer (term for automobile producers)
OI	Open Innovation
OIC	Online Idea Contests
OSS	Operations Support Systems
RBV	Resource Based View
SCC	Supply Chain Collaboration
SCL	Supply Chain Learning

SME	Small-Medium Enterprises
TCT	Transaction Cost Theory
TTO	Technology Transfer Office
VEC	Virtual Expert Communities

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Introduction

“Well-run companies are not populated by yes-people who have been taught only to carry out mindlessly the directives of management. Rather, their employees have been trained to understand what is good for the company and contribute to its innovativeness. Thus, employees of great companies exercise initiative.”

Clayton M. Christensen - ‘The Innovator’s Dilemma’

In a fast changing world with huge challenges, managing innovation starting from idea generation up to implementation is a dynamic process that is being continuously reshaped. In such an environment, not only being innovative counts, but also the speed of innovating is crucial. Therefore, the emerging environment for innovation is characterized by very high levels of knowledge availability and increasing opportunities for widespread knowledge exchange and flow, all of which could be better approached through open innovation (OI). According to Chesbrough (2003), open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Instead of the solid boundaries of the product development funnel, the open innovation funnel has permeable walls, where ideas are willingly exchanged in an open yet organized manner.

There are lots of ways to accelerate innovation in organizations through this open mindset. For example through collaborating with different external parties such as suppliers or users in open innovation programs (dos Santos and Spann, 2011), universities and research institutes, partner companies within a cluster, etc. An additional important way is to foster internal collaboration within the firm through motivating employees to be involved in innovation; in other words nurturing the internal side of open innovation through employee involvement. In this context, this can be done in multiple ways, for example by taking up employee suggestions, exempting them to take initiatives beyond organizational boundaries, introducing suggestion schemes such as idea suggestion boxes and idea competitions (van de Vrande et al., 2009) and other ways.

Many practitioners and scientists endorse the view that innovation by individual employees is a means to foster organizational success (e.g. Van de Ven, 1986). Work has become more knowledge-based and less rigidly defined, giving room to more employees with various employment bases to contribute. Highlighting the important role of people in innovation, a recent study on OI approaches in large firms has revealed that internal employees are considered by many companies as the most significant factor and critical source of innovations (Chesbrough & Brunswicker, 2013). This indicates that a lot of large companies have realized that human capital is one of the most important contributors to business success, and hence their need to invest broadly in human resource development and systematic employee involvement in corporate innovation processes.

However, driving innovation through employees is not a new phenomenon. Reports on employee engagement in innovation states far back as the 18th century when the first suggestion scheme was introduced in Japan. A lot has been published since then about employee-driven innovation and its importance as a vital approach innovative companies must adopt (Lloyd, 1999; Fairbank & Williams, 2001; Bessant, 2013; Hoyrøp et al., 2010). Nevertheless, there are a number of crucial and urgent employee involvement issues that are highly under-researched, especially in the open innovation literature that tends to focus on the external side of open innovation. For example, the literature about innovation communities mainly reports findings from innovation communities formed with external partners, rather than the ones that are incorporated within the organization (Wendelken et al., 2014).

Therefore, I would like to contribute to this discussion by addressing employee involvement issues that are rarely tapped by academic research. Hence, this thesis addresses three main topics: new enabling technologies of innovation, highly qualified external employees involvement, and trust issues. My analysis of the existing literature of those three streams of research shows that considerable research gaps exist in conveying those topics in the field of high involvement innovation (HII) and more generally in the open innovation literature. Therefore, the following important - yet under-explored - topics were found interesting to explore through this cumulative

dissertation. In the following, a summary of the motivation behind each article, the methodology used, the main findings and areas of future research is presented.

Dissertation's Motivation and Used Approaches:

This doctoral thesis consists of three articles: two are empirically-based qualitative studies, and one is based on a broad literature review that contributes to theory building.

Article 1: Accelerating High Involvement: The Role of New Technologies in Enabling Employee Participation in Innovation

- **Study significance:** Although new technical web tools were widely discussed in the last few years in the literature, this investigation provides new insights on the questions of how to realize EI benefits in practice, and in which ways do recent technological developments open up new opportunities for dealing with these issues. It allows us to draw conclusions whether new technological tools are a *quick-fix*, or a continuous learning process that needs nurturing through a set of supporting enablers, in addition to identifying the real challenges for that.
- **Methodological approach:** An exploratory qualitative study approach was used. This article aims to answer the following research questions: To what extent are known enablers for high involvement innovation nowadays applied? How are the classical barriers overcome with the adoption of new interactive web-based technologies? Are there any emerging challenges from their usage to accelerate HII?
Since the answers to these questions cannot be pointed out directly from existing literature, an exploratory qualitative study approach was seen appropriate to address those issues.
- **Main findings:** These web-based technical tools have created effectively a new momentum for disseminating high involvement, and evoked new patterns of communication that have increased employee openness, yet have in parallel raised a number of challenges and important issues to consider. Reacting to these new challenges requires a conscious adjustment of established routines and

cultural habits that the paper discusses as implications for practice and for future research.

- **Open areas for future research:** The role of technologies and especially social networks represent a key development area for research. In a similar fashion the use of the lens of user-led innovation could prove fruitful, seeing employees as active user innovators concerned with improving the processes within which they are engaged on a regular basis (Zejniliovic et al., 2012).

Article 2: Exploring the Involvement of highly qualified External Employees in Innovation – An Organizational Perspective

- **Study significance:** Although the use of the flexible workforce has been an integral part of many firms' employment strategies (Kalleberg et al., 2003), this category of employees have been hardly linked to any innovation processes. On the other hand, gaining new knowledge for innovation is an underexplored area in the area of flexible contracting, especially with regard to the highly qualified external employees. Still, there exist a few studies that refer to the capability of the HQEE to contribute to innovation. Yet, questions regarding how their involvement in the innovation process occurs in real business contexts, or how companies perceive such involvement and how this perception is reflected in their practices towards the HQEE, remain unaddressed. Furthermore, empirical studies that link external employees and innovation concentrate on the external employee perspective (Wilkens et al., 2013), but there is no comparable research exploring the employers' perspective. Additionally, this study uniquely connects between three interrelated research streams: employee involvement, flexible employment, and open innovation. By focusing on a special category of employees, dealing with employee involvement as a holistic concept is being changed to a more focused view. Therefore by covering the above issues, this study attempts to fill considerable research gaps.

- **Methodological approach:** The study addresses the following questions: 1) Can highly qualified external employees of an organization contribute to innovation? (Answered through a thorough literature review), 2) How are HQEEs involved in innovation in practice? And in which other potential ways could they contribute? And 3) How can organizations better involve the HQEE in innovation and effectively buy-in their knowledge?

For confirming the answer of question 1 generated from the literature, and for answering questions 2 & 3, a qualitative multiple case study approach based on data collected from expert interviews and corporate documents is used. Sixty semi-structured interviews with CEOs and top managers were conducted and analyzed using content analysis.

This method is seen appropriate for relatively unexplored subjects (Eisenhardt, 1989). It helps in getting deeper insights on a particular topic and developing propositions for quantitative fieldwork as a follow-up to this in-depth analysis (Churchill, 1999). The literature is used to complement the findings of an exploratory study (Strauss and Corbin, 1990).

- **Main findings:** Findings suggest that most companies realize their need to integrate external employees more into their innovation activities. However, there is still a lot to be done to maximize the innovative potential of the flexible workforce, especially within an open innovation environment. The structured findings enable companies better assess the different themes discussed and to evaluate their level of engaging the HQEEs in innovation and work on the weaknesses.
- **Open areas for future research:** Two areas seem very promising to further investigate: 1) Developing a measure, based on this study, that can be directly used by practice to measure the level of HQEE involvement in innovation, in terms of depth and breadth, and 2) A future study exploring the HQEE's

perspective and their motivation to be involved in open innovation would be an interesting contribution.

Article 3: Rethinking the Role of Trust in Open Innovation

- **Study significance:** Building trust is essential for effective knowledge exchange and thus for innovation (Sprenger, 2002). The purpose of this paper is develop an outline typology of mechanisms which enables trust in innovation and then to examine the challenges posed by ‘open innovation’ as well as their reflection on those mechanisms in the emerging innovation environment. I argue through reviewing the literature and reporting some prototype examples that current mechanisms of trust should be adjusted to fit the growing open innovation environment. Furthermore, this study brings forward the discussion of the different roles of innovation intermediaries and attempts to rethink the current typologies of roles in the literature to better fit the current open innovation environment.
- **Methodological approach:** A broad Literature review and a number of reported exemplar cases were used.

Trust has been an increasingly significant area of interest in studies of business management, as well as one of the most frequently cited concepts in studies of cooperative inter-organizational relationships (Kroeger, 2012). Yet, relatively few studies look at its role within innovation. A literature review was therefore essential to complement under-researched topics and open up areas for future research.

- **Main findings:** Based upon a rich theoretical review, findings show that trust is becoming increasingly intermediated in open innovation and that current mechanisms of trust should be adjusted to fit the new open innovation environment. The activities traditionally associated with intermediation do not suffice to describe what intermediaries can do to support trust in open

innovation. Therefore, intermediaries could take a more active role in innovation that could be described as the ‘trust incubator’, which is explained along the other major roles an intermediary performs.

- **Open areas for future research:** The trust incubator model could be investigated empirically in future settings. Future empirical work should define concrete activities and routines that intermediaries in open innovation perform to build and maintain trust.

Lastly, this thesis tends to fill important research gaps in the field of employee involvement in innovation. The analysis provides further findings to the scientific discussion around the roles of enabling technologies, trust and the flexible workforce within open innovation. Furthermore, the results of the three studies provide several practical implications and essentially make organizations assess/rethink many of their current employee involvement practices. According to the results of an important survey conducted by Boston Consulting Group (BCG), their ranking list shows that the topic of strategic workforce planning on the one hand and enhancing employee engagement on the other are the newcomers in the top five-topics for great current and future importance (Strack et al., 2012). Highly innovative companies have realized that already and are focusing on developing themselves in those areas. As the senior Vice President of HR at 3M, lately stressed „*The link between innovation, employee engagement, and trust represents everything about 3M. We knew from our own research that trust serves as the foundation for employee engagement and their resulting attitude towards innovation*”

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I Accelerating High Involvement: The Role of New Technologies in Enabling Employee Participation in Innovation

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Published in 2013 in Volume 17 Issue 06 of the International Journal of Innovation Management (VHB 2014: B-ranked)

Abstract

The experience of implementing employee involvement in innovation can be viewed as a bounded opportunity. Whilst long-term strategic benefits could flow from organizing participation across the workforce, creating structures that sustain such a culture is highly complex. In effect the “transaction costs” of high involvement innovation limit its implementation. However a number of technological and social developments (such as innovation platforms and company social networks) offer new options in this space which may change this. In particular the “reach” and “richness” trade-off could be changed to permit higher levels of participation in larger-scale projects. Much depends on the ways in which implementation of systems deploying these new approaches is undertaken and the development of appropriate behavioral routines to support them. This paper explores a number of cases within German enterprises and reports early experience along this learning curve.

Keywords: Employee involvement; open innovation; innovation contests; continuous improvement; Enterprise 2.0.

Link:

<http://www.worldscientific.com/doi/abs/10.1142/S1363919613400203>

II Exploring the Involvement of highly qualified External Employees in Innovation – An Organizational Perspective

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Published in the EURAM 2014 Conference Proceedings

The Later version is currently under review in the International Journal of Innovation Management (VHB 2014: C-ranked)

Abstract

The main purpose of this paper is to explore the nature of the involvement of the highly qualified external employees in enhancing the companies' innovativeness. The paper focuses on the interrelationship between three major trends in the current workplace that is still underexplored: flexible employment, employee involvement in innovation and open innovation. For organizations, gaining new knowledge and innovative ideas from the highly qualified flexible workforce tends to be overshadowed by concerns regarding the protection of knowledge, thus watching through a narrow lens the possible potential of this group of employees. Using a qualitative case study approach, empirical data were collected from German companies coming from different industries, including automotive, heavy machinery, chemical, pharmaceutical, electronics, insurance and others. Semi-structured interviews with top managers were conducted and analyzed using content analysis. Findings suggest that companies might be sitting on a rich source of innovative ideas they may not be aware of, and that there is still a lot to be done to maximize the innovative potential of the flexible workforce.

Keywords: Employee involvement; Innovation; Highly qualified, Flexible Workforce; External Employees.

1 Introduction

No doubt, pressures of competition and rapid technological changes force companies to continuously innovate while maintaining their flexibility. However, innovation is growingly becoming a multiplayer game. Therefore innovation researchers have been working for some time on the theoretical development of models which recognize the shifting boundaries and the engagement of an increasingly diverse number of players; such as: Distributed innovation processes (Howells et al., 2003) - Innovation systems (Lundvall, 1992; Metcalfe and Miles, 1999) - User led innovation (von Hippel, 2005; Piller, 2006) - High involvement innovation (Boer et al., 2000; Bessant, 2003; Schroeder and Robinson, 2004) and others. Above all innovation is characterized by a shift in emphasis from knowledge production to knowledge flow. An underlying principle in this emerging innovation pattern is the increasing ‘openness’ in terms of both the variety of knowledge sources and the involvement of multiple stakeholders (Chesbrough, 2003). Successful open innovation strategies require new ways of connecting external ideas to sites within the organization which can make effective use of them (Allen, 1977; Dahlander and Gann, 2010).

The current innovation environment of organizations is opening up more and more, especially in three main areas: search, employee engagement and stakeholder participation (Bessant and Möslein, 2011). The majority of research has focused on the motivation of external stakeholders to provide their knowledge to the organization (e.g. Antikainen et al. 2010). However, the internal openness of the company to involve its own employees has not been equally a research focus. Thus, this study sheds light on the second major trend of open innovation, which is opening up employee involvement in innovation.

Employees are the cornerstones of all innovative companies (Fu, 2012). There is a long tradition of engaging employees in innovation (Imai, 1987; Bessant, 2003). In high employee involvement systems, there is the possibility for sharing and building on ideas and for voting and mobilizing support for strong ones. Thus, since the human capital is the first source of internal innovation (Chen et al., 2011), it is therefore important to highlight a growing trend in employment forms which is the flexible workforce

employment. The flexible workforce include temporary, part-time, leased, and contract employees (Chattopadhyay and George, 2001). The role of this group of contingent/external employees in an organization's innovation is highly underexplored, although they could be in more frequent interaction with the core permanently-contracted employees than other external stakeholders such as suppliers or alliances' partners. Additionally, there has been a substantial change in their employment regulations in recent years, especially in Europe (Jahn et al., 2012) where firms' reliance on flexible employment has been increasing. For example, in 2011, 34.3% of employees with tertiary education in the EU, 35.9% in Germany, had a work arrangement with at least one flexible characteristic (Eurostat Labor Force Survey, 2012).

Traditional research for example on temporary work is based on the view of the social identity theory, where temporary work is associated with ill-paid jobs that require low technical and conceptual skills that the core or internal workforce would not work in (e.g. Tilly, 1992). Recent research opposed that view and showed that there are also highly-skilled temporary employees who are regarded as "knowledge carriers" in their so-called migration from and to organizations (Tempest, 2009). It even distinguished between the drivers behind employees seeking temporary work because of the provided flexibility through this work, the reduced constraints to the organization, the increased variability of knowledge along the career path, etc. – and those behind employees seeking temporary work because they don't have any another option and are waiting to shift to a permanent job. In research, the first group of temporary employees was referred to as the boundaryless, while the second group was referred to as the traditional (Marler et al., 2002).

Thus, we explore the role of the highly-qualified externals in two categories of the external workforce, which are: temporary employees and independent contractors, as those are more likely to encompass the skills and the motivation to innovate. Our choice to focus on the highly qualified external employees belongs to two main reasons: first, that it is a recent trend that companies recruit highly qualified external employees and thus it is so far less researched, and second that those employees are more likely to be involved in innovation activities in companies than their low-qualified counterparts. The

researchers agree with the direction in research that proposes that highly-skilled external employees probably continue to work as externals voluntarily and don't have the stress that low-skilled externals have to keep their job by focusing mainly on productivity (Marler et al., 2002). Therefore, the former are expected to be more intrinsically motivated and engaged in innovative activities than the low-skilled ones.

Finally, this paper aims at enhancing our knowledge about the nature of the contribution of highly qualified external workforce in innovation from an organizational perspective, by answering the following questions: Can external employees contribute to innovation in an organization? In which ways can they contribute to innovation? How do external employees contribute to innovation in practice i.e. are there any direct and/or indirect employee involvement-channels that organizations offer to capture external employees ideas/suggestions? How can organizations maximize the innovation potential of external employees?

2 Background

2.1 The flexible external workforce

The use of the flexible workforce has been an integral part of many firms' employment strategies and the utilization of that part has been a recent trend in human resource management research (Kalleberg et al., 2003). The external workforce or the flexible workforce refers to employees who are hired for a certain duration belonging to an external independent party. They have been referred to as the contingent workforce (Way et al., 2010), the atypical workers (Keller & Seifert, 2005; Addison & Surfield, 2006), the flexible labor (Boockmann & Hagen, 2001; Stavrou, 2005), the non-standard employees (Palier & Thelen, 2010; Loughlin & Robert Murray, 2012) and the external workforce (Davis-Black & Uzzi, 1993; Kaiser et al., 2007). Research and practice have shown different categorizations for the external workforce. For example, Belous (1995) categorized the external workers into: agency temporary workers, direct-hires, on-call workers, independent contractors, self-employed workers, consultants and freelancers. Following the German labor market Hartz reforms in 2003, employment in temporary agency work alone more than doubled from 330,000 in 2003 to 780,000 in 2010

(Spermann, 2011). In general, Germany has witnessed an increase in the percentage of temporary employees within its workforce (The Federal Employment Agency, 2011).

The reliance on the external workforce has been mainly for reducing costs in adjusting workload fluctuations or for screening potential workers for permanent positions (Houseman, 2001). Their role as providers of knowledge is regarded as a secondary or even non-existent role and thus underexplored in research and practice. Recent research tends to focus on the hazards of knowledge loss resulting from involving external employees (e.g. Kaiser and Rössing, 2010), but no attention has been given to highlight possible ways in which organizations can maximize their contribution especially within an environment where organizations tend to use all possible sources for innovating. Storey et al. (2002), drawing upon a huge scale survey and eight case studies in the UK, concluded that although flexible employment and the orientation towards innovation have developed as growing directions, “the potential impact of the flexible workforce on the innovation capacity was not taken into account” (p.15).

2.2 Employee Involvement in Innovation

For companies who believe in capturing innovative ideas from all possible sources, employee involvement is a crucial asset. Not only because innovations start with ideas of creative people and out-of-the-box thinkers, but also because the commitment of these people is essential to turn an idea into a concrete improvement (Nijhof et al., 2002). Employee involvement in innovation has been defined as: “Leveraging the knowledge and initiatives of employees who are not involved in R&D, for example by taking up suggestions, exempting them to implement ideas, or creating autonomous teams to realize innovations.” (Van de Vrande et al., 2009; 425).

Research confirms the potential of involving all employees to enhance innovation performance, especially in the process area but also in some new product and service development activity (Bessant, 2003; Tucker, 2002; Shapiro, 2002; Christiansen, 2000). These different approaches outgrew from the innovation theory that innovations can come from all of these different sources: users, employees, manufacturers, or suppliers

(von Hippel, 1988). Especially the knowledge and initiative of employees is a powerful source for innovations but usually not fully utilized (Bhide, 1994; van Dijk and van den Ende, 2002) – (cited in dos Santos and Spann, 2011). The large scale study by van de Vrande et al. (2009) concluded that employee involvement was a main practice of open innovation conducted by both manufacturers and services enterprises. A few studies addressed the human asset in open innovation practices and these results confirm the important role of employees in the successful adoption of open innovation (e.g. Harison and Koski, 2010).

Additionally, employee involvement has recently witnessed a changing trend in the enabling tools and technologies that facilitate a high involvement innovation culture with rapid information processing speed. Employee engagement via online suggestion schemes, idea contests, corporate intranets and other mechanisms can make a significant contribution to the overall innovation effort. Such mechanisms can lead to wider improvements in the overall business driven mainly by the involvement of more people as a main practice for open innovation.

The adoption of the ‘Open innovation’ (OI) in itself enables organizations to effectively use internal and external resources to drive their innovation processes and is considered by many contemporary firms as a way to enhance innovation capabilities. However, inspite of the growing interest in OI, there are still many unanswered questions (Mortara and Minchell, 2011). One of its most used definitions of open innovation is: ‘the use of purposive inflows and outflows of knowledge to accelerate internal innovation and to expand the markets for external use of innovation, respectively’ (Chesbrough et al., 2006: 1). In reality, not many firms follow a fully closed innovation approach, a lot of developments within and outside the innovation arena made it necessary to make innovation processes more open (Huizingh, 2011).

As described by Dahlander and Gann (2010), OI is a continuum with varying degrees of openness. It is also a multi-dimensional construct that is comprised of several activities/practices e.g., inbound, outbound and coupled activities (Gassmann and Enkel, 2004). Many studies distinguish between purposive out-flows and inflows of

knowledge to accelerate internal innovation processes (e.g. Chesbrough et al., 2006). The outflow of knowledge is referred to as ‘technology exploitation’ which implies “innovation activities to leverage existing technological capabilities outside the boundaries of the organization”, while the inflow of knowledge is referred to as ‘technology exploration’ which relates to “innovation activities to capture and benefit from external sources of knowledge to enhance current technological developments” (van de Vrande, 2009; 425). In this study, the focus will be on one of the most powerful technology exploitation practices (those also include activities like venturing and outward IP licensing) which is employee involvement in innovation.

2.3 The involvement of the highly qualified external employees in innovation

Within open innovation contexts practicing employee involvement in innovation of the kind mentioned earlier, there is a growing recognition that external flexibly-employed employees might be a great source of new ideas that can develop to valuable innovations. Although there are rarely any studies that investigate the role of external employees in innovation (whether the highly-qualified ones or in general), the following table summarizes a number of study results that support our assumption that external employees have the potential to contribute, especially to innovation.

Table 1: Summary of studies showing the ability of external employees to contribute to organizational outcomes and innovation

External employees and Innovation	External Employees propensity to contribute
A study by Felstead and Gallie (2002) concluded that a high involvement work environment further enhances the skills exercised by non-standard workers compared to those employed on standard contracts	Temporary employees’ careers are built on cumulative learning leading to accumulated knowledge as valuable ‘career capital’ (Tempest, 2009).
Matusik and Hill (1998) state that using	With the respect to the flexible workforce,

<p>skilled contingent employees in core competencies can improve the firm's performance through the inflow of ideas.</p>	<p>especially the highly-qualified ones, Stanworth and Drucker (2006) highlight the function of the flexible workforce in complementing and not just substituting the permanent workforce for numerical flexibility.</p>
<p>External flexibility could be beneficial for innovation, because contingent employees bring new knowledge to the organization, and complement innovation capabilities of core internal employees (Nesheim, 2003; Arvanitis, 2005)</p>	<p>Torka et al. (2008) state that managers should think twice before excluding non-permanent workers from direct employee involvement” (p.153).</p>
	<p>The reliance on highly-qualified external workforce can be driven by the need for standard expertise and generic skills (Lepak & Snell, 2002) or the need for specific expertise (Davis-Blake and Uzzi, 1993).</p>

Nevertheless, the ways in which external employees are actually involved in activities related to innovation processes in companies and if they do contribute to innovation is still an unanswered question. Therefore, our study will try to explore this phenomenon and fill in the following research gaps:

- a. Employee involvement in open innovation has mainly been dealt with as a holistic concept. Therefore this study will be the first to categorize the employees involved in innovation according to their employment form into two groups: external and internal, and focus on the underexplored role of external employees.
- b. As the knowledge-flow environment has been reshaped with open innovation and emerging new technologies, a lot of policies are developing in parallel to ensure the safe

inflow and outflow of knowledge for companies. Therefore, it is time that the involvement of external employees in innovation - as mobile 'knowledge carriers' - should be investigated.

c. Most studies focus on the employee perspective and not the employer's perspective with regard to external employees. Therefore, we tend to focus on the latter's perspective.

3 Research Methodology

A qualitative inductive research methodology is used. This approach is appropriate for complex and less explored questions (Flick, 2006). Empirical data was collected from ten manufacturing as well as service companies in Germany, representing different industries including automotive, mobility, chemical, engineering, heavy machinery, clothes, etc. as most innovation studies focus on very specific industries and there is need for more cross-sectors studies (Van de vrande et al., 2009). The majority of these companies are DAX, MDAX or TECDAX listed, and common to all is their strong focus on developing innovation. In total, we plan to run 40 in-depth semi-structured interviews between January and May 2014 (20 already conducted). Our interview partners can be clustered into two groups:

(1) People responsible for innovation processes and new technologies, e.g., idea management leader, head of social collaboration, IT innovation manager, head of innovation.

(2) People whose roles were particularly concerned with innovations and innovation processes, e.g., product managers, production managers, engineering and design managers, and HR managers. We also had the chance to interview the CEOs of three companies.

In this paper, we focus our analysis on the organizational perspective, however to mirror this perspective with the employees' perspective; we started interviewing some of the highly qualified external employees working in the surveyed companies.

For data analysis, we applied investigator triangulation (Denzin, 1970) in the sense that three researchers autonomously reviewed all interview transcripts and developed a categorization of findings. After comparing and discussing the initial categorization, two more iterations of refining and discussing will be run. This approach helped to increase construct validity of our analysis results.

The sample is comprised of only German companies to guarantee more reliable results due to the cross-country differences in labor regulations and protection legislations governing flexible employment contracts.

4 Empirical Findings

This paper is an ongoing research project, where researchers are currently carrying on the interviewing process that will continue until May 2014. However, there are already some interesting findings from the initial interviews, which can be summarized in this section.

Decentralization of knowledge sources:

Companies are realizing the need for expanding their sources of new knowledge. For that, having an agile diverse workforce is key for adapting to a changing environment.

“For companies that are keen to survive, they need to react fast to opportunities as well as to risks, and you cannot do that centrally anymore, you need also an external spirit for that – to explore external sources of knowledge and people that can help you out.”

The role of trust in facilitating openness

A considerable degree of trust and transparency is essential for making an exchange of ideas between an organization and its high qualified external workforce successful

“It is of great importance that we can trust people, and that the basic agreement specifications are clear, otherwise it won’t work so easily”

Motivating externals to contribute seems unimportant to companies

Some companies believe that project-based externals for example are already developed and thus there is no need to motivate them to contribute as they will show up themselves if they have a beneficial idea.

“Externals develop a lot accessing a new environment with new customers and products, thus there is no need to invest in them. They should come up and speak up for themselves if they have something to contribute, I don’t make the call here.”

The external-involvement controversy

There seems to be a controversial opinion regarding the involvement of external flexibly employed employees in innovation-related tasks and the parallel need for their knowledge and expertise.

“If it concerns strategic customers for me, I prefer to rely on my own workforce. And working with externals... depends on how much I’ll gain from it.”

Fear of management of the legal framework

There is a pressure on managers resulting from their fear of non-compliance with legal regulations when hiring the flexible workforce, even the highly qualified externals. This fear distracts them from focusing on the innovation potential of employees. An HR skill-based policy for all employees contributing to innovation regardless of their contractual agreement would be helpful.

“The first thing coming to my head as an innovation manager when working with an external is that he is not a part of us and thus all the legal package in dealing with him jumps to my head. I even sometimes say to myself, why bother with all this uncertainty? I would just stop working with externals... I will definitely lose some knowledge and profit as well, but at least I avoid uncertainty.”

The restricted areas for external employees

In some companies, especially in the chemicals industry, external employees are never hired in knowledge-sensitive departments in some companies, such as the innovation management department.

“For innovation, let me say, you know product innovation, process innovation, process optimization, all this know-how tasks, we do not hire temporary employees in product. We do it, when we perform engineering projects we do it, but all other activities, which are know-how critical we will not do that. Our concept here is, when we build production processes all over the world, we have an own team.”

In some companies that adopt modern employee involvement tools (such as idea platforms and innovation contests), only some types of external employees (for example: project-based engineers) are allowed to actively participate in using those tools. They are either not given any access to the idea platform or ongoing innovation contests, or they can login but could not post/comment i.e. contribute.

“Anyone not from our permanent workforce is not allowed to access our idea platform. I don’t need information from them and I don’t want them to be informed of what I am doing, why should I?”

Innovative ideas are marked as internal or external:

There are however more open approaches in other companies, yet innovative ideas are given an identity of either coming from an internal or an external employee.

“Technically everyone has access to the platform automatically without having to sign in. So every temporary employee or even the external ones get an XY account a domain network account they are even automatically logging on. So what we have done is using a tool that automatically identifies if the employee is internal or an external contract employee, and for externals they can only read through the platform they are not allowed to share ideas or post ideas. But the directly-hired employees by XY whether permanent or temporary like trainees, temps or company students they have full access and are free to share and post ideas on the platform, and as I said technically it is for every employee”

No incentive structure for external employees (even the highly-qualified)

In the mobility field, a company’s reliance on temporary employees is a very high, and the highly skilled are especially hired in the Engineering and Design departments. Yet,

they still don't have any incentive structure for them to innovate and contribute more. In the automotive, some legal aspects make establishing incentive structures for externals complicated. However, top management support could be a major incentive for motivating externals to contribute with their ideas and for having the supporting culture for that to happen. This also gives us an indication that our study results could be of high relevance in understanding the potential of external employees in innovation. As one CEO mentioned,

“All temporary workers are an integral part of the team. They are part of all events in all facets. That means for example: we conduct events out of work for example a summer party for all families. Even there the temporary employees and their families are integrated. That's good for common work, we have common goals and in view of that fact we would like to treat the temporary workers equally to our own workers. And I think that's very positive. You can't distinguish between a temporary worker and a regular worker when you walk through our company; same work clothing, same offices, everything.”

5 Conclusion

The empirical results so far have many interpretations for this research. For example, although the demand on highly skilled external employees is in an increasing trend, yet there is still no acceptance for the idea that they are a valuable source of accumulated knowledge that can boost innovative ideas that are similar to ones applied elsewhere. The fear from the company's side that those employees might transfer some of its innovation competencies to the next employer is probably larger than its belief that their knowledge will contribute positively to the overall outcome of employee involvement in innovation.

Additionally, several companies forbid external employees involvement even if they are highly qualified and even when the company's culture encourages the wider employee participation to share their ideas and suggestions, and develop solutions to existing problems. Consequently, this might affect the employees' general morale and cause a distinct separation between internal and external employees instead of their integration for a larger pool of ideas and collaboration for innovation.

However, it can be noted that there is a shift from numerical flexibility, as the main driver behind hiring external employees, to functional flexibility and to even seeking unique expertise that could rarely be found within the core workforce. Yet, most companies do not invest in external employees, especially the contracted employees relying on the fact that they come already developed and ready (Spermann, 2008). Even in fields where there is intensive use of externals, companies do not have an incentive structure to motivate those employees to use their skills in innovation. Thus, intrinsic motivation could be the main driver for highly skilled external employees to generate new ideas and share them with other employees in the workplace.

Finally, it is worth mentioning that innovative-oriented companies might be in possession of a valuable source of innovation without knowing it and if they do recognize it, companies are unclear about how they should benefit from this resource and use the innovative potential of its external highly qualified workforce. Some guiding strategies for managing knowledge exchange between the company's own employees and external employees and the active involvement of external employees can be very useful.

Current steps for this research include: continuing a broad literature review and widening the data sample. The results aim at filling important research gaps as well as providing useful guidelines for practitioners. And finally, recommendations for future research include testing the final propositions resulting from our in-depth content analysis in quantitative settings.

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III Rethinking the Role of Trust in Open Innovation

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Published in the ISPIM 2014 Conference Proceedings

Later version is currently in the Second Reviewing Phase in the Journal of Strategy & Management (VHB 2014: C-ranked)

Abstract

We examine trust mechanisms in innovation within a number of inter- and intra-organizational contexts and outline the challenges posed by open innovation to those mechanisms. The organizational contexts that we have chosen for examination are: supply chain development, clusters and employee involvement. We argue through reviewing the literature and a number of examples that current mechanisms of trust should be adjusted to fit the new innovation environment, and suggest that more emphasis should be placed on the ‘*trust incubator*’ role of an intermediary, within a typology of the main roles an intermediary should perform. Our systematic overview provides a rich context for further empirical research and innovation management practice.

KEYWORDS: TRUST; OPEN INNOVATION; INTERMEDIARY.

1 Introduction

Trust has always been important for innovation. By its nature innovation involves creating value from knowledge and this is a shared, interactive process; its outcome is strongly linked to the presence or absence of trust as an enabling mechanism. It plays a role in a variety of settings – for example at early stage ideation people need to feel psychologically safe enough to risk sharing hunches, intuitions, ‘wild ideas’, etc. with others (Amabile (1998)). Knowledge-sharing across organizational boundaries – for example in innovation project teams, depends on the trust relationships available within groups and across organizational boundaries (Sapsed et al. (2002)). Inter-organizational collaboration in innovation – for example in multi-company projects, strategic joint ventures or within supply chain environments – require high levels of trust to permit knowledge sharing and exchange, to prevent free-riding and to help articulate tacit knowledge and make this available for the wider system (Oliver and Blakeborough (1998); Bessant et al. (2003); Hervas-Oliver et al. (2012)). And in terms of appropriability the presence or absence of trust – whether expressed via formal intellectual property management mechanisms or contracts or informally within relationships – is a key element in capturing the value created through innovation (Teece (1986); Sako (1992)).

The emerging environment for innovation is characterized by very high levels of knowledge availability and increasing opportunities for widespread knowledge exchange and flow across traditional and increasingly diverse sectoral or national boundaries. Whilst such ‘open innovation’ offers significant opportunities for accelerating innovation and enabling the participation of many new actors, it raises significant questions about the appropriateness of current models for enabling trust and the possible need for new varieties to evolve.

From a theoretical standpoint, trust has been an increasingly significant area of interest in studies of business management reflected in the growing number of publications (Eberl (2004)). Up till the 1980’s, trust was largely neglected in economic theory, with two exceptions: in Gutenberg’s theory of the acquisition-based potential , and in the

experimental economic research founded by Sauerermann (Albach (1980)). These studies provide insights into the role of trust in mediating various kinds of exchange including knowledge, and they also give some insights into relevant mechanisms to enable trust. But relatively few studies look in detail at its role within innovation and there is a need to develop frameworks to explore both the role and enabling mechanisms to facilitate the creation of trust in innovation-linked activities.

The purpose of this paper is twofold; to develop an outline typology of mechanisms which enables trust in innovation and then to examine the challenges posed by ‘open innovation’ and their impact on those mechanisms in the emerging innovation environment.

Our method is essentially mapping reported studies in the literature and showing a number of exemplar cases to explore current mechanisms of trust in innovation. Our systematic overview provides a rich context for developing more concrete frameworks for the functioning of trust in open innovation, as well as for further empirical research and innovation management practice. The paper identifies major work on trust research integrating open innovation concepts/practices. Our literature review focuses on books, edited volumes and journal articles. To establish a time span, a starting point was set at 1995, in addition to a few major references for the topic from the 1970’s and 1980’s. We searched through all relevant articles that were found in the top ranked peer-reviewed journals listed in the Anne-Wil Harzing Journals List, with special focus on those listed under the subject areas of „Innovation“ and „Organizational Behavior & HRM“. We used several keyword combinations in our search such as “trust and innovation” and “trust and open innovation”.

This paper is organized in five main sections. Following this introduction we give a short overview on the emergence of trust in the literature and its relative importance before focusing on the role of trust in innovation within three organizational contexts in which it is a key factor in effective innovation. In the fourth section we explore the role of trust in open innovation - a shift in the innovation landscape which opens up significant new opportunities which require adjustments in the previously-discussed

trust mechanisms. These new opportunities are explored in the second part of this section. Finally in section five, we focus on reviewing existing intermediary models and build a typology of the different roles played by knowledge intermediaries. We direct attention towards their crucial role as ‘trust incubators’, especially within open innovation contexts where trust building becomes a real challenge to different parties who want to collaborate for innovation. We conclude in the final section with a number of key points, study limitations and recommendations for future research.

2 An Overview of Trust

Trust has been discussed in many fields including economics, sociology, social psychology, management, and political science. Although there is some convergence, such diversity reflects the difficulty in finding a single solid framework (Beccerra and Gupta (1999)) or a universally accepted conceptualization of trust (Clegg et al. (2002)). We suggest that there are two common broad definitions of trust. The first includes uncertainty and a risk-based view of trust while the second, which we adopt in our study, sees trust as ‘the willingness to be vulnerable based on the positive expectation of the intentions or behavior of others’ (Mayer et al. (1995); Rousseau et al. (1998)). In this definition, goodwill is assumed in the trustee, who is expected not to behave in an opportunistic way or to derive benefits at the expense of the trustor. Trust, therefore, is more likely to appear in situations when harm by the trustor to the trustee is possible.

The concept of trust varies widely according to many factors, such as the unit of analysis; trust may develop between individuals (interpersonal trust), or between individuals and organizations (institutional trust), or between partner firms or organizations working together (interfirm trust). In each of these, trust is ‘the decision to rely on another party (i.e. person, group, or organization) under a condition of risk.’(Curall and Inkpen (2006, 236)).

A commonly used framework is that of Mayer et al. (1995) which subdivides trust into ability- (or competence-), benevolence- and integrity-based trust. Ability demonstrates a high level of competence and capacity within a certain field, benevolence is based on

the assumption that the trustee is believed to want to do good to the trustor, and integrity contains the acceptance and compatibility of the common values of exchange partners.

Other frameworks show the evolutionary phases of trust, such as the one proposed by Currall and Epstein (2003). This suggests that development of trust starts slowly as both parties lack information about one other and begin at a point where they neither trust nor distrust each other. Over time, if trust-building actions follow, the level of trust grows till it begins to stabilize at the ‘maintaining trust’ phase. When a trust-violating action occurs, the overall level of trust drops dramatically into the ‘destroyed trust’ phase. Considerable effort must be exerted to return again to the zero point and further effort even to enter the trust building phase once again.

Trust has been approached from several theoretical frameworks; social exchange theory (Blau (1964)), the attribution theory (Kelley (1967)), transaction cost theory (Williamson (1975)), system theory (Luhmann (1979)), agency theory (Eisenhardt (1989)), and the resource-based view of the firm (Barney (1991)) – (See Ellonen et al. (2008)). For example, according to agency theory, the principal tends to reduce the agency costs by incentives and monitoring. However, these two ways themselves increase the agency costs. Therefore, authors have recommended building an environment of trust to reduce the chances of opportunistic behavior by agents (Beccerra and Gupta (1999)). By contrast transaction cost theory (Williamson (1975)) ignores the positive role of trust and focuses instead on the extent of risk in transactions to the extent that agents are inclined towards opportunism.

Both agency theory and transaction cost theory point out that the contexts in which relationships take place in organizations make full trust in another party excessively risky. Therefore, a variety of other tools are proposed such as, governance structure, monitoring, mutual knowledge, and incentives (Beccerra and Gupta (1999)). Trust not only allows greater flexibility in cooperation, but also reduces transaction costs. Detailed formal contracts are costly and require a lot of time to modify their terms for adapting to changing conditions. Monitoring and some other governance structures are also costly and time-consuming. Even placing too much focus on mistrustful means of

governance discourages the building of trust, which should not just be a condition for cooperation but also regarded as a result of it.

Trust and contracts are regarded as two important governance mechanisms in organizational research. We have previously referred to trust as the decision to rely on another party with a positive expectation that the later will act according to a common agreement (Currall and Inpken (2006)). Whereas contracts are written formal agreements that provide a detailed legally-bound framework for partners specifying their rights, duties, and obligations (Luo (2002)), trust and contracts have been viewed in some research as substitutes and in other research as complements. A third group, with which we tend to agree, views trust and contracts as complements or substitutes depending on other factors such as the cultural context (Wang et al. (2011)). Companies have learned to establish trust with their partners to gain the advantage of collaborative innovation and knowledge sharing.

A significant body of research has explored interpersonal trust, for example in organizational and inter-organizational contexts (e.g. Van de Ven and Ring (2006)), and a number of studies show how interpersonal, intergroup, and inter-organizational trust affect each other reciprocally (Currall and Inpken (2006)). Trust plays an integrative role in several themes, such as leadership (e.g. Dirks and Ferrin (2002); Dirks (2006)) and the venture capitalist-entrepreneur relationship (e.g. Duffner et al (2009); Fairchild (2011); Payne et al. (2009)).

In the next section we focus on organizational-level trust within the area of innovation, a field which has been relatively under-explored in the relationship literature (Roy et al. (2004)) but one of significance in the emerging environment of ‘open innovation’ (Fleming and Waguespack (2007)) where trust is the main governance mechanism for useful and safe knowledge sharing processes.

3 Contexts of Trust in Open Innovation

There are a number of inter- and intra-organizational contexts in which trust is a key factor in effective innovation. Previous literature has discussed a number of these, such

as: supply chain collaborations, strategic alliances, the lone inventor or the individual entrepreneur (who actually relies much less on trust and cares most about intellectual property rights), clusters, employee involvement in innovation, and others. We will focus our review and analysis on three of those contexts: supply chain development, clusters, and employee involvement in innovation.

3.1 Supply chain development

In the following we present the development of supply chain relationships where suppliers are being more integrated in the firms' innovation processes, and later we reflect the growing importance of trust in such development.

3.1.1 Supply chain collaboration for innovation

There is much research on the management of supply chains and the need for supply chain collaboration (SCC) among the nodes of the supply chain network from suppliers, manufacturers, distributors and retailers – to deliver products and services to end customers (Huang et al. (2002); Yan et al. (2003); Chang and Graham (2012)). For example, La Londe (2001) proposed that SCC comprises the following six elements: (1) mutual trust between each business partner; (2) sharing of information; (3) sharing of knowledge; (4) relatively long planning horizon; (5) multiple-level relationships; and (6) process for sharing benefits and burdens (cited in Chang and Graham (2012, 102)).

However, there has been growing recognition of the move from co-operating to assure effective and reliable supply, towards recognizing that suppliers are regarded themselves as a source of innovation (Lamming (1993)). Several studies have shown that supplier collaboration is an effective way to enhance innovation performance and improve firms' innovativeness (Primo and Amundson (2002); Karniouchina et al. (2005); Petersen et al. (2005)). Large innovative organizations like P&G and Wal-Mart rely on members of their supply chain to provide an innovation advantage (Fawcett et al. (2012)). There is also a trend towards “supply chain management for manufacturers of technology-intensive industries, such as automobiles, electronics, telecommunication, aerospace, and software to involve their suppliers in their secretive new product development processes, especially in the design phase” (Chung and Kim (2003, 587)).

Our interest in this section is innovation in the so-called Upstream Supply Chain Relationships, such as the relationship a disk-drive supplier may have with Dell or an auto-part supplier, such as Bosch, with Mercedes – rather than with relationships at the customer end. Innovations generated from these relationships can be incremental or radical in nature and involve both product innovation (where there is knowledge sharing and co-operation around creating new product concepts) and process innovation (which is mainly about developing and sustaining productivity improvements across a whole supply system rather than within a particular firm).

3.1.2 Facilitating trust in supply chain relationships

In moving towards innovation of the previously-mentioned kind much emphasis is placed on system level supplier development or supply chain learning (SCL) and a key aspect is the building of trust across multiple players. Supply chain learning involves building a knowledge sharing network; good examples can be found in the automotive, aerospace and food industries, and often involve formal arrangements like supplier associations (Hines et al. (1999); Dyer and Nobeoka (2000)) – (cited in Bessant et al. (2007)). For example Toyota has worked over many years to build and manage a learning system based on transferring and improving its core Toyota Production System across local and international suppliers (Dyer and Nobeoka (2000); Bessant et al (2012)). Another example is the Boeing 787 aircraft which is manufactured in Japan, Australia, Sweden, India, Italy, and France and finally assembled in the USA (Dietrich and Cudney (2011)). In spite of the cultural differences, suppliers must be able to communicate using the same technical language i.e. common engineering design software, common order/entry systems, etc.

Fawcett et al. (2012) identified four stages for the maturity of trust between the supply chain partners, which are 1. Limited trust, 2. Transactional trust, 3. Relational trust, and the fourth stage: Collaborative trust, which is the highest of the four in terms of performance capability and commitment capability. When companies share collaborative trust, they recognize that success relies on the strength of the supply chain team and its ability to deliver on promised high levels of performance. Details for orders

and forecasts, technology roadmaps, and all the relevant important information are openly shared with suppliers. There is a strong belief that joint decisions and solutions for problems benefit all parties and allow for a more innovative atmosphere and a quicker response for rapid competitive changes (Ibid, 169). Trust lowers transaction costs and prevent opportunistic behavior (Laaksonen et al. (2009)) and gives firms the chance to concentrate on using the knowledge of external partners and invest in innovation activities, thus enhancing their degree of innovativeness.

An important aspect of trust in such relationships is its long-term sustainability (Lamming (1993)). For example, in the early 1990s, General Motors (GM) saved 4 billion dollars by abandoning existing supply contracts and putting them out to competitive tender. It seemed a wise economic decision then, but ten years later, suppliers rated GM as the worst automaker to do business with (cited in Fawcett et al. (2012)). Thus, we observe that the crucial factor for sustainable success in a supply chain, especially in the field of innovation, is to be able to maintain longstanding trust and harmony among the stakeholders of the chain. Trusting suppliers as sources of innovation and sharing information openly with them may help firms achieve incremental and even radical innovations.

3.2 Innovation Clusters

In the following we present an overview of clusters and their development to support innovation, followed by an illustration of the importance of trust in interpersonal and inter-organizational relationships within a cluster.

3.2.1 An overview of clusters

Porter (1998, 197) defined clusters as “geographical concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions...in particular fields that compete but also co-operate”. The agglomeration of firms, usually small and medium enterprises (SMEs), offers the potential of ‘collective efficiency’ in which competitive advantages result from better coordination of complementary job specialties (Pouder and St. John (1996)) and a

number of researchers have highlighted the potential for such models to contribute to innovation (Best (2001)). The remarkable potential for cluster growth and competitiveness has been highlighted in a number of studies of regions such as Silicon Valley (Saxenian (1994)) and Boston's Route 128 (Nohria (1992)) in the US, Cambridge (Bessant et al. (2012)), Third Italy (Pyke and Sengenberger (1990)), and Baden-Württemberg (Breschi and Malerba (2005)) in Europe, and emerging markets across the globe (Krugman (1991)).

The idea of clusters date back to Marshall (1920), and builds on economic models in which cooperation means maximization of resources. Starting from the late 20th century, the analysis of clusters and the geography of economic activities attracted scholars from different fields and not only economists (Breschi and Malerba (2005)). There has been a movement away from disregarding knowledge-related dimensions as measurable agglomeration forces (e.g. Krugman (1991)) to studying innovative activities within clusters especially in technology-based industries. In the literature the meaning of the word 'cluster' has come to refer to both geographical concentrations of businesses (Asheim et al. (2006); Lindqvist (2009); Delgado et al. (2010)) as well as businesses that develop joint activities with each other, whether focusing primarily on economic transactions, or emphasizing on knowledge sharing activities where special innovative activities are taking place (Gordon and McCann (2005)) – (cited in Bessant et al (2012)). The latter are usually referred to as “innovative clusters” or “knowledge-intensive clusters” which are a group of interdependent organizations that contribute to realizing innovations in industry (Preissl and Solimene (2003)). Naturally, the focus on innovative clusters has been highlighted with the paradigm shift of “open innovation” (Chesbrough (2003)).

Of particular relevance in the idea of clusters is the concept of 'emergent properties' – system level effects which result from agglomeration. In particular there is growing recognition that firms within a cluster can learn and innovate together – benefiting by sharing risks, experimenting, combining knowledge, etc. Learning through networking

is a strong force pulling firms into clusters (Kuper (1997); Doner and Schneider (2000); Lundequist and Power (2002); Meyer-Stamer (2003); Morris et al. (2006)) and there are increasing attempts to construct 'learning networks' to enable such effects (Cooke (2007)). 'Collective learning efficiency' is an emergent property of these networks, a system-level effect which is difficult to replicate without deliberate efforts to create these dynamic interactions for better innovation capabilities. For example, small textile producers in Italy established a common R&D capability which led to shared experimentation and learning of different vital processes (Rush et al. (1996)). The ways firms learn through networking in innovative clusters embrace user-producer relationships, formal and informal collaborations, interfirm mobility of skilled workers and spin-offs from existing firms, universities, or research centers (Breschi and Malerba (2005)).

Successful clusters like Silicon Valley or Route 128, are characterized by their innovative capability and their embeddedness in a dense network of knowledge sharing which is essentially built on trust. Trust is central for the effective operation of innovation clusters. Firms must have trust mechanisms to compensate for the trust-reducing forces of the competitive site they share (Mesquita (2007)). Saxenian (1994) stressed that such a balanced form of interaction is at the heart of, for example, Silicon Valley's technological and entrepreneurial strength. Various studies of clusters and networks in major organization and management journals highlight the significance of trust and show how it operates in clusters (e.g. Humphrey and Schmitz (1998); McEvily and Zaheer (1999); Maskell (2001); Forsman (2009); Greve (2009); Bessant et al. (2012)).

3.2.2 Facilitating trust in clusters

Trust is notably a prerequisite for the success of any cluster, especially knowledge intensive ones where the intangible nature of knowledge makes reliance on legal safeguards a big hazard. The development of trust of clusters can be regarded as multidimensional; for example Newell and Swan (2000) distinguished between 'commitment trust' and 'competence trust'. The former emerges as a consequence of

activities around initial formation and meeting. At this stage if issues are not resolved, early failure can simply occur. ‘Competence trust’, on the other hand, arises when participants translate their commitment trust to competent feedback and interaction of ‘worthwhile’ and useful ideas. This kind of trust emerges as a result of group dynamic processes analogous to those observed in team formation. If these two kinds of trust are achieved, the network then can build “companion trust” (Ibid (2000)) which is grounded in strong personal relationships and constitutes the basis for highly developed clusters.

In another typology by Mesquita (2007), trust can be regarded as a unidimensional construct resulting from consolidating several levels. Calculative trust, which arises out of careful computations of potential punishments (Shapiro et al. (1992)) and rewards from the interaction (Deutsch (1973); Lewicki and Bunker (1995)), where parties tend to behave in a predictable manner, thus creating predictability trust, which relates to parties behaving in predictably cooperative ways that demonstrate they are not about to exploit the other (Fisher and Brown (1989); Friedman (1993)). Predictability trust then enables identification-based trust, which involves deeper kinds of relationships and valuing of others’ goals (Shapiro et al. (1992)), demonstrating goodwill (Friedman (1993)) and reciprocal concern (McAllister (1995)).

With the different typologies of trust, one common remark is that trust is a useful relational governance mechanism which positively influences interpersonal and inter-organizational relationships within a cluster, and enhances the firms’ performance levels (Liao (2010)). The presence of trust in clusters saves a lot of negotiating and monitoring costs associated with exchange contracts. Thus, firms located within clusters are more likely to benefit from collective inter-firm learning.

However, despite the great benefits of trust, many firms while trying to clone the ‘Silicon Valley’ example, fall into immature clusters built on distrust and slower innovation pace and eventually fail. Others take some time to mature and enhance trust-based learning knowledge sharing activities, such as the case of two constructed learning networks in the automotive components and timber products sectors in South Africa (Bessant et al. (2012)). Early meetings between firms, especially those who were

considered competitors, were characterized by a tense distrustful atmosphere where parties are unwilling to share any knowledge. Through a number of facilitation efforts, this was gradually overcome and the focus shifted to the larger purpose of the network, where reluctant firms became the main supporters of the learning network.

Sometimes, firms in entering a cluster, no matter how 'extroverted' they can be, are hesitant to offer detailed information and open up sensitive issues. Facilitation can play a key role in initiating the trust basis within the cluster; this role can be played by a variety of agents and can make use of a number of mechanisms – for example by providing an external channel for exchanging information. To illustrate the role of facilitators, we cite the following case from the automotive field represented in the Baden-Württemberg (BW) cluster, which is among the most innovative states in Germany, which according to the German Patent and Trademark Office, registered around 133 patents for every 100.000 inhabitants (Official Statistics 2011):

In the 1990's, the new Toyota luxury car, Lexus, arrived in the area, which is home to giant car manufacturers like Mercedes, Porsche and others. Mercedes recognized the risks of becoming uncompetitive through continuing to produce most of its components in-house and so decided to reduce costs by subcontracting the innovation part to the supply chain. The idea was discussed by several parties in the Mercedes network, till the ministry supported the idea that the regional SME's would interact together to innovate for Mercedes, and were subsidized by the state as such firms had no real R&D facilities and produced per customer orders. However, these suppliers feared to lose know-how to competitors, so agreement was reached between all parties that a third trusted party would deal with any sensitive knowledge needed to innovate. The third party was the Fraunhofer Institute in BW (Fraunhofer IPA, Stuttgart; Main area: Manufacturing Engineering and Automation). This plan worked out very well and Mercedes strengthened her global position (cited in Cooke (2006)).

The above example shows:

- The significance of trust between parties within a cluster. With a thick network of trustful institutions, each party was confident of the other's capability and integrity and thus could rely on the other.
- The presence of third parties can be helpful to improve trust/distrust net balances which requires firms to supplement naturally competitive interactions with cooperative ones. This environment of cooperation becomes a basis of reciprocal benefit for firms within the cluster (Fukuyama (1995)).
- In the above example, this clustering idea was initiated by the government, therefore a high degree of institutional trust is needed in order to ensure that all parties comply with „the rules of the game“ and are committed to non-leakage of other partners' knowledge (Mesquita (2007)). However, on other cases where the trust in institutions is not remarkably high, social trust within the network precedes. For example, the Silicon Valley cluster remains highly dependent on entrepreneurial initiatives and professional inter-personal relations more than the institutional context.

Although the trust management and cluster management literature has accumulated a substantial body of knowledge - including factors affecting the trust development in clusters or the different dimensions of trust development – scholars agree that more needs to be done to identify the activities involved in initiating new trustful relationships and those involved in restoring trust once it has been broken, within cluster relationships (Dwivedi (2003); McEvily et al. (2003); Mesquita (2007)).

3.3 Employee Involvement in the Innovation Process

In the coming part, we provide an overview of a major intra-organizational context of trust in innovation which is employee involvement in innovation. Trust here plays a critical role for their active involvement which is also discussed in this part.

3.3.1 An overview of employee involvement in innovation and trust

On the intra-organizational level, we have chosen the context of employee involvement where trust plays a critical role in the decisions of employees to innovate. Employee

involvement is a broad concept that may include different practices, such as participation, decision making, consultation, and empowerment. The common definition for employee involvement is ‘the exercise by employees of influence over how their work is organized and carried out’ (Fenton-O’Creevy (2001, 28) – cited in Morgan and Zeffane (2003)). However, we are particularly concerned here with the involvement of different employees in the firm’s innovation process by contributing their innovative ideas and suggestions (Imai (1987); Bessant (2003); Schroeder and Robinson (2006)).

Although many programs for ‘kaizen’ or ‘continuous improvement’ are based on employee involvement, the failure rate is high (Bessant et al. (2001)). Making such systems work and sustaining them depends highly on trust. Trust in that case can be of various kinds:

- Trust in allowing employees to make changes without exerting tight control – employees are allowed to experiment and change things within a broad strategic framework.
- Trust on the part of employees that their ideas will be recognized and used – and not misappropriated.
- Trust that resulting productivity improvements will involve some sharing of gains rather than exploitation – no employee will suggest new ideas which will result in their losing their jobs! Equally motivational calculus implies that unless there is a perceived fair sharing of any gains – through a reward scheme, a bonus or whatever – then the flow of innovative ideas will dry up.

Innovation trust can be defined as, ‘an expectancy of reasonable and positive reactions by others in response to individual innovation attempts’ (Clegg et al. (2002, 410)). Most studies have agreed that if employees don’t trust in a number of expectations, they will not innovate. For example, employees expect authorities’ support to their innovation efforts and therefore vertical trust (i.e. trust in management or authorities) enhances feelings of support to generation of new ideas by employees (Scott and Bruce (1994); Tan and Tan (2000); Ellonen et al. (2008)). Employees’ perception of being valued by the organization drives employees to innovate on behalf of the organization even in the

absence of anticipated direct reward or personal recognition (Eisenberger and Fasolo (1990)). Furthermore, the presence of horizontal trust (i.e. trust in peers and building social ties) is essential for an innovative atmosphere. In general, innovativeness behaviors could be enhanced by building both interpersonal and impersonal trust.

We conclude from the above findings that there are a number of prerequisites for employees to develop the kind of trust that motivates them to innovate, whether affective-based or calculative-based. Furthermore, previous research has found trust to be positively related to the effective sharing of knowledge and innovation across the organization (Levin and Cross (2004); Mooradian et al. (2006)). Besides the motivation to innovate, there is the willingness to share knowledge and novel ideas with others in the organization and for that a considerable degree of trust is required.

3.3.2 Facilitating trust in high involvement innovation

Arguably one of the biggest challenges of the 21st century is to increase the level of involvement of a significant number of people with high impact innovation, moving from 'kaizen' activities which are locally based and of limited impact, to a wider participation in major innovation projects (See Bessant (2003, 54)). A wider participation of employees with high levels of co-creation and collaboration for innovation is what characterizes high involvement innovation from the traditional organizational innovation agenda. But developing this capability is likely to place significant emphasis on building the above kind of high trust working environment. Thus, managers in an innovative company must work hard on communicating an open innovation strategy to the entire organization as employees comprise a huge part of the decentralized network of innovation, for example, IBM Jams and other recent techniques that allow employees to discuss their ideas freely.

Suitable well-communicated incentive structures, developing strong social ties among employees, transparency in corporate decision making, developing an internal division of skills & educational knowledge, and other strategies can be powerful tools to build a trustful atmosphere to prove to employees that their ideas are heard and even implemented (Pinkwart (2012)).

As with the previous examples, building trust is a long-term process which relies on a number of interacting components, including structures, incentive systems and commitment to training and team-building. Evidence suggests that there is an important role to be played by innovation facilitators who can help build such a culture and identify where and how suitable interventions can be configured and deployed to support this (Bessant (2003)).

4 Trust in Open Innovation

Obviously, innovation highly depends upon the collaborative learning practices of different stakeholders across the organization. With open innovation, these practices involve more and more stakeholders inside and outside the organizational boundaries, which places higher emphasis on the role of trust as a governing mechanism for an effective knowledge exchange. In this section, we first provide an overview of open innovation and its key trends, followed by a discussion of the emerging trust challenges in open innovation contexts.

4.1 Open innovation: The shift from knowledge creation to knowledge sharing

So far we have been considering innovation in three contexts and the role which trust plays in its effective operation. But the landscape for innovation management has shifted dramatically during the past fifteen years, driven by a variety of technological and social forces which have moved the emphasis from knowledge production to knowledge transactions and flow. This environment is one in which issues of trust become central as the effective building and operation of diverse networks of players becomes an increasingly important feature of ‘open innovation’.

The idea of innovation as a networked, multi-player game is, of course, not new. For example, Carter and Williams pioneering study of ‘technically progressive’ firms in the UK identified that the degree of ‘cosmopolitan’ orientation (as opposed to ‘parochial’) was a significant determinant of innovation success. In other words, those organizations with rich networks of connections were more likely to be successful innovators (Carter and Williams (1957)). This theme emerged in the many major

studies of innovation throughout the 1960s and 1970s – for example Project SAPHO stressed linkages as a critical factor whilst the Manchester ‘Wealth from knowledge’ research provided extensive case examples of award-winning innovators who shared a common external orientation (Langrish et al. (1972); Rothwell (1977)).

Innovation researchers have been working for some time on the theoretical development of models which recognize the shifting boundaries and the engagement of an increasingly diverse number of players; these include: Distributed innovation processes (Howells et al. (2003)) - Innovation systems (Lundvall (1992); Metcalfe and Miles (1999)) - User led innovation (von Hippel (2005); Piller (2006)) - Globalization (Santos et al. (2006)) - High involvement innovation (Boer et al. (2000); Bessant (2003); Schroeder and Robinson (2004)) - Complex product systems (Gann and Salter (2000); Davies and Hobday (2005)) - Recombinant innovation (Hargadon (2002)) - Communities of practice (Wenger (1999); Brown and Duguid (2000)) - Clusters and innovation (Best (2001)).

Arguably an underlying principle in this emerging pattern is increasing ‘openness’ in terms of both the variety of knowledge sources and the participation/involvement of multiple stakeholders. With this comes an increasing reliance on the development of trust as an enabling mechanism – whilst in principle there are rich opportunities offered by increasing connectivity, in practice these will only be realized if there is an underlying relationship of trust.

The emerging picture is one of convergence around three key trends – opening up search, employee engagement and stakeholder participation – which offer significant opportunities for enhancing the innovation process (Bessant and Moeslein (2011)). This has significant implications for the three innovation contexts we examined earlier.

4.1.1 Opening Up R&D

For example traditional models of firm-based R&D are giving way to new arrangements which access external ideas and enable the exchange of internally generated knowledge with external partners. Chesbrough (2003) highlighted this increasing permeability and

recent years have seen extensive reconfiguration of organizational innovation processes to enable it. In practice it means that organizations need to learn to manage a ‘knowledge supply chain’ in which partners are increasingly selected for their knowledge contribution in an act of co-creation of innovation. They need to find new partners as well as develop deeper links with existing ones and they need to be able to construct high trust relationships which allow extensive information sharing.

An illustration of the scale of this shift is Procter and Gamble who introduced their ‘Connect and develop’ program in response to concerns about internal R&D productivity – even in an organization with a \$3bn R&D spending and 8000 scientists, it was becoming impossible to generate the volume and variety of ideas needed to grow the business (Lafley and Charan (2008)). The resulting performance improvements have been underpinned by a major re-engineering of connections and linkages within and outside the firm, moving it towards a position where half of its innovations are sourced externally.

The emphasis since the publication of Chesbrough’s book has been on finding ways to make open innovation work in a variety of different practical contexts. Organizations as diverse as the BBC, Lego and the UK Ordnance Survey are increasingly engaging communities of software developers, sharing source code and inviting them to ‘*use our stuff to build your stuff*’. This is the highly successful open model used by Apple in building the iPhone platform, where thousands of developers create applications which make the core product more attractive. ‘*Crowdsourcing*’ is another variant on this, where companies open up their innovation challenges to the outside world, often in the form of a competition and usually web-enabled.

Such approaches engage an increasing range of players in a variety of ways – for example, companies like Swarovski have deployed crowdsourcing approaches to expand their design capacity, whilst Audi and BMW use it to prototype and explore new features. The model has been applied in a variety of settings including public sector and social enterprise – (for a detailed review see Bullinger et al. (2010)).

Another variant - 'recombinant innovation' – uses ideas developed in one world to good effect in another (Hargadon (2002)). Cross-sector learning of this kind opens up new ways of looking at old problems. For example low cost airlines like Ryanair learned about rapid turnaround in airports by watching pit stop teams in Formula 1, whilst the UK National Health Service has enhanced patient safety by deploying innovations originally developed in oil rigs, chemical plants and aircraft cockpits. Innovation market-places are increasingly appearing across the internet – for example Innocentive.com operates a model in which 'seekers' are connected with 'solvers' to deal with challenges posted by the former. The solver community now extends to nearly 200,000 people, offering not only a high volume of R&D capacity but more importantly rich diversity in perspectives. Lakhani and Jeppesen examined 166 challenges placed on innocentive.com's website and also carried out a web-based survey of solvers and found that the model offered around a 30% solution rate – of particular value to seekers looking to diversify the perspectives and approaches to solving their problems (Lakhani and Jeppesen (2007)). The approach was particularly relevant for problems that large and well-known R&D-intensive firms had been unsuccessful in solving internally. Interestingly the survey also found that solvers were often bridging knowledge fields – taking solutions and approaches from one area (their own specialty) and applying it to other areas.

Successful open innovation strategies require new ways of connecting external ideas to sites within the organization which can make effective use of them. In turn this raises questions of networking and knowledge management, issues identified by Allen back in the 1970s but coming to the fore in an era of social networking and enabling technologies (Allen (1977); Dahlander and Gann (2010)). Much of the new challenge is about combining and creating communities of practice around key themes which transcend traditional organizational boundaries (Wenger (1999); Brown and Duguid (2000); Lafley and Charan (2008)).

4.1.2 Opening up engagement

As we saw earlier, there is a long tradition of engaging employees in innovation (Imai (1987); (Boer et al. (1999); Bessant (2003); Schroeder and Robinson (2004)) but until recently this emphasized incremental and localized improvements – kaizen. However developments such as corporate intranets and the trend to social networking have shifted the focus to more radical innovation, tapping into internal entrepreneurship through innovation competitions etc. These effectively bring the traditional ‘suggestion box’ into the 21st century but also add the important dimension of interactivity. Within such systems there is the possibility for sharing and building on ideas and for voting and mobilizing support for strong ones – a feature which appears to engage and motivate employees.

Models of this kind are finding widespread application not only within the private sector but also across large public sector organizations (Murray et al. (2010)). Mobilizing internal entrepreneurship, especially around social issues, is becoming a central element in the innovation strategies being deployed in the search for both efficiency savings (incremental innovation) and more radical service development.

4.1.3 Opening up innovation communities

An important variant on this theme can be observed in the growing number of ‘quasi-organizations’ represented by formally constructed networks which aim to engage multiple players in focused co-operative innovative activity. Examples of these might include: supply networks, sector and regional clusters and topic-based networks. In each of these there is a commitment to building a network within which shared, co-operative activity takes place and through which emergent properties can be generated. We saw earlier that active management of supply chains through various kinds of supplier development program are a well-established feature of many sectors. They arise from a recognition that the performance of large firm ‘owners’ of these supply chains depends on their ability to orchestrate improved performance from all the links in that chain (which may involve small and managerially inexperienced players). In similar fashion regional clustering continues to represent a powerful force for innovation

accelerated and enabled by IT-based linkages. See, for example, the highly successful motorcycle cluster around the city of Chongqing.

‘Learning networks’ of this kind can be found in a variety of contexts but they share the same principles of open engagement – bringing in actors already in the system more actively into the innovation process. But they do not emerge by accident – and the process of forming and then enabling performing requires active management. The conditions under which effective networking takes place are less clearly identified, but it is becoming clear that simple factors such as proximity do not, of themselves, explain the complexities of networking (Bessant et al (2012)).

A further area in which opening up is taking place is bringing active users into the innovation process and constructing communities around them. Exemplified in the research of Eric von Hippel, user led innovation highlights the active role played by users as active initiators of change (Herstatt and von Hippel (1992); von Hippel (1988, 2005)). Whilst already a well-documented and important source of innovation the emergence of powerful communication technologies which enable active co-operation of user communities in co-creation and diffusion has accelerated the trend.

Companies like Lego, Threadless, Adidas and Muji engage with users as front-end co-creators of new products and services. Importantly this doesn’t stop at the private sector – there is growing use of these approaches to create innovative and more successful public services. Hospitals are increasingly focusing on patients as a source of ‘experience-based design’ input and innovative partnerships, like Nokia’s Living Lab, aim to work closely with users co-developing services for long-term care. At the limit innovation of this form takes place entirely within the user community as a co-operative enterprise – the examples of Linux, Mozilla and Apache underline the potential of such properties as an alternative to firm-centred R&D.

At the limit this involves communities creating innovation amongst and for themselves and the resulting innovations only then being appropriated by the traditional corporate

agents in public and private sector – a significant reversal of the traditional innovation model (Murray et al. (2010)).

This links with observed shifts at the ‘fuzzy front end’ of innovation and particularly the locus of design activity (Reid and Brentani (2004)). Traditional models of innovation implied a separation between design and adoption but there is growing use of increasingly sophisticated techniques to collect intelligence about user concerns and wishes. Further work has demonstrated the potential contribution of users as active co-creators of innovation, a trend reflected in much of the work on ‘mass customization’ (Piller (2006); IJIM (2008); Pickles et al. (2008); Bessant and Maher (2009)).

4.2 Open innovation opportunities and emerging trust challenges

The significant opportunities described in section 4.1 represent both an acceleration in established innovation trajectories and also a set of emergent properties which change the nature of the innovation game. Bessant and Moeslein (2012, 19)) mentioned a number of emergent properties resulting from open collective innovation (OCI) that can be summarized as follows: decreasing barriers to innovation and making it more like a multi-player game – building communities around key themes of innovation through increased involvement – widening the base for sources of new ideas from external specialists to users involvement in design – networking smaller innovation communities – accelerating diffusion of ideas and reaching the small markets with highly differentiated expectations.

However, realizing these opportunities will depend increasingly on establishing and sustaining trust, especially at the inter-organizational level. In the following section we discuss some of the emerging innovation opportunities in open collective innovation (OCI) and the trust issues which they raise.

4.2.1 The system of intellectual property rights

At the heart of open innovation is the concept of *knowledge flow* – allowing increased mobility of ideas. As we saw earlier, the IPR system has evolved as a set of contractual

forms to regulate sharing of ideas whilst allowing the originator of an idea to appropriate at least some of the benefits. In this way the issue of trust is managed. But open innovation poses a direct challenge in that the technologies available for encoding, storing and transmitting knowledge are much more powerful – but also more vulnerable to misappropriation. 'Hacking' is now commonplace and reflects an ability to bypass IPR systems – effectively challenging the carefully placed trust management framework. This technological shift is matched by one of social change in which networking and peer-to-peer connectivity has massively increased – Facebook, for example, represents a community of over 800 million people and would if it were a country be the third largest in the world. Within such communities the norms around sharing and knowledge exchange are very different – knowledge is perceived to be a free good, actively traded – and the 'IPR' framework here is almost a mirror image of the traditional one; social networks presuppose free flow unless there is an active opt out on the part of a participating individual.

This has major implications for the innovation process. As the music and film industry have discovered, the challenge from internet piracy represents a fundamental destabilization of the current business model, and one which it is difficult to prevent. The issue is exacerbated by an emerging set of social norms which are around free sharing and which militate against the IPR built into traditional product purchases in which royalties can flow back to the authors. Developments in 3D printing and online design technology make it likely that this challenge will also extend to physical systems – for example, companies like IKEA may find their designs hacked and used to create files to drive 3D printers to allow copying and peer-to-peer sharing of products. It is clear under these conditions that the traditional model of trust embedded in an IPR system is failing; however alternative business models are emerging which attempt to deal with this. For example, in the music community the shift from ownership to rental models, typified by Spotify and iTunes, offer a flow of royalties to artists and authors but derived from an audience which chooses to trade ownership for widespread and easy access. It replaces one form of contract – a *purchase* – for another, in the form of a *rental agreement*.

On the positive side, open innovation has been characterized by the growth of active, information sharing networks of high trust. The success of Linux and the others amongst many others testifies both to the power of the technology and social norms to create such communities and also to the emergent properties around shared collective innovation. Significantly the group norms – often monitored and ‘policed’ by active moderators – place stress on trust development. Dahlander’s study of the music software community around ‘Propellerhead’ showed that ‘free-riding’ was quickly made visible and actively discouraged – at the limit by ostracism and rejection from the community. The emergent norm was one of ‘give to get’ and encouraged a high level of innovation based on a high trust network (Dahlander and Wallin (2006)).

4.2.2 Transfer of tacit knowledge in process innovation

A second area in which the importance of trust in enabling open innovation emerges is around the transfer of tacit knowledge, particularly in process innovation. Where knowledge is codifiable it is possible to manage its transfer and maintain trust through contractual means (although the above IPR discussion suggests this protection may be increasingly ‘leaky’). But in many cases process know-how is held in the skills and practices of individuals and groups and in more tacit form – making its sharing and transfer more difficult. Arrangements such as supplier development programs or learning networks and clusters operate best in high trust conditions where there is flow and interchange of people – for example via ‘guest engineer’ programs, employee secondments or knowledge transfer partnerships. As we suggest elsewhere, such learning networks are characterized by high trust and their internal processes are designed to develop and maintain this through emergent group norms. As with the online communities above, the absence of trust can lead to the breakdown of the whole system (see Morris et al. (2006)) and it is often maintained by exclusion or ostracism of those members unwilling to commit to the relevant norms. Once again there is a role for third parties as network brokers, catalysts and facilitators to enable development and maintenance of such high trust relationships (Bessant et al. (2012)).

4.2.3 Recombinant innovation

Another potentially rich opportunity in open innovation is in *recombinant* innovation – bringing to bear diverse knowledge sets to solve established problems. Enkel and Gassmann (2010, 256) referred to it as *creative imitation* – where “existing solutions from other industries are creatively imitated and retranslated to meet the needs of the company’s current market or products”. In principle this is an attractive opportunity since it draws on established and proven knowledge rather than needing to develop it *de novo*. But in practice the challenges lie in locating relevant knowledge outside the ‘normal’ search space, in exploring and assessing it and finally in acquiring and exploiting it. In the traditional IPR regime this process becomes difficult particularly at an early stage because organizations do not know what is relevant for them (and therefore valuable enough to pay for) until they have explored a new knowledge set. But IPR makes it difficult to explore without payment – a paradox which militates against the recombinant innovation opportunities. The reverse is also true – organizations may not be aware of the true value to others of knowledge which they have generated but which is peripheral to their needs, and they have poor channels to advertise it even if they did.

This problem of connectivity is one which elsewhere we characterized as one of ‘finding, forming and performing’ in new innovation networks (Birkinshaw et al. (2007)). It highlights the need to search in unexpected places and ways and then to form relationships which allow exploration and shared risk-taking – essentially activities which depend on being able to build trust quickly. Once again this is an area where, at present, the role of third parties acting as brokers but also as ‘trusted agents’ is facilitating connectivity.

A good example is the UK intermediary organization 100% Open (www.100open.com). It grew out of a project with Procter and Gamble who were looking to source innovations externally as part of their ‘Connect and Develop’ initiative. The need was for mechanisms to identify and broker partnerships, allowing early stage disclosure under ‘safe’ conditions which protected particularly smaller enterprises as they shared

knowledge with a much larger player. Lessons learned in that process – about how to use both social networking and internet marketplaces and about how to manage sensitive knowledge sharing and mutual exploration led to the current business model. This offers a high trust brokerage service, linking often radically separate partners and enabling them to explore – through mechanisms like ‘the airlock’ (a space where discussions take place with non-disclosure protection) – new opportunities offered in the open innovation space. The resulting model has led to several high value partnerships, for example linking McLaren Formula 1 racing car technologies to the UK national air traffic control network.

Another organization operating in this space is IXC - the Innovation Exchange. Once again the model is one of third party brokerage in the open innovation space with a variety of operating mechanisms aimed at dealing with the ‘finding, forming and performing’ challenges. In this case one of the powerful tools is the placement of ‘trusted intermediaries’ – experience graduate scientists and engineers – in companies who are able to look at the company knowledge base and identify trading opportunities, both for inward and outward flows of intellectual property. These trusted intermediaries form a high trust network on behalf of the participating companies, and meet frequently to operate a secure marketplace across which IP can be traded and relationships formed.

4.2.4 Employee involvement in open innovation

One final area where the increasing role of trust is seen in open innovation is in the enhancement of employee involvement programs. As we noted earlier the principle of ‘high involvement innovation’ is an old established one but the practice has hitherto been constrained by the logistics of managing a large volume of ideas. The suggestion box approach poses problems of collection, processing and implementation of ideas – but lack of feedback or progression of employee ideas often results in a negative feedback loop in which the motivation for submission of further ideas is damped down. Open innovation approaches by contrast allow for high speed and capacity technology via intranets to capture, share and allow interaction and development of ideas, whilst

social networking norms encourage the creation of thriving internal communities able to sustain motivation and momentum around these ideas.

An increasing number of examples suggest that employee engagement via online suggestion schemes, idea contests and other mechanisms can make a significant contribution to overall innovation effort. Such models also extend the range of involvement, moving from capture of ideas around local workplaces to more entrepreneurial suggestions about wider improvements in the business. But while the enabling social and information technologies enhance the possibility for widespread participation the underlying issues remain centered on trust. Research suggests that high involvement systems depend on establishing a set of behavioral routines around participation in innovation – and reinforcing these to the extent that they become part of the underlying culture – ‘the way we do things around here’. Trust issues are raised around appropriation of ideas, reward and recognition, employment security, etc. and in particular in allowing a degree of space for exploration. Such ‘permission to play’ approaches characterize organizations as diverse as 3M and Google where employees are given the time and space to innovate.

Another emerging property of open (internal) innovation with regard to employee involvement is somehow linked to the research of Eric von Hippel (i.e. user led innovation), which is regarding employees as user innovators. By using and regularly interacting with companies’ processes; employees could suggest ideas to improve the processes they themselves are working on and generate high impact process innovations. This also requires trust where employees should perceive that the organization values their contributions and even need them.

5 Trusted Intermediaries in Highly Innovative Contexts

As we saw in the preceding section, the emerging open innovation environment poses a number of challenges related to trust. In particular these highlight the important role of intermediaries – as boundary spanners, as neutral agents through whom sensitive dialogue can take place and with whom proprietary knowledge can be safely shared. In this section we will explore these mechanisms in more detail and propose that existing

intermediary-models within open innovation contexts should evolve to focus more on trust building activities, or as we call it their role as ‘trust incubators’.

5.1 Intermediaries – from Brokers to Trust Incubators

The general meaning of an intermediary is an organization or a group of persons that act as bridges that connect different parties to one another in either bilateral or multilateral relationships. According to Howells (2006, 720), an innovation intermediary is ‘an organization or body that acts as an agent or broker in [some] aspect of the innovation process between two or more parties’ which give innovators more rapid access to external knowledge (Chesbrough (2006)) and thus enable innovation. Whether networking for external knowledge occurs between businesses (B2B), or between businesses and their clients (B2C), or between businesses and academia, different terms and forms of innovation intermediaries have evolved.

Other common terms for an intermediaries are: brokers (Hargadon and Sutton (1997)), bridging organizations (Sapsed et al. (2007)), technology transfer agents (Matkin (1990)), and bridges (Bessant and Rush (1995)) and most commonly, third parties. These underline the idea that the main activities performed or roles played by intermediaries are concerned either with a brokerage role of connecting the main parties or a facilitation role of enhancing knowledge transfer across organizational boundaries. Arguably these models could evolve further in the open innovation context to encompass more critical roles whose absence might threaten the gains of open knowledge sharing between parties. We have termed this set of activities the ‘trust incubators’ role, borrowing the term “incubator” from the entrepreneurship literature in which it is used to describe a supportive environment for the “hatching” and development of startups (Bergek and Norrman (2008)).

Bringing different parties together does not necessarily mean that a trustful relationship evolves. Since inherent lack of trust is generally associated with brokerage demands (Flemming and Waguspack (2007)), dedicated intermediaries should focus highly on developing trust between different parties. We refer to two main areas of trust development: First, strengthening the trust between the intermediary and their client

firms/bodies (i.e. developing the initial trust that generated the work between them) (Howells (2006)), and second: incubating direct trustful relationships between the clients and building the foundation for a strong long-term relationship. As a trust incubator an intermediary not only permits but also supports a learning process of developing trust between different parties involved in emerging collaborative relationships, especially within open innovation contexts. A trust incubator offers intermediary mechanisms to create the initial trust relationships on behalf of their client firms before a long-term relationship can develop on a more direct basis. In this way they offer distinct advantages over innovation markets like *innocentive.com* in that they deal with the trust-building dimension and thus permit more open disclosure and sharing.

The different forms of trusted intermediaries and the main roles especially played by innovation intermediaries will be highlighted in the coming part of this section.

5.2 Trusted intermediaries in the literature

There is, of course, already an extensive literature on intermediaries but it is useful to track the evolution of the role(s) which researchers see them playing in the innovation context. Initially firms with competent R&D teams relied on individuals known as *gatekeepers* or *boundary spanners* who were able to obtain special external information for their subunits and disseminate it internally for these subunits (Tushman (1977); Tushman and Scalan (1981)). However, their access to external knowledge as individuals is often limited and mainly benefits their own subunits in the company. We want to highlight more the recent work done on innovation intermediaries that mainly operate in open innovation contexts (Huston and Sakkab (2006)). While, for instance, the 2006, 2009, & 2010 special issues of *R&D Management* provided a rich basis for theoretical and empirical work for open innovation research, the 2010 issue particularly focused on the role of intermediaries in open innovation.

For example, du Chatenier et al. (2010) conducted an empirical study to identify the main competencies of individual intermediaries known as *open innovation (OI) professionals*. Those professionals form OI teams from different organizations to create knowledge collaboratively. Results showed that the most found competency for OI professionals was their ability to brokerage solutions. OI professionals have to deal with many challenges, by creating trust and matching different parties' goals, however the activities to do so was not investigated. In another study Sieg et al. (2010), pointed out the difference between *traditional knowledge brokers* on one hand – which innovate by brokering knowledge from where it is known to where it is not, (what we referred to earlier in this paper as 'recombinant innovation'), and the concept of *virtual/web-based knowledge brokers* on the other hand – those which run an internet community of customers of a certain product and by gathering shared knowledge and discussions of customers help the client firm in its innovation processes. Famous examples for the first form are IDEO, McKinsey & Company, and Accenture, which make consultants another form of intermediaries (Hargadon and Sutton (1997); Hargadon (2003)). Compared to the virtual brokers (Verona et al. (2006)), traditional knowledge brokers have limited reach, short-term relationships with their clients but can better transfer tacit knowledge to them.

Another common form of intermediation is associated with *Technology Transfer Offices (TTOs), Science Parks, and Business Incubators*. These are technology transfer intermediaries mainly between academic institutions and businesses (see Yusuf (2008) in the special issue of *Research Policy*). They can also be referred to as *Living Labs*. A similar form are the so-called 'Campus Companies' which are organizations that aim at supporting new founders from universities or research centers i.e. academic entrepreneurs, by connecting them with resourceful parties such as venture capitalists, potential customers, etc. (Pinkwart (2002)). They also foster spin-offs of universities and research institutions.

The last common form of intermediary we would like to highlight is the *private incubators*. These incubators support start-ups by finding prospective partnerships for them with other companies, especially the big ones. They facilitate the flow of

knowledge and new technologies between companies. They could be set up by private individuals or as an independent initiative from big companies to obtain larger access the external market. Furthermore, they could be physical institutes, or virtual platforms like the Connect and Develop program by P&G.

Although the above forms of intermediaries have gained increasing attention especially in markets where open innovation is a central issue (Reichwald and Piller (2007)), their trust building role is still under-explored. Even in the vast research on trust facilitators, little can be known about their formal engagement processes and actual activities for facilitation. Few research studies have covered the different roles played by innovation intermediaries and their corresponding activities. Among the exceptions is the study by du Chatenier et al. (2007) who carried out an extensive literature study on the activities OI professionals have to perform in OI teams. The main three were: managing the inter-organizational collaboration process, managing the overall innovation process, and creating new knowledge collaboratively. In another study Lee et al. (2010) conducted research to develop an intermediated networked model for SMEs. Results revealed that intermediaries support networking of SMEs through three main activities and two indirect activities. Direct: network database - network construction - network management. Indirect: one designed to develop the culture of collaboration and the other to facilitate collaboration. However the role of trust building was not highlighted as a clear role of intermediaries.

Arguably there is growing convergence around the role of a trusted and trust-incubating intermediary with several core components:

a. *The Researcher role*: studying the market, technologies, prospective clients from large firms, SMEs, startups, universities, etc. thus building a database for all the resulting information for future use. It also includes gathering information about trustworthy partners/clients and identifying history of their reputations.

b. *The Broker/Mediator role*: matching suitable parties together, organizing technology and knowledge transfer, engage in value adding brokerage activities, etc.

c. *The Trust-Incubator role*: working on increasing direct trust levels among network participants through working on goal congruence of main parties, facilitating knowledge transfer, organizing activities with direct touch-points between original parties, increasing frequency of interaction, and other activities that help enhance a collaborative culture with high willingness for trust and for a sustained long term relationship, whether it remains intermediated (like in the case of virtual knowledge brokers) or it turns into direct high-trust relationship between the main parties.

d. *The Collaborator role*: maintaining a trustful atmosphere parallel to common innovation and knowledge transfer projects, fast problem solving, offering extra assistance to clients beyond the immediate project, helping in connecting with further networks, etc. Figure 1 illustrates examples of the different trust roles an intermediary should normally play.

Finally, we are not proposing the term ‘trust incubator’ as yet another ‘buzzword’ in the innovation jargon. Rather we are interested to highlight future directions of research for work on intermediaries which pick up on the relationship building and maintaining aspects of the role in an open innovation context. Several authors explicitly recognize that very little evidence exists on the relationships between innovation intermediaries and their clients (Sieg et al. (2010)). Although there is research which has attempted to identify different forms and characteristics of innovation intermediaries, little has dealt with the implementation of open innovation through innovation intermediaries and the roles and activities required for that. We hope we have helped to highlight the ‘trust-building’ role of an intermediary, and the importance which that will have in the development of more secure long-lasting network architectures.

6 Conclusion and Directions for Future Research

In the open innovation environment emphasis shifts from knowledge creation and control to issues around managing knowledge flows. Potentially this opens up rich opportunities for innovation – in speed, scale, reach, etc. But realizing these powerful opportunities is likely to depend even more on trust, especially the more relational kind.

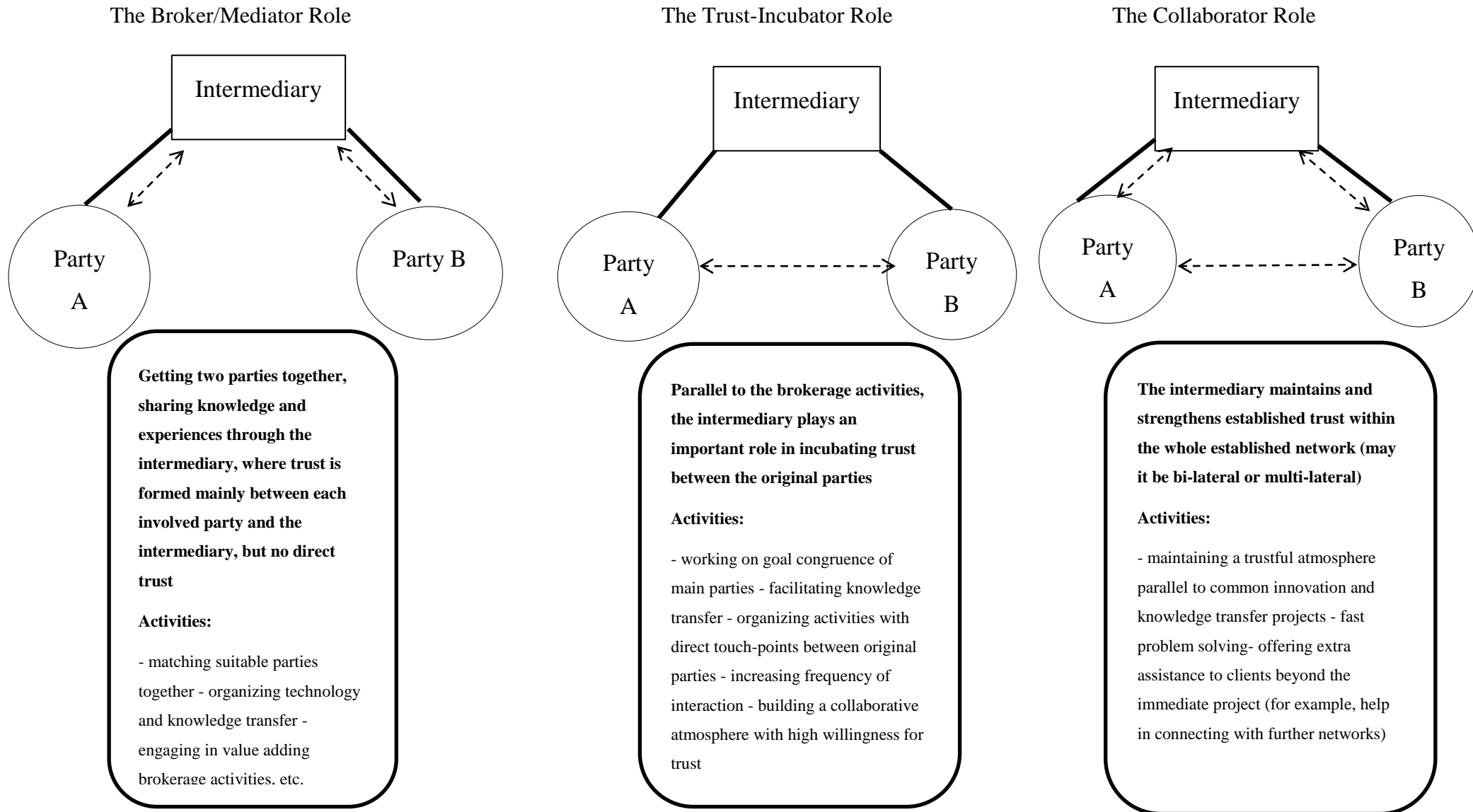
Trust can be enabled in innovation through a variety of mechanisms ranging from formal/contractual through to more flexible relationship-based. The latter forms allow for more flexible knowledge sharing, for shared learning, for exchange of tacit knowledge, etc.

We can see this trend toward relationship-based trust in the area of trust enabling routines; those which worked well in the past are to some extent now inappropriate (for example much of the contract-based IPR framework) whilst other new ones need developing (for example around recombinant innovation and solving the ‘finding, forming, performing’ problem). Whilst clusters and communities play an increasingly significant role in innovation the operation of those networks involves much higher levels of social capital accumulation and deployment. Within supply chains there is a growing recognition of the need to replace current models with a more ethically and sustainability-driven approach (Shinohara (2010)). Companies are realizing the growing importance of engagement of employees in the innovation processes, especially if they want to adopt open innovation in external collaborations. They should open up first *internally* before they open up externally. And as a consequence of these trends, the role of third parties/ intermediaries is becoming significant in inter- and intra- organizational collaborations. Table 2 provides a summarized illustration of the changing role of trust in open innovation.

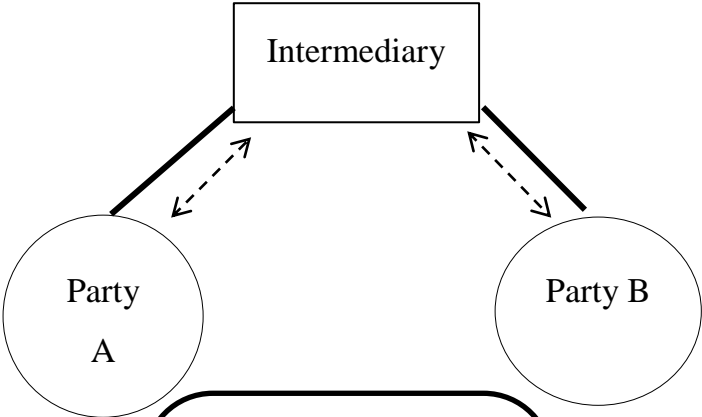
In our review we have tried to summarize key elements in the literature around trust and innovation. Trust as a governance mechanism and its comparison with contracts has been widely discussed but we suggest that the increasingly interconnected environment requires the evolution of new and modified mechanisms to enable effective network building and operation. ‘Open innovation’ of the kind we have outlined in the paper places greater emphasis on the ways in which inter-organizational relationships are enabled. Our contribution has been to identify the emergence of new directions for trust-building and new mechanisms to enable this and we have reported some prototype examples. However, there is a growing need to find concrete mechanisms of when and how to use trust mechanisms especially on the inter-organizational level. Future research should try to elaborate more the role of trusted intermediaries, which is a focal

point with the increasing open innovation challenges. In particular, the growing role of innovation intermediaries as ‘trust incubators’ could be explored through empirical work tracking the experiences of current intermediaries and finding out which activities are contributing to the development of high trust between them and their clients, and more importantly which activities, if any, contribute to the ‘incubation’ of direct trust between the original two or more parties involved in the knowledge transfer and innovation processes.

Figure 1: Examples of the different trusted- & trust incubating-intermediary roles



The Broker/Mediator Role

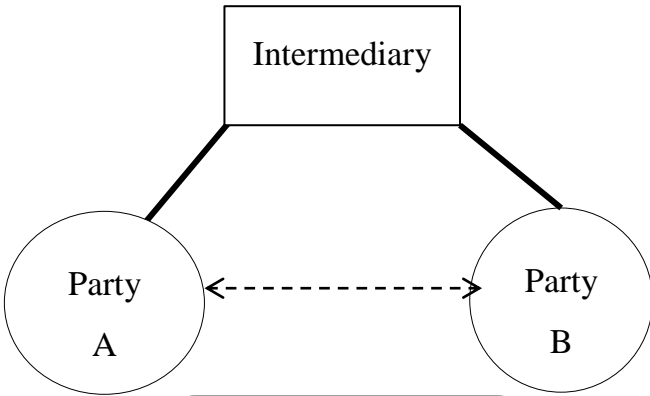


Getting two parties together, sharing knowledge and experiences through the intermediary, where trust is formed mainly between each involved party and the intermediary, but no direct trust

Activities:

- matching suitable parties together - organizing technology and knowledge transfer - engaging in value adding brokerage activities. etc.

The Trust-Incubator Role

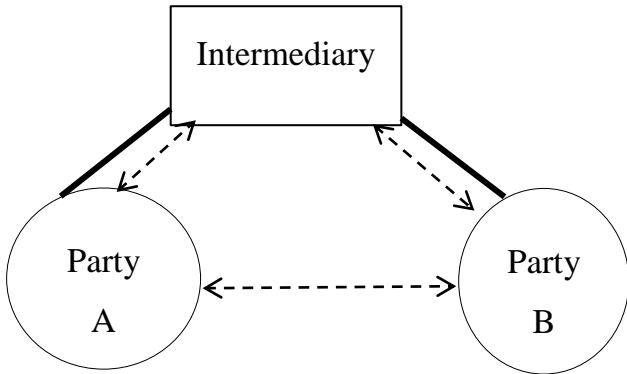


Parallel to the brokerage activities, the intermediary plays an important role in incubating trust between the original parties

Activities:

- working on goal congruence of main parties - facilitating knowledge transfer - organizing activities with direct touch-points between original parties - increasing frequency of interaction - building a collaborative atmosphere with high willingness for trust

The Collaborator Role



The intermediary maintains and strengthens established trust within the whole established network (may it be bi-lateral or multi-lateral)

Activities:

- maintaining a trustful atmosphere parallel to common innovation and knowledge transfer projects - fast problem solving- offering extra assistance to clients beyond the immediate project (for example, help in connecting with further networks)

Table 2: An illustration of the changing role of trust in open innovation

Organizational contexts for trust in innovation	Dimensions of trust in innovation	Influence of open innovation in reshaping trust	Examples of trusted intermediaries
Supply Chain Development	Capability-based trust (i.e. performance capability and commitment capability)	Enhancing collaborative trust between firms and suppliers through a value-based model of the supply chain – in case of sensitive information trusted facilitators help parties collaborate.	Intermediated supply chain collaborations such as; - Mercedes & SME-Suppliers for Mercedes (intermediated by Fraunhofer institute i.e. research institute) - Walmart & Suppliers (intermediated by Li & Fung Ltd i.e. sourcing intermediary)
Clusters	Commitment-based trust and competence-based trust	Emergence of ‘Collective learning efficiency’. Achieving ‘companion-based trust’ within clusters, through building both commitment and competence-based trust Shifting from individual focus to the larger purpose of the network.	Network brokers and facilitators enabling effective collaboration – for example in South African textiles, auto components sectors (Bessant et al. 2012)
Employee Involvement	Ability-, benevolence- and integrity-based trust.	Organizations becoming ‘internally open’ through enhancing a high involvement	OI Professionals i.e. professionals in interfirm open innovation teams, intermediate knowledge exchange and trust

		innovation culture within organizations.	between the firms they represent, as well as within their departments 'Innovation Champions' within firms ,i.e. employees who are highly involved in innovation and regularly share in generating new ideas, drive the company's innovation by motivating other employees and acting as role models.
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Further research in the innovation management field

Book Chapters:

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