Fitness of business models for digital collaborative platforms in clusters: a case study

Luca Cremona[1], Aurelio Ravarini, Gianluigi Viscusi [3]
[1]SmartUp and Lab#ID, LIUC - Università Cattaneo, Castellanza (VA), Italy
lcremona@liuc.it
[3]Ecole Polytechnique Fédérale de Lausanne -College of Management of Technology, EPFL-CDM – ODY 1 16 (Odyssea) Station 5 CH-1015 Lausanne, Switzerland,
gianluigi.viscusi@epfl.ch

Abstract This paper investigates the role of business models for exploiting digital options within digital clusters (that are clusters where collaboration is IT-dependent). To this aim, this research focuses on digital platforms, a specific IT artifact supporting an inter-organizational system (IOS), which finds a typical application domain in clusters of enterprises. Thus, the paper first discusses the theoretical background and presents a literature review that has been used to set up a framework for analyzing the factors influencing the exploitation of digital platforms at cluster level. The framework is developed through a Design Science Research (DSR) methodology whose empirical ground will be represented by a cluster of more than a hundred of manufacturing small-medium enterprises. An exploratory case study is then discussed in this paper, meant to represent the early stages of application of the DSR method.

Keywords: digital platforms, business models, clusters of enterprises

1 Introduction

This paper presents a research in progress focusing on the adoption of digital platforms in a cluster of enterprises in the manufacturing sector. Digital platforms for online collaboration (in the following: *Digital collaborative platforms - DCP*) can potentially improve the coordination between different actors (e.g., trading partners) and activities (e.g., joint activities), information diffusion, communication within different groups or communities, and the generation of knowledge [7]. The growth in adoption and relevance of DCPs at societal as well as at business level has raised questions about their value, especially when

dealing with participation and knowledge sharing spanning beyond the enterprise boundaries [5, 6]. As argued by [15], IT can act as either an *operand resource* (often tangible and static) "*that an actor acts on to obtain support for executing a task*", or as an *operant resource* "(often intangible and dynamic) "*that act on other resources to produce effects*". Thus, in a case a DCP can be considered an enabler of innovation process and outcomes; whereas, in the other case, it acts as a trigger, informing rather than being informed by the users. At the state of the art, the literature on DCPs and innovation has focused mainly on the role of the single enterprises participating to the platform rather than the inter-organizational network of experts as a whole that a DCP enables [5, 6]. Little consideration has been devoted to the use of DCPs to support clusters of enterprises and the related supplier-customer relationships. Maybe also because of the variety of organizations involved (large incumbent corporations and small and medium enterprises) as well as business models.

Taking these issues into account, in this paper we aim to understand the factors impacting on the use - within clusters - of digital collaborative platforms as an operand resource, and the diverse trajectories that they can trigger as an operant resource. In particular, we are going to investigate the role of business models for exploiting digital options [21] by the use of the platforms adopted for knowledge sharing within what we call *digital clusters*, that are clusters where collaboration is IT-dependent, i.e. dependent on the participation to a DCP. Therefore, the following explorative research questions (RQ) arise:

RQ1: What's the role of business models, among other factors, for the use of DCPs and their digital options exploitation?

RQ2: Consequently, is there a business model for an enterprise that better fits the needs - as well as allows to better exploit the benefits - of using a DCP to support the activities in a being part in a digital cluster?

The paper is structured as follows. First we present the research method and introduce the analysis of the theoretical background as well as the main concepts emerging from the literature review. Then, we propose an analytic framework and we use it to preliminarily discuss the outcomes of a case study about an industrial cluster. The conclusive section outlines limitations and future work.

2 Research Method

This research follows a Design Science Research (DSR) approach [12]. According to [12] scholars applying DSR should carry out a sequence of research activities that are *building*, *evaluating*, *theorizing on* and *justifying* artifacts. The work presented in this paper concerns the reconstruction of the theoretical background underpinning the two research questions mentioned above (*building*), the discussion of the outcomes of a case study (*evaluating*) and the proposal of an analytic framework (*theorizing on*). In particular, the case study presented in this paper and the subsequent discussion are meant to represent the early stages of application of the DSR method. The case study is exploratory [26] and based on an interpretive approach to research in information systems [13, 25], involving both researchers and practitioners. The case study aims to produce an understanding of the context of a DCP adoption in a cluster, and how the business model of a company may bind or else enforcing it. As sources of evidence we have considered memoranda and formal reports (documentation and archival records:) as well as interviews [4]. Details on data collection and analysis follow.

2.1 Data collection

A questionnaire, originally designed in English and later translated in Italian (with the contribution of a native English speaker), was used to carry out interviews. The questionnaire was distributed to two small and medium-sized enterprises (SMEs): one can be considered an innovator given the digital proactivity of its representatives; on the opposite, the other firm can be considered conservative given its digital aversion. To get a higher data reliability the interviews were carried out in two different timings: at the beginning of the project (October 2012) and after almost one year the firms were using the platform (July 2013). The CEO or its representative and/or the marketing and sales manager were interviewed. To increase the validity of our coding and data analysis procedure, we aggregated multiple sources of evidence [26]: artifacts (i.e. extracts from the platform), documents from each firm (about performances and financial situations) and information from websites.

All data were collected from primary sources and secondary sources: documentation, archival records, interviews, direct observations, participant observations and physical artifacts [26]. Information coming from websites or from the sections of the platform dedicated to each firm of the cluster was useful in order to triangulate the data: the presentation of the firms, their activities, the representatives, their presence in foreign countries, information regarding international projects (agents, branches or at least a contract). Other data regarded the participation and the presence at the social and business meetings happening inside the cluster and organized with the aim to explain, through practical sessions, how to use the platform.

2.2 Data analysis

All interviews have been tape-recorded and transcribed: the transcripts from the interviews were aggregated into a case protocol helping the researchers in organizing data. The projects were encoded and structured using the software NVIVO 10 following a grounded theory approach [10, 22] that aims at finding properties or links between data. The coding procedure was done as follows: first, in order to mitigate potential bias, the junior researcher (first coder) who had not taken part in the interviews read and coded the interview transcripts by identifying text passages that included information about the constructs of the theoretical framework. Following the coding of the first coder the senior researcher (second coder), likewise, coded the transcripts. The comparison of the two coding resulted in an average inter-coder reliability of 85%. The two coders then examined the mismatched coding and agreed on a final coding matrix that was used for the data analysis. The reasons for mismatches were always very obvious (e.g. one coder had simply overseen an issue within a statement). Only in two cases the professor (third coder) was called in as a referee.

3 Related Work

Business model emerged as a relevant research topic as well as a business's strategic concern with the advent of the internet, literally exploding between 1995-2010 [2]. Notwithstanding the vast literature actually available, the definition for what is a business model is still

subject of debate [27]. Among others, we adopt the perspective by Zott & Amit [28], who conceptualize a business model as *"a system of interdependent activities that transcends the focal firm and spans its boundaries. The activity system enables the firm, in concert with its partners, to create value and also to appropriate a share of that value"*[28]. Furthermore, Zott & Amit [28] identify for an activity system architecture a set of design elements (i.e. content, structure and governance) and design themes (novelty, lock-in, complementarities and efficiency) for the sources of the activity system's value creation.

Business model representations as result of business modeling have been developed to provide a tactical and strategic perspective to requirements engineering, consequently aligning traditional conceptual modeling areas such as business process modeling [3, 9, 16, 17]. Thus, considering business models representations as a way to provide high-level requirements to, e.g., Chief Information Officers to design a company IS, the gap seems to be actually a matter of alignment between different representations of *as-is*, *as-whished*, or *to-be* IS [20].

However, being the focal firm the traditional focus of the business model's literature, the question about the difference between its application to industrial ecosystems [23] and clusters (as a specific type of such ecosystems) instead of a single organization deserve further attention and seems worth to require further investigation, focusing on the boundary spanning characteristics of business model as a system-level concept [27]. The possibility itself to name with the term "cluster" a set of firms is related to the presence of structural linkages, i.e. systematic - although eventually weak - interactions. As argued by Porter [19], *"clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition"*, such as, e.g., suppliers, manufacturers of complementary products, governmental institutions or universities. While it can be debated whether interactions in a cluster can lead to cooperation, coordination or collaboration, there is no doubt they could not occur without the (systematic) exchange of information. Contrary to single organizations alone, firms in a cluster show geographical distances, cultural differences and divergences of strategic aims that shall be bridged through inter-

organizational information systems (IOS) such as, e.g., DCPs for coordination, cooperation, and knowledge sharing [18].

Considering now platforms, the state of the art literature provides a clear definition of platform [14] as "*a set of technological building blocks and complementary assets that companies and individuals can use and consume to develop complementary products, technologies and services*". Furthermore, [8] provides a classification of technological platforms, while [9] has investigated how externally focused so-called "industry platforms" affect innovation. The growth in adoption and relevance of DCPs at societal as well as at business level has raised questions about their value, especially when dealing with participation and knowledge sharing often spanning the enterprise boundaries [5, 6],

At the state of the art, the literature on DCPs and innovation has focused mainly on the role of the single enterprises participating to the platform rather than the inter-organizational network of experts as a whole that a DCP enables [5, 6]. Little consideration has been devoted to the use of DCPs to support activities within clusters of enterprises and their supplier-customer relationships. Clusters are complex organizations, often involving large incumbent corporations and diverse small and medium enterprises, and where different business models as well as aim for entrepreneurial action coexist [3]. In principle, complexity could be smoothed by improving the knowledge sharing among enterprises (as actually digital collaborative platforms are claimed to do [18, 24]). Thus, our work stands from previous research with the aim to study if and how the usage of a DCP in a cluster can lead to improving mutual knowledge and creating joint activities.

4 Case study

Following Zott & Amit's [28], the business model of a firm can be seen as an activity system that is characterized by a set of important design parameters: activity system content; activity system structure; activity system governance. Within this paper, these parameters are used to map two firms, two SMEs belonging to the Lombardy Energy Cluster (LEC, a cluster of firms in the thermo-mechanical industry located in the Lombardy Region, Italy). It is worth noting that in this paper we added the value proposition perspective to what proposed by [28] and we explicitly described how firms build activities to get to customers. The first firm under study, given its young top management

and its proactivity in using the DCP tool, may be considered an "*innovator*". This firm is active on the DCP and posts commercial opportunities and market information that can be exploited by other firms in the cluster. The value proposition of this firm is to become a central firm in the cluster by providing value added activities for other firms in the cluster. The activity system of this firm is based on the following selected activities: treatments and coatings, both for aesthetical and protective purposes on a wide variety of materials.

Other firms in the cluster, which are manufacturer and producers of mechanic component for the oil and gas industry (such as valves, vessels, tubes and pipes), could send them to this firm in order to have executed those specific activities. The activity system, with the usage of the DCP is changed given that the firms is using the new IT tool as a way to improve visibility inside the cluster. Therefore the opportunity to have a personal webpage, where the firm is presenting its relevant activities and competences, is a way to strengthen relations with other firms. With regard to the activity system structure, the firm posted opportunities for collaboration online and organized to make them happen offline. Considering the activity system governance, the son of the CEO plays a pivotal role and acts both as Head of Innovative Projects and formal representative in cluster and institutional meetings (he is, for example, the President of the Italian Delegation of Young Entrepreneurs at G20). This person, proactive and passionate of new digital technologies, acts as a digital champion among other entrepreneurs and helps pushing the growth and usage of the DCP.

A totally different management characterizes the second firm. Both the CEO, (i.e. the entrepreneur) - a baby boomer - and his son, the Head of the Technical Department, are not familiar with and generally reluctant to use digital technologies. Oppositely to the first firm, this one can be labeled as "*conservative*". They access the DCPs few times only and with the attitude of lurkers: they do not share any information about commercial or market opportunities; rather, they try to exploit opportunities posted from other firs participating to the platform.

The value proposition of this firm is to support other firms by providing highly specialization in design of ecologic plants, thermals, handling and stocking ones. From an activity system perspective [28], this firm is specialized on activities of design of specific plants that put the

firm in an outlier position in relation to other firms of the cluster. In fact, while the majority of firms are producers and manufacturers of specific components, this firm's activities are peculiar and its needs, therefore, are alike. Referring to the activity system structure, the usage of the DCP impacted at different levels on current firms activities. During the development and first usage of the DCP the representatives of the firm participated in several offline meetings and were proactive in sharing their needs and objectives. After this positive start, the CEO and his son were not active on the DCP and showed a sense of mistrust towards the DCP because they feared opportunistic behaviors from the other participants. As a result, their interactions with the other firms of the clusters remained limited to traditional media, such as phone calls and offline meetings, to start new projects and make new customers.

Activity system governance is referred to who performs the activities. Within the second firm of the study the design department plays a pivotal role: since all the firm activities are orchestrated from here. The person in charge of this is the son of the CEO and has a complete visibility among all activities performed. The CEO, on the other hand, plays an important role as formal representative during institutional and cluster meetings.

5 Discussion of the results

The analysis of the case study focused, on the one hand, on the relationship between business models and clusters - seen as business ecosystems -, to explore the possibility to represent a cluster as a "business model ecosystem", i.e. a set of specific, interrelated business models characterizing the firms of a cluster. In doing so, we were interested in the emerging variables able to explain the implications of the different business models on the adoption and usage of DCPs. Figure 1 shows the main constructs of the framework.

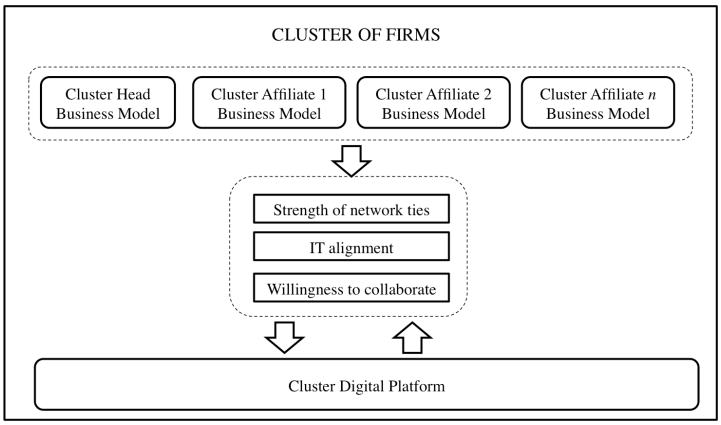

Fig. 1. An analytic framework for understanding the dynamics adoption and exploitation of DCPs at cluster level and the role of business models.

A cluster of firms can be abstracted as a configuration of business models, where we recognize two main types: business models describing the firms affiliated to the clusters, and the business model of the organization in charge of formally managing the clusters (the "cluster head"). The business models of the affiliated firms can vary significantly, as the two firms of the case study show rather stereotypically. Such diversity allows highlighting three main factors influencing the fit between the DCP and a certain business model of a cluster affiliated firm. In fact, different business models:

- imply different information needs and IT infrastructures; thus, a firm affiliated to a cluster, when opting to participate into a DCP, would require to verify the *IS/IT alignment* at firm level;
- deal with different types and topologies of networks of social relationships due to different clients and channels; thus eliciting the *strength of network ties* among the actors in the cluster is relevant to anticipate the usefulness of the DCP as a support to such ties;
- incorporate different organizational cultures and in particular different attitudes towards competitive vs. collaborative behaviors, within the firm and with its partners; thus, assessing the *willingness to collaborate* characterizing a business model is key to assess the effectiveness of the DCP as a medium for sharing firms contributions.

The case study reported above provide evidence of two different business models that actually lead to opposite usages of the platform. It is evident that a lurker behavior contradicts the principle of collaboration and - if spread among the firms participating to the DCP – would quickly lead to the ceasing of any contribution on the platform, i.e. the abandoning of the DCP. Nevertheless, the presence of only pure "innovators", like the first firm in our case study, may generate conflicts to achieve a leadership role within the community hosted by the DCP, which, in turn, could lead to disaffection and abandonment of the DCP from the firms. We can anticipate – therefore – that the ideal cluster should include a composition of several business models to exploit at best the potential of a DCP.

Due to the complex and multidisciplinary nature of the subject, we acknowledge the limitations of the state of the art analysis presented above. We can identify two possible directions for further research. First, it would be relevant to identify several business models (beyond the two presented in this case study), to describe a comprehensive business model ecosystem. Second, it would be interesting to address the three variables as dynamic properties of the business models, evolving along time as the cluster evolves and as the usage of the DCP evolves. To do so, we will follow the DSR approach and will run another iteration of the building-evaluating-theorizing cycle using case studies and a further systematic survey to support and improve the analytic framework introduced in this work.

6 Conclusion

The subsequent steps of application of the DSR method will involve the application of the theoretical framework presented above to a specific cluster of firms. The cluster object of the study is the Lombardy Energy Cluster, a cluster of thermo-electro mechanic firms located in Lombardy, a region in Northern Italy. More than 100 firms, mainly SMEs, belong to the LEC and offer a variety of products (e.g., pipes, tubes, valves) and services (e.g., coating, thermal treatments, painting). Since 2012, LEC had adopted a DCP, social-networking like, to foster knowledge sharing and collaboration among cluster members. The research study is based on a qualitative multiple case studies approach that takes into consideration a selected pool of firms, 6 firms, that can

be considered representative (in terms of size, turnover, age of top management, relationships with other firms in the cluster, etc.) of the cluster itself. Further extension of the research would be on different directions: first, extending the pool of firms analyzed in order to grant multiple and extended insights on different DCP adoptions; second, combining different research approaches (such as survey-based plus case studies) in order to exploit benefits deriving from multiple perspectives; third, comparing the study carried out within this specific cluster with other clusters that could either have adopted DCPs or willing to do it.

References

1. Alberti, F.G., Sciascia, S., Tripodi, C., Visconti, F.: The entrepreneurial growth of firms located in clusters: a cross-case study. International Journal Technology Management. 54 (1), 53–79 (2011).
2. Amit, R., Zott, C.: Value creation in E-business. Strategic Management Journal. 22 (6-7), 493–520 (2001).
3. Andersson, B., Bergholtz, ME, Ananda Ilayperuma, T., Johannesson, P., Gordijn, J., Grégoire, B., Schmitt, M., Dubois, E., Abels, SH, Axel Wangler, B., Weigand, H.: Towards a Reference Ontology for Business Models. In: Embley, D.W. et al. (eds.) Conceptual Modeling - ER 2006. pp. 482–496 Springer (2006).
4. Benbasat, I., Goldstein, DK, Mead, M.: The Case Research Strategy in Studies of Information-Systems. MIS Quartetly. 11, 369–386 (1987).
5. Ceccagnoli, M. et al.: Cocreation of Value in a Platform Ecosystem: The Case of Enterpreise Software. MIS Quartetly. 36, 263–290 (2012).
6. Ceccagnoli, M. et al.: Digital Platforms: When is Participation Valuable? Communations of ACM. 57, 2, 38–39 (2014).
7. Cremona, L., Ravarini, A.: Collective Intelligence and Social Computing: A literature review. Information systems: crossroads for organization, management, accounting and engineering: ItAIS: the Italian Association for Information Systems, Heidelberg [u.a.]: Physica-Verl, 35-41 (2012).
8. Gawer, A.: Bridging differing perspectives on technological platforms: Toward an integrative framework. Resource Policy. 43, 7, 1239–1249 (2014).
9. Gawer, A., Cusumano, M.A.: Industry Platforms and Ecosystem Innovation. J. Prod. Innov. Manag. 31, 3, 417–433 (2014).
10. Glaser, B.G.: Basics of grounded theory analysis. Sociology Press. Mill Valley, CA (1992).
11. Gordijn, J. et al.: Business Modelling Is Not Process Modelling. ER. 1921, 40–51 (2000).
12. Hevner, A. R., March, S. T., Park, J., Ram, S.: Design Science in Information System Research. MIS Quarterly 28, 75-105 (2004).
13. Klein, H.K., Myers, M.D.: A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly 23, 1, 67–93 (1999).

14. Muegge, S.: Platforms, Communities, and Business Ecosystems: Lessons Learned about Technology Entrepreneurship in an Interconnected World. Technology Innovation Management Review (2013).
15. Nambisan, S.: Information Technology and Product/Service Innovation: A Brief Assessment and Some Suggestions for Future Research. Journal of the Association for Information Systems, 14 (4), 2013.
16. Osterwalder, A. et al.: Setting up an Ontology of Business Models. In: Grundspenkis, J. and Kirikova, M. (eds.) CAiSE'04 Workshops in connection with The 16th Conference on Advanced Information Systems Engineering, Riga, Latvia, 7-11 June, 2004, Knowledge and Model Driven Information Systems Engineering for Networked Organisations, Proceedings, Vol. 3. pp. 319–324 Faculty of Computer Science and Information Technology, Riga Technical University, Riga, Latvia (2004).
17. Pigneur, Y.: An Ontology for m-Business Models. In: Spaccapietra, S. et al. (eds.) Conceptual Modeling - {ER} 2002, 21st International Conference on Conceptual Modeling, Tampere, Finland, October 7-11, 2002, Proceedings. pp. 3–6 Springer (2002).
18. Pigni F., Ravarini A., Saglietto L., An Explorative Analysis of the Effects of Information and Communication Technologies and Inter-Organizational Relationships on Supply Chain Management, Supply Chain Forum: An International Journal, 11, 4 (2010).
19. Porter, M.E.: Clusters and the new economics of competition. Harvard Business Review. November-December, (1998).
20. Salinesi, C., Rolland, C.: Fitting Business Models to Systems Functionality Exploring the Fitness Relationship. CAiSE'03. Velden, Austria (2003).
21. Sambamurthy, V., Bharadwaj, A., Grover, V.: Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms. MIS Quarterly 27, 2, 237–263 (2003).
22. Strauss, A.: Qualitative analysis for social scientists. Cambridge, England: Cambridge University Press (1987).
23. Tsvetkova, A., Gustafsson, M.: Business models for industrial ecosystems: a modular approach. J. Clean. Prod. 29–30, 0, 246–254 (2012).
24. Venkatraman, N., El Sawy, O. A., Pavlou P. A., Bharadwaj A.: Theorizing Digital Business Innovation: Platforms and Capabilities in Ecosystems. Available at SSRN: http://ssrn.com/abstract=2510111 or http://dx.doi.org/10.2139/ssrn.2510111 (2014).
25. Walsham, G.: Interpretive Case Studies in IS Research: Nature and Method. European Journal of Information Systems 4, 74–81 (1995).
26. Yin, R.K.: Case study research : design and methods (Fourth ed.). Sage Publications. (2009).
27. Zott, C., Amit, R. Massa, L.: The business model: recent developments and future research. J. Manage. 37, 4, 1019–1042 (2011).
28. Zott, C., Amit, R.: Business model design: an activity system perspective. Long Range Plann. 43, 2-3, 216–226 (2010).