

Taking Open Innovation to the Next Level: A Conceptual Model of Social Product Development (SPD)

Full Papers

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Abstract

The initial success of open business models is encouraging many organizations to implement their own co-innovation networks. *Social product development*, or SPD, represents a new business model enabled by social technology platforms. It extends collaboration beyond customer-involvement models to socially-engaged individual actors in the ideation and development of new products. The increasing adoption necessitates developing a framework to help researchers clearly understand and practitioners effectively design the SPD platforms. This paper develops a conceptual model for SPD and illustrates the validity of the model via a case study on a particular SPD platform, focusing on its business model, network governance, and key processes and design features. The proposed model is sufficiently general yet grounded in the phenomenon to guide future research on socially-enabled innovation and SPD networks in particular.

Keywords

Open innovation, co-innovation, collaborative innovation network, social product development.

Introduction

Our understanding of how innovation occurs has been revolutionized by theoretical and practical developments in open innovation, in which focal firms in a value chain engage their customers, suppliers, external research and development experts, and other constituents in innovation processes (Alexy and Reitzig, 2013; von Hippel et al. 2011; Schreier et al. 2012). Widespread adoption of information and communications technologies (ICTs) has further enabled actors to collaborate, not only across organizational boundaries but also across geographies (Gemser and Perks 2015). These developments have coalesced in the phenomenon and study of collaborative innovation networks or CoINs (Leavy 2012; Romero et al. 2011). A recent and notable development in CoINs is the application of social technologies to engage actors through social mechanisms (Brown and Wyatt 2010; Harrisson et al. 2011; Kahnert et al. 2012). *Social product development* (SPD) represents a new business model enabled by social technology platforms (Bertoni et al. 2012; Piller et al. 2012), which extends collaboration beyond customer-involvement models to socially-engaged individual actors in the development of new products (D’Andrea et al. 2015; Garcia-Haro et al. 2015). The benefits of engaging social actors in new product development (NPD) have been argued persuasively (e.g. Nambisan and Baron 2009). However, basic research is as yet needed to integrate different empirical studies into an integrated theory (Curley et al. 2013; Gassmann et al. 2010). Additionally, developing a conceptual model to understand the structure of SPD networks is a critical first step to inform design of business model, structures, and technology platforms (Bechmann and Lomborg 2012).

In this study, we develop a conceptual model of SPD that synthesizes the literature on socially-enabled CoINs and validate the model with a case study of a recently formed and rapidly growing SPD network (Quirky.com). We then discuss contributions and areas for future research.

Theoretical Background

Proponents of open innovation argue that the essential resources for sustained innovation lie beyond an organization's boundaries with its customers and value chain partners and that organizations need to work collaboratively with internal and external stakeholders to create and realize creative solutions (Westergren and Holmström 2012). Indeed, the open innovation model explicitly includes external actors who participate actively and systematically in a firm's innovation processes (Morgan et al. 2012) to create or disseminate information or develop and evaluate new ideas (Zwass 2010). The model has recently been expanded to encompass networks of diverse actors who collaborate in innovation activities primarily through ICTs (Gassmann et al. 2010). To characterize ICT-enabled innovation networks, Gloor (2006) coined the term *co-innovation network*, or CoIN, and defined it as "a cyberteam of self-motivated people with a collective vision, enabled by the Web to collaborate in achieving a common goal by sharing ideas, information, and work" (p. 4). Notable examples of CoIN include open source communities such as FLOSS, open intermediary co-innovation platforms such as InnoCentive, competition-based software crowdsourcing platforms such as TopCoder, creative co-creation networks such as Threadless, customer virtual communities such as MyStarbucks Idea, and public co-innovation communities such as iBridge.

Research on SPD has been developed within the broad literature on open innovation (Chesbrough 2003; Chesbrough et al. 2008) and co-innovation (De Maggio et al. 2009; Romero et al. 2011) to investigate how new product development processes may be transformed by widespread availability of ICTs in general and social media in particular (Bertoni et al. 2012; Piller et al. 2012). SPD is a user-driven, product-centric, non-transactional and participatory approach to external actor involvement that relies on social technologies and social mechanisms to enable new product development (Bertoni et al. 2012; Chisty 2011). In SPD networks like Quirky and Edison Nation, members submit new ideas or recommend how to improve others' ideas. The platform owner, with members' input, then selects products to bring to market. While the SPD model is similar to a virtual customer environment sponsored by a firm to engage its own customers in innovation activities, the platform owner in SPD networks acts primarily as an innovation intermediary rather than as a firm that relies on external innovators to improve its own product portfolio.

From Co-innovation to SPD

Although SPD business models are built on the experiences with earlier models of "democratizing innovation" (Chisty 2011; Peterson and Schaefer 2014), it can be distinguished from other types of CoIN in a number of ways. First, SPD networks do not structure network boundaries or roles strictly between solution-seekers (NPD sponsors) and problem solvers, as is typical in many CoINs. In the open innovation model, firms usually define (own) the problem and solicit creative solutions from customers, whereas in the SPD model participants in the community develop both problems and solutions (Bertoni et al. 2012; Piller et al. 2012). SPD processes are governed by shared coordination between platform owners and participants to jointly influence the new product development lifecycle. In SPD, new product ideas are identified and refined by the community *collaboratively* (Schreier et al. 2012). Co-innovators are not committed to any projects for a fixed period (Paulini et al. 2013) and may work on different products concurrently.

Second, SPD networks are open networks in which participants are engaged in an innovation community *socially* rather than *systematically* or structurally. For instance, participants in SPD networks are not preselected or screened (by themselves or platform owners) on the basis of firm/customer or product/end-user relationships, as in virtual customer environments (Nambisan and Baron 2010). Unlike crowdsourcing platforms (e.g., Amazon's Mechanical Turk), SPD participants are not hired to perform predefined tasks (Paulini et al. 2013) specified by a firm. Instead, SPD participants are relatively free to select which projects and which new product development activities to work on based on their interests, expertise, and goals in any phase of product life cycle (Peterson and Schaefer 2014). Individuals' financial rewards depend on the products' success and the individuals' collaborative contributions to their development.

Third, SPD networks are a hybrid of social and innovation network forms that aims to create value for stakeholders through social exchange (Franke et al. 2008). Similar to other social exchange networks such as electronic networks of practice (Wasko and Faraj 2005), SPD networks rely on a group of socially engaged participants to contribute to the community (Paulini et al. 2013). In contrast to dedicated social knowledge-sharing networks, an SPD network exists primarily to foster *collaborative* new product development, so that knowledge sharing develops within the context of ideation (i.e., generating new

product ideas), refinement, and evaluation of product ideas by community members. In contrast to the CoINs implemented to address problem solving or innovation tasks exclusively, SPD networks also have the goal to enhance participants' socialization by nurturing relationships among participants (Peterson and Schaefer 2014). The open, fluid, and social characteristics of roles and tasks contribute to the emergent nature of some online communities structured and maintained through voluntary participation of socially engaged actors (Paulini et al. 2013).

To summarize, we posit that SPD networks, while building on earlier models for open co-innovation and sharing some characteristics with other CoINs, present a distinctive value proposition for platform sponsors and participants by placing individual innovators at the heart of the new product development in a social network structure (Kahnert et al. 2012; Piller et al. 2012). To enhance our understanding of the SPD phenomenon, we develop a conceptual model and report a case study that validates this model.

SPD Conceptual Model

We draw on Complex System theory (Monge and Contractor 2003) to develop a conceptual model for SPD that consists of three components: (a) Processes that enable SPD, (b) Platform (technology) that enables or supports the processes, and (c) Rules and structure that frame and govern the processes. As a complex system, an SPD network is the web of *agents* (internal and external actors) co-creating or sharing value in the form of knowledge, experience, and ideas. The agents' *inputs* to the system and their inter-relationships are governed by a central integrator supported by a technological *platform* to achieve the desired *outputs*. The central integrator is the SPD sponsor that integrates resources (value offered by the agents), coordinate processes, and defines rules and roles. Figure 1 illustrates our proposed conceptual model.

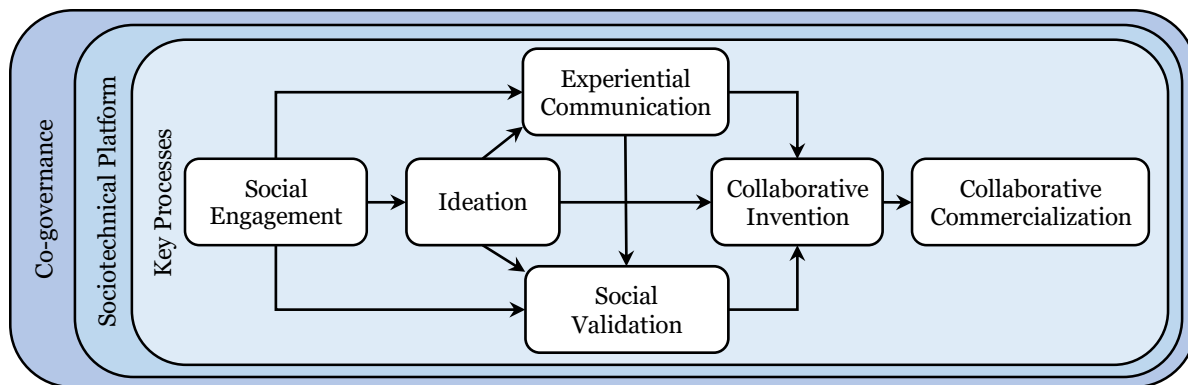


Figure 1. Conceptual Model of Social Product Development (SPD)

Processes. The SPD lifecycle consists of a series of inter-related *processes*, including engaging social actors, encouraging them to ideate, communicate, and evaluate, supporting the collaborative product development, and commercializing new products.

Social Engagement. SPD networks are socio-professional value networks, where organizationally-independent actors are socially engaged in reciprocal value exchanges to build a knowledge-driven socially-enabled enterprise and co-create new organizational, individual, and shared values (Lee et al. 2012). Social engagement is the process of building a 'community of interest' to develop shared interests, professional relationships, and trust among the members before the ideation process. Social engagement as a process of establishing relationships between actors, and between actors and the innovation sponsor is the first and essential step to establish SPD. Unlike typical co-innovation models, the social engagement process in SPD emphasizes longer-term relationships rather than short-term contracting.

Ideation. Idea generation (ideation) involves encouraging creative idea proposition and dissemination. The productivity and sustainability of SPD networks depend on external individual actors who are eagerly, actively, and purposefully ideating through reciprocal problem-solving processes (Romero & Molina, 2011). Ideation in SPD networks is usually in the form of proposing new product concept or features at a more abstract level (rather than an eventual implementation). The success of ideation process depends on proper idea management including knowledge acquisition, distribution, and integration.

Experiential Communication. Actor communication is the essential foundation not only for collaboration but also for validation of different ideas within the network. Value-based communication is a critical driver of co-creation processes in virtual contexts (Füller 2010). SPD process requires experiential communication by which actors evaluate other actors' competency, ideas, and knowledge (Golfetto, 2003). Experiential communication helps individual actors conveniently test and anticipate other actors' competencies and contributions of creative ideas before collaboration. Communications in SPD networks are driven by internal transparency and direct knowledge sharing. Communication is not limited to product idea evaluation or refinement; rather, it also enables learning and experimenting within and beyond the network.

Social Validation. The SPD practices enable systematic positioning of socially engaged actors across the innovation lifecycle, where they can become active stakeholders in evaluating and defining =new products' values (Füller 2010; Piller et al. 2012). The socio-professional structure of SPD networks allows the network owners to collect reliable market data before making any decisions on product production and commercialization. Validating new product ideas socially can help SPD networks minimize the risks associated with the marketability and profitability of new products.

Collaborative Invention. Upon evaluating and social validating, a new product idea, actors have opportunities to participate in collaborative product development, also referred to as collaborative invention (or co-invention). Co-invention usually includes exchange of knowledge, development of technical solutions, evaluation of prototypes, and critical assessment of product features and design. This process is the key factor differentiating SPD networks from other types of co-innovation networks.

Collaborative Commercialization. The goal of SPD is to launch marketable and profitable products. SPD networks rely on their communities to achieve this goal through collaborative commercialization. This process may take various forms from social validation of marketing strategies to co-marketing and co-promotion efforts.

Platform. An SPD network is a multilayered and interconnected sociotechnical system including the set of actors, and interactions depend on social network structure to create, evaluate, and diffuse values. The platform is the backbone of this system and is the vehicle for innovation processes from establishing virtual networked teams to enabling sharing and integrating operand resources such as skills, knowledge, and competencies (Nam and Lee 2010). The platform assists the community with learning, participating in, and contributing to the value co-creation processes. SPD communities are formed and function by the application of social and collaborative technologies (Abhari et al. 2016). SPD networks depend on these technologies to reach potential actors, offer equal innovation opportunity to them, and effectively engage them in value co-creation activities. SPD networks also require advanced knowledge management and collaborative design tools for reciprocal value exchanges and value consummation in co-invention phase.

Co-governance. The success of SPD processes highly depends on the coordination of (a) social engagement and participation in ideation, (b) exchange of experience, information, and knowledge (experiential communication and social validation), and (c) actors' direct contribution to new product development and commercialization. SPD business logic and coordination rules are determined by the network coordinator (central integrator), and observed and occasionally adapted by community members. For example, the roles in a SPD network are dynamically defined by the central integrator in collaboration with other individual actors based on the actors' competencies and what worked or did not work in the past. This process turns the network into a self-organizing system (in terms of role-assignment) that is dynamically co-governed. Co-innovation processes can create, reproduce, and transform the structures as well (Ketchen et al. 2007). The SPD approach to network governance is unique and different from typical CoIN models from three perspectives: (a) the actors' autonomy, (b) the nature of the relationships between the central integrator and the actors, and (c) the level of actor integration and involvement. These differences highlight the participatory role of community member in governing the SPD network.

Case Study

We conducted a case study to evaluate and refine the proposed conceptual model. The case selection was based on the 'information-oriented case selection' suggested by Flyvbjerg (2006) and the revelatory single case study approach supported by Yin (2009). The data were collected from Quirky.com—an SPD network—because: (a) co-innovation in Quirky requires more interactions between external actors and the company

than other similar cases and therefore provides more opportunities to study external actors' collaboration and engagement. (b) Quirky business model is more comprehensive than other SPD networks because of a higher level of actor involvement and the variety of co-innovation processes. (c) the numerous co-innovation opportunities in this network provide a rich phenomenon to study. And, (d) the various sources of data (user and product profiles and forum discussions) are publicly available to study.

The first data source was a set of email interviews with active members of the Quirky community. A total of 50 active and successful Quirky members were invited to participate in the interview. The forum discussion was the second source of data. Some of the interview questions were asked through the platform discussion board as well. The third source of data was the participatory and non-participatory observations by the first author of network actors' contribution, interactions, and relationships across the platform. Several users and product profiles were also reviewed during non-participatory observation. The fourth resource was published materials by the company such as reports, blog posts, and press release that discuss the SPD processes and outcomes. The last set of data was the published case studies of Quirky in books, academic journals, and managerial reviews. The analytical method was based on the juxtaposing of the different data sources (Creswell 2013) and explanation building method (Yin, 2009). The information was initially monitored, refined, summarized, and coded. The analysis continued by drawing a conclusion based on explanation building technique with support of literature for having valid domains and sharper external validity (Pandit 1996).

Case Report

Launched in 2009, Quirky.com is an SPD platform with about 100 employees, located in New York City. Quirky's business model is based on soliciting new product ideas for broad categories of consumer products and sharing a portion of the sales revenue with the community of innovators who contribute to product ideation as well as product selection, design, development, and promotion. Quirky not only sells its products directly on its platform but also distributes them through America's top retailers including Target, Bed Bath & Beyond, and Amazon.com. As of the time of the study, about 600,000 members had collaboratively developed and launched 150 consumer products. Quirky's mission is to make 'invention accessible' (Piller et al. 2011; Roser 2013). It offers a variety of co-innovation opportunities that cannot be typically found in other SPD platforms. The diversity of co-innovation tools and processes at Quirky allows studying the different aspects of SPD such as processes, governance and platform. While large-scale socially-enabled co-innovation platforms are still very rare, Quirky has successfully implemented such a model using social media technology (Piller et al. 2012). The key SPD processes identified in the study of Quirky (Figure 2) are illustrated as follows:

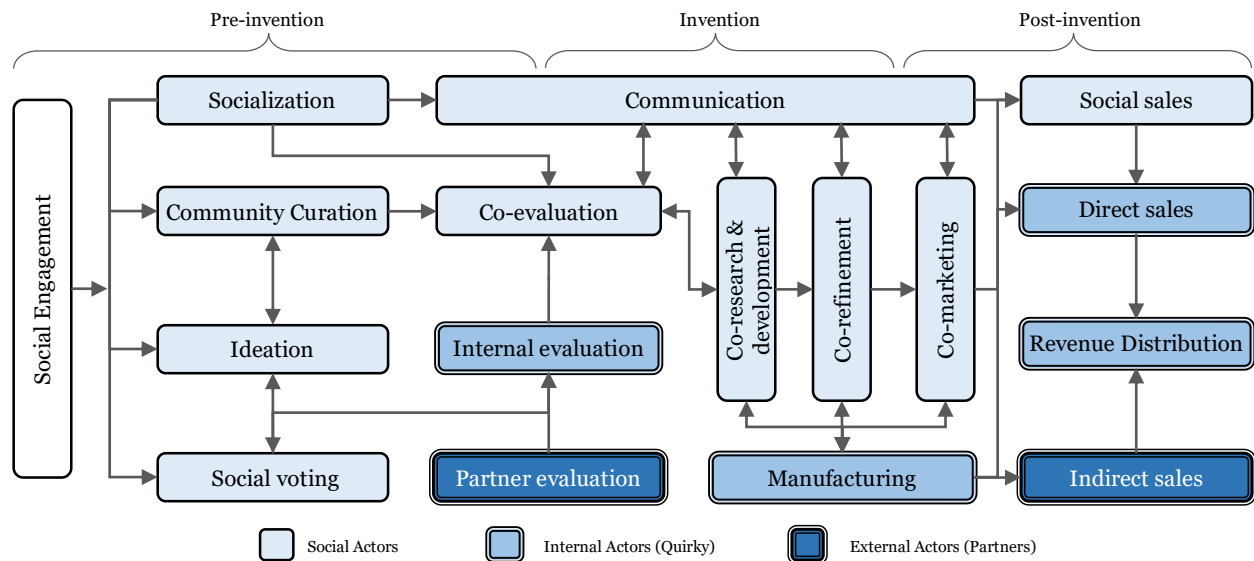


Figure 2. Social Product Development Process (Case of Quirky.com)

Quirky's SPD process starts with actor *engagement* in a social invention community, where individuals can join as members and explore different invention profiles, other members' backgrounds and contributions, collaboration and ideation opportunities, and success stories. Quirky then invites members to propose new product ideas. The proposer, or 'lead-actor', needs to provide the description and visual presentation of the invention. Other members can also join the ideation processes by adding features, inspiring ideas, sketches, 3D models, video pitches, and market research data. We call this process collaborative *ideation*. Once an idea is submitted, co-ideation continues and the Quirky online community has limited time to review, criticize, and vote for the idea. In our conceptual model, we label this process *community curation*. The community leaves comments, finds similar products, shares ideas on social networks, and participates in related discussions. The community finally votes on whether an idea should enter the next stage of product evaluation.

The evaluation process in SPD networks relies heavily on the collective wisdom of the invention community as all product ideas are socially evaluated and validated before the development phase. This process is manifested in two forms in Quirky: *social voting* (social market research) and *co-evaluation*. The social voting helps with discovering consumers' preferences, potential use cases, and design directions for new product ideas. If an idea is well received by the community (via social voting), it goes through a staff review process – *internal evaluation* – and then to the next evaluation phase – *co-evaluation*. Additional factors considered in internal evaluation by Quirky (internal actors) and its business partners (external actors) include uniqueness, manufacturing, marketability, and intellectual property rights. The co-evaluation event (a live community event) happens next, in which members of the community gather to choose the best ideas from those selected by Quirky and its partner in the *internal evaluation* phase.

Upon the announcement of winning ideas after each live evaluation event, community is asked to participate in co-invention process. This process has two main phases: (1) co-research & development of the new product features – for example, co-specify design requirements; and (2) co-refine the product design based on prototype test results and engineering requirements (e.g. mechanical, electrical, software, and materials). Quirky members can continue refining ideas while the ideas are in the development phase. After the refinement phase, Quirky then works with manufacturers to determine production plan and pricing. If the idea is accepted for production, the lead-actor must assign ownership of the IP to Quirky. The final SPD process, new product commercialization, has two major collaborative components that focus on the launching of the product: community members first contribute to planning marketing activities such as naming, pricing, and packaging and then to promotion and social sales.

All the co-innovation activities discussed here are supported by Quirky's online social networking platform. The Quirky platform provides three groups of tools for internal and external actors to support co-innovation processes: ideation tools, communication tools, and collaboration tools. Internal actors also have access to an additional group of tools for coordination. With ideation tools, community members can submit, review, vote, comment, and build upon others' ideas. Collaboration tools enable co-evaluation and co-development. Communication tools support relationship development among the actors and facilitate knowledge and experience sharing in different phases of SPD.

Quirky plays four major roles in governing SPD process: (1) Quirky seamlessly integrates the processes and resources (e.g. knowledge, actors, tools) from the initial ideation to the final commercialization; (2) Quirky effectively communicates goals, roles, and rules at different phases, and continuously adjusts them based on community feedback and performance; (c) Quirky's employees (internal actors) impartially collaborate in product idea improvement and management then strategically decides when and how to launch the new product in market. Although the Quirky governance model uses a hierarchical vetting system to maintain system stability and achieve desirable outcomes, its members actively participate in (a) *co-coordination* of new projects through community curation and co-evaluation, (b) *co-regulation* of roles based on the actors' resources and collective experience, and (c) *co-improvement* of platform, structure and processes (which are defined by Quirky community projects).

Discussion

The key concepts and their properties that emerged during the case study are well-aligned with our proposed conceptual model (see Table 1). Three main concept categories were identified in the case study: (1) the processes comprising six related SPD activities; (2) the sociotechnical platform enabling and

supporting SPD activities; and (3) the governance system coordinating the activities and integrating the resources. The case study confirmed that the overall structure of SPD networks such as Quirky can be defined and differentiated from other innovation networks considering these categories.

Studying SPD processes in Quirky allowed us to map all the activities and explore their alignments with our proposed model. SPD at Quirky has three phases: *pre-invention*, *invention* and *post-invention*. During the pre-invention phase, we have observed two main activities of social engagement and ideation. Quirky, as expected, utilizes social mechanisms and provides positive socio-professional stimuli such as professional community building to encourage community members to join, follow new product development projects, establish relationships, and submit new ideas. The findings confirm that the ideation process is initiated after an actor is socially encouraged to join, explore, and establish some connections. Therefore, social engagement is the main antecedent of SPD. Quirky systematically encourages actors to propose solutions for unfulfilled consumer needs and collaborate to refine and improve the solutions proposed by other actors. It also offers a variety of evaluation and collaboration tools to support product idea realization. The invention phase consists of two main components, social validation and co-invention. After the initial ideation, community members participate in evaluating and selecting the ideas for further development, a process we conceptualize as social validation because it is enabled by mechanisms such as social voting and social market research. At this phase, members also participate in two main co-invention activities, co-design and co-refinement. The invention phase heavily relies on the systematic exchange of ideas and knowledge between actors to facilitate social validation and co-invent. Finally, findings of our case study highlight the role of communication in driving co-invention and commercialization. As expected, in the post-invention phase, Quirky's members play an active role in commercialization by participating in social sales and promotion activities.

Results of the case study further suggests that SPD processes should not be studied in isolation from their supporting technology and governance. The execution of all SPD activities in Quirky depends on an advanced information system sociotechnical platform. Tools such as profile, portfolio, posting, conversations, and sharing provide various collaboration opportunities within the Quirky community. They enable and enhance collaboration and long-term engagement by facilitating socio-professional exchange among the actors. The case of Quirky also exhibits that SPD networks can be co-regulated and coordinated as external actors actively participate in integrating operant resources, self-regulating new product projects, and dynamically redefining the relationships, role, and structures. The findings confirm that SPD networks rely on participatory governance as external members are the crux of new product development.

Categories in Conceptual Model	Constructs in Conceptual Model	Categories Emerged from Case Study
Processes	Social Engagement	• Socialization enabled e.g. by social media, social exchange & networking, social acquisition, community involvement, and social team building.
	Ideation	• Ideation • Co-ideation & community curation
	Experiential Communication	• Value-based communication enabled e.g. by messaging, community posting, idea exchange, knowledge-sharing, brainstorming, social promoting.
	Social Validation	• Co-evaluation • Social voting and social market research
	Co-invention	• Co-research & development • Co-refinement
	Co-commercialization	• Co-marketing (e.g. naming, pricing, packaging) • Social sales & co-promotion
Platform	Sociotechnical Platform	• SPD platform including ideation tools (e.g. submission toolkit), collaboration tools (e.g. virtual design toolkit), and communication & networking tools
Governance	Co-governance	• Co-coordination • Co-regulation • Co-improvement

Table 1. Alignment between Proposed Conceptual Model and the Case Study

The case study helps explain the relationships between key components of an SPD network, regardless of its specific instantiation in a business model. Therefore, the proposed conceptual model could be applicable

to different SPD networks. First, the proposed model is process-based not role-based – the main differentiator of open business models. Second, the model is not limited to any of the specific arrangements of problem-solvers, innovation sponsors, platform coordinators, and users while comprising the necessary elements of co-innovation observed in this study and discussed in the literature.

Conclusion and Future Directions

In this paper, we develop a conceptual model of SPD and validate it with a case study of Quirky.com. To the best of our knowledge, this is the first attempt to study and describe the SPD ecosystem from a process-oriented perspective, which has important theoretical as well as practical implications. The major theoretical contribution of this paper is that it complements existing studies that have investigated new models of co-innovation. The case of Quirky exemplifies the SPD model as a new approach to co-innovation and shows that firms could make invention socially accessible and organizationally agile by investing in six key processes, implementing a robust sociotechnical platform, and promoting co-governance. Identifying the key components of this new model might help us understand certain shortcomings of social innovation as discussed in the literature. The findings also connect to the research strand on open innovation information system, in which a central question addresses design optimization and sociotechnical affordances. Furthermore, our findings provide a new framework for a systematic investigation of SPD network and technology for further theorization and empirical studies. With respect to practical contributions, this study reveals a new conceptual model for leveraging co-innovation approaches beyond their known potential. The study suggests different processes that firms can seamlessly explore and exploit to integrate social actors in new product development. The findings also help firms maintain the efficiency of collective creativity in different stage of new product development.

This study is not without limitations. The study on a single case study suffers from a lack of comparability and transferability of results. Additional research involving different cases is thus needed to further validate the proposed conceptual model. In addition, future research is needed to investigate SPD from the perspective of (a) strategy (e.g., alignment between business strategy, IS strategy, and SPD strategy); (b) design (e.g., IS tools, technologies and methodologies supporting SPD implementation and improvement); (c) management (e.g., knowledge management, network stability, productivity issues); and (d) application (e.g., users' adaptation and behavior). Further, in-depth study is necessary to control for situational aspects and enhance our understanding with respect to other structural components, network-product cortexes, and human factors such as incentives and culture.

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