Creating value for everyone – when product design crafts ecosystem regulations

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Milena Klasing Chen[1], Sophie Hooge[2] and Blanche Segrestin[3]

[1]milena.klasing_chen@mines-paristech.fr
[2]sophie.hooge@mines-paristech.fr
[3]blanche.segrestin@mines-paristech.fr
All at the Mines ParisTech PSL Research University, Center for Management Science, 60 Bd Saint Michel, Paris, 75006 France.

Value creation and the companies' value propositions have long been the centre of managers' concerns. Although increasing work is done on creating value with the customer, value creation at the ecosystem level is less studied. This is particularly the case in innovation contexts. Through the study of two cases in strongly regulated business-to-business (B2B) markets, one on a public transports operator and one on a systems assembler in the aeronautic sector, we analyse how projects on radical innovations are efficient levers to investigate the mechanisms of value creation for several actors. We propose a model of these regulated B2B markets - complex value networks - and show how the value evaluation framework was changed by a business model innovation, evolving to take into account the value for several actors of the ecosystem. We furthermore describe how major innovation in product design challenges the existing regulations, allowing companies to propose or sustain innovative regulations, and changes relations in the value network, sustaining the emergence of new partnerships.

Value creation in innovation ecosystems has been receiving increasing attention, and Ritala et al. (2013, p246), signalled "literature is currently lacking an integrated understanding on the mechanisms for value creation and capture in the innovation ecosystem context". Adner (2006, p98) defines innovation ecosystems as the "collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution". Innovation ecosystems demand specific processes and methods, and are extremely complicated due to interactions between the different actors and processes (Adner and Kapoor, 2010).

In some cases, these interdependences have been successfully used to create value for few actors at the ecosystem level, as in the case of multi-sided platform markets (e.g. Rochet and Tirole, 2006), where one class of customers is a tool for value creation for yet other customers. In multi-sided platform markets, companies create value for two or more actors (and they often get their revenues from two or more actors, too) to establish a viable business. In the case of newspapers for example, they need to attract both readers and advertisers, and a greater number of readers creates value for the advertisers (Hagiu and Wright, 2015).

These approaches however have rarely focused on strongly regulated markets, where the products or the relationship between actors of the ecosystem are constrained by a set of regulation rules that could overlap (for instance, aeronautics probates concern airplane elements as well as pilots or airport infrastructures). Such markets are challenging for management research on collaborative innovation, since innovations are made more difficult by the density of regulations that are shared by several actors. We contribute to this research gap by exposing managerial characteristics of these specific markets that we entitle "complex value networks". Our

research underlines how innovative product design can be used to re-craft the value chain and the regulations of a strongly regulated innovation ecosystem by integrating opportunities and needs of several actors in the ecosystem, going beyond the direct customer.

Through the study of two empirical cases in business-to-business (B2B) markets within public transportation and aeronautics, this paper proposes an analysis of how projects on radical innovations are efficient levers to investigate the mechanisms of value creation for several actors in an innovation ecosystem. We furthermore examine how they lead to three main breakthroughs in the dominant business model of an ecosystem and in it's entire value network: the set of evaluation criteria for a product, the valuable relationships between actors in the ecosystem and regulations inside the markets.

2. Defining complex value networks

According to Normann and Ramirez (1993), strategy has for a long time been placed in literature as the art of correctly positioning a firm in the value chain. The concept of value chain was introduced in the 1980's by Michael Porter (1985), and has since been widely used as a tool to analyze value creation at the firm level (Fjeldstad and Ketels, 2006). It is used to describe the series of activities operated by manufacturing firms, which create value for their customers by transforming inputs into products. While the value chain is used as a tool to analyze value creation, business models articulate how value is created for users by an offer based on a certain technology (Chesbrough and Rosenbloom, 2002). Demil and Lecocq (2010) add that the business model explains how value is created for two actors, the customer and the firm.

But the value chain approach seems less and less adapted to describe value creation and strategic positioning, especially in sectors where products and services are more and more dematerialized and in certain areas of the public sector (Peppard and Rylander, 2006). One of the options to value chain introduced in literature is the concept of value networks, where the value creation addresses a network of numerous customers who benefit of their interdependence (Stabell and Fjelstadt, 1998). The concept has been discussed by scholars in link with the service-dominant logic and the value co-creation literature (Lusch et al., 2010), and has been applied to telecommunications, e-business, insurances, and supply management, amongst others (Fjeldstad and Ketels, 2006). Value networks are considered more adapted to describe some industries, because instead of following a linear activity logic where each activity adds value as seen in value chains, value networks allow connecting multiple buyers and sellers at a single node (Funk, 2009). Furthermore, Funk (2009) draws attention to the fact that the relationships in value networks are harder to model than those in value chains. Instead of having a buyer/seller logic and each actor adding value through his activities, as in value chains, value networks describe value creation as the result of interactions between different actors. These interactions do not have to be only a circulation of goods, services and revenues, but can also be linked to the circulation of knowledge and intangible benefits, which can be brand recognition, information or loyalty (Zhang et al., 2014).

To describe value creation at the ecosystem level in strongly regulated markets, the concept of value networks appears relevant because it does not only focus on how a firm creates value for its customers, but on the entire value-creating system. One firm's business model is therefore insufficient to describe the entire value-creating process; we have to look into the entire ecosystem and how all the actors (suppliers, business partners, allies, competitors, prescribers and customers) interact to create value. Therefore an important organizational element of the value network structure is the rules that govern participation in the network (Kogut, 2000). This does not exclude the fact that in value networks new business models can emerge, but as described by Peppard and Rylander (2006) in their work on network value analysis, the business model is just a part of the issue of creating value in a network. The comprehensive description of where value lies in a network demands to take into account all stakeholders of value creation in the meaning of stakeholders from Freeman (1994), i.e. all actors that influence or are affected by the value creation and identifying the value for all participants.

According to Gebauer et al. (2012), value is always created by at least two actors, for example a supplier and a buyer. Therefore, they defend all contexts have value networks: value chains as seen in manufacturing are **simple value networks** for them.

Gebauer et al. (2012) apply the concept of value networks to public transport services, and state that the value network in this context is not as simple as in cases where there is only a supplier and a buyer. Their research highlights the importance of other actors in public transport that help co-create value. Based on their work, we propose therefore to introduce the notion of **complex value networks**, which will refer to the networks in which there are numerous actors involved in value creation, and where value creation cannot be described in a linear way, like in manufacturing value chains. Due to the introduction of several actors for whom value is created through the network of multiple buyers/sellers, like in the case of multi-sided platforms, the cost and the price for a certain product are dissociated. This separation happens because the different actors are linked and might be willing to cover costs of producing a product for another actor because that creates value for them. In such context, the business model approach, which focuses on value creation for the customer, is uneasy to apply to analyze the value creation process at the ecosystem level because the dissociation between cost and price induces interdependencies among actors. Furthermore, some stakeholders of value creation in complex value network lead activities exogenous to buyers/sellers business interactions, but which support or reduce the value creation at the ecosystem level. Thus, we will find key influencers or prescribers in complex value chains, which are highly relevant for value creation. As stated by the study on the mobile phone industry done by Funk (2009),

policy makers need to be involved in the value creation issues and in value evaluation, because they influence the standards put in place, which in return impact the potential of value creation for business players.

In the case of a stabilized complex value network, value creation at the ecosystem level could be analyzed through a dominant design model approach (Abernathy & Utterback, 1978). But in the context of innovation, value creation analysis and building is an effective research question (Lee et al., 1995). As stated by Midler and Beaune (2010), breaking the dominant design renews the customer practices and values, as well as the ecosystem and its perimeter. They show on the example of the electrical vehicle that there are difficulties in addressing value creation in innovative projects. The question is especially understudied in networks and standard-based ecosystems (Gallagher & Park, 2002; Soh, 2010) to which our research aims to contribute. Beyond a tool for analyzing value creation, we propose to investigate through two case studies the managerial patterns of value creation from innovation in complex value networks.

Table 1 concludes this section summarizing the main differences between simple and complex value networks from literature analysis.

Table 1. Comparison between simple and complex value networks.

	Simple value network	Complex value network
Main actors	- Unique Buyer/Final user - Unique Producer/Seller	- Interdependent Final users - Multiple Buyers - Interdependent Producers/Sellers - Prescribers
Direct price-cost link for users	Yes	No, products and services often partially or completely paid for / by other actors of the ecosystem
Value creation analysis	Business model and value chain positioning	In stable ecosystems: dominant design In emergent ecosystems or in case of innovation: ?
Example	White goods	Public transport

3. Materials and methods

Our research relies on the analysis of two case studies (Eisenhardt and Graebner, 2007) that highlight contrasted experiences of value creation for multiple stakeholders in complex value networks.

The first case concerns a public transport operator (PTO), whose main customer is a transport authority, contracting public transport for the final users. From a business model approach of the PTO, it is a classical business-to-administration-to-user configuration (Malaval and Bénaroya, 2013) but if we consider all actors involved in or impacted by the value creation, the numbers of stakeholders exploded. We identified politicians and governments, users associations, other operators, infrastructure builders and manufacturers, employers, urban planners, policy makers, residents, rolling stock manufacturers and maintainers. A schematic overview of the complex value network in the transport ecosystem can be found in Figure 1.

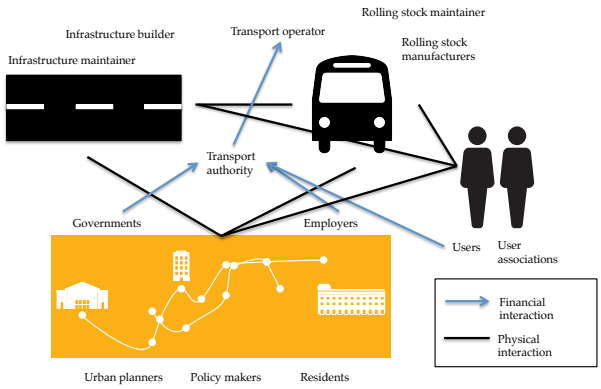

Figure 1. Public transport ecosystem

The second case concerns an aeronautics supplier working in the extremely regulated B2B market of aeronautics and who is very distant from the final user in the value chain (B2B2B2C). The studied firms sells pre-assembled systems (like the cockpit, which we will focus on in our case) to plane assemblers. The ecosystem in which the firm evolves therefore contains parts manufacturers and plane assemblers. But besides them it is also composed of other system assemblers, who have to work following standards to make the plane assembly possible, as described in other industries relying on modularity by Baldwin and Clark (2006). Standards are deeply influenced by the certification and regulation agencies, which also regulate airlines and pilots. Airlines and pilots are also part of the ecosystem, since they are the buyer and final user of the planes, but the airline's passengers also have to be taken into account. The ecosystem is illustrated in Figure 2.

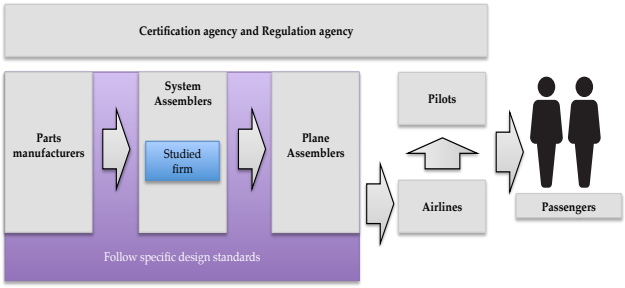

Figure 2. Aeronautics ecosystem in which the studied firm is placed. Adapted from Fricker and Mouldi (2014).

Through an intervention research method (Radaelli et al, 2012; David and Hatchuel, 2008), the authors assisted these two companies in the exploration of value creation at the ecosystem level, which was needed to put in place a low cost strategy. In particular, we analysed how the public transport operator used low cost product design to involve ecosystem players in a value creation exploration, despite the fact that they used to associate low cost to a degraded service for the final users. The aeronautics company also wanted to innovate in one of their products

by proposing a low cost version. Although they were confident in their customer's interest for that kind of product, they were faced to a major challenge, to get their product certified. This was central since regulations made it impossible for their customers to buy non-certified products.

In the first case, the authors were involved in longitudinal collaborative research (Coughlan & Coghlan, 2002) with a public transport company, and one of the author as executive PhD student (Hay, 2004) led an intervention research (Radaelli et al., 2012): she actively participated in the strategy developed during two and a half years. In the second case, two of the authors led a collaborative research during one year with two practitioners in charge of developing a low cost strategy for one of the firm's product.

4. The public transport operator case

The PTO in we studied launched a research project on low cost in the beginning of 2012. The goal of the research project was to find innovative solutions to reduce costs. This was mainly motivated by an increasing challenge to reduce costs through operational effectiveness projects and a desire to expand the firm's activity beyond its historical market.

Part of this research programme, aimed to explore disruptive strategies for public transportation and practitioners, used in collaboration with the authors an oriented creativity method called KCP, for knowledge, concept and project (Elmquist & Segrestin, 2009; Hatchuel, Le Masson, & Weil, 2009). The main outcomes of this method for the PTO were a structured low cost innovation strategy, and a coherent bundle of research projects around proposed innovations. Some of the proposed innovations were radical and challenged the dominant design of public transport. They followed a smart low cost design strategy (Klasing Chen, 2013), which mainly consisted of radically reducing costs and creating more value for the client by starting a design from scratch of a solution to an identified need.

These propositions however, made clear that in the case of a complex value network like public transport, value creation for the final user, as done in simple value networks, was not enough. There was a need to consider other actors in the value chain, the buyer for one, as well as important influencers of the ecosystem.

Rendering the actors of public transport explicit was the first step toward the value creation for the entire ecosystem. It allowed identifying other actors inside the transport system besides the supplier (the transport operator), the buyer (the transport authority) and the user (the passenger), like politicians, user associations, infrastructure, etc... We then proceeded to identifying how transport already created value for all these actors. This allowed us to evaluate who were possible influencers, and also who would be affected by the introduction of breakthroughs in the dominant design.

One of the proposed innovations, for example, proposed the replacement of the physical infrastructure through a virtual one. The value network around infrastructure is completely changed by this shift: the infrastructure builders can be excluded of the new value network, while app developers and other smartphone platform actors must be included. This kind of offer mostly faces violent reactions from the affected actors. They often do their best to avoid being excluded, and are often successful in convincing the other actors that changes would be harmful.

Another example was a business model innovation, based on crowd funding and crowdsourcing. It clearly allowed value creation for the classical actors: the user, the transport authority and the transport operator. It also allowed the integration of additional actors in the value chain, in charge of putting in place and organizing these platforms. However, as can easily be seen in other crowdsourcing activities, the classical actors could easily have been excluded, if the initiative came from outside the PTO. The study of these possibilities clearly shows the interest incumbent actors have in working on these solutions. By opposition to the previous example, in this situation, they adopted a position that allows them to continue being a part of the value chain, as well as to create new partnerships.

In the case of public transport offers proposed inside RATP, adding functions was part of most of the initiatives proposed in the smart low cost design approach. The functions added covered a wide range and were destined to different actors, going from functions for the user, like proposing to book your seat inside the transport, to functions for the competition, like a coordination of all transport modes. Each one of the added functions represented additional costs, and some were evaluated as having little chance of being accepted on their own. The reason for this was that they failed to create value for more than one actor. Combining these new functions often resulted in products that increased the number of beneficiaries of the innovative design activity, making them much easier to be accepted.

Our case study inside the PTO also highlighted several interactions within the transport ecosystem. In the innovations proposed inside the PTO, we often realized the ecosystem was not adapted for their development. But instead of stating that innovations were not feasible due to an unfavourable ecosystem, an effort was made by the research program participants to push innovations in the ecosystem and to overcome difficulties. The work on low cost products actually provided the operator with some of the lacking arguments to discuss changes in the ecosystem with other actors. It furthermore provided an occasion to compare the ecosystem in which the PTO was with other ecosystems, as low cost airlines or frugal health devices and this benchmark helped to show which aspects where really barriers linked to the ecosystem, and which were rigidities linked to the company.

We identified two aspects in which adaptation of the ecosystem played a determinant role to the successful development of low cost offers: infrastructure and contracts and regulations design. In many cases designing an infrastructure is part of the assignments of the transport planner, and the transport operator is picked once the infrastructure already exists. This is often justified by the

calls for tenders, which might be biased if one of the operators participated in the infrastructure design. But it is sometimes also linked to the lifecycle of infrastructure, which is very long when compared to the shorter cycles for which transport operators receive a contract through calls for tenders.

Our work inside the PTO on a smart low cost design of an entire transport system showed that many potential cost reductions could only be achieved by rethinking infrastructure in a direct link to operations. As was observed with low cost airlines and airports, having an infrastructure designed especially for the low cost operation allows positive feedback, adding value both for the airports and the airlines. The same can be observed in the case of low cost transport. Not carrying unnecessary elements inherited from classical operations reduces infrastructure and operating costs.

When looking at existing contracts and regulations around the PTO, a service contract exists between the user, the transport operator and the transport authority. A second contract exists between the transport operator and the transport authority. The main rights of the user and his main obligations are recalled in the contract, and they include but are not limited to the obligation to have a valid transport ticket, to validate it when entering public transport and to produce it on demand; to respect the premises and not litter them; and to respect the security rules.

This contract is only possible in this format because of the existence of the contract with the transport authority and of the orders and decrees', stipulating what is expected of passengers and of the transport operator. In the service contract with the user as it exists nowadays, there are no penalties for train delays, nor for service interruptions. These are all handled in the contract between the public authority and the transport operator. If the operator wants to avoid being regulated by the transport authority, it normally has to propose a service that would not be part of its public transport mission. Not operating a public service would free the transport operator of a series of constraints.

However, to operate a service that would not be part of its public transport mission regulated by a transport authority, the operator would need to create new service contract with the user. Being able to create a different user contract also means being able to change the relationship with the user. Transferring a part of the activity to final users could be part of this new contract. One of the aspects the transport operator has to work on to develop its low cost strategy is on the arguments to make the new contract attractive for the user and its current customers. Findings from this case study are summarized in table 2.

Table 2. Findings from the PTO case study.

Identified constraint	Findings from the PTO case study
Value creation	Value creation needs to go beyond value for the final user, but there is a need to create value for the entire ecosystem. It depends on understanding collective rules and governance mechanisms.
Breakthroughs in the dominant design	Breakthroughs bring about changes in the value network, which can be taken into account through generic value creation. Firms should be proactive in working on breakthroughs to avoid being excluded of the new networks.
Organization to create value in complex value networks	Need to collaborate with other actors in the value chain to achieve higher value creation.

5. The aeronautics case

This case is based on the work done with industrial partners inside a group that builds electrical systems for the aerospace markets, on the design of a low cost cockpit. From a business model perspective, the firm seems to be in classic scheme of BtoBtoBtoX: they sell theirs parts to an assembler, who sells the plane to airlines that finally sell tickets to passengers. In practice, as the company is a cockpit provider, the final user for them are the pilots, who do not paid the supplier for the designed services. Moreover, the value network inside which the industrial partner was situated is well-known to be extremely complex, including several different manufacturers (engine manufactures, airframes manufacturers, component manufacturers), the assemblers, airlines, pilots and regulators.

In this context, the firm started a research project on the development of a low cost cockpit. The research included an analysis of all the certification demands, like the temperatures the cockpit had to be resistant to, and the comparison to what was provided today by the company; as well as an analysis of the standards in place. The goal of this analysis was to identify potential cost reductions by identifying aspects on which the company's product might be delivering more than the customer valued. Furthermore, the company conducted a reflexion on who were the actors affected by changes in their products, and how they should be integrated in the design. This was to make sure the new product could be accepted and integrated into the system.

One of the proposed solutions was to use a tablet-like object to replace the cockpit. Many pilots do indeed already rely on tablets as auxiliary objects to plan their flights, and consider them very handy. However, this innovation was quickly considered as not adapted to the regulations in place. Due to safety reasons, every part of the plane needs to be certified. And to attain the high safety performance airplanes have nowadays, the certification process slowly integrated a certain number of standards and aspects of the dominant design, like the technology used, that make breakthrough innovations systematically appear as impossible to be certified. In the case of the tablet-like object, the temperature constraint

for example demanded important changes to the existing objects. And applying the other constraints seen in regulation, amongst them the test flight hours the object has to have before being certifiable, quickly increased costs.

The result of the exploration of this solution and of other paths identified during the research project was that to overcome this difficulty a certification innovation space should be opened. This space would assemble all the actors of the value network, and allow to discuss and to recreate a new certification, that would not make breakthroughs of the dominant design impossible to be certified. The actors of the value network have to be convinced of the importance of this space. This will only be possible if the new certification space and the products it will allow to certificate can actually create value for the entire ecosystem.

A further possible approach to complex value networks and strong regulations was proposed to launch the low cost cockpit. It was to launch it as a non-certified object sold directly to pilots, clearly classified in some other category than a cockpit. That meant excluding the buyer who used to decide on the service and pay for it and offer the services directly to the final user. This is rather challenging, since it means excluding the firm's main buyer of the value network, and represents certain risks. But several examples exist, although many of them are part of informal economies. That is the case of carpooling services like Uber, or of private waste collection schemes, like those organized by recycling companies. We can also cite the Grameen Veolia initiative (Yunus et al., 2010), where water is directly sold to the population through prepaid cards, with a business model that resembles more to the bottled water business model than to the one seen in European water supply. Findings from this case study are summarized in table 3.

Table 3. Findings from the aeronautics case study.

Identified constraints	Findings from the aeronautics case study
Value creation	Standards and regulations can demand to find new ways to create value, including changes in the actors of the value network and creating new value networks
Breakthroughs in the dominant design	Breakthroughs in the dominant design can be the catalysts for radical changes of the ecosystem
Organization to create value in complex value networks	The existence of standards makes collaboration inside the ecosystem essential to propose breakthroughs. One actor cannot create new standards and regulations on his own.

6. Main results

From the case-studies analyses, we identify two different levels of interaction with the ecosystem that allowed us to develop our model of complex value networks. The first consists in creating innovations that integrate all the actor's value evaluations, while the second level consists of changing the ecosystem by changing the product and therefore regulations and interactions in the ecosystem.

6.1 Creating value for all actors in the ecosystem

Our first result therefore is that the business model innovations in these complex value chains allowed highlighting specific managerial patterns to involve and renew the value evaluation framework of other actors than the firm's customer. The value evaluation frameworks of different actors of the ecosystem were different, and often contradicting. That was namely the case for the PTO, where value for the public authority was, amongst others, measured by the number of passengers transported for a given cost. In opposition to that, value for the final user was measured by being comfortably transported, in a transport that was not overcrowded.

Evaluation of both our cases through the complex value network model, allowed highlighting the other actors inside the value network, and leads us to propose a different approach to value creation.

It furthermore allows us to propose that **generic value creation** can be fostered in complex value networks. We transpose genericity as defined by Kokshagina (2014), meaning in this case the ability to simultaneously create value for several actors. As proposed by Kokshagina (2014) in the case of generic technologies, that should be adapted for several applications that are often still unknown, generic value creation should create value for several actors, some still unknown and sometimes not part of the value network. The network for a proposed innovation might not be the same as the ones found in the dominant design. All actors inside a network might not have been correctly identified, or new, unknown actors might be part of the new value network. Having products with generic value creation allows reducing risks of not creating value for all actors. From this perspective, the analysis of value creation is made possible in innovative complex value networks: the managerial challenge is to build a common core of value the most generic as possible.

6.2 Redesigning the ecosystem

Our second result is to describe how product design in complex value networks challenges the existing regulations and changes relations in the value network. In both companies the contracts and regulations in place do not allow the emergence of new business model propositions. We were able to identify that not only legislations applying to the operator are important, those linked to the authority are also essential. And shifts in the value network including new actors also demand a more comprehensive analysis of legislation. This allows understanding the impacts of these new actors and identifying weaknesses in legislation. But instead of only trying to exploit regulation voids, as has been done in the case of the e-cigarette (Etter et al., 2011), these elements

were used to re-open discussions on regulations in both our cases.

Thus, the PTO was able to open negotiations on transport that would not be evaluated as public transport, but as a proximity service. This meant creating a new ecosystem, where the regulations of public transport did not apply. And in our second case the company worked on creating a space with other actors of the value chain to rethink certification. There was surely a space for creating non-certified objects, where non-aeronautical companies were already positioning themselves, and it represented an opportunity of value creation.

Knowledge on what was valuable for the different stakeholders of the ecosystems also pushed both firms to establish new partnerships with other actors in the ecosystem. The companies were therefore both able to redesign their value network, and often to integrate new actors into the ecosystem. In both cases, the relationships in the new networks were also influenced. These networks focused on creating value for all its actors, and not only for the customer as is normally done in competitive situations and described on literature around value chains. The networks' focus on value creation for all, demanded close collaboration between all actors in the value chain.

6.3 Proposing a model of complex value network

Building on the state of the art and the results from the cases, we could propose a more detailed model of complex value networks. Strongly regulated B2B ecosystems demand a new approach to value, since the final user's, the firm's customer's and external regulators' expectations and value evaluation frameworks have to be taken into account. Value evaluation of products in these cases is structuring in the relationship between actors, and the product itself is the base for he ecosystem and regulations in it. We propose in the table 4 below a specification of the notion of **complex value networks**.

Table 4. Specifications of complex value networks.

	Simple value network	**Complex value network**
Main actors	- Unique Buyer/Final user - Unique Producer/Seller	- Interdependent Final users - Multiple Buyers - Interdependent Producer/Seller - Prescribers
Direct price-cost link for users	Yes	No, products and services often partially or completely paid for / by other actors of the ecosystem
Governance mechanisms	Competitive (Optimization of value for customer)	Collaborative (Optimization of the number of beneficiaries in the network)
Collectives rules of coordination	Firms processes to market launch	Standards and regulations (infrastructure & certifications)
Value creation analysis	Business model and positioning in value chain	In stable ecosystems: dominant design In emergent ecosystems or in case of innovation: Generic value model

7. Managerial implications and discussion

From an academic point of view, our findings and new model add to the theory on ecosystems dynamic. We show how value networks evolve inside ecosystems, as well as how ecosystems can be influenced by product design.

Concerning managerial implications of these results, the first one is that when designing innovations in complex value networks, the value for several actors, not only the direct customer has to be evaluated. This means there is a need to change the design process to take several actors into account, including the business customer in B2B and the final user of the product, but in a joint investigation of value potentials, also open to other stakeholders. Although user integration into the design process has been the object of several studies and has been classified as extremely risky although rewarding (Enkel et al., 2005), taking the user into account does not necessarily mean user integration, especially in the new product development process of B2B industries. This conclusion was also reached concerning other stakeholders of the value at the ecosystem level. In the case of our empirical studies, it meant above all to change the company's value evaluation and their approach to the "customers of value" within the ecosystem. A partnership between the two or more businesses integrating an ecosystem approach can emerge from this effort, and allow the creation of more adapted products and services. This is a very different managerial approach as the usual bargaining over value between stakeholders.

Secondly, incumbent firms in complex value networks should actively seek to participate in radical innovations, since these can create new value networks. Participation in the network's development is a first step to reduce chances of being excluded of it.

The final implication of these results is the possibility for companies in complex value networks to act on both identified interaction levels with the ecosystem. Instead of undergoing regulation changes or trying to find regulatory voids, companies can use innovative product design to influence regulations. By changing their relationship to other actors in their value chain, they can propose or sustain innovative regulations that would take into account innovations that create value for the whole ecosystem.

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