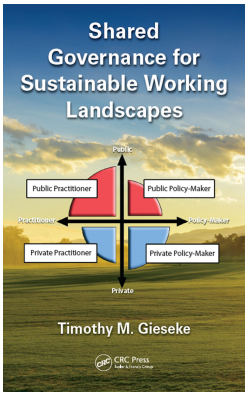

Shared Governance for Sustainable Working Landscapes

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Designing a business ecosystem

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chapter eleven

Designing a business ecosystem

Sustaining agricultural landscapes and governing the glocal commons remains an unresolved wicked problem. The diverse and disparate stakeholders, conflicting governance styles, and challenges of accounting for natural capital ecoservices is currently overwhelming for the corporate, government, and nongovernmental organization (NGO) entities and sectors to address.

In Deloitte's *Business Ecosystems Come of Age*, Eggers and Muoio (2015) see a trend by which many kinds of wicked problems are being recast as *wicked opportunities* and resolved though *solution ecosystems*. Unprecedented networks of nongovernment organizations, social entrepreneurs, governments, and businesses are coalescing around seemingly unresolvable socioeconomic issues. Moore (2006) referred to this opportunity space as a *business ecosystem*.

Thomas and Autio (2013) define a business ecosystem as a network of interconnected organizations around a focal firm or a platform incorporating both production and use side participants with a focus of cocreation of new value through innovation. Moore (1993) described a *business ecosystem* as a space where leaders co-envision and comanage coevolution among members. Leaders in a business ecosystem establish what might be called community governance to achieve *collective action* in a manner similar to democratic and quasidemocratic communities (Moore, 2006). The concept and function of business ecosystems are believed to be capable of better explaining how multisided businesses evolve (Baghbadorani and Harandi, 2012).

11.1 Evolving ecosystems

Ecosystem is a term first coined in 1935 by British botanist Arthur Tansley to describe a community of living organisms and nonliving components (air, water, and mineral soil) linked together through nutrient cycles and energy flows. Types of ecosystems are defined by the network of interactions among organisms, and between organisms and their environment. Moore (1993) expanded the use of the term by suggesting that a company be viewed not as a member of a single industry but as part of a *business ecosystem*.

11.1.1 Business ecosystems

The business ecosystem is a new and important stream of theory in the field of strategic management. It uses metaphors and concepts from ecology and develops a new way of looking at relations between firms. Businesses are seen as interconnected and interdependent members of *ecosystems* that coevolve and share a common fate (Baghbadorani and Harandi, 2012).

In a business ecosystem, companies coevolve capabilities around new innovations by working cooperatively and competitively to support products, satisfy customer needs, and eventually incorporate the next round of innovations (Moore, 1993). A business ecosystem can also be conceived as a network of interdependent niches that are more or less open to the world of potential contributions and creative participants (Moore, 2006). Business ecosystems are dynamic and coevolving communities of diverse actors typically bringing together multiple players of different types and sizes in order to create, scale, and serve markets in ways that are beyond the capacity of any single organization. Competition, while still essential, is certainly not the sole driver of sustained success. Participants are incentivized by shared interests, goals, and values, as well as by the growing need to collaborate in order to meet increasing customer demands, from which all can derive mutual benefit (Kelly, 2015).

In contrast to the conventional value chain view, business ecosystems offer a dynamic, systems view. This view consists of the value chain of a business and those with rather indirect roles, such as companies from other industries producing complementary products or equipment, outsourcing companies, regulatory agencies, financial institutes, research institutes, media, universities, and even competitors. Economic competition no longer resides at the business level, but competition is formed and defined between business ecosystems (Baghbadorani and Harandi, 2012).

Business ecosystems do differ from natural ecosystems, in that the actors in business ecosystems are intelligent and are capable of planning and picturing the future with some accuracy. Second, business ecosystems compete over possible members. This kind of behavior is not observed in nature. Third, business ecosystems are aiming at delivering innovations, where natural ecosystems are aiming at pure survival (Liu, 2013). With this conscious guidance, an increase in the rate of ecosystem evolution is expected as the ecosystem concept continues to become more embedded in business culture and processes.

11.1.2 E-commerce ecosystems

Amor (2000) credits International Business Machines (IBM) for coining the term e-business in 1996 to describe the use of information and communication technology to enable relationships with individuals, groups,

and other businesses via the Internet. The concept of a digital business ecosystem emerged in 2002 by adding *digital* to Moore's (1993) *business ecosystem* (Nachira et al., 2007).

Lihua et al. (2010) defined e-business ecosystems as an organic ecosystem that is made of enterprises and organizations with close relations, using the Internet as a platform to create alliances, share resources, and make full use of their advantages beyond geographic limits. The basis for this definition was the Alibaba Group, an e-retailer whose business model and prospectus is based on the ecosystem business model. The term *e-commerce ecosystem* is analogous to e-business and digital business. It is a term used by Liu (2013) to describe the application of natural ecosystem theory to business ecosystems. Liu (2013) traces this evolution back to the study of systems theory, to the application of ecological theories and business methods to reach this advanced stage of e-commerce ecosystems.

11.1.3 An eco-commerce ecosystem concept

An eco-commerce ecosystem is described as the next conceptual phase on the continuum of natural and business ecosystem evolution. Figure 11.1 depicts this evolution beginning with the natural ecosystems that humans rely on for food, shelter, and other provisions. As society evolved, businesses were created and their interactions eventually evolved into business ecosystems (Moore, 1993).

With the advent of the Internet, big data, and communication networks, business ecosystems evolved into increasingly connected e-commerce ecosystems. The Alibaba Group, the largest online and mobile

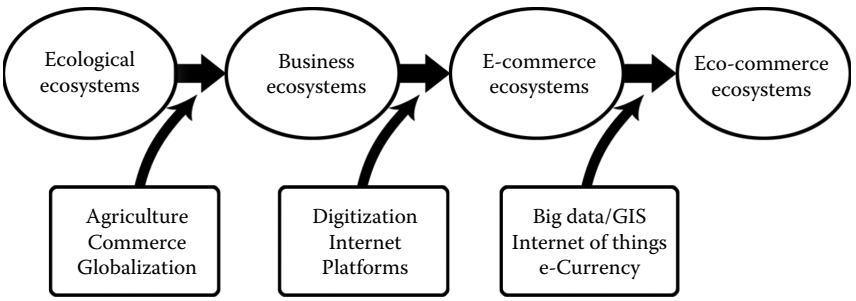

Figure 11.1 Ecosystem *types* are in a constant state of evolution beginning with early humans interacting directly with ecological ecosystems for all their provisions. Agriculture and commerce led to the development of business ecosystems. With the advent of digitization, the Internet and platforms, e-commerce ecosystems emerged in the 1990s. With big data, GIS, algorithms, and e-currency systems, ecological benefits can be accounted for and exchanged in eco-commerce ecosystems. (Adapted from Liu, H., Z. Tian, and X. Guan. *International Journal of U- and E-Service, Science and Technology* 6, no. 6, 41–50, 2013.)

commerce company in the world in terms of gross merchandise volume, operates an ecosystem using a multisided platform for third parties. In its prospectus, it uses the term *ecosystem* 160 times.

It is through the knowledge gained from the ecological, business, and e-commerce ecosystems that an eco-commerce ecosystem can be designed. Incorporating geographical information system (GIS) capabilities, natural capital units (NCUs), and the capacity to conduct transactions are new traits in the evolution toward an eco-commerce ecosystem. In a nutshell, ecological ecosystems beget business ecosystems, which beget e-commerce ecosystems, which beget eco-commerce ecosystems.

The eco-commerce ecosystem concept has capacities similar to Esty and Ivanova's (2002) global environmental mechanism that would characterize environmental problems, create space for environmental negotiation, and sustain a buildup of capacity to address sustainability issues. The eco-commerce ecosystem contains a negotiation space where ecoservice values of the natural ecosystem interface with the ecoservice capacities of the e-commerce ecosystem. In other words, the functions and processes of the natural ecosystem are accounted for by using the functions and processes of the e-commerce ecosystem. Resolving the complexity issues of the intertwining ecosystems is the function of an eco-commerce ecosystem.

11.1.3.1 Interface of ecoservice values

The plane or point where the ecosystems interface is where complexity converges, values are accounted for, and sustainability issues can potentially be resolved. An interesting, yet somewhat obvious revelation at this interface is the recognition of the similarities of the definitions of e-commerce ecosystem services and ecological ecosystem services.

The Alibaba Group states that it does not engage in direct sales, compete with their merchants, or hold inventory, but provides the fundamental technology infrastructure to help businesses leverage their capacities to conduct commerce. In other words, the value of the Alibaba Group resides in providing the *structure, processes, and functions* of the e-commerce ecosystem to enable other businesses to create value within the Alibaba Group ecosystem. These structures, processes, and functions are the *ecoservices* of the Alibaba ecosystem. The entire valuation proposition of the Alibaba Group is based on creating these ecoservices.

Perhaps not just coincidently, the wicked challenge of sustaining the agriculture landscape is how to value the structure, processes, and functions (ecoservices) of the agroecosystems. It is at the interface of the natural ecosystems and the business ecosystems that new ecoservice valuation strategies lie. The concept of the eco-commerce ecosystem is based on the application of the structure, processes, and functions of an e-commerce ecosystem to account for the ecoservices (structure, processes, and

functions) of the agricultural landscape ecosystem. The parallels between natural and business ecosystems identified by Moore (1996) continue to unfold as greater complexity is revealed.

11.2 Ecosystem design layers

Designing a platform-based business ecosystem is unlike a traditional business supply chain where a product is produced and then delivered into an existing or developing market. When designing an ecosystem, it is the interaction of the participants and their roles, not the market, that is essential (Adner, 2006).

Design considerations for a business ecosystem include the environmental layer, participant layers, and risk management. The environmental layer includes the economic, technology, natural, social, cultural, law, policy, and financial groups and issues that surround the participants and frame the entire ecosystem (Yu et al., 2011). The participant layer includes the leaders, users, and contributors: those that create, support, and interact with the platform. The risk management layer includes typical business assessments as well as issues associated with users and contributors of the platform that are not under direct control of the platform builders.

11.2.1 Participant layers

Platform participants can be described in multiple ways. Yu et al. (2011) identified three internal groups (*leader, key,* and *support* populations) and two external groups (*related* and *parasitic* populations) to describe the populations in a business ecosystem. Baghbadorani and Harandi's (2012) similar model is used here and describes three participants layers: leaders, users, and contributors.

11.2.1.1 Leader layer

The leaders' layer contains the platform, vision and governance (Baghbadorani and Harandi, 2012) of the business ecosystem. Lihua et al. (2010) identifies this layer as the core of the business ecosystem, providing the platform and regulatory services that integrate and coordinate the ecosystem. It sets the vision and standards for the other members of the ecosystem to follow. The main value that the business ecosystem leader brings to an ecosystem is the platform and the tools and frameworks it provides.

11.2.1.1.1 Platform Creating an ecosystem begins with building the platform to create the conditions that enables interaction. Since value is produced by the users, the platform must overcome obstacles such as the chicken-and-egg dilemma, converting consumers into producers,

encouraging producers to produce more, and providing an adequate incentive for users to engage and interact on the platform (Choudary, 2015).

The platform may be monetized through strategies such as a transaction fee, a producer fee for access, revenue from advertisements, or a freemium strategy where enrollment is generally free with users paying for more advanced tools. Participants will support the monetization strategy if it brings value to the participants. Hagel (2015) categorized multisided platforms into types based on what they do for their participants:

1. Aggregation platforms focus on transactions or tasks to be completed. These tend to operate as a hub-and-spoke mode supporting generally short-lived relationships based only on a particular transaction. Transactions are usually brokered by the platform owner and organizer. These platforms aggregate data, participants, and collaborators.
2. Social platforms are similar to aggregation platforms in that they aggregate people, but focus on building long-term relationships rather than just a transaction. The connections are network-based, rather than a hub-and-spoke model and so transactions or communications do not usually go through the platform owner.
3. Mobilization platforms are designed to connect a group of people to accomplish something beyond the capabilities of any individual. Because of the need for collaboration, these platforms tend to foster long-term relationships to achieve a shared goal. Examples include open source software platforms and social support platform movements.
4. Learning platforms have an emphasis on small work groups with trust-based relationships that take on a particular challenge. These platforms not only create efficiencies in collaboration and transactions as the other platform types, but also grow the participants' knowledge and accelerate performance improvement.

Hagel (2015) sees the first three platforms listed as having the potential to evolve into learning platforms. Businesses that find ways to design and deploy learning platforms will likely be in the best position to create and capture economic value in an increasingly challenging and rapidly evolving business environment.

11.2.1.2 User layer

The user layer contains the key species of the ecosystem: the customers involved in business trading, as well as consumers, retailers, manufacturers, and suppliers (Lihua et al., 2010). The users are those that interact directly with the core functions of the platform (Yu et al., 2011). Users are the vital components as they purchase the products and services

that business ecosystems are formed to produce. Hence, without users, formation of an ecosystem could be meaningless.

11.2.1.3 Contributor layer

The contributor layer includes supportive and parasitic species (Lihua et al., 2010) consisting of numerous interdependent organizations and individuals contributing to the evolution of a business ecosystem. These organizations actively work on platforms to improve their performance, while extending the capabilities of the platform. Contributors carry out tasks related to design, production, operations, distribution and delivery of products, solutions, and services (Baghbadorani and Harandi 2012). Considered supportive species, they are not dependent on the business ecosystem for their survival and include logistics companies, financial institutions, telecommunication suppliers, and government agencies.

Parasitic species are companies that must coexist with the business ecosystem. They rely on the ecosystem for survival. Typical instances are value-added service providers, such as technology vendors, advertising and marketing service providers, training agencies, and consulting firms (Lihua et al., 2010). These businesses and the business ecosystem rise or fall as one (Yu et al., 2011).

11.2.2 Risk management layer

Business ecosystems contain greater uncertainties than a typical supply chain due to the dynamic nature and relationships associated with participants in the user and contributor layers (Adner, 2006). Initiation risks are similar to other types of businesses and include product feasibility, supply chain access, and potential competition. Risks specific to platforms include interdependence and integration risks associated with external contributors that one has little or no control over. These risks dramatically increase as the number of interdependent intermediaries increase.

To assess these risks, Adner (2006) suggests mapping the business ecosystem to reveal insights where problems may arise. Firstly, identify all the intermediates and the innovations that must be adopted prior to the users creating value. Secondly, estimate the delays caused by integrating these intermediates and innovations into the ecosystem. These delays are often compounded by those intermediates lying farther out in the ecosystem. Thirdly, on the basis of those estimates, calculate the probability of the ecosystem materializing. This risk assessment is critical if several intermediates are depended on for developing the platform. Adner (2006) calculates the risk of four intermediates, with each having a 90% of delivering their innovation, as having a 66% chance of occurring. In this case, it is $0.9 \times 0.9 \times 0.9 \times 0.9$, which is 66%.

11.3 Strategies for an eco-commerce ecosystem

To create a thriving ecosystem, a system of trust must be built into the ecosystem layers. This trust must be constructed within the context of the business ecosystem and considered a tangible, actionable asset that is created (Covey and Merrill, 2006). The platform architecture and the curation process for data and participants must provide confidence to the users and contributors that their interactions will generate positive returns. It must also enable users to work through issues that emerge.

A common mistake that managers make is to plan out the full ecosystem with rigidly held positions, roles, and strategies of delivering the product or service to the end customer. If this approach is taken, managers tend to overlook the processes through which the ecosystem will emerge over time. A successful growth strategy accounts for the delays, challenges, and risks that are inherent in collaborative networks (Adner, 2006).

A successful platform strategy (Choudary, 2015) requires a *magnet* to bring the user groups to the platform, *a toolbox* of technology to enable the users to conduct their activities, and a *matchmaking* process to correctly connect users using valid data. It must also contain an incentive design where users experience some level of fun, fame, and/or fortune.

11.3.1 User magnet

Due to the chicken-and-egg scenario of multisided platforms, attracting initial users is challenging as values are nonexistent or relatively low prior to the engagement of two or more users' groups. In the case of the multisided shared governance (MSSG) platform, the supplier group consists of the platform managers, farmers, and land managers and the demander group consists of governments, corporation, utilities, and NGOs. The magnet for the supplier group is to account for and understand their level of sustainability with the potential that some entity seeking sustainability values will connect and purchase them. The magnet for the demanders is to procure landscape data that meets their sustainability objectives.

While both are options, it would seem that sustainability demanders associated with corporate supply chains and utilities associated with water quality trading schemes would be the most promising initial clients. The magnet in this case is affordable and readily accessible S1.0 NCU data they could acquire directly from the platform and the potential to search for an optimum location to generate credits or achieve objectives.

Government users could have many application needs depending on the agency and their objectives, but may be initially reluctant to use a nongovernment platform. Green bond financers may use the platform to assess areas of interest with low natural capital functions with the potential to increase natural capital functions. Academia may use the platform

for research related to landscape management, index development and use, economic valuation schemes, and transdisciplinary research. NGOs could use the platform for some or all of the uses mentioned to meet their organizational objectives. In all cases, it becomes more attractive to users as the number of engaged sectors and organizations increases.

11.3.2 Technology toolbox

The platform architecture contains the technological infrastructure for interaction and enables users to retrieve or generate new values. The MSSG platform is based on a GIS-gridded landscape containing natural capital cells (NCCs). Each NCC is identified by its location and contains landscape data with an accompanying cache of indices to generate NCUs. This architecture becomes a basis for a smart assessment whose value can cascade down the value stream to be used for planning, implementation, portfolio development, assurance, auditing, and valuation.

The MSSG platform enables a *participatory approach*, a vital component of an assessment due to its ability to bring new information to the scientific, government, or economic community. This level of landscape intelligence is seldom attainable by any other means.

This information is then packaged as NCUs with multiscale and multiscope capabilities, allowing numerous stakeholders to interact at the scale and within their parameters of choice—such as soil quality at the field scale or carbon at a regional scale. The resulting data can be readily sorted, compiled, and queried to provide specific resource information needs to varying government and nonprofit organizations, and the private sector. Therefore, the management data itself becomes a value above and beyond the value of resource-management outcomes. This occurs because the resource-assessment data generates the landscape intelligence that can become the basis for supply-and-demand dynamics of ecoservice markets. Properly packaged, it becomes commoditized data capable of generating income from a variety of transaction types. Due to the range of transaction values and the nearly unlimited number of potential transactions, an internal platform cryptocurrency is proposed.

11.3.2.1 Cryptocurrency

A MSSG platform cryptocurrency would be an internal currency designated for commerce within the eco-commerce ecosystem. A cryptocurrency is a medium of exchange designed for the purpose of exchanging digital information through a process made possible by certain principles of cryptography (Box 11.1). Cryptography is used to secure the transactions. In most cases, it is also used to control the production of new currency units or coins as it relates to fiat currencies (Godsiff, 2015).

BOX 11.1 CRYPTOCURRENCIES

A cryptocurrency is a medium of exchange such as the U.S. dollar. Bitcoin, the first cryptocurrency, appeared in January 2009. There are more than 672 in use in 2016.

Like the U.S. dollar, a cryptocurrency has no intrinsic value; it is not redeemable for another commodity, such as gold. Unlike the U.S. dollar, however, cryptocurrency has no physical form, is not legal tender, and is not currently backed by any government or legal entity. In addition, its supply is not determined by a central bank and the network is completely decentralized, with all transactions performed by the users of the system. The term cryptocurrency is used because the technology is based on public-key cryptography, meaning that the communication is secure from third parties. This is a well-known technology used in both payments and communication systems.

Source: Murphy, E.M. et al., Bitcoin: Questions, Answers, and Analysis of Legal Issues, Washington, DC, Congressional Research Service, 2015.

Fiat currencies are those that have no intrinsic value such as being backed by a physical commodity. The value of fiat money is derived from the relationship between supply and demand rather than the value of the material it is made from.

Rather than a fiat system, the value of a MSSG platform currency would be associated with NCUs in some manner. Since there is a limited number of NCCs delineated on the surface of the earth (~6.4 trillion), the total number of cryptocurrency units could be associated with this finite and apparent number, creating a nonfiat currency based on natural capital and its capacity to produce ecoservices and ecological goods.

Some of the advantages of cryptocurrencies are low transaction costs, borderless transferability and convertibility, and trustless ownership and exchange (Tether, 2015). This allows peer-to-peer transfer of value over the Internet much like paper currency is exchanged between people, except every transaction is validated with cryptography. Cryptography protocol could simplify complex asset transfers and be able to publicly identify who currently owns a unit of property such as an NCU, and could include a record of both past ownership and other history. Such efficiencies and data reduce transaction friction by allowing individuals to directly transfer property without the use of a broker, lawyer, or notary to sign. Traditional contracts could be replaced by code that self-executes when a triggering event occurs. These characteristics provide NCU transactions

at a scope and scale that is simply not possible with traditional means of transactions. A carbon impact factor (CIF) is an example of a family of cryptographic financial instruments, serialized and blockchain-enabled, that is proposed to be used to quantify and value the carbon efficiency associated with the production of agriculture commodities (Madden et al., 2015).

11.3.3 Matchmaking, incentives, and trust

If users are attracted to the platform to seek value for their ecoservices or achieve a sustainability objective, then two agreeing parties must be connected to fulfill this transaction. This matchmaking process can be accomplished through queries on what type of sustainability values are being produced or which values are needed to address sustainability objectives. The platform could identify specific areas of interest such as a watershed contributing to harmful algae blooms in the Great Lakes, a region supplying drinking water to the Des Moines Water Works service area or fields that contribute a commodity for a specific product.

Connecting corporate suppliers with land managers in a cost-effective manner is often enough incentive to encourage interaction. It is through a well-designed curation process and ease of interaction that eventually builds platform use and trust.

11.4 Ecosystem emergence considerations

An emerging business ecosystem is analogous to the process of ecological succession in biology. Grasses and shrubs create or stabilize a new space and are followed by conifers and nitrogen-fixing trees such as Alders. These, in turn, produce more fertile conditions for hardwoods to progress toward the climax structure of a rich, diverse, and stable ecosystem with substantial biomass (Moore, 2006). Ecologically, this scenario is described as a state and transition model, where each state incurs some level of stability until certain thresholds are reached and the ecosystem transitions to a new state (Stringham et al., 2003).

Thresholds may be reached through gradual succession as described by Moore or by a more disruptive environmental change, such as the introduction of invasive species, pollution, disease, fire, or flood. A threshold is a point in the transition that results in a change in the state. The new state may be a degraded, less productive state, or a highly productive, more diverse climax state. As a complex system, no one can control the process of transition or the endpoint, but one can attempt to initiate and support this shift.

Thomas and Autio (2013) proposed three phases of business platform ecosystem emergence: initiation, momentum, and optimization.

The initiation phase consists of the initial idea, resource gathering, and early operation. Early operation consists of prototypes, restricted access, sense- and rulemaking, low levels of promotion, some press coverage, and insignificant competitor activity.

The momentum phase is when the ecosystem begins to grow rapidly, driven by incoming investment, increasing numbers of participants, emerging positive network effects, aggressive marketing, industry, and societal interest, as well as competitor activity. During this phase, ecosystem growth is the main goal, with much interaction and commerce between the hub firm, users, and contributors.

The optimization phase is when the focus of activity moves from expansion to control and value appropriation. With the ecosystem established as the undisputed leader, focus now shifts closer to control of the activities of ecosystem participants and value appropriation. The rate at which the ecosystem moves through these phases is related to how well resource, technological, and institutional activities are executed within the context of the existing environment at large.

Resource activities are associated with developing organizational capacity. Technological activities are associated with platform performance and institutional activities are those efforts that establish norms of behavior, governance, and procedures within the ecosystem.

Overall, the institutional activities shape a shared understanding resulting in a collective identity of the ecosystem and assist in influencing contextual activities relating to the efforts of organizations outside the ecosystem, but within the overall environment.