

Healthiness of a Business Ecosystem: Its Structure and the Role of IT

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Abstract

In a customer-driven economy, single-business level analysis may not be sufficient. A large number of loosely interconnected participants who depend on one another for their mutual effectiveness and survival make up a business ecosystem. A business ecosystem is a holistic view of vital flows and relationships that sustain business activity. Businesses need to understand their physical condition in a business ecosystem to evaluate their capabilities. This paper defines the healthiness of business ecosystems in order to understand their competitiveness. It can give business an actionable guide. Healthy ecosystem means a business environment that has had four capabilities to survive. IT plays a leading part in healthy business ecosystem. It looks into business strategies and the role of IT in business ecosystems.

Keywords:

Business ecosystem; Healthiness; IT

1. Introduction

Customers live in an information-rich environment. Now, information, products, and services become commodities, and value-added and associated service levels become key differentiators in creating sustainability in business [22]. The strategy of a single corporation has limitations for producing valuable products [19]. Accordingly, the business should collaborate with other organizations to make their business ecosystem survive [11].

In a number of research, the capabilities of core inter-organizational processes, such as customer relationship management, supply chain management, and contract manufacturing, are suggested as critical to firm performance [1]. This indicates the importance of business relationships and the diversity of organizational partnerships [16, 5]. A business ecosystem uses an ecological, holistic lens for viewing all of the relationships and flows that affect an organization [24, 10]. A business ecosystem can be defined as an extended business network that includes customers, competitors, suppliers, retailers, and other financiers [7, 10, 14, 15, 16]. A number of research emphasize an ecosystem perspective. However, there is no actionable guide to adapt the field. For using the

concept of ecosystem, a more practical approach is needed. This paper extends and refines the business ecosystem concept to recognize the firm's high performance through healthiness. In a business ecosystem, symbiotic relationships ultimately benefit consumers [22]. Healthiness creates symbiotic relationships. More definitely, these benefits can be created in a healthy business ecosystem.

Some studies mentions and emphasize the healthiness of business ecosystems [10, 14]. Healthiness means the desired state of a business ecosystem. However, it has its limit in adaptation and use in a real business. Therefore, we provide four dimensions about healthiness. Then we consider IT roles in a healthy business ecosystem. IT plays an important role in business ecosystems. Limited academic investigation has been carried out on how and why IT can create healthiness gains for firms in a business ecosystem context. Central to this paper are two ideas: business ecosystem healthiness and the IT role.

The purposes of this article are not only to define what a healthy business ecosystem is and how it differs with organizational competitiveness, but also to conceptualize the role of IT in healthy business ecosystems. To do this, we first review the basic concept of business ecosystems. Second, we discuss the importance of healthiness in the aspect of competitiveness. Then we provide four dimensions for understanding healthiness. Third, we provide the business issues of ecosystems in terms of IT. Fourth, we provide the implications of our work for managers and researchers. Finally, we mention the limitations of this work, and provide the directions of future work.

2. Business ecosystem: a bird's-eye view

Although there is no universally accepted definition, a business ecosystem can be understood as the loose networks comprising suppliers, distributors, outsourcing firms, makers, service providers, and technology providers [10, 14, 15, 16]. James Moore defined the business ecosystem as being made up of customers, market intermediaries, suppliers, and the core business itself [10]. Business ecosystems are composed of a number of related groups of organizations or business domains [14]. After the introduction of this concept in business by James Moore, the term then aroused the interest of researchers and

practitioners. Business ecosystem looks into a loosely interconnected business network. However, the term business ecosystem started from a biological and ecological perspective of economic environment [17]. That is, the characteristics of a business ecosystem are explained by the advantages of business network and the features of ecological behaviors. The ecological perspectives have a number of implications for business and organizations [20, 12, 13].

The business ecosystem concept is usually based on the following characteristics: relatedness, dynamic and symbiotic relationship, many organizations, and shared fate [7, 14, 15, 16, 18]. In other words, a business ecosystem is relationship-oriented, with dynamic and symbiotic relationships [22, 18]. They are dynamic because they are in a constant state of change, while they are symbiotic because each partner in the relationship benefits [22, 15, 18]. For example, when a special promotion is over, the store and the operator may have no further need to cooperate, so other partnerships will be maintained dynamically. The relationships between organizations, partners, and customers are intimately linked and constantly evolving [18].

Many studies emphasize that the business ecosystem concept gives businesses a chance to understand their environmental opportunities and create their new market opportunities [19]. In addition, they argue for the need for practitioners to build healthy and rich business ecosystems [15]. In other words, important studies into business ecosystems relate the healthiness of the ecosystem with competitiveness in this context. It can be an easy-to-use guideline for practitioners. Here, the meaning of healthiness should be particularly investigated to understand the ecosystem perspective. As a key issue in this context, the conceptual foundations for healthiness in business ecosystems are investigated in this paper.

3. Healthiness of business ecosystems

3.1 Healthiness and competitiveness

A primary goal of an organization living in a business ecosystem is to increase market share. Therefore, all customers included in their business ecosystem should be satisfied. Previous research has said that the company should make their business ecosystem healthy to achieve their business objectives [15]. James Moore discussed the importance of a rich business ecosystem [10]. A rich business ecosystem is one that is strong enough to grow and be profitable [10]. Iansiti and Levin stated that the healthiness and competitiveness of a business ecosystem help it to be more resilient to market changes and more responsive to customer needs [14, 16].

Healthiness means the desired state of business ecosystems. Previous studies use healthiness together with competitiveness [11, 14]. If we look more minutely, there

are some different meanings comprised in the ideas of healthiness and competitiveness. Therefore, we compare the healthiness and competitiveness to exactly explain the meaning of healthiness. The healthiness of a business ecosystem is an *absolute concept* having a meaning that every ecosystem must be healthy to ensure its survival. In contrast, the competitiveness of a business ecosystem is a *relative concept*, meaning that an ecosystem should have competitive advantages to ensure its success among similar ecosystems. For example, there are two healthy finance ecosystems. The first ecosystem actually has a greater capability to get a bigger market than the other. In this case, we can say that the first ecosystem has competitiveness but the second one does not. Here, we notice easily that there is a difference between the two concepts. Detailed examples of healthiness and competitiveness are discussed in Section 3.3.

Ryder (1990) said of 'ecosystem health' that "the alluring feature of the human health metaphor is that people have an inherent understanding of personal health." [21]. We found some ideas through an initial definition of health and healthiness. Basically, according to the definition of WHO, health is the ability to efficiently respond to challenges and effectively restore and sustain a state of balance. Then healthiness means the state of possessing good health. That is, we can understand the healthiness concept as the homeostasis mechanisms: it is the property of an open system, especially of a living organism, to regulate its internal environment to maintain a stable, constant condition, by means of multiple dynamic equilibrium adjustments, controlled by interrelated regulation mechanisms [23]. Thus, the equilibrium is based on the internal stability and external robustness.

The healthiness should be clearly defined for us to understand the capabilities of a business ecosystem. Surprisingly, this important issue is often noted but rarely studied in the vast literature on healthiness. Section 3.2 provides a framework for how one might analyze and understand the healthiness of a business ecosystem.

3.2 Healthiness dimensions

What makes a business ecosystem healthy? We seek the dimensions of the extent to which a business ecosystem has durable growth of opportunities for its members and improves the benefits it delivers to its customers. Iansiti and Levien developed three healthiness measures: robustness, productivity, and innovation [14, 15, 16]. They provide considerable insight into healthiness issues, and their three key measures are implacable in this area. Nevertheless, there remains an unexplained aspect. These three variables seem plausible, yet they require further consideration. First, Iansiti and Levien said that robustness is an ability to guard against external shocks and provide a degree of predictability [14, 15]. It is an inconsistent explanation. Of course, a healthy business ecosystem should be robust in the face of perturbations and disruptions. However, the term

predictability can be included in creative innovation capabilities – their third measure. Second, productivity is explained as the second construct of a healthy ecosystem that is able to produce more with the same or less input. This includes the ability to consistently transform technology and other raw materials of innovation into lower costs and new products. While the concept of productivity is significant, new products and new markets should again be treated as an aspect of creative innovation. Although they suggest the ROI measure for evaluating the productivity of a business ecosystem, the ROI cannot fully explain the productivity. Finally, they proposed the innovation. The innovation means the variety or diversity in a business's new products or services. The variety and diversity are very important in both ecological and business literature [14]. However, the variety and diversity can be used to mean the diversity of species (of different organizations) or the variety of products and services. If the diversity is used to indicate products and services, this concept can be understood as a part of innovative creation,

but if the diversity is used to indicate the idea of different 'species' of organizations, then a new concept, stability, is needed, to fully explain the healthiness. Diverse species are needed for stable ecosystem. Here, we can bring up one more dimension.

One more dimension, stability, is a fundamental dimension for explaining healthiness. It is different from 'robustness' in its aspect of environmental influence. Stability is considered among organizations inside the business ecosystem itself. However, robustness is considered the ability of the business to protect itself from outside environmental changes. In a biological ecosystem, the diversity of species can be regarded as the major indicator to explain their stability and healthiness. The diverse species, meaning the variety of organizations, support the stability of the business ecosystem; this is the initial state of healthiness. On the basis of this fundamental idea, we redefine the healthiness dimensions and summarize the concept in Table 1.

Table 1. Healthiness of business ecosystems

Recommended states in previous research		Proposed healthiness	
(Moore 1993)	(Iansiti 2004, 2005)	Healthiness dimensions	Healthiness measures
Stable structure	-	Stability	Diversity
			Dependency
Robust, Resilient, Predictable	Survival rate	Robustness	Resilience
			Reliance
Profitable	Productive	Productivity	Effectiveness
			Efficiency
Innovative, Responsive	ROI		Prediction
	Product diversity	Creativity	Innovation

Stability

The structure and process of a rich ecosystem are reasonably stable. Both in ecological and business literature, it is important that systems also exhibit variety or diversity [14]. The complex web of relations composed with diverse organisms gives many alternative choices of scarce and valued resources in an ecosystem. Variety means how many different species or types of organizations there are. The diversity provides greater choice and reliability to the customers [15].

Robustness

Business ecosystems must keep their sustainability and viability to confront environmental threats. A healthy business ecosystem is robust in the face of perturbations and against external shocks. Resilience and reliance can be great indicators of robustness.

Productivity

Productivity is the ratio of the output of goods and services in dollars devoted to the production of that output [14, 15, 16]. A healthy business ecosystem is able to produce more with the same or less input. It indicates the effectiveness and efficiency of a business ecosystem's core behavior.

Creativity

Creativity means the ability to consistently transform the raw materials of innovation to increase meaningful diversity through value creation. A primary goal of a business ecosystem is to create a new market and increase their market share. In this creativity, diversity means a number of valuable products or services. To carry out creative innovation, the business ecosystem extends the new relationship to competitors, retailers, and other business partners to deliver services through a single brand. For this creativity, prediction and innovation capabilities of the business ecosystem must be free for creating niche markets.

3.3 Various angles of healthiness

Figure 1 reveals the healthiness and competitiveness according to healthiness dimensions. Healthiness has four dimensions and each dimension has two sub-dimensions. There are many types of business ecosystem, such as business ecosystem I and II.

Business ecosystem types and healthiness

Four healthiness dimensions are basically significant in every ecosystem. However, according to the type of

ecosystem, more important dimensions can be determined in an ecosystem. For example, in a business ecosystem I, stability and robustness are more important dimensions than productivity and creativity. On the other hand, creativity and productivity are more important dimensions than others in a business ecosystem II. For example, in a finance ecosystem, the stability of an economic stream is the most important healthiness factor, but in an IT ecosystem, creativity to conduct a device convergence can be suggested as the most important dimension.

Business ecosystem maturity and healthiness

All business ecosystems can evolve. Depending on business ecosystems’ states of maturity, all dimensions of healthiness can be competitiveness factors, or alternatively, the dimensions of healthiness may not influence competitiveness. As we mentioned above, competitiveness is a part of healthiness. The maturity of ecosystems can change the degree of competitiveness. Maturity can be explained by an average of other ecosystem’s healthiness such as competitors’ healthiness. By the level of business ecosystems’ maturity, the elevation of competitiveness

change.

In other words, if all business ecosystems are in the initial phase of evolutionary stages, stability and robustness can be significant competitiveness factors. However, in other cases where a lot of ecosystems already have stability and robustness, the stability and robustness do not contribute to competitiveness anymore. If every ecosystem has already established all the dimensions of healthiness, then healthiness is not a competitiveness factor, but the foundation to compete is. Therefore, we know that competitiveness can be a part of healthiness in evolutionary stages.

By the proposed healthiness concepts, we can comprehend the different meanings between healthiness and competitiveness. The most important thing is that healthiness is fundamental to the capability to survive and compete. Therefore, healthiness can be understood as a desired state of business ecosystem. We use it to frame the role of IT aspect of business ecosystem strategy.

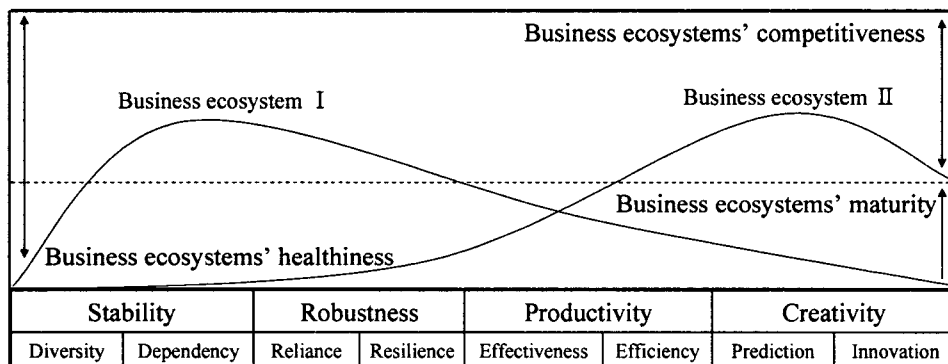


Figure 1. Healthiness and competitiveness of a business ecosystem

4. The roles of IT in healthy business ecosystems

Some research posited that IT can be an important asset in making a healthy business ecosystem [1, 16]. Because a business ecosystem is based on a number of relationships and those relationships are difficult, the creation of successful relationships is a key factor for success. When IT can manage business domains and control inter-organizational relationships within a business ecosystem, it becomes a significant and reusable resource. At this point, there are some major technical and business issues that must be addressed. Moreover, for aligning the business and IT [8, 4], this paper considers the business strategies first and then suggests the roles of IT according to healthiness concepts.

4.1 IT roles for healthiness

IT roles for stability

Businesses must understand their business ecosystem first [19, 22]. In Section 3, we mentioned that the diversity of

species is a fundamental condition of healthiness. If a business ecosystem has diverse organizations, as well as customers, suppliers, banks, retailers, and so on, the business ecosystem is balanced in the aspect of stability for claiming initial healthiness. Organizations in a business ecosystem are comprehended in the same way as species in a biological ecosystem. The diversity of species is an initial condition for having a healthy business ecosystem. For example, in a customer demand-driven economy, payment can be made with a combination of electronic money, frequent-flyer miles, and affinity points [22]. For this to be possible, business ecosystems must be connected with other systems in other organizations for complete purchasing [22]. For healthiness, business ecosystems should make a stable ecosystem composed of diverse organizations, even non-profit organizations [6]. For carrying out this strategy, IT can be a significant resource. It is difficult to find a boundary in a business ecosystem [14, 15, 16]. IT assists executives to find all of the business domains and classify the relationship types to find their business ecosystem boundaries. IT also permits stable communication between diverse organizations and helps to make contact for

building new relationships.

IT roles in robustness

Business ecosystems’ robustness is made up by resilience and reliance. The changes in governance regulations, customer buying patterns, and macro-economic conditions are some examples of environmental changes [10]. If some species in a business ecosystem are damaged by outside environmental change, the stability of the entire ecosystem could collapse [10]. Therefore, business ecosystems must monitor critical business domains and assist unhealthy species to recover. To do this, IT can offer a fast response time between species and can monitor the states of individual organizations. And IT can produce reasonable solutions for solving the damages.

IT roles for productivity

Overall productivity can produce benefits for all members of an ecosystem [14, 15, 16]. For business ecosystem productivity, the company should distinguish dominant domains and supplement tight relationships to make an effective and efficient production line. IT provides holistic effectiveness and efficiency. IT can be used to evaluate the capabilities of each domain and relationship. Integrated IT infrastructures enable firms to develop this higher-order capability. This capability enables business ecosystems to permit information flows and to share information with their partners in order to create information-based approaches for superior products or services [1, 3].

IT roles for creativity

Value creation enables a business to distinguish itself from competitors and provides a means of establishing a bond with the consumer. Business ecosystems must predict opportunities to create niche markets for their sustainability. If they want to find a niche market, every organization should carry out actions for innovative creation. Particularly, complementary knowledge between domains can be an essential source of innovation. IT can be blended with inter-organizational processes to develop higher-order capabilities for demand sensing, operations and workflow coordination, and global optimization of resources. IT can stimulate other domains to conduct valuable actions, and provide a degree of predictability.

4.2 Intelligent nervous system in healthy ecosystems

Each dimension of healthiness needs a special role of IT. However, there is a common feature. For overall healthiness, IT must be an intellectual nervous system. IT must regulate business ecosystems’ responses to internal and external stimulation. To do this, it senses external change as a peripheral nerve, and it brings into action organizations as a brain. Moreover, IT should be an instrument for doing intelligence analysis. For good business analysis, healthy information should flow into the business ecosystem. Here, information is the lifeblood [2]. IT can protect the flow of information and knowledge on the state of healthy. Figure 2 presents the main concept of this paper.

Healthiness	Business Ecosystems’ Healthiness				Business Ecosystems’ Competitiveness			
					Business Ecosystems’ Maturity			
Dimension	Stability		Robustness		Productivity		Creativity	
Indicator	Diversity	Dependency	Reliance	Resilience	Effectiveness	Efficiency	Prediction	Innovation
Ecosystem Strategy	Include diverse organizations, even nonprofit organizations		Monitor the external shocks and recover unhealthy domains		Distinguish dominant domains and complement tight relationships		Predict niche markets and inform business actions	
IT role	IT permits stable communication and frequent contact		IT offers a fast response time between domains		IT evaluates each domain and relationship and manages information flow		IT stimulates other domains and provides a degree of predictability	
Nervous system	IT regulates responses to internal and external stimulation; IT senses external change as a peripheral nerve; IT brings into action organizations as a brain; IT analyzes intelligence information; IT protects flow of healthy information and knowledge.							

Figure 2. The roles of IT in healthy business ecosystem

5. Conclusions

Business ecosystems could be a business’s greatest opportunity [13]. For businesses to be a part of an ecosystem, they must have a shared vision for the marketplace they are targeting. It allows collaboration for their mutual advantage [22].

A business ecosystem should manage valuable resources. The resources of healthy business ecosystems can be defined from a multidirectional perspective. In addition,

ecosystems’ resources are abundant and diverse. Here, we need to pay attention to IT resources. IT allows the support and control of the dynamic relationships in the business ecosystem [2, 16]. We should define and predict the future roles of IT in ecosystems.

This paper proposes some ideas for understanding a business ecosystem’s healthiness. As stated, healthiness and competitiveness can be used to express the capabilities of a business ecosystem. Competitiveness can be understood as the advanced healthiness of a business ecosystem.

Healthiness can be redefined according to the evolutionary stage in each type of ecosystem. Healthy business ecosystems have stability, robustness, productivity, and creativity. For ensuring their healthiness, organizations should manage their resources, such as IT, in each of their evolutionary stages. In particular, information aspects, such as IT, can play a major role in business ecosystem success [2].

There are limitations to our work. First, the concept of analysis is not specific. Business issues and IT roles are broadly indicated, and a particular type of business ecosystem is connived. Many ecosystems can be defined, such as finance ecosystem, retailing ecosystem [10], and IT ecosystem [14]. We can see healthiness and competitiveness differently, as has been noted earlier, according to the type of ecosystem. Second, proposed concepts are not validated. A research of business ecosystem is in the initial stage. Future studies need to consider the type of ecosystem and develop specific measures to valid healthiness. Moreover, the roles of IT in business ecosystem should be examined.

This paper suggests some ideas for researchers and practitioners on understanding healthy business ecosystems and how they can manage their IT resources. In addition, this paper states a subtle distinction between healthiness and competitiveness. Although drawing the boundaries of an ecosystem is difficult [16], business ecosystems can be used as ecological, holistic lenses for viewing all of the relationships and flows that affect an organization [13]. Using the healthiness of a business ecosystem is one way to conduct a systemic and comprehensive rethinking of evolutionary guides.

6. References

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