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The Role of IT in Business Ecosystems

A CLOSER LOOK AT THE MATURE NETWORKS AND ECOLOGICAL behaviors in businesses allows us to appreciate “a business ecosystem.” This type of ecosystem is defined as an economic community involving many companies working together to gain comparative advantages as a result of their symbiotic relationships.^{5,8} Ecosystems permit companies to create new values that no company could achieve alone.² Likewise, symbiotic relationships provide some benefits for related parties such as consumers and partners, among others. Information, products, and services have become commodities. Value-added and associated service levels have also become key differentiators in ensuring business sustainability.⁴ A strategy involving a company attempting to succeed by itself has proven to be limited in terms of its capacity to create valuable products or services. In view of this, it is crucial that businesses collaborate among themselves to survive in a business ecosystem.^{4,8}

From an ecological standpoint, the diverse interrelations among organisms in a natural ecosystem can be understood by looking at the sequence of events in an alliance and cooperation. In a business relationship, this can be seen either as similar or complementary coordinated activities performed by firms to produce superior mutual outcomes or singular

outcomes with expected reciprocity over time. Therefore, it is critical to generate positive gains in business ecosystems. Companies that create healthy ecosystems ensure vitality to the business. However, from the perspective of individual companies in an ecosystem, there is no specific guideline that will help them deal with the ecosystems they belong to. There is, however, one approach that highlights the need to understand how companies create symbiotic relationships through information technology (IT). Therefore, this article attempts to provide underlying guidelines in IT which will allow companies to create healthy business ecosystems. This is achieved by conducting several rounds of in-depth interviews with practitioners in two flagship companies in the financial industry.

A business ecosystem consists of a large number of loosely interconnected companies that are dependent on one another.^{1,5} As a decentralized network of various relationships between companies, it shows the vision and proof of multiple contributors. These contributors banded together for a common cause even though they have different interests.⁸ This suggests that companies are predisposed to comprehend correct directions and that they work together in a complex business web.

In an ecosystem, a “keystone” is the dominant platform obtaining the greatest advantage from the ecosystem members, similar to predators dominating the highest position of the natural food web. It determines the survival of both the ecosystem and its members.⁵ If the keystone company disappears in the business ecosystem, many interrelated members associated with it also disappear because its role cannot be quickly replaced by other companies. However, it is also true that in the complex web of business, we cannot guarantee the survival of the keystone company without flagship companies. Furthermore, keystone companies are rare in a real business setup, as most companies are categorized as flagship companies in a business ecosystem.

As an ecological term, “flagship” refers to the few species that attract the most popular support. It also has a broader support distribution which covers a diversity of organisms.¹² It arises from a few exposed key species. In business ecosystems, the focus is the “company,” which means that any company can be a flagship. Furthermore, strategic leadership is mainly provided by a flagship company with closer business relationships with other companies, such as key suppliers, customers, and competitors, than a keystone company.¹⁰ In short, a flagship company plays a critical role as a node located in a hub-position. It links many other nodes in a business ecosystem at the same level. However, despite its substantial role, scant attention has been given to understanding a flagship company’s functions in a business ecosystem.

This article intends to correct this by deriving business implications from flagship situations. Although the impact of the flagship company in an ecosystem is less substantial than that of the keystone company (see Figure 1), the flagship’s healthiness is proof of its ecosystem’s healthiness. Therefore, it leads to better business and ecosystem performance.

A Flagship Company’s Strategies

Healthiness can be a roothold for individual companies to become competitive. If a company wants to maximize its competitiveness, it should pursue better healthiness for its ecosystem.⁸ However, it is difficult for companies to maintain a healthy state because its health could be affected by many factors.⁵ As such, it is a challenge to clearly define healthiness along the companies’ strategic positions and directions. In the end, the health of a business ecosystem helps companies become more resilient to market changes and more responsive to customer needs.^{2,5} It demonstrates the capability of the interrelated companies to provide comparative advantages to individual companies. Companies can easily exchange and share vital resources in a healthy business ecosystem.

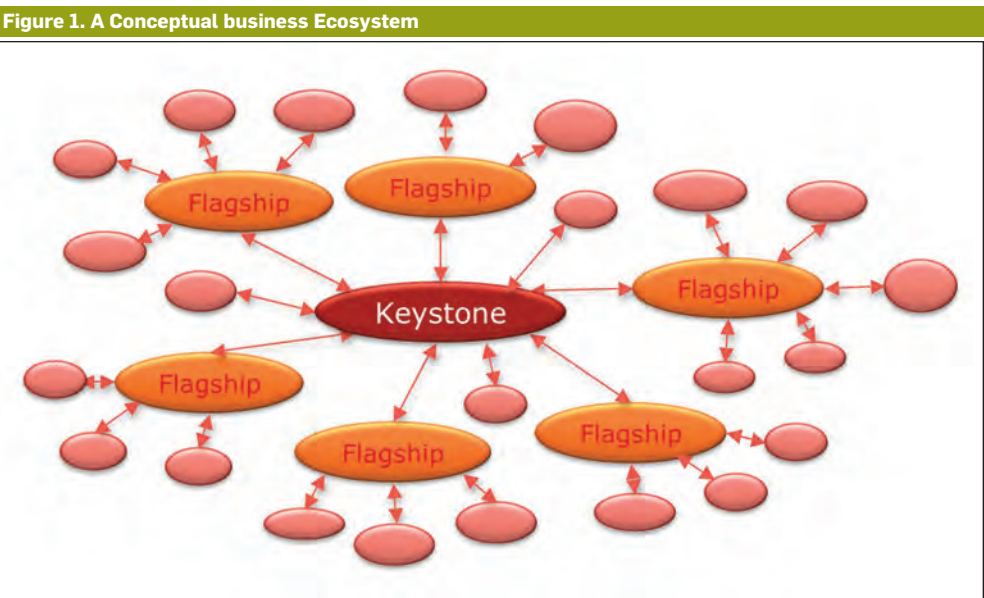


Table 1. A Flagship Company’s Healthiness Strategies

		Knowledge Intensity	
		Infrastructure-Oriented Business Ecosystem	Knowledge-Intensive Business Ecosystem
Environmental Velocity	Dynamic Business Ecosystem	Robustness	Creativity
		If the external stream of an infrastructure-oriented business ecosystem is fast, the ecosystem should be able to cope with external shock.	If a knowledge-intensive business ecosystem is confronted by a high velocity circumstance, the ecosystem, using other companies’ capabilities, should be able to produce an innovative products or services.
	Stable Business Ecosystem	Interoperability	Productivity
		If an infrastructure-oriented business ecosystem is in equilibrium, the ecosystem must maintain a smooth exchange in its business processes.	If a knowledge-intensive business ecosystem is in equilibrium, the ecosystem must seek the highest productivity to ensure market growth.

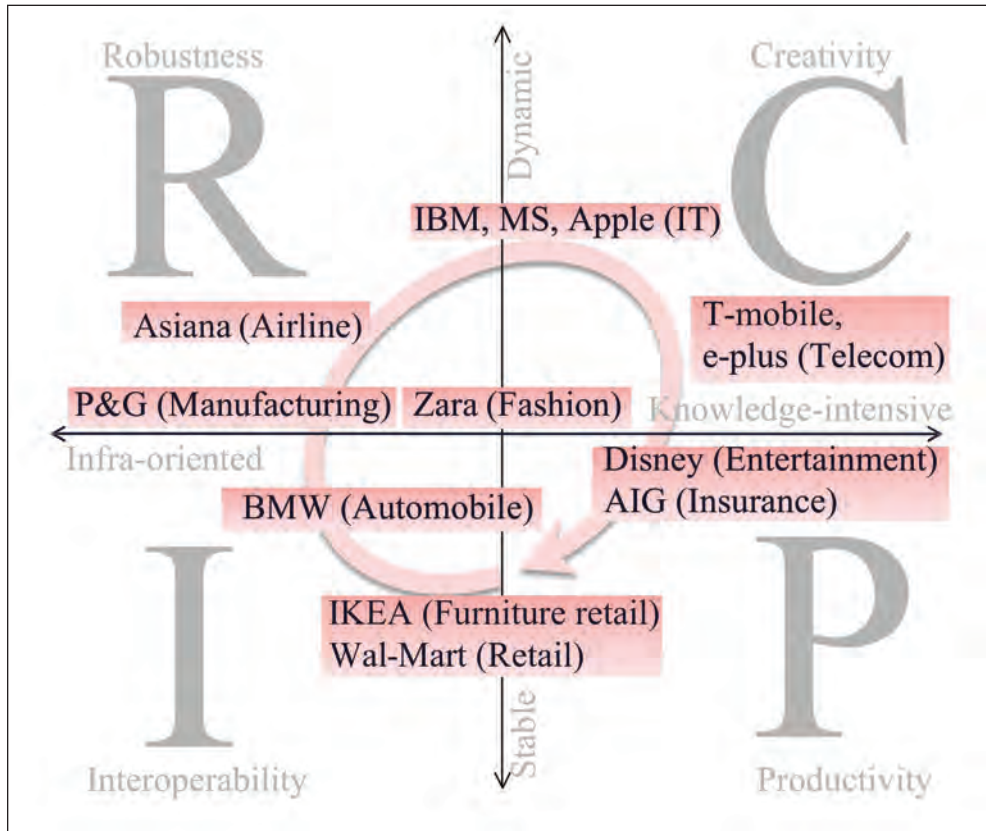
Four dimensions must be present to achieve this. First, it is necessary for companies in an ecosystem to have *interoperability* in order to work with other companies through smooth exchanges related to business processes.¹ Connectivity among diverse companies and dependency on felicity are critical instruments of interoperability. Second, relationships should be *robust* against crises⁵ for them to have stable business activities.⁸ Third, creativity among members generates evolutionary products and creates niche markets.⁵ Finally, *productivity* allows for effective and efficient productions in the ecosystem.⁸ These four dimensions provide a state of healthiness for individual companies and the whole ecosystem (see Table 1).

On the whole, all four healthiness dimensions are essential in creating and sustaining a company’s comparative advantages. However, individual companies tend to have different priorities

on the basis of contextual conditions. A flagship company recognizes appropriate locations in its business ecosystem through two contextual conditions: *environmental velocity* and *knowledge intensity* (see Figure 2). Both are used as tools to analyze and determine the current and future locations of a flagship company in an ecosystem.

Ecosystems sometimes collapse when conditions change radically. Therefore, an environmental velocity in business ecosystems is critical in the survival of a flagship company. Knowledge intensity also influences business ecosystems. It is seriously regarded as the basis for creating competitiveness because of its immense value in the information age. It is an indicator that recognizes the characteristics and values of core products or services. For example, the low velocity of an environment refers to a relatively stable environment, while less intensive

Figure 2. Examples of Flagship Companies in the Contextual Grid



knowledge indicates an infrastructure-oriented business ecosystem.

A flagship company's location determines the ecosystem's healthiness priorities in the current business practice. However, locations can be changed over time because contextual conditions vary, especially when the flagship company's key products and business environment are changed. Companies must learn which of the healthiness dimensions is most advantageous to them. If a flagship company belongs to a high velocity environment, it should either consider robustness with other entities or pursue creativity, but each should be in accordance with knowledge intensity. In contrast, if core businesses or products are more knowledge-oriented, a flagship company should focus on either creativity or productivity in accordance with the level of environmental velocity.

A flagship company can take on different dimensions in the grid depending on contextual conditions. Depending on the contextual location, it can prioritize the healthiness dimensions that should be equipped with as soon as possible. A flagship's core business

takes on different characteristics in different areas. Also, its position in the grid is mainly determined by its characteristics. In actual situations, a flagship company seeks to have its comparative advantages in different contextual conditions as shown in Figure 2. Even if a flagship company is located in a particular cell in the grid based on its current contextual conditions, its moving path could be different from the others.

This study used objective indicators to find the appropriate positions of flagship companies in Figure 2. Knowledge intensity is evaluated by considering knowledge R&D spending and the number of patents,¹¹ which represent global rankings of knowledge intensity using R&D investment in the high-tech industry. On the other hand, environmental velocity is evaluated in terms of the length of product life cycle. If the life cycle is short, the flagship company is considered to have a rapidly changing business environment.³

For example, BMW is an automobile manufacturer that highly relies on infrastructures and production of automobile components, though its environment is more stable than those of

IT companies. As such, stable supplies and continuous sales are the critical factors behind its healthiness. It is further assumed that its relationships with the requisite suppliers and various selling agencies are strongly linked and stable. Therefore, interoperability should be BMW's best strategy for healthiness.

Asiana is affiliated with Star Alliance, indicating that it has adapted the grid of interoperability. All the processes in this flagship company are focused on safe flights and comfortable services, which are achieved through robustness in its ecosystem. Other entities related to Asiana's ecosystem should likewise monitor atmospheric phenomena and unexpected dangers. Robustness is made feasible by having exact and timely communication with co-working companies. As such, robustness is the most appropriate strategy for Asiana's healthiness.

An interesting field to analyze for this study is the mobile industry. Cellular phone devices are fast evolving and mobile services are creating diverse options to meet customer needs and demands. For example, T-mobile in Europe has adapted a flagship strategy that maximizes creativity through its partnerships with other companies. In the case of Disney, its ecosystem has almost completed its radical technological innovation for creativity. It now considers productivity as a top priority.

Overall, each flagship company can pursue different flagship strategies. In addition, its location is not static. It becomes dynamic because of the changes in external velocities and product life cycles within the life of an ecosystem. As such, a flagship company should learn how to identify the appropriate strategy as well as monitor the changes that ecosystems undergo over time.

The Role of IT in a Healthy Business Ecosystem

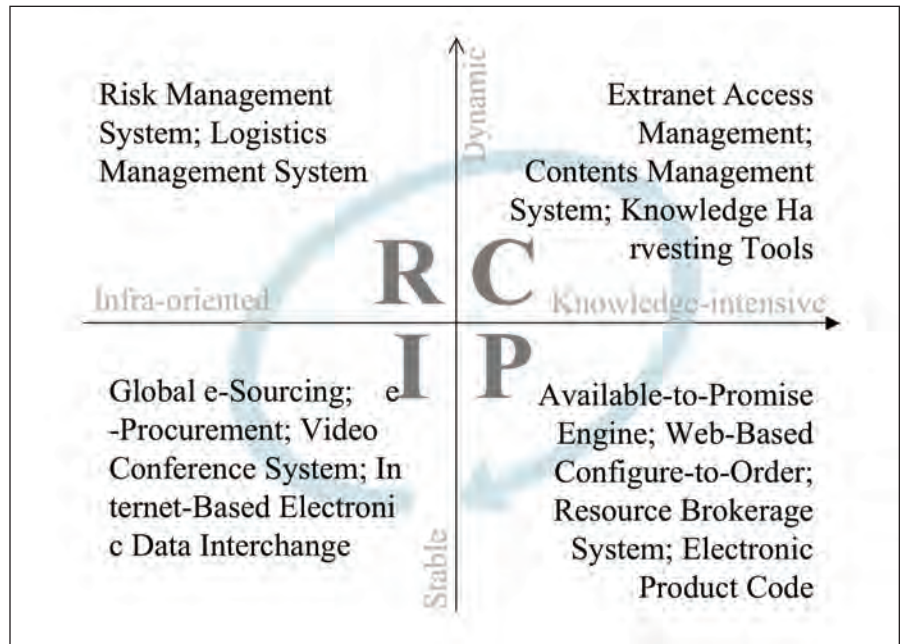
Natural ecosystems have vital energy. Using the same principle in business ecosystems, mutually beneficial relationships among companies should

be developed to enable sharing of vital resources and to run commercial flows (for example, cash, materials, information, idea, and people).¹ Moreover, information about business ecosystems is like energy in natural ecosystems because business warfare is beholden to information capital. In natural ecosystems, smart organisms control their energy. In business ecosystems, a flagship company manages information and its flows. At the company level, information is considered a critical tool and an essential asset. At the ecosystem level, a mechanism for information flow is significant in evaluating a flagship's healthiness, and with it, the ecosystem's competitiveness. Therefore, a flagship company should determine which information is needed and can be utilized. A healthy information flow is an indication of a healthy ecosystem.

IT is generally recognized as a valuable instrument for creating, storing, and transferring information capital. A flagship, as a living company, adapts IT to conduct information sensing and responding. IT is also used to indicate a flagship's healthiness as it allows for the creation of healthy business ecosystems.⁵ Creating successful relationships becomes crucial for companies because business ecosystems are based on a number of relationships, considering that those relationships are difficult to manage and monitor. IT becomes a significant and reusable resource because it plays the role of managing and controlling inter-organizational relationships within a business ecosystem. It can enhance robustness in a high velocity environment and support creative work especially in the knowledge-intensive business. Moreover, it helps companies reduce cost and build new relationships in a relatively stable business environment.

The role of IT needs to be interpreted in terms of the four different dimensions of healthiness (see Figure 3). First, in the aspect of interoperability, the diversity of species becomes a fundamental condition to gain a healthy business ecosystem. If a business ecosystem contains diverse entities (for example suppliers, banks, and retailers), it becomes balanced in terms of interoperability. For example, in a customer demand-driven economy, payment can be made through a combination of electronic

Figure 3. Examples of IT Applications



money, frequent-flyer miles, and affinity points.⁴ For the payment to be workable, the systems in a flagship company must be tightly connected with other systems in other flagship companies to become complete.⁴ IT also allows stable communication between diverse companies, and likewise helps identify diverse contacts for building new relationships (for example, global e-sourcing, e-procurement, video conference system, and Internet-based EDI).

Second, IT allows for robustness in business ecosystems through resilience and reliance.⁸ Changes in governance regulations, customer buying patterns, and macroeconomic conditions are examples of environmental changes. If certain species in an ecosystem are damaged by outside environmental changes, the interoperability of the entire ecosystem could collapse.⁸ Therefore, business ecosystems must continuously monitor the environmental changes and assist unhealthy species to recover. With the support of IT, a flagship company can enjoy faster response time between species, monitor the status of individual companies, and produce reasonable solutions for minimizing damages (for example, risk management system and logistics management system).

Third, value creation enables a flagship company to distinguish itself from its competitors and provides a

means of establishing bonds with customers. A flagship company must also predict potential opportunities to create niche markets for its sustainability. Innovative actions for value creation should be performed once it recognizes a niche market. To do it effectively, IT should be merged with inter-organizational processes to create higher-order capabilities for demand sensing, operations and workflow coordination, and global optimization of resources. IT also enables a flagship company to conduct valuable actions and provide a high degree of predictability (for example, extranet access management, content management system, knowledge harvesting tools, and others)

Finally, overall productivity can generate significant benefits for all ecosystem members.⁵ To achieve productivity, a flagship company should distinguish major business domains and complement relationships with others to determine effective and efficient production lines. Therefore, it allows for the evaluation of each business domain's capabilities. Integrated IT infrastructures enable a flagship company to develop this higher-order capability and subsequently allow it to share information smoothly with its partners to create superior products or services⁷ (for example, available-to-promise engines, Web-based configure-to-orders, and resource brokerage systems).

Table 2. The Role of IT for Healthiness

Dimension	Interoperability	Robustness	Creativity	Productivity
Indicator	Diversity	Reliance	Prediction	Effectiveness
	Dependency	Resilience	Innovation	Efficiency
Flagship Company's Strategy	Include diverse companies, even nonprofit organizations, and regulate the dependency of each relationship	Monitor the relationships' changes and external shocks and recover unhealthy domains	Predict niche markets and create new opportunities; lead and inform business actions	Distinguish dominant domains and complement tight relationships in an effective way
IT Roles	IT permits stable communication and frequent contact	IT offers a fast response time between domains	IT stimulates other domains and provides a degree of predictability	IT evaluates each domain and relationship and manages information flow
Examples of IT Applications	Global e-sourcing; e-procurement; Video Conference System; Internet-based Electronic Data Interchange	Risk Management System; Logistics Management System	Extranet Access Management; Contents Management System; Knowledge Harvesting Tools	Available-to-Promise Engine; Web-Based Configure-to-Order; Resource Brokerage System; Electronic Product Code
IT as an Intelligent Service Platform	<ul style="list-style-type: none"> • IT regulates responses to internal and external stimulation. • IT senses external changes like a peripheral nerve. • IT brings companies into action like a brain. • IT analyzes intelligent information. • IT protects the flows of healthy information and knowledge. 			

Table 3. Strategic Guidelines on How to Become a Healthy Flagship Company

Steps		Guidelines
Step 1	Know Your Ecosystem	<ul style="list-style-type: none"> • Define your core business and enumerate all processes. • Find interrelated organizations for your full set of products and services. • Categorize the companies having similar characters and roles and check all relationships among entities. • Understand your business ecosystem with its interrelated entities and complicated relationships. • Grasp the flows of information and inspect inter-organizational systems.
Step 2	Enhance Your Healthiness	<ul style="list-style-type: none"> • Determine the flagship company's direction and manage the valuable resources of your ecosystem. • Reshape your ecosystem using a flagship strategy. Consider the ecosystem's healthiness if you want to develop new relationships with other companies. • Make interoperable relationships with other healthy organisms using IT services.
Step 3	Maintain Your Flagship Strategy	<ul style="list-style-type: none"> • Catch the movement of latent customers and invite them in your ecosystem using a prediction system. • Observe a hidden web of a flagship's key competitors. • Find a flagship's location and check the changing patterns of the ecosystem. Reevaluate and update the direction of the flagship company's strategy if the flagship faces a change in contextual conditions. • Maintain the total healthiness of information systems.

An Intelligent Service Platform to Support Overall Healthiness

Each dimension of a healthy ecosystem requires the strong support of IT, thus allowing every flagship company to become an observer in critical changes or risks. In a way, business ecosystems become a surveillance network, in which IT plays the role of an intelligent service platform that regulates the responses of business ecosystems to internal and external stimulation (see Table 2). It senses external changes like a peripheral nerve, brings companies into action like a brain, and provides instruments for doing intelligent analysis. In doing effective business analysis, healthy in-

formation is necessary in an ecosystem. Thus, information is the lifeblood of ecosystems.⁹ IT should protect the flow of information and knowledge on the state of healthiness from interrupted or unauthorized access.


IT governance should ensure the healthiness of an ecosystem by providing agile and reliable IT service when placed within the managerial paradigm of building IT as an intelligent service platform. Service Oriented Architecture (SOA) can be used as a technological paradigm for intelligent IT service. It is a state of application development used for the fulfillment and reinforcement of agile values.⁶ An

intelligent IT service platform can be easily connected or disconnected with other companies to build and sustain healthiness. However, agile practices can also be applied in the SOA paradigm, such as frequent delivery and testing of applications, to interconnect with other companies. Implemented in an agile manner, SOA rapidly enables greater responsiveness to the changes in a business ecosystem. Moreover, aside from reinforcing agile values of reducing waste and building integrity by creating a pervasive platform for valuable and reusable functionality, it also contributes to making an intelligent IT service platform by providing a healthy information delivery platform for either a flagship base or a trading partner base.

Guidelines: A Flagship Company's Strategy for Sustainability

The strategies of a flagship company are identified as potent tools that deliver solutions for a healthy business ecosystem. An ecosystem perspective in understanding business practices can provide meaningful implications to companies. However, it is difficult for a flagship company to obtain a clear picture of its internal and external business situations primarily because of the presence of diverse, flexible, and dynamic relationships. This implies that the boundary of an ecosystem frequently changes according to business purposes and that each entity and relationship need to work together to enhance the overall healthiness of a business ecosystem. Therefore, it is crucial for a flagship company to understand its real features and define its healthiness from an ecosystem viewpoint.

This article sought out ways to provide readers with benchmarks on ecosystems. It also attempted to provide basic guidelines for determining the healthiness, flagship strategies, and role of IT for every process undergone by companies and their ecosystems (see Table 3). The guidelines were initially developed based on previous literature,^{5,8} but they were further refined and validated through in-depth interviews with practitioners. The interviews were semi-structured, with each interview lasting for one to two hours. Although interviews were the principle form of data gathering, existing sec-

ondary data such as documentaries and archival materials were gathered wherever available to supplement the interview results. After refining the initial version of the guidelines, they were distributed to the interviewees to get their feedback again. Later, the guidelines were finalized based on their comments. By following these steps, a flagship as a single company can identify its existing features and make an ecological strategy in terms of how to work with other companies. Likewise, it can help define and predict its role in the ecosystem. 

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