Strategic Implications for E-Business Organizations in the Ubiquitous Computing Economy *

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Abstract  The ubiquitous economy brings both pros and cons for the organizations. The third space emerged by the development of ubiquitous computing generates new concept of community. The community is tightly coupled with people, products, and systems. Organizational strategies need to be reshaped for the changing environment in the third space and community. Organizational structure also needs to change for community serving organization. Community serving concept equipped with the standardized technology will be essential. One of the key technologies, RFID service will play a key role to acknowledge identification and services required. When the needs for sensing the environment increase, technological requirement such as the ubiquitous sensor network (USN) will be critically needed..

Key words  ubiquitous economy; ubiquitous computing; management strategy

Development of Information technology shifted the paradigm of business and daily life from the industrial orientation to the information orientation. In the industrial era, efficient production of products gained the competitive advantage. The wealth is generated by physical product producers. Most values are generated by producers. We call this era as the first space\(^{(1)}\). However, in the information era, production of information gains the advantage. The weight of values shifted from the product to the information. The shift of the paradigm from the industrial age to the information age reflects that the source of wealth has changed from the production orientation to the information orientation. This area is called as second space. Tab.1 describes the characteristics of spaces from the fist space the third one.

The first part of information age is about to the end. We witness the next shift of the information age to the third space. Where the first part of information age is characterized as the emphasis on production and distribution of information, the next part of information age emphasizes utilization of the information in every aspect of life. The first stage of information age is based on the medium of information processing devices such as network computer. Most computing technologies are device dependent. Information gathering and reserving are based on those devices.

Tab.1  Characteristics of the different space economy

<table>
<thead>
<tr>
<th>Space</th>
<th>1st Space Economy</th>
<th>2nd Space Economy</th>
<th>3rd Space Economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Products</td>
<td>Material Goods</td>
<td>Information Goods</td>
<td>Space Goods</td>
</tr>
<tr>
<td>Consumption Method</td>
<td>Possession</td>
<td>Connection</td>
<td>Residence</td>
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<tr>
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<td>Marketplace</td>
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<td>Mechanism</td>
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<td>Network Externality</td>
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</tr>
<tr>
<td>Dimension in Consumption Method</td>
<td>One-Dimensional (Linear) Economy</td>
<td>Two-Dimensional (Area) Economy</td>
<td>Three-Dimensional (Space) Economy</td>
</tr>
<tr>
<td>Main character</td>
<td>Possession</td>
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<td>Residence</td>
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However, the next evolution is relatively free from those devices. Devices can shape in various types. Most of them may not be acknowledged by the users.
or customers. The second part of information age is characterized by space\(^1\). The space is generated by computing and networking technology. The word space needs to be differentiated with place. Place is confined by physical restrictions. The time and location restrictions are also existed. Space, on the other hand, emphasizes both electronic and physical world. The space can be articulated either electronically or physically. Place is the area where personal daily locations are reaching. Space is the area where personal daily activities are done. Personal preferences affect quite strongly in the space these days. Most intellectual activities are done in the space. Most decision makings are done in the space. The space based computing can be defined as ubiquitous computing economy because space does not disregard physical location. The main difference from second space is that this space can combine both place and space. The information processing can be possible anywhere and anytime. Real meaning of freedom from the location can be possible in the second part of information age. This second stage of information age can be referred as ubiquitous computing economy\(^1\).

1 Change of Economic Mechanism and Characters of Goods

The second stage of information age shifted the basic requirements of computing from device dependent to device independent. In other words, ubiquitous computing blurs the place and the space. Ubiquitous computing technology blurred the dichotomy of physical place and cyber space. The third space here means the new concept of space that integrates both physical place and cyber space.

1.1 Economic Mechanism

Ubiquitous technology expands to almost all parts of the society. When the invention of steam engine bred capital economy, ubiquitous technology that seemed simple technological development might shift the paradigm of society as steam engine did. As the industrial revolution in the early 19 century shifted the society from agricultural goods orientation to the product goods orientation, the first information revolution changed to the information goods orientation. The second part of information revolution changed from the information goods to the space goods orientation. The first space that emphasizes possession of goods trades the products in the market with price mechanism. The second space that emphasizes connection trades information processed by network externality. The third space that emphasizes residence deals space goods emphasizing community.

The space goods that characterize the third space economy are based upon the information about each product. Computers and products communicate each other and are ready for providing services. Ubiquitous space is like a living organ. The users in the ubiquitous space are not served from an independent product or thing, but from the system itself. For example, a blind person in the ubiquitous space can feel the space through the glasses that have sensors for visualization. To the blind man, the product is the space itself.

The characteristics of products define the economic system. Product goods are possession oriented. In order to be utilized as a product, the product should be possessed by somebody. The personal wealth is defined by the number of products possessed.

On the other hand, information goods are not related with the wealth. The person who has much information may not be rich. Information goods are not to be possessed but be accessed. In order to enrich the value of information, the information should be assessed or connected by as many people possible. The information should fly all over the world without any hurdles.

Space goods are not matter of possession either connection. Space goods are matter of residence. People do not need to possess or connect the space goods. The value of space goods are space itself. In other words, people do not need to operate to receive the service. The actualization of value is possible when all sensors in the ubiquitous space collaborate together to provide various services for people such as visualization service, home protection service, and shopping aid service. These services are not possible by purchasing or connecting by individual customer base but by just living inside the community. Industrial
age emphasized possession where information age emphasized connection. The ubiquitous age emphasizes residence.

Compare to the possession oriented society, connection oriented society can change consumption pattern with more flexibility. The same books can be read thorough PDA or cellular phone in the connection society. In the residence society, people can read the contents of book through various devices almost any time he or she wants. The third space economy will exceed the first and the second space in the level of flexibility and information richness.

1.2 Characteristics of Space Goods

One of the important characteristics in the third space is the stability. Information goods can be used unlimited number of people. Information goods are too easy to copy. This character inhibits the tradability as a commodity. In order to solve this problem, most information goods are traded through the contract in the network. However, the value of information goods is still unstable.

Moreover, space goods will have stable value because the source of wealth resides in the space itself as the land was the source of wealth in the agriculture economy.

The second characteristic is the changing factor of the space. In the industrial society, most economic activities are based on the market where invisible hand was working. The physical place where the demand and supply meet together is the market. From the second space economy, the physical market was absorbed by electronic market. The electronic market had new paradigm of economy such as increasing return to scale and network externality. Network externality is simply noted that as the snowball increases its size, the merit of network increases exponentially. Increasing return to scale constitutes the basic winning strategy of winner takes all.

The third space economy expands the network through the community. The community here includes people and products. Community here means people and products reside in the same ubiquitous space. The living ubiquitous residences can share practically anything such as informant and space. The real meaning of community can be possible only when they share the space.

The ubiquitous apartment complex is an example. U-plex is not a place to provide physical products and network facilities but to provide community with both electronic and physical spaces. Sensors in the u-plex help to park easily, to find lost dogs or children. The merit of u-plex is based on the interactions among sensors in the complex, electronic spaces, and residences. Individuals in the complex cannot change the space by himself. They can change anything only when they act as a community. They discuss new sensors and chips and services available and the standards are fixed. After these interactions, the third space evolves into new shapes.

In the community, the discerning supplier, demander, producer, and consumer is meaningless. The residences are both producers and consumers. Applying traditional market mechanism may be difficult into the community directly. The residences living in the same community hardly compete. Where network externality articulates that the number of connections is closely related with the value of network, the community does not follow that theorem. Rather, the limitation of time and location, too many residences may incur inefficiencies such as congestion. As population ecology theory articulate, optimal size of community might exist.

The economic and political processes may be in depth compare to the community in the second space. Cyber communities in the second space are loosely coupled. Communities in the third space are tightly coupled compared to the second space. The second space has loosely coupled character. In the second space, individuals need to find appropriate communities by him or herself. In the third space, most communities are integrated.

Seeing this, economy of the third space is relatively similar to the politics. Many decision makings in the third space are based on the discussions and voting. The level of participation is quite high compared to the community in the second space. The third space blurs the dichotomy of economy and politics.
Tab.1 Business strategy in the third space

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<tr>
<td>Generic strategy</td>
<td>Price &amp; quality advantage through production efficiency</td>
<td>Network expansion through diversification, alliances and M&amp;A (marketing orientation)</td>
<td>Integrating space and place through click-and-mortar (consumption orientation)</td>
</tr>
<tr>
<td>Organization structure</td>
<td>Hierarchical structure (sharing orders)</td>
<td>Network structure (sharing information)</td>
<td>Hyper-space Structure (sharing space)</td>
</tr>
<tr>
<td>Strategic orientation</td>
<td>Product based competition</td>
<td>Network expansion</td>
<td>Totality in space serving</td>
</tr>
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2 Organizational Strategies for e-Business in the Ubiquitous Age

Innovation of ubiquitous technology brought the era of affluence and governance of space goods. The space goods have been acknowledged as independent goods. The change of business strategy can be demonstrated as Tab.2 shows. Seeing the big picture, the industrial age can be characterized as mass production society. The mass production noted as a conveyer belt system can be characterized by the words of Henry Ford I. “Give any colors to the customers as long as it’s black.”

The second space, characterized as “Internet economy” shifted the rule of thumb from the production to marketing. Information age shifted the basic role in the market from the producers to the marketers. The marketers define the needs of consumers and producers follow the rule defined by marketers. Amazon dot com is not a book producer either book seller in this perspective. Amazon dot com is a book marketer. IBM is not a computer producer but a system marketer, helping customers utilize system more efficiently and effectively. More than 60% of revenue IBM generates is from the services.

As network externality is the key for success in the second space, the rule of competition still lies in the number of customers locked into the company. First mover advantage governs the marketing strategy, where attaining a critical mass is key for positive cash flow.

In the third space, on the other hand, the second space strategy may not be appropriate. The third space is composed with tens of thousands of small spaces called ‘hot spots’ that are alive and are all goods. Preempting space goods does not necessarily reflect dominating the market of the space. Space goods retain their independency working together. The critical mass concept may not be appropriate in this space. The core strategy in the third space is integrating physical space and cyber space. It is often called as “integration of on-line and off-line” or “click-and-mortar.”

Click-and-mortar has dual meaning. The first meaning is e-transformation from the first space to the second space. The traditional “brick-and-mortar” organization transforms their organizational processes and strategies for the purpose of adaptation to the Internet-based economy.

The second meaning is the opposite way. The Internet-based commerce and transactions adapt off-line behaviors. For example, Internet shopping mall has a limitation in reaching the customers. Returning the unwanted products are still difficult hurdles. The 24h opening shops such as Seven-Eleven can moderate the deficiencies of Internet shopping. The customers can physically look-and-feel the product when the customers order the product. After physical investigation, the customer can actually decide to purchase. The shops can also benefit because it can have more customer traffics.

Click-and-mortar strategy emphasizes that the decision area should be at the customers’ location. The first space maximized the customers’ possessions. The second space maximized the customers’ connections. The third space optimizes customers’ residence. From the third space, the customers receive real freedom from the place interacting in the space.
Organizational structure is also influenced by the third space paradigm. The first space emphasized command and order. Organizational structure also supports these emphases. Pyramid structure was the representative form. The second space emphasized information flowing and sharing. The network structure emphasizes information sharing and new knowledge generation. The second space witnessed the emergence of various types of organizations\(^3\). Most structures emphasize efficiency and expansion.

The third space emphasizes not only sharing information but also collocating space together. During the World Cup in Korea, millions of people gathered into the grand plaza to see and feel the games. Information itself was far better at home. Comfortable chair, nice bath room, and clear picture of the game are only some parts of advantages for staying at home. However, people demanded more. They needed to share the mood. They needed to share the space together.

The third space management can be characterized as inter-space and hyper-space. The second space emphasized only interface between computer and people. Easier and more user friendly interface was the main consideration. Internet brought “hyper-text” that can be easily moved among information network. When the integration of electronic space and physical space was getting critical, hyper-space concept is required. The organization serves each space for every need. Practically everything in the communities is identified and is able to communicate information each other. For the organizational perspective, virtualized organization will reshape to actualize itself, in other words, space sharing community. Sharing space with customers, colleagues, and competitors will be inescapable.

3 Korea’s National Strategy for the Ubiquitous Age

Korea has been adopting new IT services ahead of competitors, commercialize them and preoccupy the IT service industry turned out successful. With a goal to a new virtuous cycle, Korean government recently drew up the u-Korea IT839 strategy. The strategy is largely based on the confident vision about the ubiquitous economy. It will promote an effective industrial development model that creates future growth engine through the strong collaboration among IT services, infrastructure and manufacturing as Fig.1 shows.

Radio frequency identification (RFID) service and ubiquitous sensor network (USN) infrastructure play a key role in the strategy. RFID is a sensor technology that identifies information on the product with an RFID tag and gathers information from its surrounding environment. The technology is expected to be used extensively in our daily lives from management of food, livestock, wastes and environment to logistics, distribution and security services. Korea will allocate additional frequencies for RFID in 2004 and complete development of core technologies such as chip, reader and middleware by 2010. Together with the new growth engine project including Telematics and home network, RFID based service will maximize synergic effects and enhance consumer convenience.

The USN recognizes and manages information over the Internet through an RFID tag attached to a product. The network will be the first step toward the informatization of a product, which will be the basis of a ubiquitous society. Korea will establish a policy framework for the USN by 2004 and introduce a u-life by the target year 2010.
4 Concluding Remarks

The ubiquitous economy provides both pros and cons for the organizations. The foremost factor can be inferred that the rule of thumb in the second space economy is changing. The change is not partial but comprehensive. The Internet based organizations (dot-coms) now meet critical test for the community serving paradigm. E-transformation has been successfully applied to the traditional large organizations. Organizations need to prepare for the second part of e-transformation. Now, thin and flexible organizations need to change themselves as a total service provider. We witness the corruption of competitive organizations when they failed to evolve from the first space to the second space. We will see again those organizations that failed to adapt to the third space that is characterized as a totality in the space serving.

The one best practice for success was old time success formula. Community serving concept equipped with comprehensive service with the standardized technology will be essential. Seeing this, one of the key technologies, RFID service will play a key role to acknowledge identification and services required. When the needs for sensing the environment increase, technological requirement such as the Ubiquitous Sensor Network (USN) will be critically needed.

References


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