ISBN 978-952-5726-00-8 (Print), 978-952-5726-01-5 (CD-ROM)
Proceedings of the 2009 International Symposium on Web Information Systems and Applications (WISA'09)
Nanchang, P. R. China, May 22-24, 2009, pp. 459-464

Research on Construction of Information Ecological Model in E-commerce

Wang Xiwei, Zhao Yunlong, Liu Mingyan
School of Management, Jilin University,Changchun City, China
Wxw_mail@163.com

***Abstract*—Based on the idea of system theory, from the viewpoint of ecosystem, this paper analyzes the connotation and factors of information ecology, combines with the characteristics of e-commerce to construct the information ecological model in e-commerce, and uses China's Taobao as empirical study to analyze the information ecological factors of Taobao and its success. This research may enrich theoretical system on information ecology, play a guiding role in promoting the development of e-commerce and provide theoretical basis for development of e-commerce and establishment of information ecology in e-commerce in the Network Age.**

***Index Terms*—e-commerce; information ecology; factor; model; construction**

I. INTRODUCTION

Information ecology is an emerging interdisciplinary, how to direct enterprises to use information technology better based on the framework of information ecosystem theory has become the key issues in the research of current information ecological theory and application. Information ecology originated in the United States in the 1960s, only 40 years' history. H.Marshall McLuhan [1] earliest put forward the concept of media ecology, and proposed "the medium is the message", "cold and hot media", "global village" and other viewpoints. In 1989, Rafael Capurro [2] from Germany put forward the information pollution, information on balance, the "digital divide" between the information-rich society and the information-poor society and so on. In 1995, David Lathed [3] from the United States studied the ecological issues faced by the information in process of dissemination, stressed the need to establish the new concept of values and resources of the media and the environment, and harmony between man and nature. In 1997, Thomas H. Davenport and Laurence Prussic [4] from the United States put forward the concept of information ecology at the micro level, combined information management theory to analyze the relationship between human and organizations in the information environment.

The research on information ecology in China started later. In 1990, Zhang Xinshi [5], an academician, put forward the concept of information ecology earliest and emphasized the use of information technology to model and analyze natural ecosystem. Subsequently, scholars studied the information ecology at a different angle. Li Meidi [7] discussed information ecosystem elements, functions and composition, etc. Zhang Fuxue [8] analyzed concepts such as information ecology, information systems, information ecology science and compared the distinctions between information ecology and information management. From the perspective of information ecology, Xie Lihong [9] analyzed the ecological environment of information in network and tools of information management. Jiang Luquan [10] first studied the model of enterprise information ecology with the application of information ecology theory. Tian Chunhu [11] inspected the whole society information environment and its mutual relationship to people at the macro level.

After comparing and analyzing the literature above, this paper argues that the characteristics of current ecological research in information ecology are three-many, three-few. (1) Many conceptual researches, and few applied researches. (2) Many theoretical researches and few empirical relatively researches. (3) Many studies of the issue of enterprise information ecology and few studies of the issue of information ecology on e-commerce environment. Currently facing the environment in e-commerce of enterprise development, this paper uses information ecology theory to establish information ecological model in e-commerce and makes use of relevant ecological cases for analysis, with a view to play a guiding role in enhancing the competitive edge of enterprises engaged in e-commerce.

II. INFORMATION ECOLOGY AND INFORMATION ECOLOGICAL FACTORS

A. The Connotation of Information Ecology

In 1999，Bonnie .A. Nardi & Vicki L. O'Day [12,13] defined information ecology as "a system consists of the people, practice, values and technology in a particular environment." and believed the core of the information ecological system was not technology but human's activities supported by the technology. Chen Xisheng [14] figures out information ecology is the sum of information resources elements within a certain range and their relationships. Chen Shu [5,6], Tian Chunhu [11] and Ying Jinping [15] consider that information ecology is the sum of the relationship among information, people, environment. Zhang fuxue [8] fingers that information ecology refers to a system consisting of people, practice, values and technology in a specific regional environment, which is the existence of knowledge in the overall system.

Based on the idea of system theory, from the viewpoint of ecosystem, this paper holds the view that information ecology is researching information self-organization theory, information systems and other information science issues within information architecture. Information ecology refers to specific

© 2009 ACADEMY PUBLISHER
AP-PROC-CS-09CN001

www.manaraa.com

information space and information technology as a means to achieve a balanced state, and information man and the information environment of the transmission and feedback activities in information resources' support, which is the sum of all around the information exchanging elements that include human information ecosystem and social organizations.

B. *Information Ecological Factors*

Information ecological factors [16] refer to the environmental elements in the information ecology, which have direct or indirect influences on the growth, behavior, development, mobility & distribution, and social evolution & development of human beings & social organizations in the information ecology, including information man and information environment.

First, the information man. The information man [17] refers to the social organization consisting of a single or a number of persons who need information and participate in information activities. The information man referred in this paper is broadly concerned, which includes not only a single individual at the micro level, but also the special groups of the persons engaged in information work of enterprises, government agencies at the macro level. Information man is the subject and the media of communication between internal and external information environment.

Second, the information environment. The so-called information environment refers to the environment that the overall of the information individuals or groups may contact and its dissemination in society. Information environment is divided into the internal environment and external environment. There are both inter-linkages and mutual impacts, both constraints and mutual promotion between information environment and information man. Information environment includes information resources, information technology, information ethics, information policy and information law.

C. *Relationships Between Information Ecological Factors*

From the viewpoint of ecosystem, information ecological factors have the relationship of interactions and mutual influence. The relationships among the various factors are shown in Figure 1.

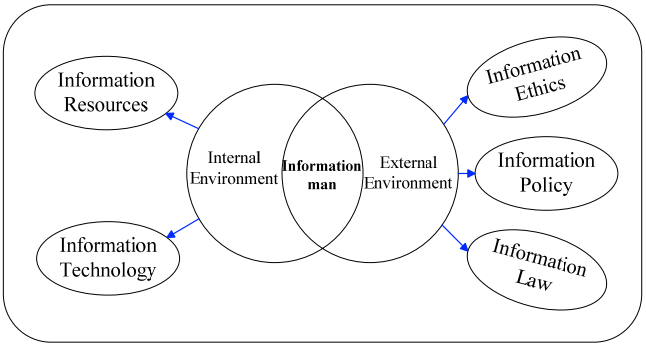

Figure 1. Analysis of the interactions among information ecological factors

1) Interactions among the information man

The interactions of information man include not only the interactions between a single organization and various organizations but also the interactions between various organizations and various organizations. This relationship is mutual benefit, mutual harm, partial benefits and partial damage relationship of information.

2) Interactions between information man and the internal and external information environmental factors.

The information man can collect, transfer and use information resources, develop and improve information technology, and promote the development of information technology. Information technology can extend information organ functions of the information man and improve information man's information capacity. Information ethics, policies and law are the "software" enacted by information man and used to adapt to information environmental factors. It provides an "incentive" through rational expectations to tell and encourage information man what and how to do, as well as the expected return to do so. It can also provide a "limit" to discourage the information man what not to do, and the price that people have to pay for doing so.

3) Interactions among the information eco-environmental factors

Information eco-environmental factors do not exist in isolation, but exit with mutual promotion and restraint. Changing of an information Eco-environmental factor can cause changes in others. These changes ultimately affect the balance of information ecosystem.

III. CONSTRUTION OF INFORMATION ECOLOGICAL MODEL IN E-COMMERCE

A. *Development of China's E-commerce and Analysis*

1) Opportunities faced by development of China's e-commerce market

Although e-commerce in China started late, it is developing rapidly. According to published survey in 2005, the e-commerce industry in China developed rapidly in recent years, the total number of online stores is more than 100,000, and the number of goods displayed on-line is about 20 million, over 18 million Chinese have traded online. China Internet Network Information Center (CNNIC) 2006 report showed that the number of China's stable online shoppers has reached 30 million, 26% of Internet users have experiences of online shopping. At the same time, according to CCID's survey, the total of China's e-commerce transactions in 2006 reached 1.1 trillion Yuan, which is expected to 14.47 trillion Yuan in 2010. The figures above fully demonstrate that China's groups of Internet users already have a certain scale. Internet market is facing an important opportunity of high-speed development.

2) Challenges faced by development of China's e-commerce market

According to statistics, among Internet users who have not experience of shopping, 71.1% of them do not trust shopping online. Internet integrity becomes an obstacle to personal e-commerce development.

First, the network infrastructures of information technology are inadequate. In China, a national financial network has not yet formed, the e-financial industry has not yet been realized and e-commerce also falls behind the e-finance, which restricts the survival and developing space of e-commerce. There are a variety of unreliable

www.manaraa.com

factors, including software, lines, and the system's non-reliability in the Internet of China. Second, the information flow in information resources is not smooth and asymmetric. In e-commerce, the information between majority of businesses and consumers cannot often been coordinated and communicated by networks. The use of information in commerce depends on the telephone and other traditional ways. Third, information security and legal protection system is not sound. E-commerce involves a number of commercial secrets and personal privacy. There are so many loopholes and problems of insecurity in the existing domestic online transactions .Therefore, Internet security has become a big burning problem. Fourth, management system and operational mechanism of the information policy need improving. The existing management system of the information industry has a serious stigma of planned economy. Over-centralization and monopolization restrict the competition in the market, which is not conducive to popularization and application of e-commerce in the whole society.

B. Information Ecological Model in E-commerce

Engaged in e-commerce, the transactions between both internal and external business environment regard the transmission and feedback of information resources of business as a link, information technology in e-commerce as a means, meeting business needs as the goals, which forms a motion state of supply-demand balance. The state can be understood as the information ecology in e-commerce. With the features of China's e-commerce, opportunities and challenges faced in development, this paper constructs the information ecological model in e-commerce (as shown in Figure 2), which helps enterprises engaged in e-commerce recognize the core elements so as to enhance the core competitiveness of enterprises in the process of construction of e-commerce.

The information ecological model in e-commerce mainly consists of transactions and internal & external environmental factors. Transactions include information producers - businessmen, information transmission - the portals, search engines and information platform, information consumers, etc. Internal environment refers to information resources, information technology and corporate culture. External environment includes three aspects: social environment, e-commerce policy and legal environment for e-commerce.

In information ecological model of e-commerce, factors of the internal & external environment have the relationship of mutual influence. To some extent, Internal & external environment determine the supply of business and the demand of customers. At the same time, Changes of the business' supply and customers' demand have influences on the internal & external environment in e-commerce. The two sides of transactions also interact. Information producer is also the information costumer, customers' needs guide business' supply. On the other hand, the strategies of business' supply affect customers' purchasing power. In a good information ecosystem of e-commerce, the structures and functions in each part of the system are in the dynamic balance of mutual adaptation and coordination, which is known as the balance of information ecology in e-commerce.

C. Factors that Influence Balance of Information Ecological in E-commerce

It is necessary to consider three aspects, namely the structural coordination, the functional harmony, the balance of input & output in the quantity of material when measuring whether an e-commerce ecosystem is in the balance of information ecology.

Therefore, based on the information ecological factors in the information ecological model, we put forward the main factors that influence the sound development of information ecology in e-commerce, including information politics, information system development process and information culture. Specific description at TABLE 1[18]

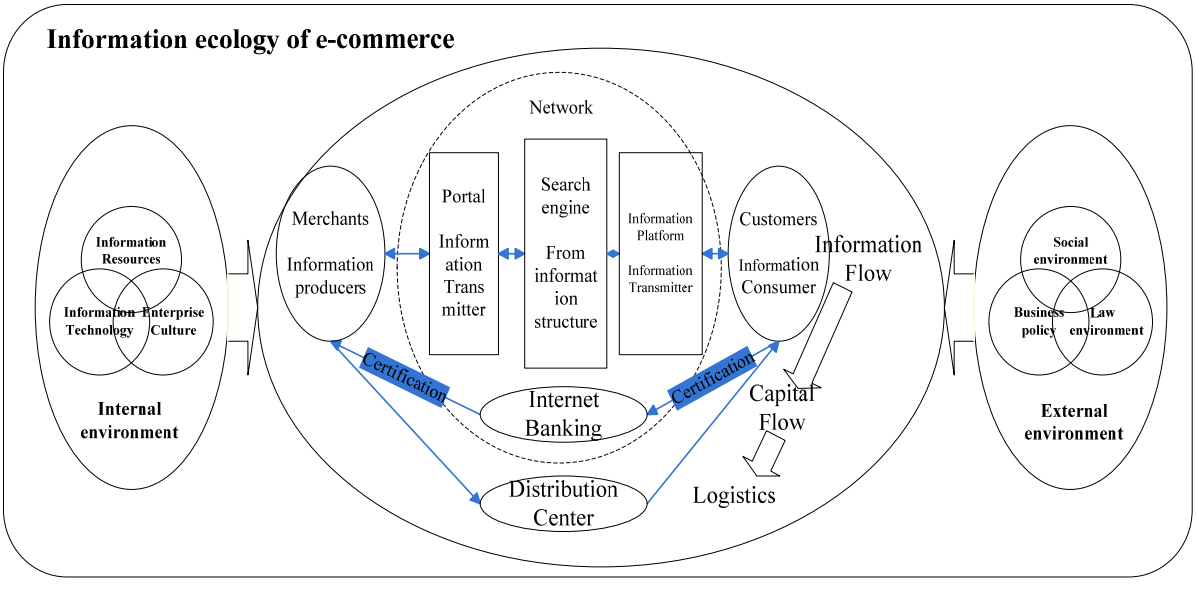

Figure 2. the information ecological model in e-commerce

www.manaraa.com

TABLE 1. Factors that Influence Balance of Information Ecological in E-commerce

Factors		Description
Information politics		The human struggle over an e- commerce application's content and functionality can lead to resultant designs that favor certain stakeholder groups rather than address end-user needs.
System development process		A perceived slowness in changes to an e-commerce application's design or information content can lead to user dissatisfaction.
Information culture	Information sharing	The provision of protected secure areas in an e-commerce applications interface to pre-defined exchange of documents and ideas.
	Information overload	The filtering of information within an e-commerce application can lead to greater user acceptance of the system.
	Access	Providing quick and universal access to an e-commerce application can lead to heightened usage.
	Information control	Offering a means to tailor display and presentation of information within an e-commerce application can increase user satisfaction with the system.
	Attitude	A positive perception towards and awareness of an e-commerce application's functionality can lead to greater user adoption.

IV. CASE STUDY

A. Overview of Taobao in China

Taobao, which is committed to creating a global premier network for retail shopping, is Asia's largest business web site and typical e-commerce web in China. It was founded by Alibaba Group in 2003. The current business is across two major parts from the C2C (Costumer to Costumer) to B2C (Business to Costumer). At the same time, it also provides a trading platform for the buyers and sellers. The sellers can open shops at Taobao to sell everything they want to sell, and buyers can buy their favorite things in this platform and can compare different attributes (price, supply and delivery, etc.) of the same commodity to select the most suitable goods for their own.

As of the first quarter of 2008, Taobao has more than 62 million registered members and the number of registered members of Alipay is more than 63 million, which covers the vast majority of net purchasing crowds in China. Taobao's transaction volume exceeded 18.8 billion, the annual turnover in 2007 exceeded 43.3 billion. According to the research of a third-party authority in 2007, Taobao occupied more than 70% of market share in China, more than 80% market share of C2C market. Currently, Taobao has become first choice for more and more Chinese netizens starting a business online and meeting friends.

B. Analysis on Information Ecological Model of E-commerce in Taobao

From the viewpoint of Taobao's success, Taobao implements the business-to-customer bridge, which sets business portals, search engines, customers shopping platform and payment security for all, provides the whole range of hassle-free services for businesses and customers, ensures transaction security and safeguards legitimate rights and interests of both sides .We can analyze Taobao's success with the use of the information ecological model in e-commerce above.

1) External environment of Taobao's information ecology

From the viewpoint of social environment, Taobao is in the social and national macro background of China's political stability and steady economic development. With China's network infrastructure continuously improved, the number of netizens is rising. From the viewpoint of business policy, Chinese Government actively supports e-commerce and provides a good environment for the development of e-commerce. The Government has enacted a series of relevant policies, laws, regulations, etc. From the viewpoint of legal policy, China has made corresponding laws and regulations to promote the development of e-commerce, which effectively promote and facilitate e-commerce applications and security system.

2) Internal environment of Taobao's information ecology

From view point of information resources, any user of Taobao can use the platform to release business transaction information. From the viewpoint of information technology, Taobao uses self-developed strategy in the interaction design of information system [19], bases on the user interface of Yahoo to provide more suitable JavaScript UI effects and tools suiting Taobao and other Chinese Web Application. From the viewpoint of corporate culture, Taobao advocates the lively and efficient network transactions culture of integrity of "Good thing may not be selected, but Credit cannot be dropped". When creating a more secure and efficient trading platform, Taobao is also dedicated to create and advocate a lively family atmosphere of mutual aid. Each person transacting in Taobao not only transacts more quickly and efficiently but also makes more friends in transactions at the same time.

3) Information man of Taobao's information ecology

Taobao's information man is businessmen and customers. As information producers and consumers in e-commerce information ecological model, buyers and sellers in Taobao-the online trading platform, the seller can initiatively provide online sales or auction for goods, and the buyer also can choose goods to bid and purchase, no longer constrained by time and space, extensive and convenient prices, bargaining, bidding process can save a lot of market communication costs. Online transactions are involved in large groups, having wider choice, and it is important that the price and quality advantage attract users. This form just reflects survival of the fittest rules of ecosystem.

4) The "three streams" of Taobao's information ecology

From business model of e-commerce service platform, we need to address the crux of the "three streams" - the information flow, capital flow and

www.manaraa.com

logistics, which is the main line of Taobao's information ecological model. Based on Internet platform, Taobao integrates B2C and C2C e-commerce, and aggregates business as well as related information and makes conformity and classification, in order to provide effective real-time information services. At the same time, for further refinement and expansion of Taobao's information services, Taobao provides international site cluster for global business.

On solving the cash flow problem, Taobao uses the tool of "Alipay", which makes efforts to resolve the issue of network payment, and realizes online payment, the middle funds management of the disbursement and other functions. At the same time, with digital certificates, it ensures the capital security, information security, cargo security, trade secrets in online transactions, etc.

In the logistics, presently, Taobao's businesses use third-party cooperation. By the main way of cooperation and recommending third-party logistics companies, Taobao provides the most basic logistics information services for customers.Besides, reports of Taobao's logistics are also in basic models of relatively simple information publishment and retrieval.

C. Taobao's Success Inspiration

Based on information ecological model in e-commerce, this paper argues that Taobao's succeed in China, brings enlightenment to the enterprises that are engaged in e-commerce, including the following points: First, make full use of opportunities of China's economic restructuring and e-commerce developing. Taobao's birth coincided with the rapid development of China's network in China's economic take-off moment and caught up with the Government's strong support for e-commerce as well as the rising of awareness of China's e-commerce consumer. Secondly, the rational use of information technology and internal and external resources of corporations. Taobao makes full use of the Internet which is the most convenient information exchange platform, sets information of both buyer and seller into one whole. Third, provide a trading bridge between buyers and sellers. We can say Taobao is a trading platform, which provides adequate information, safety, scientific management and safeguarding mechanisms for the interests of buyers and sellers.

In conclusion, by the information ecological model in e-commerce which is constructed in this paper, we can analyze the successful e-commercial operation of China's Taobao and help China's enterprises that have no access to the success in e-commerce make a clearer understanding of their internal & external environment and the problems they are facing, so as to enhance the core competitiveness.

V. CONCLUSION

Based on the idea of system theory, from the viewpoint of ecosystem, this paper analyzes the connotation and factors of information ecology and constructs information ecological model in e-commerce. Using e-commercial operation of China's Taobao as the object of empirical analysis, this paper aims at showing construction of information ecological model in e-commerce has influence on success in e-commerce, and expects to promote the development of e-commerce in enterprise. Since the system of information ecology theory needs further improving, factors that constitute the information ecological model of e-commerce in this paper still have some limitations. How to operate the actual e-commerce, use a method of quantitative analysis and base on analysis of the research to analyze the interactions among the information ecological factors will be the main contents in following study. In modern enterprise, with the awareness of applications, needs and levels of e-commerce improving, with the professional level of the service platform enhancing, using information ecological theory to explain the reality of e-commerce business development will become the focus in research on theory and application of information ecology in the future and ultimately promote information ecological system to improve applications of e-commerce.

ACKNOWLEDGMENT

This research was supported by Subsidization Project of National Social Science Fund of China (08BTQ033).

REFERENCES

[1] Grant Havers, "The right-wing postmodernism of Marshal McLuhan Media," Culture & Society. London: Jul. 2003, Vol.25, Iss.4, pp.511.

[2] Capurro,Rafael, "Moral Issues in Information Science," Journal of Information Science,1985,No.11,andavailable in http://www.capurro.de/moral.htm.

[3] Cerulo, Karen A, "An Ecology of Communication: Cultural Formats of Control Contemporary Sociology" .Washington: Nov.1996. Vol.25, Iss.6, pp.807.

[4] T H Davenport, L Prusak, Information Ecology: mastering the information and knowledge environment [M]. New York: Oxford University Press,1997.

[5] Chen Shu, "Balance and disorders in Information ecology," Information and Documentation Work, 1995, NO.4, pp.12-13.

[6] Chen Shu, "Research on Information Ecology," Library and Information, 1996, NO.2, pp.12-13.

[7] Li Meidi, "The Analysis of Information Ecosystem," Journal of Information, 1998, Vol.17, NO.4, pp.3-5.

[8] Zhang Fuxue, "Study on Information Ecology," Information Science, 2002, Vol.20, NO.1, pp.31-34.

[9] Xie Lihong, "On the Problems of the Information Ecology in the Network," Library, 2000, NO.2, pp.11-13.

[10] Jiang Luquan, Zou Zhiren, "Information Ecology: New Mould of Enterprise Information Management," Knowledge of Library and Information Science, 2001, NO.3, pp.2-6.

[11] Tian Chunhu, "Study on Information Ecology," Journal of Information, 2005, NO.2, pp.90-92.

[12] B A Nardi, V L O' Day, Information Ecologies: Using Technology with Heart, [M]. [S.l.]: MIT Press, 1999.

[13] Zhou Qingshan, Li Hanying, Zhu jianrong, Li Tengdong, "An Introduction to the Research of Information Ecology and Basic Conception," Library and Information, 2006, NO.6, pp.25.

[14] Chen Xisheng, Yuan Jingrong, "Research on elements of information system in enterprise information resources ecosystem," Technology Economics, 2002, NO.7, pp21-22.

[15] Ying Jinping, Feng Xinjian, "Strengthening the Construction of Informational Ethic Promoting the Balance of Informational Ecology," Journal of Zhejiang

www.manaraa.com

Business Technology Institute, 2004, Vol3, NO.3, pp.30-32.

[16] Jiang Luquan, Information ecology & sustainable development of society. Beijing: Beijing Library Press, 2003, pp150-158.

[17] Xue Lihong, "Discussion of information man and its cultivation," Modern Information, 2004, NO.9, pp207-209.

[18] Brian Detlor, "The influence of information ecology on e-commerce initiatives," Internet Research: Electronic Networking Applications and Policy, 2001, Vol11, NO.4, pp.286-295.

[19] Zhang Dinghui, "Research on the Method of Interaction Design of Management Information System," Shanghai: Tongji University, School of Economics and Management, Dec. 2007, pp.76-77

www.manaraa.com