第三届中美电子商务高级论坛论文集

Proceedings of The 3rd Sino-US E-Commerce Advanced Forum

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Preface

It is our great pleasure and honor to welcome all the delegates to the Sino-US E-Commerce Advanced Forum. The forum is co-sponsored by Ministry of Education, Center for Research in Electronic Commerce at the University of Texas in Austin, hosted by Business School at Nankai University, supported by Management School at Hebei University of Technology, National Natural Science Foundation of China, China Association of International Center for Electronic Commerce (ICEC), E-Commerce Committee of China Information Economics Society, China Association for Information Systems (CNAIS), Center for Research in Electronic Commerce at the University of Texas, USA, The Rawls College of Business Administration at Texas Tech University, and Center for International Business Education and Research (CIBER) at Georgia Institute of Technology.

The Sino-US Forum on Electronic Commerce is an international forum for researchers and practitioners from different areas of e-commerce/e-business to exchange information on the strategic management, engineering design, enabling technologies, and anecdotal experiences as related to e-business, in order to identify the emerging research topics, as well as to help shape the future of IT-transformed enterprise, government, and commerce. The subjects of the papers range from theories to applications, topis include Strategic management in e-Business enterprise; Enterprise information integration and management innovations; Information technology and application in e-Business. They reflect the latest progress achieved by domestic scholars, scholars in USA and other countries and regions in the fields of E-business and related fields.

The conference would not have been a success without help from so many people. On behalf of the program and organizing committees, We'd like to take this opportunity to thank all authors for their excellent contributions and to all the referees for their time and expertise regarding paper review. We also additionally thank Prof. Zhangxi Li, Prof. Qi Li and Prof. Han Zhang, for their great supports to this forum. Especially, I'd like to express our appreciation to Nankai International Business Forum, and E-Commerce Committee in China Information Economics Society, for their technical support, and express our appreciation to Business School of Nankai University for the financial support to the forum. Finally, our sincerely thanks go to all the conference secretariat staffs for their hard working and consistent support to the forum.

We wish all the participants enjoy this three-day forum and have a wonderful time in Tianjin.

The Sino-US E-Commerce Advanced Forum

June, 2006

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Online Service Quality and the Duopoly Quality Competition with IT Advancement

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Abstract: **This paper is intended to develop a quality competition model to explain the phenomenon of online service provision. Using a game-theoretic model of competing online service providers (OSPs), I find that even when the optimal profit for an individual player would suggest a lower level of IT quality investment, the players are incented to invest at a higher quality equilibrium level. Given certain assumptions, this situation is advantageous for both OSP providers and their subscribers, and this phenomenon, in turn, promotes the continued rapid advancement of online technology.**

Key words: ***Online service providers, information technology, quality, competition***

1 Introduction

In the last decade, the world has witnessed an explosion in the number and types of services provided on the Internet, often free or very inexpensive to subscribers, by online service providers (OSPs). Examples include search engine competition and expanded email services by Google, Yahoo, and MSN (Baker 2004; Olsen 2004; Mukhopadhyay et al. 2004); increased features in news services such as CNN.com, CNET.com News, and BBC; incrementally improving electronic services by already inexpensive electronic brokerage firms (such as E*Trade's PowerTrade desk service, which has experienced several major upgrades since 2000); expanded features of low priced Internet Application Service Providers (ASPs) such as Loopnet.com and IMW (www.inetworks.com).

The most predominant business model is that OSPs offer their services free to subscribers, but are paid by advertisers, in which advertising rates are a positively-correlated function of the number of web site hits. Another variation is affiliate marketing, in which vendors ask OSPs to place the vendor's logo on the OSPs web page and then pay a commission to the OSP when a customer clicks on the logo and makes a purchase from the vendor. In another common business model, OSPs support transactions with low unit cost over a high number of transactions. An example of this business model is discount brokerage firms such as ScotTrade.

Because there is not much room in reducing price for OSPs to compete with each other in their market, as the services are either low-priced or free, the only way that OSPs can attract a high number of subscribers or users is by increasing their quality (e.g., by offering more and better features). Increasing the number of users would lead to an increase in advertising dollars, by increasing the number of advertising clients as well as increasing fees or commissions from existing clients. The increased advertising dollars could potentially increase earnings. The increase in earnings, of course, depends on the level of investment required of the OSP to attain the improvement in quality sufficient to attract more users. Still, the question remains why a profitable OSP already having a high number of subscribers, would continue to roll out new (often free) features requiring substantial investment on the part of the OSP, even without any charge of use. This can be considered as a competition strategy with regard to the quality, which is distinguished from traditional quantity and price based competition. The insight is gained from this phenomenon by using a game-theoretic approach to investigate the behavior of OSP market participants. It is begun by characterizing the new features offered by OSPs as improvements in the quality of their offerings. Our approach extends previous research (Banker et al. 1998), which treats the quality of a commodity as a stable feature in the market, differentially determined under certain conditions. The previous research is unable to account for the continuous quality advancement of OSPs (Dewan et al. 2000; Hall and Porteus 2000; Mukhopadhyay et al. 2004).

I find that as the cost of IT declines, competing OSP providers are encouraged to continue investing in quality, in order to keep their status in the market. The equilibrium profit is a moving target that must be continually chased. These incentives driving OSPs to continually improve are in place, whether or not competitors collude, and whether or not competitors' actions are symmetric or asymmetric. Given certain assumptions, continual improvement through IT advancement is advantageous for both OSP providers and their subscribers.

This paper is organized in four sections: introduction, literature review, model and discussion and conclusions.

2 Literature Review

The early research on market competition referring to the product quality was typically focused on the monopolistic competition with differentiated products (Dixit and Stiglitz, 1977; Perloff and Salop, 1985; Tirole, 1995). In a market with differentiated products, any of the rivals is not able to totally dominate the market with the price complying with certain quality level. Following Dixit's initial work in 1979, Bankers et al. (1998) present a revised version of the model with both price and quality involved. In the model, two competitors choose an optimum product quality and compete on price. After having derived the equilibrium price, the competitors will resolve their equilibrium quality levels. Hall and Porteus (2000) develop a model of interfirm competition in the context of ISP, in which the service quality is the main

factor causing customers' switching to a better service. Gans (2002) studies the Nash equilibrium for quality competition under different scenarios: 1) competitors are symmetric, 2) costs are asymmetric, and, 3) multiple competitors. The market share is the key issue in the study. Dewan et al. (2000) investigate the competition in Internet-based product customization using the game theoretic method. In general Dewan et al.'s model follows the traditional approach in differentiated product price competition. In particular, Dewan et al. develop the model in two scenarios: simultaneous move and sequential move. The duopoly competition model by Aoki (2003) is more economic oriented, in which quality investment with both Bertrand and Cournot competition are studied.

Recently, the competition between web search engines has attracted IS researchers' attention. For example, Mukhopadhyay et al. (2004) develop a two-period game-theoretic model for studying the entry into the search engine market. It is revealed that quality plays an important role in user demand for search engines, which is discontinuous with regard to quality level. In this way, the cost advantage is the key strategy used by a new entrant to compete with the incumbent players in the market.

3 Model

Consider a pool of consumers with a continuous heterogeneous preference β in [0, 1], to two quality attributes, ak1 and ak2, of product gk. Consumer j evaluates the quality as xj = βj ak1 + (1-βj) ak2. If two quality differentiated products, namely g1 and g2, are priced the same, consumers will pick whichever product has the better quality. It can be easily shown that if a11 > a21 and a12 < a22 there must exist a β', such that the consumers with $\beta < \beta'$ will take product g1, the consumers with $\beta > \beta'$ will take product g2, and the consumers with $\beta = \beta'$ will be indifferent between these two choices. Then the percentage of the market shared by these two products, depends on the distribution of β. From this example, it can be seen how a composite quality works. In the case just given, it is impossible to define the equality of two composite qualities without referring to the type of the involved consumers. In other words, when stating "the quality of two products is the same", it is assumed that the consumers are homogenous in quality evaluation.

Assumption 1: All consumers in the online service market are homogeneous in quality evaluation.

Assumption 2: All consumers in the online service market are heterogeneous in utility evaluation with regard to price and quality.

Based on the assumptions, a consumer composite quality evaluation vector is defined as B =,(β1, ...βn) for the product with n attributes a = (a1, ..., an). The composite quality with a given set of quality attributes for product gk is xk = x(ak)= BakT. According to assumption 1, B is fixed.

The above is suitable for defining the quality level of online service user preference. When there is more than one combination of (a1, a2, ..., an), such that a(1) $\neq$ a(2) and x(a(1)) = x(a(2)), two online services can still be referred to as differentiated even if the quality levels are the same. In addition, assume there exist an optimum a* that minimizes the cost of the online service with a given composite quality level x(a*) = Q(a). In default, x(a) will be used to denote the x(a*) without extra explanation. In this way, quality can be defined as a linear measure of composite quality x = | x(a)| = BaT.

Consider that two OSPs, labeled 1 and 2, are competing in an online information service market. Each OSP offers its online service with a fixed price to the users, and typically the use of services can be free depending on the type of service. The OSPs earn revenue indirectly from other sources, with the amount of revenue being positively correlated to the size of the user population. Each OSP chooses a quality level x1 and x2 respectively to maximize its profit, and x1 $\geq$0 and x2 $\geq$0. There is no direct effect of service quality on the price of other chargeable services that offered by the same OSP that provides the free online services. In this way, the OSPs are competing in the service user population that is aware of, and responsive to, changes in the service quality level.

Assumption 3: The cost of upgrading to a certain level of service quality is constantly decreasing because of IT advancement. Therefore, two OSPs can upgrade their service quality from time to time in order to keep up the size of their user populations.

Assumption 4: There is a one-time fixed investment for each upgrade; hence the decision to upgrade quality does not occur continuously but happens periodically. The longer the upgrade interval, the lower the average investment per unit of time. Therefore, the OSPs always try to extend the effective period of each upgrade unless maintaining the same quality level will no longer keep up their profit, as the declining cost for a particular level of quality is always modifying the market equilibrium.

Based on the above setting, the OSPs' profit functions can be expressed as:

πi(xi, xj, t) = Ri(xi, xj) – ci(xi, t), i, j = 1, 2 and i $\neq$ j

where $R_i(x_i, x_j)$ is the revenue and $c_i(x_i, t)$ is the cost.

Following a typical duopoly competition model and Assumption 3, then $\frac{\partial R_i}{\partial x_i} > 0$, $\frac{\partial R_i}{\partial x_j} < 0$, $\frac{\partial c_i}{\partial x_i} > 0$, and $\frac{\partial^2 c_i}{\partial x \partial t} < 0$, meaning:

(1) The higher quality level an OSP adopts, the more revenue the OSP will earn because of more market share

(2) The higher quality level a OSP's competitor adopts, the less revenue the OSP will earn because of less market share

(3) The higher quality level an OSP adopts, the more cost the OPS will invest

(4) The marginal cost of quality is decreasing over time.

The two OSPs are involved in a three-stage game described below:

Stage one: The two OSPs are engaged in the equilibrium quality pair (x10, x20), from which any one of the OSPs changing its quality level unilaterally will be worse off.

Stage two: Both OSPs see that the cost of quality has decreased and that there is a new equilibrium quality pair (x11, x21). Each OSP has a choice of two actions with regard to the quality level: Upgrade, Not Upgrade.

Stage three: The OSPs move simultaneously.

The equilibrium status at Stage one when $t = t_0$ implies the following first order condition:

$$\frac{\partial \pi_i(x_{i0}, x_{j0}, t_0)}{\partial x_{i0}} = \frac{\partial R_i(x_{i0}, x_{j0})}{\partial x_{i0}} - \frac{\partial c_i(x_{i0}, t_0)}{\partial x_{i0}} = 0, \text{ for } i = 1, 2$$

At Stage three, when $t = t_1$, it can be derived that $c_i(x_{i0}, t_1) < c_i(x_{i0}, t_0)$ because the cost for the same quality level decreases. As the revenue remains the same, both OSPs are benefited by the reduced cost of the quality expenses. Since $\frac{\partial^2 c_i}{\partial x \partial t} < 0$, then $\frac{\partial c_i(x_{i0}, t_1)}{\partial x_{i0}} < \frac{\partial c_i(x_{i0}, t_0)}{\partial x_{i0}}$. This means $\frac{\partial \pi_i(x_{i0}, x_{j0}, t_1)}{\partial x_{i0}} > 0$ and both OSPs have the incentive to increase their quality level. However, since $\frac{\partial R_i}{\partial x_j} < 0$, meaning there exist negative externalities between the two OSPs if both of them change the quality level of their services, $\pi_i(x_{i1}, x_{j1}, t_1)$ may not necessarily be higher than $\pi_i(x_{i0}, x_{j0}, t_1)$.

Lemma 1: When the marginal cost of quality decreases from time t_0 to t_1, OSPs always upgrade the quality level from (x_{10}, x_{20}) to (x_{11}, x_{21}).

Proof: There are two possible situations:

(1) $\pi_i(x_{i1}, x_{j1}, t_1) > \pi_i(x_{i0}, x_{j0}, t_1)$. In this case, "Upgrade" is the best strategy for both OSPs.

(2) $\pi_i(x_{i1}, x_{j1}, t_1) \leq \pi_i(x_{i0}, x_{j0}, t_1)$.

If an OSP, say OSP 1, remains x_{10}, it will be worse off if OSP 2 adopts x_{21}, at which point OSP 2 will take more market share because of better quality. As both OSPs understand this outcome, the problem is actually a prisoner's dilemma game (Figure 1), in which both OSPs will be willing to pay more for higher quality level (x_{i1}, x_{j1}), even though they will be worse off.

		OSP 2	
		x_{20}	x_{21}
OSP 1	x_{10}	$\pi_{1(00)}, \pi_{2(00)}$ →	$\pi_{1(01)}, \pi_{2(01)}$
	x_{11}	$\pi_{1(10)}$ ↓ $\pi_{2(10)}$ →	$\pi_{1(11)}$ ↓ $\pi_{2(11)}$

Figure 1: OSP's Game (The payoff function $\pi_{i(ab)} = \pi_i(x_{ia}, x_{jb}, t_1)$)

Lemma 2: Even if there exit an optimal (x_1^*, x_2^*), such that $x_1^* < x_{11}$ and $x_2^* < x_{21}$, and $\pi_i(x_i^*, x_j^*, t_1) = max_{xi}\, \pi_i(x_i, x_j^*, t_1) > \pi_i(x_{i1}, x_{j1}, t_1)$, $i, j = 1, 2$, the OSPs will still take (x_{i1}, x_{j1}).

First, it can be proved that there may exist such an optimal quality level (x_1^*, x_2^*) under certain conditions. When $|\frac{\partial R_i}{\partial x_i}| < |\frac{\partial R_i}{\partial x_j}|$ at (x_{i1}, x_{j1}) for both OSPs, a minor reduction of quality level by an OSP will cause a loss that is less than the gain from competitor's reduction. Properly lowering the quality level by both OSPs will make both OSPs better off. This figure can also be further improved by the reduced cost for the quality. It is worth pointing out that $x_1^* < x_{11}$ and $x_2^* < x_{21}$ is the necessary condition for the existence of an optimal (x_1^*, x_2^*) when it is not identical to (x_{i1}, x_{j1}), because it is impossible that $x_1^* > x_{11}$ and $x_2^* > x_{21}$. If it were so, it would have held that $\pi_i(x_i^*, x_{j1}, t_1) > \pi_i(x_i^*, x_j^*, t_1) > \pi_i(x_{i1}, x_{j1}, t_1)$. Then both OSPs would have the incentive to upgrade the quality from (x_{i1}, x_{j1}) to (x_1^*, x_2^*). This is contradictive to the assumption that (x_{i1}, x_{j1}) is the equilibrium quality level. In similar fashion, it can be proved that it is impossible that $x_1^* > x_{11}$ and $x_2^* < x_{21}$, *or* $x_1^* < x_{11}$ and $x_2^* > x_{21}$.

Lemma 2 means that ① if there exists a pair of optimal quality levels for the OSPs should they collude, both of these optimal quality levels must be lower than their equilibrium quality levels, and, ② even though an optimal quality level will bring OSPs better profits than the equilibrium quality level in certain financial structures, each OSP will still choose the equilibrium quality level to prevent the potential loss that might occur if their competitor advanced to the equilibrium quality level. This is similar to situation of the Cournot competition.

According to the definition of Nash equilibrium, the following proposition is reached:

Proposition: (x_{11}, x_{21}) is a pure strategy Nash equilibrium of the OSPs at time t_1.

The above discussion can be further extended to the multiple-period situation, which is a repeated prisoner's dilemma game, and the oligopoly market context, where the OSPs are less likely to cooperate. Then:

Corollary: OSPs always adopt more advanced technology ahead of the optimum implied by their need at the present.

4 Discussion and Conclusion

Price, quantity and quality are three main properties of a commodity. In studying competition, traditional models are classified into quantity competition (e.g. Cournot competition), price competition (e.g. Bertrand competition), and differentiated competition – vertical or horizontal. In previous research, quality is considered as a predetermined factor. That is, once the level of quality is decided it will be kept as a constant. Our model shows that quality can play the same role in market competition as quantity and price in the economic environment that is empowered by rapidly improved IT. In our model, the constantly decreased cost for quality makes it dynamic while the price remains stable and the competitor are

competing to gain more market share. This situation, which is characteristic in the markets for OSP providers, sets the stage for a quality war in the market, which is refueled by the advancing IT.

In traditional economics theory, "wars" based on price or quantity implied that there would be winners and losers in a specific case. In OSP quality wars, however, the situation may be advantageous for all stakeholders, including OSP competitors and their subscribers, if certain assumptions apply. These are owing to the IT advancement. The improved IT will always add in more values to different products and increase the benefits to users. In this way, both producers/OSPs and consumers/users will find more room to increase their utility. This is reflected at the consumer side as the Machrone's law and at the OSP side as improving profits, providing the new entry is not the dominant trend in the specific market.

The adoption of advanced IT for online information service is driven by the market competition and maintains the profit of the business. In particular, when a new IT emerges, OSPs will inevitably adopt it in order to keep their status in the market. This can explain why Google launches Gmail taking the advantage of computer hardware advancement, and why Email giants yahoo and MSN have been regularly adding additional features in their email services, why News channels like BBC and CNN have been constantly updating services on their online sites.

It is obvious that the adoption of an innovative IT to improve the quality may not be chosen by all online service providers in the same market simultaneously. However, "once enough players in a networked market decide to switch to a new product, everyone else's motivation to do so becomes stronger" (Chakravorti 2004). In a multi-OSP market, if the adoption timing for an OPS is randomly distributed, its impact on other OSPs also will occur randomly. In this way, any OSP not adopting advanced IT to improve its business will allow the value of its services to erode and its market share to decline over time.

The spillover from the quality competition in online services markets also exerts positive externalities to IT innovators. Quality competition keeps stimulating the demand for the IT market, include the new technology, knowledgeable IT personnel, and innovative IT application ideas.

The further work will be on the extension of the model to the situation of sequential move with multiple OSPs.

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Building an e-Learning Business

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Abstract **—In this paper we discuss the eLearning industry and develop some ideas on building and e-Learning business. The paper cossiders a series of case srudies and describes a new experiment in the development of an eBusiness for eLearning.**

1 The eLearning Industry

1.1 Introduction

eLearning is the process of teaching and learning using electronic media, generally distributed over a network. For a thorough coverage of eLearning, see Anderson and Elloumi (2004). The market for eLearning is the market for the provision, delivery and administration of learning services through the use of new media and network technologies.

Following the success of eCommerce, eLearning provides an effective pathway to bring education and training beyond national borders. With the deployment of technology, eLearning can make education and training accessible to even more people and more places around the world. eLearning is also a large information industry, which has shown continuous growth over the past few years, and is now a key eCommerce based market.

The eLearning industry has gone through many of the development cycles as other hi-tech industries, and suffered from the dot-com boom and bust of 2000. It has now entered a period of steady growth and the future bodes well for its development as a key element in the support and delivery of education and training.

1.2 Market Overview

Learning normally takes pace in a stakeholder rich environment, with the learner interacting with their organization, the training/education provider, the payment agent, fellow learners, and any awarding body. The end goal of a learner is acquisition and/or certification of a competence or knowledge and understanding of a subject. In order to achieve this goal the learner engages in the consumption of services and educational content, via infrastructural tools. These relationships are shown in Figure 1 (Hamalainen et al 1996).

eLearning is one of the fastest growing, knowledge-based industries on both sides of the Atlantic and is the single most important transforming influence on education and corporate training and development across the globe (Sloman, 2001). However, it has not grown as expected. In the US, for example, the market for eLearning content and services was expected to double in size every year, reaching approximately $11.5billion by 2003. The actual figure for 2003, according to Clark (2003), was only $5.2billion.

Some of the reasons for this lack of growth are the general downturn in the hi-tech markets, as well as a slow

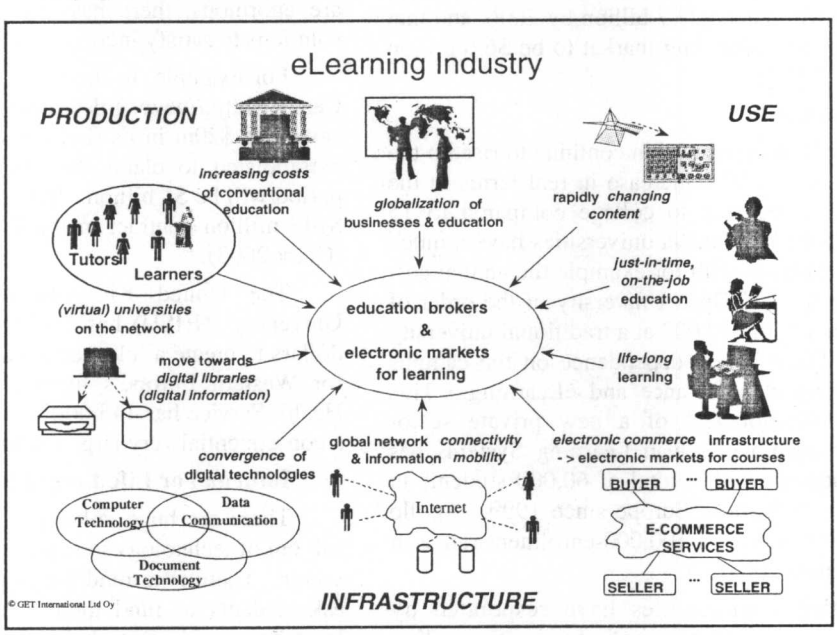

Figure 1 Attributes of the Learning Industry

uptake of eLearning, and resistance to eLearning from end users (Sloman 2002). Even industry experts have recognized that the expectations of eLearning have been "unrealistic" and "overhyped" (Straub 2002). Today, however, the eLearning industry is consolidating and is growing in a more coherent manner.

There is however some good news in the growth of the American provision of eLearning from the traditional brick and mortar schools.

According to Allen and Seaman (2005) twenty percent of all higher education students now take online courses. This compares with under 1 percent in 1995, the growth rate underpinned by these figures 18 per cent for online enrollments. There is also a push in the USA to improve the provision of online programmes by allowing programmes with more than 50% online to access federal student aid.According to Allen and Seaman, increasing numbers of institutions across sectors see online education as essential to their strategic planning. However, each institution must have a sustainable eCommerce and business model to ensure that such an adventure is feasible.

1.3 Segmentation of the eLearning Market

The eLearning market can be segmented as follows:

Corporate

The corporate eLearning market is that concerned with the major corporations and other private sector companies.

IDC (2003) admits that the worldwide corporate e-learning market is not growing at the rate once predicted. However, they are still confident that it is growing. IDC now predicts that market growth will be affected by the global economic slowdown but that "normal market growth" (IDC 2003) will resume in the near future.

IDC predicts that the worldwide IT education and training market will reach $23.7 billion by 2006, and that worldwide corporate e-learning market to be $6.6 billion for 2002. (IDC 2003).

Formal Education

The costs of formal education continue to rise, in the USA there has been a 50% increase in real terms in the cost of sending a teenager to college compared to 15 years ago, while the new media universities have a much lower student cost base, with for example the annual cost of attendance at the UK Open University of the order of $5-600, compared with $10,000 at a traditional university (Clark 2003). There is less dependence on the campus and more learning at a distance and eLearning. This allows for the development of a new private sector provision. For example, Sylvan Learning Systems has purchased six schools with a total of 60,000 students in Latin America and Western Europe since 1999. Apollo International aims to have a 100,000-enrolment range in 10 years (Kuchment 2003).

The traditional universities have responded by creating their own international, for-profit online learning ventures aimed mostly at adults. A good example of this is the Interactive University (http://www.interactiveuniversity.net). Nevertheless, the traditional universities have been deploying eLearning technologies to support their own content and service provision. It is now accepted that one area of major growth of eLearning in university education is in the support of traditional delivery, not in solely delivery at a distance. Indeed, it is increasingly expected by both students and faculty that eLearning supports classroom delivery.

According to Gartner Research, (Harris et al 2003) "Supplemental use of e-learning for traditional instruction outpaces its use in purely remote instruction for faculty and students alike. E-learning will grow as a primary instructional resource in higher education through 2007, when more than 70 percent of students will use e-learning as a supplement to traditional instruction. Institutions must plan for geometric, rather than arithmetic, growth in e-learning system capacity."

The development of the use of eLearning can be exemplified by the success of traditional universities rolling out eLearning through traditional channels and even into the provision of high school credits. For example, Brigham Young University (http://www.byu.edu) has many thousands of enrollments and appears to be profitable. Similarly, the development of the Interactive University was based on the provision of High School credits leading to the development of University programs.

Government

All governments in the developed world have accepted eGovernment, which includes eLearning, to support modernization. All new policies generate new eLearning possibilities and can be rolled out more quickly using technology. Since the numbers employed in government, and its agencies such as the health service, are enormous, there has been a search for lower-cost solutions to satisfy increases in demand.

For example, in the USA the Gov Online Learning Center (http://www.golearn.gov) claims to have made a saving of $20m in its first 20 weeks of operation, this is extrapolated to claim that the savings over a 10-year period will be $1 billion. In the armed forces there was a $143 million contract in the US for eLearning in 2000. (Clark 2003).

The United Kingdom National Health Service University (NHSU) has a budget of tens of millions of dollars to create a 'cleaner to consultant' learning service for Western Europe's biggest employer. The National Health Service has 145,000 new employees per year with a consequential very large training need. (Clark 2003).

Informal or Life Long Learning

There are huge cultural barrier to overcome in the roll out of technology to support learning in the consumer sector. There is a trend for governments to increasingly ask students to fund their own learning. In addition, learning providers are being forced to use technological

solutions to reach their customers. The consumer market grows as more learners pay for their own learning.

This allows the learning model to change from a short sharp fix, when the learner is young, to a life long engagement with the learner. As the individual develops through life, they need new skills and new content delivered to them, allowing the eLearning delivery sector to grow in a different manner to that of classroom delivery.

2 Business and Revenue Models for E-Learning

Timmers (2000) defines a business model as an "architecture for products, services, and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenues".

In the literature there is a range of business models and taxonomies of business models. An interesting analysis of business models is available in a course written by Michael Rappa (2006), where he has identified 38 business models grouped into 9 types. This exemplifies some of the confusion which arises when organizations attempt to enter the eCommerce world for eLearning. We shall see how hype and exaggeration has led to significant failures in major projects. There is also confusion and failure in modest projects.

3 An eCommerce View of the eLearning Industry

Analyzing the value chains can provide an effective way to understand the structure of information system applications. This approach to the understanding of eLearning as an industry and to be practiced as eCommerce can be guided by the business models for Internet-based management education proposed by Enders and Hutzschenreuter (2001), who identified three business models related to eLearning as follows (Enders, et al, 2001):

The integrated model: those institutions that carry out the entire process of creating content, packaging it, marketing, distributing, and delivering it to customers by themselves.

The packaging model: those companies that specialize in taking content from others, packaging it and delivering the packaged materials to customers.

The broker model: those companies or institutions that engage in delivering pre-packaged materials from different providers to customers.

The processes involve six major activities crucial to eLearning. They are: content creation, content support, content packaging and wrapping, content distribution, support services, and delivering to end users, these processes then form a value chain.

These ideas come together to develop a model of the eLearning value chain (Figure 2). One of the best models is due to Paul Stacey (2002).

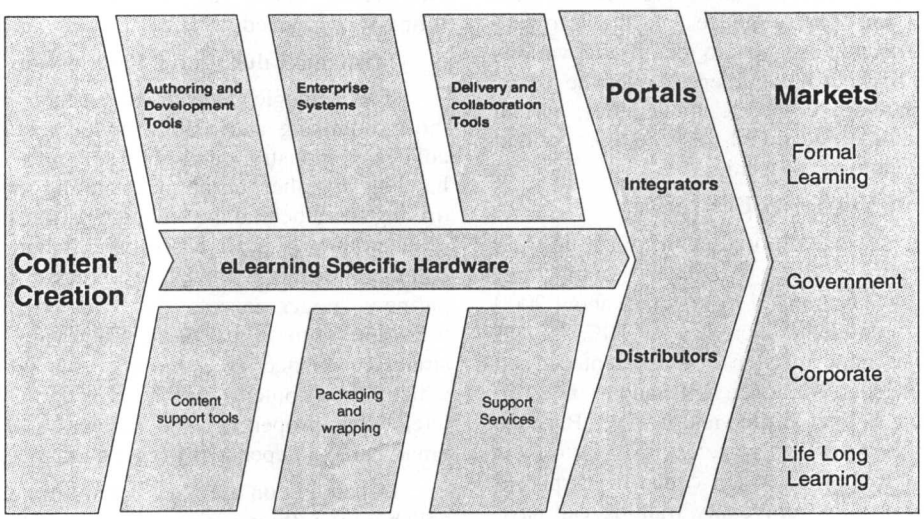

Figure 2 eLearning value Chain (Based on Stacey 2002)

However, in any business we have four major fields for consideration – the product/service, provider/customer relationships, infrastructure and finance.

So when we start on any eCommerce based eLearning project, the owner of the project should identify all possible revenue streams, clearly understand the various customer values delivered on these streams, and the relationships underpinning these values including supply and delivery partnerships, and have clear understanding of the enabling infrastructure.

4 Market Trends and Drivers

To predict the development of the eLearning Industry, a clear idea must be obtained on its trends, drivers and inhibitors. One view of the main drivers, trends and inhibitors for the industry in 2004 is expressed in Figure 3. These trends, drivers and inhibitors were identified based on a series of meetings held during 2003

and the early part of 2004. The participants at these meeting were a mix of academics and business persons.

What sets the virtual university enterprise apart from other enterprise models is its absence of a physical classroom. All the learning and teaching is done 100% online.

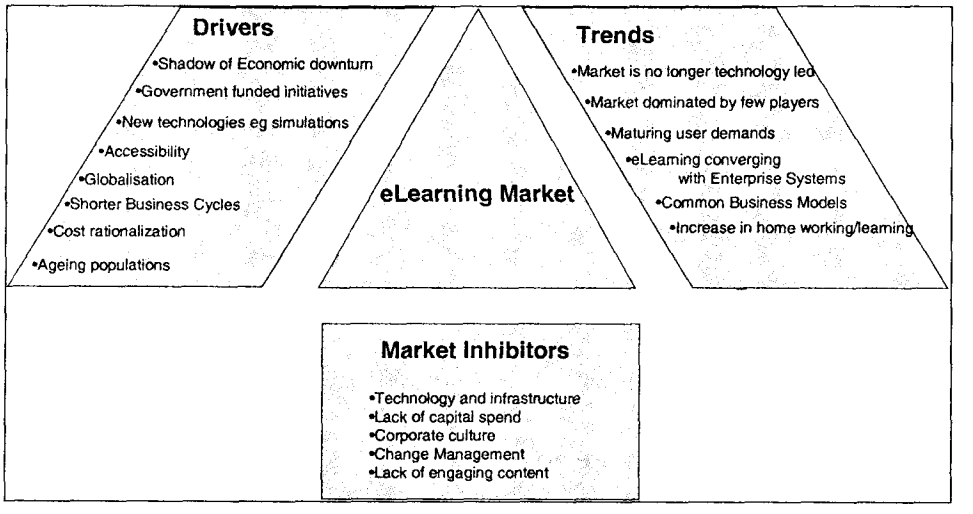

Figure 3 Trends, Drivers and Inhibitors for the Elearning Industry

5 eLearning Enterprises

These trends, drivers and inhibitors manifest themselves in the development of the new enterprises of the eLearning Industry. The eLearning landscape is filled not only with dot-coms but also with big corporations, for-profit spin-off ventures, and big and small universities--all vying for a piece of the growing marketplace. This section attempts to identify the various eLearning enterprises that have emerged over the years. The enterprises include: corporate universities, virtual universities, strategic educational partnership, content companies and technology companies.

The Corporate University Enterprise

In recent years, large corporations have set up their own learning centers. Since 1990, the number of corporate universities has jumped from 400 to about 2000 and the number of students increases at 30% a year (Jones, 2000). The main mission of these centers is to use eLearning to improve employee skills and to invest in human capital while saving on time and money. Because these learning centers provide service exclusively to their corporate employees, they are often called a "corporate university". The corporate university training can save hundreds of millions spent on employee training and education (Jones, 2000). Employees can take courses and learn them at any time and in any place.

Virtual University Enterprise

A virtual university is not a new phenomenon. The idea of giving the individual the flexibility to take a course anytime, anywhere; to interact with professors and other students in small learning communities; and to choose from a wide range of course offerings has inspired many innovations since the 1980s. In recent years, the number of schools following the virtual university model has increased.

Examples of virtual university enterprises – University of Phoenix Online (http://www.schoolguideusa.com/university-of-phoenix-online.html) or the online offering of traditional universities such as Brigham Young University (http://www.byu.edu).

Strategic Educational Partnership

The strategic educational partnership could be the most promising and viable model of all. Universities, colleges, industry, and IT software companies are banding together at an accelerating rate. The basic driving force behind the strategic partnership is the power of economies of scale based on collaboration. The more collaboration allows more resources sharing among the partners, bigger access to the market place, and faster transition into eLearning (Carnevale, 2000). The strategic alliance is a loosely coupled partnership in which the content providers retain control of its intellectual property. The partners still maintain their brand name independent from the alliance.

Depending on the type of institutions involved in the collaboration, three major variations of this enterprise are observed. They are the partnership between dot-com and business corporations, dot-com and educational institutions, and among educational institutions.

Distributed Learning Model

The collapse of many educational adventures over the past few years, not only in the collapse of dot com based ideas, but also in the collapse of highly funded eVersity models has led to the development of new models. For example, the emergence of distributed learning model is showing promise for the future of the eLearning industry with innovative technologies, where the learning community is distributed across a physical map of the world along with an electronic one. This

model has flavors of a bricks and mortar approach blended with a significant electronic support network. Here the broker forms a chain of delivery partners who act as local fulfillment agents for students, allowing the handling of local tutorial support. In this model, the University or Accreditation supplier acts as a curriculum and learning content supplier and/or as a quality agent assuring that the learning has taken place. With this model, the broker can still place a great significance on Brand, the brand delivers the experience, and the quality agent assures quality. (See for example http://www.interactiveuniversity.net).

6 Examples of eLearning Business in the Value Chain– Case Studies

6.1 The example of the ITITechmedia Games Project

ITI Techmedia, was setup by the Scottish Government with the aim to bring Scotland to the forefront of the global market for digital media and communications technology. The company has an investment fund of £150m over 10 years to to develop a range of pre-competitive technologies with global market potential. The ITITechmedia is market-driven, 100% commercially focused and committed to positioning Scotland as an important world centre for the creation and marketing of new intellectual assets which will achieve commercial value and stimulate economic benefit for Scotland.

Games-Based Learning is the focus of our first R&D programme which began in September 2003. The programme is intended to capitalise on the potential growth in what is currently a relatively immature market.

Games-Based Learning is part of the wider e-learning services market which, in North America alone, is forecast to be worth USD80 billion in 2006. The technology developed as a result of the programme is intended to overcome the main barrier to growth in the Games-Based Learning market – namely, the complexity involved in the development of learning modules. ITI Techmedia plans to develop a differentiated creation and authoring platform that will greatly simplify the development process. It will allow effective and engaging learning to be created and delivered quickly and easily by learning experts.

The research phase of the programme is now complete and the early stages of technology development are underway.

ITI Techmedia carried out a series of studies during 2003 to 2005 which gave a marketing view and a technology foresight for technologies to be deployed in the eLearning space.

6.2 The Royal Bank of Scotland

The following information is based on a presentation by Brian McLaren (McLAren, 2003).

The Royal Bank of Scotland is No 2 in Europe, and No 5 in the World ranking by market capitalisation. The RBS has been involved in staff training and development for many decades based on traditional chalk and talk within a traditional training centre and using a generic curriculum. In 1995 the Bank sold the training centre and in 1997 moved to training consultancy as a base for provision to its employees. In 1998, RBS started to build a business case for eLearning. The case was based on the Retail Business looking for a consistent training model; the Corporate Communications objective to standardize & improve communication, and HR beginning to look at the implementation of e-HR. There was significant business sponsorship from within the Bank. A Training & Communication Network (TCN) was built consisting of a network of PC's offering: Access to the Group Intranet via ISDN; Satellite delivered Virtual Classroom and an internally built 'Learning Management System'. This network was initially rolled out to 650, and by 2003 had reached 1,800 location. Within the Bank the initial target audience was 26,000 retail staff.

By 2003, there were 350+ hours of interactive custom learning content developed making the application the largest e-learning initiative in UK.

The benefit of this project to the Bank was a 7:1 Return on Investment reported, which is equivalent to 7 times more training for money spent. There was a recorded reduction in workshop time yet more training offered, and a reduced time to market.

There were also significant issues from the HR point of view, before the TCN was rolled out "lack of training" was consistently one of two top reasons for leaving, after "lack of training" became the 7th highest reason (link to cost of turnover).

One of the most interesting aspects of eLearning within the RBS, was its influence in the take-over of the National Westminster Bank by the RBS. In the bid document for the takeover, there were forecast deliverables based on the roll out on the TCN to the National Westminster retail business. It was intended that 1000 new satellite installations and 1150 new TCPC installations. The roll out of this infrastructure was to realise a benefit of £22.5m projected over 5 years.

It was estimated that RBS Training had reduced its headcount by 50% due to the roll out of eLearning, and a similar reduction in head count at National Westminster was expected.

By 2004, the take-over was finished, and RBS and Nat West was now integrated. It is accepted that eLearning was a critical success factor in training for IT Migration - the largest IT integration project in Europe. Within the training for IT migration alone,

- 36,450 staff trained in new system within 12 week period prior to conversion
- 838,500 hours of training completed during this period
- 277 hours of training material developed
- 6 delivery channels used - online the key
- Estimated savings of £10.8m realised
- quality of training accepted as higher than traditional means