

AVATAR BUSINESS VALUE ANALYSIS: A METHOD FOR THE EVALUATION OF BUSINESS VALUE CREATION IN VIRTUAL COMMERCE

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ABSTRACT

The recent years have seen the emergence of a number of virtual worlds with various designs and purposes. Some have become very popular and have developed growing in-world economies. Real-world businesses are increasingly experimenting with doing virtual business there as well. In this paper, we present Avatar Business Value Analysis, a novel theoretical framework and a computational method and decision tool to help evaluate and strategically manage business value creation inside synthetic environments, and show how it can be applied to cost-benefit analysis in practical settings. The decision-tree-based method includes traffic metrics that may be used to empirically estimate the business value of virtual commerce ventures. We also investigate some intangible factors that are impacting these metrics in the context of the particular case of the virtual world *Second Life* and discuss their implications. We conclude by outlining strategies that could be considered by the operators of virtual worlds and the real corporations in order to promote sustainable virtual business in synthetic environments.

Keywords: business strategy, business value creation, online marketing, second life, traffic metrics, virtual commerce, virtual worlds.

1. Introduction

The recent years have seen the emergence of a number of virtual worlds with various designs and purposes. These worlds have found large user bases and growing member communities. *Massively multiplayer online games* (MMOGs) have been playing the pioneering role in bringing these synthetic worlds out of the subculture of computer geeks into the mainstream Internet-based business domain. As synthetic worlds are becoming more popular, they are developing advanced in-world economies [Castranova 2005] by offering users the opportunity to conduct a variety of virtual business activities that we refer to as *virtual commerce*, or v-commerce. Besides academic fascination with virtual economies and the possible spillovers to the real world economies, existing companies, online and offline, are investigating the means that would allow them to leverage the nascent virtual markets to their own advantage [Hemp 2006]. Since innovative use of new forms of electronic business can improve firm performance [Zhuang 2005], many Fortune 500 companies are rushing to establish some presence in virtual places like Linden Lab's *Second Life* [Mennecke et al. 2007]. In addition to creating brand awareness that may translate into eventual sales of real products in the real world, these companies are aiming to understand the concealed needs of their current or potentially new customers. Understanding deep-seated desires, which may openly be expressed in virtual settings, may help the companies in better serving customers not just in the virtual but also in the real world. Many of these companies are also anticipating a new source of income by directly selling virtual products and services to the inhabitants of the virtual world.

1.1. Research Questions

Our research is motivated by the need to understand business value creation inside virtual environments, specifically business value that derives from traffic to virtual stores. There is no established theoretical body or empirical work to ground research in this emerging field yet. The literature also lacks appropriate measures that would allow the assessment of the value of virtual world business ventures [Barnes 2007]. We do not address in this

article the business model of owning and operating a virtual world. We rather concentrate on existing real-world companies setting up a presence and conducting virtual commerce inside an established virtual world run by an operator such as Linden Lab. The article's main research question is: "How can we assess the business value created inside a virtual world, and how does that value translate into tangible benefits in the material world?" The purpose of the paper is to propose a novel theoretical framework that conceptualizes the business problem of value creation in virtual worlds, and to contribute an original computational method and decision aid that can be employed by management to support virtual business investment and strategic management decisions. In our analysis, we concentrate on Linden Lab's *Second Life* virtual world as our chief case in point. Since a multidisciplinary approach is appropriate for studying synthetic environments [Bray & Konsynski 2007; Roche 2007], we address the technology, social, economic and legal aspects of virtual worlds in our article. Virtual worlds in general have not yet reached the required level of maturity that would leave a lasting impact on the way companies conduct business with their existing or potentially new customers. By drawing lessons from the case of *Second Life*, our analysis may assist real businesses in devising effective strategies for their future virtual world ventures.

1.2. Organization

In section 2, we present an overview of virtual worlds in general and Linden Lab's *Second Life* in particular. In section 3 we develop our theoretical framework of business value creation inside synthetic environments. The framework includes Avatar Business Value Analysis, a decision-tree-based method for analyzing traffic metrics that may be used to empirically estimate the business value of virtual stores. We investigate in section 4 factors that are impacting these metrics in the specific case of *Second Life* and outline strategies that could be considered by the real corporations in order to improve their virtual world operations. In section 5, we draw lessons from the case of *Second Life* and offer a set of success factors for achieving mature and sustainable v-commerce environments.

2. Virtual Environments

The first notion of synthetic worlds did not start in the computing world, but rather in the realm of science-fiction literature. In *Brave New World* [Huxley 1932] and *The Three Stigmata of Palmer Eldritch* [Dick 1965], people experience under the influence of pharmaceutical products a virtual reality different from their own real existence. *Neuromancer* [Gibson 1984] and *Snow Crash* [Stephenson 1992] replaced pharmaceutical technology with networked computing technology as the means to create and access alternative worlds. *Neuromancer* refers to the cyberspace interpretation of computer networks, while *Snow Crash* revolves around the *Metaverse*, a virtual-reality successor of the Internet.

The vision of science-fiction writers is already materializing in MMOGs and other virtual environments. In addition to playing, users may socialize, trade and even earn incomes in such spaces. This has paved the way for a new attractive way of accessing the Internet through the point of view of an *avatar*, which is the virtual-self, or graphical representation of the user. Experts predict that soon enough "our gateway to the Internet will look more and more like a videogame and less like a book" [Bradley et al. 2005; Castranova 2001].

Even though the majority of MMOGs are of the fantasy or role playing genre, there are niches in the science-fiction, combat simulation and social interaction segments as well. Social interaction games may be adopted by consumers to satisfy various needs and desires. Some users may be interested in the fantasy aspect of the games, considering virtual worlds as means for virtual escapism from real life pressure. They may even visit virtual worlds to take part in hedonistic activities that they may or may not associate with in real life. Others may also consider synthetic worlds as social spaces for self-expression and meeting like-minded people, as platforms for engaging in artistic creativity, or as public places for civic organization and governance. In fact, purely social interaction games such as Linden Lab's *Second Life* and Makena Technologies' *There* are the closest to Stephenson's original notion of the *Metaverse* and are promoting the establishment of advanced virtual economies. Companies are therefore increasingly considering virtual worlds as a new frontier for doing online business with current or new customers. We draw in this article primarily on social interaction places, and in particular on *Second Life*, to motivate and illustrate our theoretical analysis, rather than on role playing games that have set plots and rules.

2.1. Linden Lab's Second Life

Launched in 2003, *Second Life* is a three-dimensional virtual world where content creation is largely the responsibility of the inhabitants [Ondrejka 2005]. *Second Life* residents are encouraged to buy or rent virtual land and create various types of virtual world content and virtual goods. Since the residents retain the intellectual property rights to their personal creations, they can trade with other residents using *Second Life*'s official currency, Linden dollars (L\$). Linden dollars can be converted to real US dollars on the LindeX currency exchange market, and a total of USD 7.6 million was exchanged for Linden dollars in the month of December 2007 alone [*Second Life* Virtual Economy Key Metrics 2008].

Recognizing the economic opportunities that are materializing inside *Second Life*, many real businesses are implementing v-commerce initiatives, trying to gain early-mover advantage in what could become a revolutionary way of conducting business online. Organizations such as Toyota, Circuit City, Dell, Sears, Adidas, and many

others, have all opened virtual stores in *Second Life*, expecting to better understand and connect with consumers, to reach new potential customers, and to create and increase brand awareness. While some companies have set up fully transactional virtual stores, many only allow the avatars to interact with the virtual products and services that are presented without offering them the chance to actually buy anything. Others organize promotional and social activities that are more related to image rather than specific products directly. Such companies are focusing on brand awareness aiming to engender indirect sales for their products, either physical or digital, in the real world. In addition to brand awareness, companies such as American Apparel that sell virtual versions of their existing real life products for avatars to wear in the virtual world, also aim to generate direct revenues from the sale of the virtual goods.

The professional business and technology trade press were quick in opening virtual bureaus to file reports from inside the synthetic world. They ran cover stories on *Second Life*, discussing how users may have alternative virtual identities and how some have become entrepreneurs [e.g. Hof 2006]. The press even heralded *Second Life* as a future revolutionary medium for conducting electronic commerce in a three-dimensional setting. Empirical data from current industry research studies, however, indicate that virtual shops are mostly empty [La Plante 2007], generate very little business value, have limited profit growth potential and 90% of them fail within 18 months [Gartner 2008]. The business and technology press that originally ran cover stories on *Second Life*, proclaiming that it has a thriving virtual economy that is attracting real corporations, is now dismissing it as just hype [Rose 2007]. Numerous academic researchers are also already doubting their value for real businesses [Clemons et al. 2007] and predicting their demise [Noam 2007]. Overall, it largely remains inconclusive whether companies are getting positive returns on investments they make in virtual stores and whether virtual world commerce is viable in the long run.

3. Avatar Business Value Analysis

Despite the recent negative reviews in academic and business publications, companies continue to explore v-commerce possibilities. Even if company executives are not sure yet of the kinds of benefits they can obtain from such initiatives, they do anticipate that virtual worlds will play a vital role in reaching the millennial generation that is enormously at ease in online social network and synthetic environments [Kobayashi-Hillary 2007]. We next present Avatar Business Value (ABV) Analysis as a novel framework that companies can use in order to assess the business value of their virtual world initiatives and devise more effective v-commerce strategies. We anchor the AVB Analysis framework in the electronic commerce and marketing literature on internet shopping. It is related specifically to Web Chain Analysis, an area that aims to evaluate the value of commercial web sites [Hanson & Kalyanam 2006]. Web Chain Analysis has been applied, in particular, to the analysis of the relationship between online advertising and web site traffic and e-commerce sales.

Avatar Business Value Analysis, as a concept, is similar to Web Chain Analysis in terms of motivation and methodology, but different in terms of its specific method, which is designed to support v-commerce analysis (business inside virtual worlds) rather than e-commerce analysis (business on conventional web sites). ABV Analysis hence includes a formal representation of the events and decisions taken by an avatar (and subsequently the real person behind the avatar) as a result of interacting with a virtual store.

The framework enables real companies to measure the potential benefits of their virtual presence in a virtual world. Virtual presence may be in the form of a virtual advertisement or product placement that the inhabitants encounter when visiting different areas of the world. It may also be in the form of a full-fledged virtual store presenting virtual merchandise or offering some business-sponsored virtual activities [Vedrashko 2006]. We do not analyze product placement, mini-games or virtual advertisements but focus on the business value that may be created through the establishment of virtual stores. We distinguish in this article, as shown in Table 1, between virtual stores (places to conduct v-commerce), web stores (places to conduct e-commerce), and brick-and-mortar stores (places to conduct physical commerce). Both virtual stores and web stores exist online on the Internet. A virtual store is a three-dimensional representation of a brick-and-mortar store inside a virtual world. A user can only interact with the virtual store through his avatar. A web store on the other hand is a two-dimensional representation of a brick-and-mortar store that is identified by a URL.

We thus differentiate in this article between virtual business and real business, and likewise between the virtual commerce operations and real operations of an organization. V-commerce refers to any operational business transactions and business activities inside a virtual store that supports the sale of virtual goods, and generates virtual revenues in virtual currency such as *Second Life*'s Linden dollars (L\$). Real operations on the other hand take place either online (e-commerce operations related to a web site) or offline (physical operations related to a brick-and-mortar store). They involve the sale of real goods, digital or physical, intended for use in the material world. The sale of real goods generates revenues in real currency such as US dollars. Likewise, we distinguish between virtual customers, typical online customers or internet shoppers, and physical customers. Virtual customers are avatars that interact with virtual stores, while online customers visit web sites and physical customers go to

brick-and-mortar stores. Since a user may have more than one avatar in a virtual world, a single real customer may embody multiple virtual customers.

Table 1. Commerce Categories

Commerce Type	Location	Customer Type	Income Type
Virtual Commerce	Virtual Store in a Virtual World	Avatar	Virtual and/or Real Currency
Electronic Commerce	Webstore, or Conventional E-Commerce Ready Website	Internet Shopper	Real Currency
Physical Commerce	Brick-and-Mortar Store	Physical Person	Real Currency

ABV Analysis is based on a decision tree that models an avatar moving around a virtual world. We define and interpret the probabilities of possible events or actions that can occur during the interaction of an avatar with a virtual store¹. All tree diagram paths ultimately lead to quantifiable outcomes, allowing us to calculate the expected business value of opening a virtual store in a virtual world.

The following illustrates the series of decisions faced by a virtual customer when he notices a virtual store. If the avatar chooses to enter the virtual store, he may buy a virtual product by paying in virtual currency. Whether the avatar buys a virtual product or not, visiting the virtual store creates brand awareness and the real user that owns the avatar may visit and purchase products for use in the material world from the company’s web or brick-and-mortar stores at a later point in time. We assume that corporations aiming to sell their real products need to direct the users towards their web or brick-and-mortar stores to finalize the transactions². Our tree diagram therefore does not include real transactions (e.g. purchasing with a credit card a product intended for use in the real world) through virtual stores.

3.1. Entering a Virtual Store

The first event in the tree diagram in Figure 1 describes an avatar that is strolling inside the virtual world and passing by a virtual store. For psychological or technical reasons, the avatar may not notice the virtual store of a particular company [Benway 1998] despite any efforts that the company may make to attract avatar attention. We call the probability of this occurring NNR; the *No Notice Rate*. There is zero value for the real company when avatars do not notice its virtual store.

If the avatar does notice the virtual store, he may choose to enter and talk to the store avatar representatives or interact with some of the presented virtual products. This occurs with a probability of $(1-NNR)*(VSER)$, where VSER, the *Virtual Store Entry Rate*, is the probability of an avatar entering the virtual store that he notices. There is also the possibility, with a probability of $(1-NNR)*(1-VSER)$ that the avatar may notice but choose not to enter the virtual store. In that case, the only value accruing to the real company is increased brand awareness. Since the tree diagram covers all possible steps taken as a result of strolling inside the virtual world, the probabilities of not noticing the virtual store, noticing but not entering, and noticing and entering the virtual store add up to 1.

3.2. Purchasing a Virtual Product

When an avatar enters a virtual store and interacts with the virtual store representatives, other avatars, or the virtual products offered for sale, he becomes a prospective virtual customer. A prospective customer may buy a virtual product with virtual currency. The added business value to the corporation is brand awareness from buying the virtual good, in addition to virtual revenues in virtual currency. The probability of a virtual product sale is PCR, or *Prospect Conversion Rate*. A prospective customer may also choose not to buy anything, with a probability of $(1-PCR)$. The additional business value of such a choice at this stage of the decision tree is just the increased brand awareness.

¹ The names we have chosen to give to these newly defined constructs are original, but whenever possible we have incorporated terms from the electronic marketing literature that describe analogous concepts in web site traffic analysis [see, e.g., Hanson & Kalyanam 2006]

² We omit possible e-commerce capabilities that would allow virtual customers to order real products in virtual stores for the sake of simplicity. It could be easily incorporated in our method without changing our principal analysis.

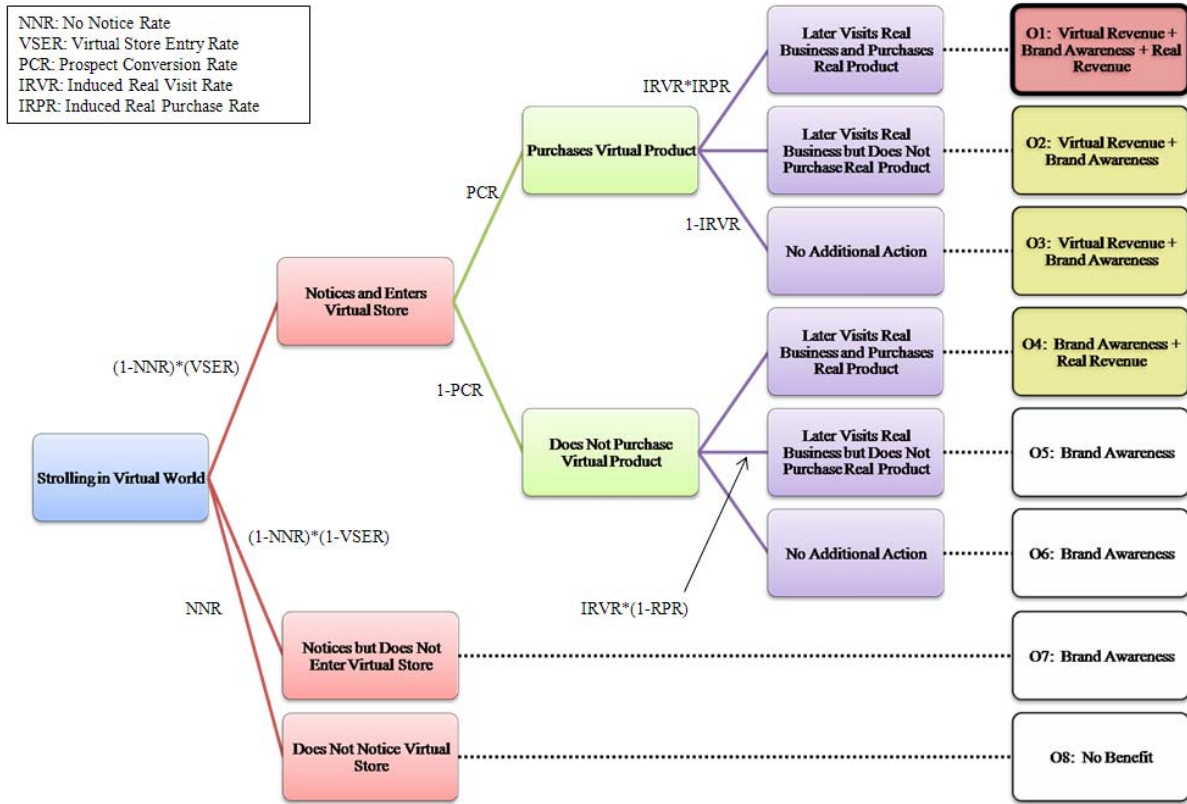


Figure 1. Business Value of a Virtual Store

3.3. Purchasing a Real Product

Whether the avatar purchases a virtual product or not, there is still the possibility that the virtual store experience will prompt the user behind the avatar to visit a web store or brick-and-mortar store at a later point in time. The probability of this occurring is IRVR, or the *Induced Real Visit Rate*. Visiting a virtual store may not lead to any further action with zero added-value to the company. The probability of no further action is (1-IRVR). If the user decides to visit a real store, he may buy a real good, with a probability of (IRVR*IRPR), where IRPR is the *Induced Real Purchase Rate*. This adds real revenue³ to any business value accrued up to this point. Business value creation is maximized in the special situation where the user buys a real good after his avatar buys a virtual one. If the user experiences a real good but decides not to buy it, he will still become acquainted with the company's products, which increases his brand awareness, the sole added-value at this point of the tree-diagram. The probability of this happening is (IRVR)*(1-IRPR).

It is worth noting here that IRVR and IRPR of a user who bought a virtual product may be different from IRVR and IRPR had the same user not bought the virtual good. The probabilities of a customer visiting a real store or buying a real world product may, for example, be higher if his avatar had chosen to buy the virtual version of the product first. For simplicity, we use the same rate whether the avatar buys a virtual good or not prior to visiting a real store. We furthermore do not take into account any differences between the conversion rates of web and brick-and-mortar stores since consumers are increasingly integrating multiple channels in their purchasing behaviors (in other words they may check an item on a company's web store before buying it from the brick-and-mortar store, or they may test a product in a brick-and-mortar store before ordering it online) [Yoram et al. 2002].

³ The company may wish to use a measure other than real revenue (for e.g. real gross profit) to account for the value accruing from a real purchase. Bhimani (2004) is a good start for understanding the issues concerning the management accounting implications of the digital economy.

3.4. Business Value Computation

ABV Analysis supports the calculation of the value of any part of the chain of events illustrated by the decision tree. This in turn allows the computation of the business value of virtual stores and the evaluation of specific company strategies. This however necessitates the estimation of the probabilities NNR, VSER, PCR, IRVR and IRPR. Similar to market research in conventional online advertising, these may be obtained from different sources, including traffic data supplied by the virtual world operator, clickstream analysis generated from the company’s web store databases, or the results of general marketing experiments and surveys conducted by the company or market research firms. Following the estimation of the parameters, the costs of setting up a virtual presence in a virtual world such as *Second Life* may be compared to its expected benefits to gauge whether investing in a virtual store would increase the real company’s value or not.

A key measure that businesses need to take into account is the *Expected Value of the Virtual Store* (EVVS). It is obtained by multiplying virtual world traffic by the *Expected Value of an Avatar Contact* (EVAC).

$$(1) \quad \text{EVVS} = \text{store traffic} * \text{EVAC}$$

Virtual world traffic figures are bounded by the total number of active residents of the virtual world. EVAC is calculated by summing up the probability of occurrence of all events multiplied by their monetary outcome, denoted by O_i , $1 < i < 8$, in Figure 1. The outcomes may include virtual revenue, real revenue, and brand awareness. Virtual revenue and real revenue figures can readily be forecasted using the prices associated with the company’s virtual and real product portfolios. Strengthening the brand name of the real company may also be quantified by indirectly measuring its effects on various aspects of business operations such as improved efficiency in market relations, increased market share or the ability to command premium prices [Keller 1993].

$$(2) \quad \text{EVAC} = (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * \text{IRVR} * \text{IRPR} * O1 \\ + (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * \text{IRVR} * (1-\text{IRPR}) * O2 \\ + (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * (1-\text{IRVR}) * O3 \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * \text{IRVR} * \text{IRPR} * O4 \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * \text{IRVR} * (1-\text{IRPR}) * O5 \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * (1-\text{IRVR}) * O6 \\ + (1-\text{NNR}) * (1-\text{VSER}) * O7 \\ \text{(We exclude } O8 \text{ from the calculations since } O8=0)$$

The computation of EVVS is meaningful when a business also forecasts the *Expected Costs of Setting up and Maintaining a Virtual Store* (ECVS). Whenever a real business is interested in expanding its operations into a virtual world, calculations that yield an expected value of a virtual store exceeding its costs ($\text{EVVS} - \text{ECVS} > 0$) indicate that the virtual world venture is worthwhile. On the other hand, calculations that yield an expected value of a virtual store not covering its costs ($\text{EVVS} - \text{ECVS} < 0$) suggest that the company should reconsider its decision of having a presence in the virtual world (Figure 2).

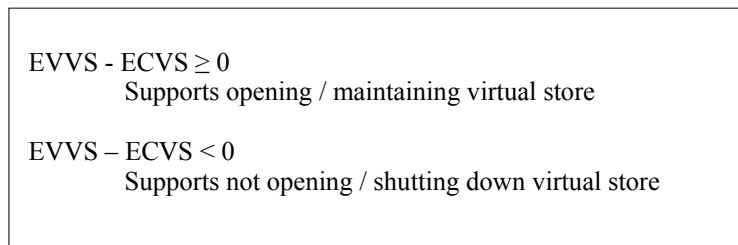


Figure 2. Long-term Strategic Decision Rules

For businesses with established virtual world operations, the calculation of EVVS on a regular basis provides a quantifiable assessment of the various sources of business value created by a virtual store. It therefore assists companies in identifying potential sources of strength or weakness in their operations, and can be used to improve v-commerce performance. The businesses may also be interested in calculating EVAP, the *Expected Value of an Avatar Prospect*. While EVAC denotes the expected benefit from a virtual customer that notices, but may or may not enter a virtual store, EVAP measures the expected benefit from an avatar that does enter a virtual store and who hence experiences the virtual goods on offer and becomes a virtual customer prospect.

$$(3) \quad \text{EVAP} = (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * \text{IRVR} * \text{IRPR} * \text{O1} \\ + (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * \text{IRVR} * (1-\text{IRPR}) * \text{O2} \\ + (1-\text{NNR}) * (\text{VSER}) * \text{PCR} * (1-\text{IRVR}) * \text{O3} \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * \text{IRVR} * \text{IRPR} * \text{O4} \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * \text{IRVR} * (1-\text{IRPR}) * \text{O5} \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{PCR}) * (1-\text{IRVR}) * \text{O6}$$

If virtual customer prospects do buy a virtual product for the first time, the real companies may also wish to predict their lifetime value. Ongoing interaction with customers is central to AVB Analysis, especially since advances in social computing platforms and services have shifted the interaction between a firm and its customers away from transactions and towards relationships [Sheth and Parvatiyar 1995]. A customer lifetime value is the present value of future cash flows attributed to the customer [Berger and Nasr 1998]. In the context of virtual environments, we define *Virtual Customer Lifetime Value* (VCLV) as the present value of future cash flows, both virtual and real, attributed to an avatar.

The calculation of VCLV is rather complicated in special cases where one real customer corresponds to multiple virtual customers (i.e. a single user has multiple identities in the same virtual world). In such cases, the problem of attributing the real revenues and benefits from brand awareness to more than one avatar arises. However, for the standard case of users who own a single avatar, the calculation is as follows:

$$(4) \quad \text{VCLV} = \sum_{t=1}^T \frac{(\text{VR}_t + \text{RR}_t - \text{VC}_t - \text{RC}_t) \gamma_t}{(1 + r_t)^t}$$

where VR and RR are the *virtual* and *real revenues* attributed to a single virtual customer. VC denotes the *virtual costs* of interacting with a virtual customer, such as the costs of virtual representatives assisting the avatar in the virtual store. RC on the other hand are the *real costs* of assisting the user behind the avatar in any interactions he may have with the company in real life. γ is the *Virtual Customer Retention Rate* and r_t is the *discount rate*. Since virtual customers may have diverse spending patterns and service needs, the real businesses may find it more practical to divide their virtual customer base into segments and calculate VCLV for each segment. The companies may then identify the most profitable virtual customers and invest in retaining the avatar segments with the highest VCLVs.

As mentioned earlier, some virtual stores may not sell any virtual goods, only showcasing the virtual products or offering other promotional in-store activities. Such promotional stores are currently the majority of virtual stores in most virtual worlds. Their value is mainly in branding, building familiarity with and generating real sales of current or future real product offerings. In these cases, our analysis could be simplified and calculating EVVS, EVP and VCLV would be slightly different.

$$(5) \quad \text{EVAC (for virtual stores that present but do not sell virtual goods)} \\ = (1-\text{NNR}) * (\text{VSER}) * \text{IRVR} * \text{IRPR} * \text{O4} \\ + (1-\text{NNR}) * (\text{VSER}) * \text{IRVR} * (1-\text{IRPR}) * \text{O5} \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{IRVR}) * \text{O6} \\ + (1-\text{NNR}) * (1-\text{VSER}) * \text{O7}$$

$$(6) \quad \text{EVAP (for virtual stores that present but do not sell virtual goods)} \\ = (1-\text{NNR}) * (\text{VSER}) * \text{IRVR} * \text{IRPR} * \text{O4} \\ + (1-\text{NNR}) * (\text{VSER}) * \text{IRVR} * (1-\text{IRPR}) * \text{O5} \\ + (1-\text{NNR}) * (\text{VSER}) * (1-\text{IRVR}) * \text{O6}$$

$$(7) \quad \text{VCLV (for virtual stores that showcase but do not sell virtual goods)} \\ = \sum_{t=1}^T \frac{(\text{RR}_t - \text{VC}_t - \text{RC}_t) \gamma_t}{(1 + r_t)^t}$$

4. Avatar Business Value Analysis for Strategic Management of V-Commerce Operations

In this section, we illustrate how real companies can employ ABV Analysis concepts to evaluate and strategically manage their v-commerce operations. Based on evidence from our case analysis of *Second Life*, we analyze the factors that are currently negatively impacting the performance metrics (as summarized in Table 2) and ultimately the business value of virtual stores in terms of the measures EVAC, EVAP and VCLV developed in prior sections. While our method is designed to quantify the tangible outcomes from running virtual stores, there are other, intangible factors that play a role in determining success or failure. Some of these will be briefly discussed next.

Table 2. Strategic Management of Key Avatar Business Value Analysis Model Parameters

ABV Model Parameter	Factors Affecting the Parameter in the Current <i>Second Life</i> (SL) Setting	Recommended V-Commerce Strategy Responses
VSER: Virtual Store Entry Rate	<ul style="list-style-type: none"> • SL client instability when large groups of avatars are in one single location • Mistrust among many virtual world users towards real corporate interests inside SL 	<ul style="list-style-type: none"> • Lobbying SL for client upgrades • Adding value to the avatar experience inside SL, which would help build trusted relationships between the user communities and real businesses
PCR: Prospect Conversion Rate	<ul style="list-style-type: none"> • SL client crashes and security breaches • SL virtual property policy • Virtual goods offered for sale are often replicas of existing real products and hence do not add value to possible fantasy element in SL 	<ul style="list-style-type: none"> • Lobbying SL for client upgrades • Lobbying SL for an internal governance structure and better virtual property guarantees • Innovating virtual goods that target fantasy elements in SL and that may have no counterpart in real life
IRVR: Induced Real Visit Rate	<ul style="list-style-type: none"> • Frequent SL client crashes 	<ul style="list-style-type: none"> • Lobbying SL for client and system platform upgrades
IRPR: Induced Real Purchase Rate	<ul style="list-style-type: none"> • Fantasy element in avatar virtual purchases may not translate to real purchases • Technological challenges in conveying real product texture and scents in virtual replicas 	<ul style="list-style-type: none"> • Researching the nature of virtual identities • Encouraging research in tactile and olfactory virtual world technology

4.1. Business-Related Factors

The virtual store entry rate VSER is likely negatively affected by the distrust exhibited by *Second Life* residents towards in-world corporate investments. In fact, inhabitants of *Second Life* generally still consider it primarily as a place where they can interact with other residents, and possibly as an environment that allows them to exercise their creativity and design and trade in virtual goods. Many are suspicious of real corporations that build virtual stores and set up giant advertising billboards in *Second Life* public spaces. They consider such practices an unwelcome invasion of their community. A number of real businesses have also overestimated the prospect conversion rate PCR when setting up their virtual world operations. Most of the presented virtual goods are basically virtual replicas of existing physical items for use inside the virtual world. These virtual reproductions of actual physical objects are intended to generate brand awareness, but how avatars respond to these items largely depends on whether the users behind the avatars are importing their social behavior and values to *Second Life* or merely inventing a new fantasy life. Users that have avatars fashioned after their actual physical features may, for example, be interested in buying a Mercedes-Benz in *Second Life* as an indication of their virtual wealth. Furrries, a community of anthropomorphic animal avatars, are on the other hand less likely to be motivated by the status symbol of an expensive car, but may be inspired by a completely different kind of product design.

The induced real purchase rate IRPR may also be overestimated by the companies currently running virtual stores in *Second Life*, sometimes because they misunderstand the nature of virtual identities. Some organizations in fact venture into *Second Life* with the explicit objective of better understanding their target audience and connecting with virtual consumers. These organizations hope that the users who interact with or buy virtual goods will eventually purchase their physical world counterparts. It is important to realize that even if interacting with a virtual copy of a real product is an improvement over examining its specifications on a picture posted on a web store [Childers et al. 2001], current technological limitations do not allow virtual products to convey textures or scents to the users behind the avatars [Lui et al. 2007]. The present technological challenges therefore hamper the potential connection between experiencing virtual products and purchasing real goods [Levin et al. 2005]. This connection also largely depends on a mass of users that build their virtual lives as a replica of their real existence, or at least on users that transfer most of their real identity elements to their virtual lives. This notion may not hold with many virtual world residents, who are attracted by the possibility of living a *Second Life* very different from their own. It is therefore unwise to assume that the behavior of avatars in virtual worlds has much bearing on their actual purchases in the real world [Clemons 2008]. Users who buy a virtual product may have no desire for its real-world counterpart.

4.2. Operator-Related Factors

In addition to company specific strategic factors, the business value of virtual stores is jeopardized by *Second Life*'s current perceived lack of traffic critical mass. Achieving critical mass, or a minimum number of users to make subsequent adoption of a technology self-sustaining, is vital for innovations that are of an interactive nature [Rogers 1995] and also significantly influences user attitudes [Hsu & Lu 2004]. Achieving critical mass is dependent on the "perceived" number of actual adopters [Mahler & Rogers 1999]. Despite *Second Life*'s touted popularity, empirical evidence suggests that most of the virtual world's spaces are predominantly empty [La Plante 2007]. According to Linden Lab, the number of *Second Life* residents stands at 12.5 million [*Second Life* Economic Statistics 2008]. This number however includes all virtual identities, or avatars, registered on *Second Life* since its inception in 2003. Because of dead accounts, multiple registrations and so on, the number of unique active users of *Second Life* is estimated to be less than 10% of the official figure [Wagner 2007], and the number of users who are simultaneously logged on at any given time is only a fraction of that.

The virtual store entry rate VSER may be negatively affected by *Second Life*'s existing technical limitation that makes the system unstable whenever more than about 70 avatars meet simultaneously at one single location [BBC News 2006]. Residents may be turned off by the latency of the system [Claypool & Claypool 2006; Hsu & Lu 2004] and real company events that are designed to promote and attract traffic to virtual stores may hence fail. The prospect conversion rate PCR, or the probability of an avatar purchasing a virtual good, may also be negatively affected by frequent outages of the *Second Life* software. Users in fact experience client crashes that interrupt their sessions around 22% of the times they are logged in [*Second Life* Virtual Economy Key Metrics 2008]. This likely negatively affects user experience and undermines the initiatives of real businesses when the system crashes while the consumer is in the process of buying a virtual good. *Second Life* is also subject to the more serious hacking attempts [BBC News 2006] that put its user accounts, with the attached personal and credit card information, at risk. The perceived privacy concerns may decrease trust [Teltzrow et al. 2007] in virtual commerce and hence negatively affect PCR. The *Second Life* client crashes may also decrease IRVR, the induced real purchase rate, especially when a user is being redirected to the company's web store to complete a real transaction.

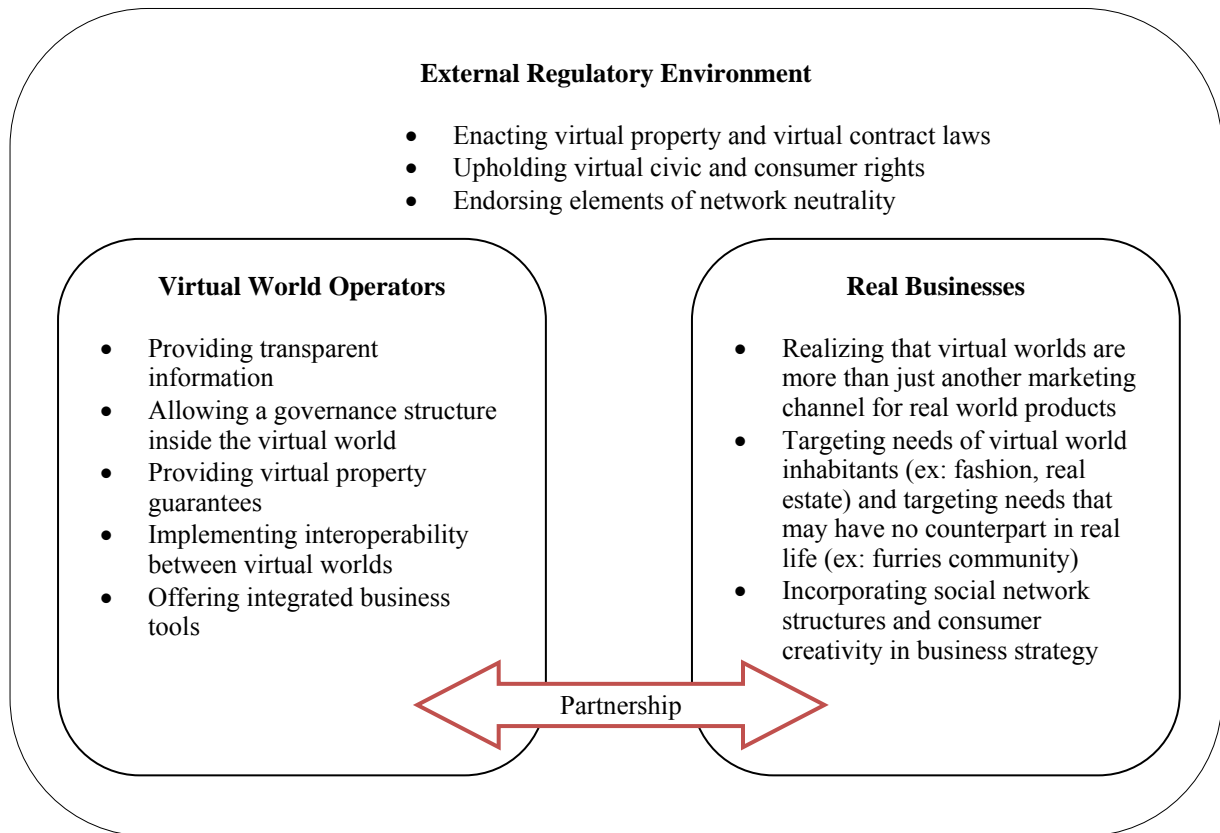


Figure 3. Key Factors for Achieving Mature and Sustainable V-Commerce Environments

Furthermore, Linden Lab's virtual property policy probably has a negative effect on the prospect conversion rate PCR, or the probability of avatars buying virtual products. Virtual assets in *Second Life* are mere binary

sequences on a server [Hunter and Lastowka 2004], which renders their value vulnerable to loss without seller liability or legal recourse. *Second Life*'s End User License Agreement (EULA) also gives Linden Lab the unlimited right to modify *Second Life*'s rules, duplicate world content and devalue virtual currency or any virtual good at will [Archinaco 2007]. Unless Linden Lab amends its virtual property policy, users may not have enough trust in the virtual world operator and may be reluctant to invest real money in virtual assets [Wu & Liu 2007].

5. Concluding Remarks

The discussion of business and operator-related factors in section 4 clearly shows that virtual worlds like *Second Life* currently fail to achieve their v-commerce potential. However, it is important to emphasize that commerce within a synthetic environment is still in its infancy and likely to improve over time. The specific performance measures proposed in our ABV Analysis framework provide a useful lens for guiding strategic responses and operational improvements. Our analysis also suggests that implementing successful virtual commerce platforms in the future demands close cooperation and strategic partnerships between the virtual world operators and the businesses running v-commerce operations inside synthetic worlds (cf. Figure 3).

Companies interested in v-commerce need to adapt their strategies to the nature of virtual worlds. They may for instance seek to participate in and derive some business value from the social networks that develop in synthetic environments. Providing outlets for consumer creativity inside a virtual world may even constitute a means for integrating consumers into the company's real production chain [Wikström 1996; Goel & Mousavidin 1997; Arakji & Lang 2007]. Moreover, researching the fantasy behavior of virtual consumers such as the Furies, for example, and understanding their needs and wants would help the real businesses in offering products that specifically target these new desires.

In addition to providing transparent information about the size of the virtual resident populations, operators ought to maintain sound internal governance structures [Lessig 2006] that would serve as a foundation for both civic and business conduct among resident communities and business entities. This includes a strong system organizing virtual property as well as intellectual property over virtual designs and creations. Virtual world operators may also consider implementing interoperability between various virtual worlds to allow users to transfer their established virtual identities and travel between virtual realms. Real business operations may seem less invasive to the inhabitants of virtual worlds if they have the option of visiting a commercial virtual space then leaving it to a different business free zone. Virtual worlds that invite real world investments should also offer additional functionalities that integrate v-commerce with the more general online operations of the real businesses [Bloomfield 2007]. Virtual stores could offer interfaces to conventional e-commerce web sites and allow transactions to be finalized inside the virtual world, instead of redirecting the consumer to the seller's web store.

While not directly inferred from our ABV Analysis, long-term v-commerce sustainability further requires the development of a comprehensive regulatory environment that organizes virtual world economic activities. There is first a need for clear protection of virtual property in the legislations [Hunter and Lastowka 2004; Fairfield 2005]. Moreover, since virtual worlds have no national boundaries [Goldsmith and Wu 2006] and it is unclear which real world laws the virtual world users and businesses ought to follow, virtual contract laws may be essential for protecting the interests of virtual world inhabitants and businesses. Finally, upholding some form of network neutrality [Wu 2006] that would prohibit the Internet service providers from degrading the speed of delivery of MMOG content or from imposing surcharges on the use of MMOGs [Frieden 2007] is important to support innovation [Economides 2007] in virtual worlds and v-commerce practices.

In conclusion, virtual worlds still hold the possibility of radically altering the way we conduct business online and new business models for virtual stores are likely to be innovated. The *Metaverse* may become in the near future very real indeed.

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