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Abstract

This paper studies three digital media development models in virtual world. We characterize the revenue mechanisms behind each model, by incorporating the concept of horizontal and vertical supply chain integration of digital media industry. We incorporate the core value of digital media development in the first model, which considers digital media as information goods. Pricing, quality differentiation, quantity discrimination, and content design combined determine the VW popularity and the financial performance. Based on the first model, the second model incorporates the advertising revenue. It becomes essential to optimize both information goods revenue and advertising revenue, while increasing one would decrease the other due to the traffic dynamics. Based on the first two models, the third model considers both vertical and horizontal supply chain integration in the digital media industry. In this model, we add one extra dimension of network externality that leads to better understanding of consumers, suppliers, and their mutual interest. Based on these three models, we suggest several strategic implications that facilitate operations, increase revenue, and enhance consumer experience, including strategic alliance, reduction of virtual-real world barriers, and tailored advertisement.

Keywords: *Virtual World, Virtual Media Development, Social Media, Information Goods.*

1. Introduction

"Virtual worlds are online communities in which individuals interact in simulated environments" (Chesney et al 2007). The population of virtual worlds has increased rapidly since 1996; at present, millions of people own accounts in virtual worlds. Virtual worlds can be defined "as a multiple-dimensional computer generated environment to which users can access by being connected to the Internet". Such environment has often been developed to supply online entertainment, social networking, and other educational purposes to the users.

There are two main different types of virtual world. Game-oriented environments, usually defined as multiplayer online games (MMOs), in which players are placed in a game setting and share the gaming experience, for example the popular online game World of Warcraft. The second type is based on social networking sites (SNSs) that allow users to socialize, collaborate and trade, for example the Second Life. It creates a virtual environment in which people can "communicate, collaborate, and buy and sell not only virtual goods and services but also real products through their customized virtual spaces and avatars" (Hendaoui et al. 2008). Powered by popular virtual world communities like the Second Life, the expected number of users who will participate in virtual word by 2016 will soar to about 90-100 million. This massive growth provides VW vendors with the opportunity to dramatically increase their revenues especially if they will be able to take full advantage of the enormous power from such innovative and fast growing online communities. Nowadays total virtual words' revenues are about $7.6 billion. However, the North American and European markets are expected to triple by 2020. This will mean a potentially huge increase in revenues for this period, reaching a total of $22.8 billion by the end of 2020.

The purpose of this paper is to conceptualize the media development models in current virtual world practiced. A sustainable virtual media development is largely determined by how VW firms manage revenue and balance costs. We therefore investigate the revenue mechanisms behind each media model and study how to reach optimal profitability level. In general, virtual world media content is characterized by negligible marginal cost with a large sunk cost. While a VW firm is able to differentiate and bundle virtual goods and services, the cost structure in this marketing strategy is very different from a conventional market (Varian 2000). VW firms can also benefit from significant advertising revenue that is largely determined by the size and traffic throughput of the virtual world. It becomes essential to optimize revenues from both information goods and advertising, while increasing one would decrease the other. Consequently, we need to understand VW users as consumers, media developers as suppliers, and the mutual relationships. We are motivated to maximize all the key elements of digital media development in VW: traffic, revenue, network size, and overall demand/supply satisfaction.

The remainder of this paper is organized as follows: Section 1 presents a brief overview of relevant literature, followed by the introduction of the three media development models in virtual worlds. Managerial and strategic implications are presented in section 3. Section 4 provides a brief conclusion on the insights garnered and future research.

2. VW Media Development Models

Virtual world has gained tremendous attention in recent years. VW alters both in-game and out-game behaviours of VW players. Billieux et al. (2013) investigates the relationships between self-reported motives and actual in-game behaviours based on a sample of approximately 700 *World of Warcraft* players. Results show significant relationship between self-motives and in-game behaviours. Online virtual worlds, such as Second Life, are rapidly becoming recognized as a technology of substantial future importance for marketers and advertisers (Barnes 2007). Many of these virtual worlds provide the potential medium for very rich and varied new and enhanced modes of advertising. Such varied advertising experiences can be immersive or absorptive, active or passive. Potential modes of advertising include product placement of 3-D objects (such as brand-name clothing), billboards, radio, musical

performances, movies and videos, advergames (typically mini-worlds or mini-games) and cross-promotional offers and activities. The word "community" seems poised to overtake "relationship" on the Internet as the new marketing buzzword. So-called "community brands" like the Geocities Web site ("home" of more than three million community members "living" in 41 "neighborhoods") provide communication media for hundreds of thousands of individuals who share common interests. As consumer-goods companies create online communities on the World Wide Web for their brands, they are building new relationships with their customers and enabling consumers to communicate with each other (McWilliam 2012). Virtual world also serves educational purposes. Boulos et al. 2007 studied the educational potential of 3-D virtual world applications to medical/health librarians and educators, based on Second life (http://secondlife.com/). They described some medical and health education examples from Second Life, including Second Life Medical and Consumer Health Libraries.

The business model remains largely unsorted in nowadays' virtual world firms. Existing literature of the revenue models of digital goods, such as computer software and communication bandwidth pricing, has been studied in the past 15 years. Digital goods is characterized by high fixed cost and cost to zero marginal cost, making it very different problem from traditional production economy. For an instance, the bundling strategies is proven to be very profitable for a monopoly when bundling very large numbers of unrelated digital goods (Bakos et al. 1999). The reason is that the law of large numbers makes it much easier to predict consumers' valuations for a bundle of goods than their valuations for the individual goods when sold separately. As a result, this "predictive value of bundling" makes it possible to achieve greater sales, greater economic efficiency, and greater profits per good from a bundle of information goods than can be attained when the same goods are sold separately.

(Bhargava et al. 2001 & 2008) studied versioning as an optimal strategy for information goods sales. Their characterization of digital goods is that variable costs are invariant with quality, including the special case of zero variable costs. Results showed that versioning is optimal when the optimal market share of the lower-quality version, offered alone, is greater than the optimal market share of the high-quality version, offered alone. A firm can profitably employ versioning for information goods if it can design the lower quality in a way that, relative to their valuations for the high-end version, high-type consumers have a lower relative valuation for the lower quality than do low-type consumers. Virtual world is also able to capture revenue from virtual space and time by placing third party advertisement (Manchanda et al. 2006). It studied whether banner advertising affects purchasing patterns on the Internet based on behavioural database that consists of customer purchases at a Web site along with individual advertising exposure. The results show that the number of exposures, number of Web sites, and number of pages all have a positive effect on repeat purchase probabilities, whereas the number of unique creatives has a negative effect. Returns from targeting are the highest for the number of advertising exposures. The findings also add to the general advertising literature by showing that advertising affects the purchase behaviour of current (versus new) customers.

The question of how digital media in virtual world should be developed, according to what criteria, and the underlining strategy, is largely remained unanswered from existing literature. Based on supply chain research, we derive three development models to generalize these questions.

2.1 First model

In the first model, the virtual world develops media content based on individual rent collection from the community, which can be described as:

$$\text{REVENUE} = A + B(\text{TRAFFIC}, \text{INDIVIDUAL RENT})$$

where ***Traffic=f(Media Content),*** indicating that the VW traffic and consequently revenue are determined by the quality of the media content. In this case, the individual rent includes a monthly, weekly or hourly subscription fee, or revenues generated from the sale of virtual goods and services for "free-to-play" games. Firm side costs refer to both the sunk costs that include all the costs to create and maintain the system, and the marginal costs that are spent on each additional customer. Usually a large part of a virtual world vendor's costs is represented by sunk costs while the additional cost to sustain to

serve an additional customer is relatively low. Consequently, it is advisable to try to increase traffic and distribute sunk costs on a large customer base. In this first model, virtual world vendors assume as a monopoly and attract customers simply based on the level of awareness of the virtual media (such as a virtual game) and its popularity. There is no attempt to influence the sensibility of the customer. Examples of virtual worlds currently using this model are virtual good sales-based games like MapleStory or game-based virtual worlds such as World of Warcraft.
In this model, a VW service provider is like a traditional producer of digital content that is based on quality, quantity, and price combo, tailored by various price differentiation programs. The development of media contents is thus subject to the economic incentives and consumers' preferences on price, quality, etc.

2.2 Second model (Horizontal Integration)

The major point of difference between the first and the second model is the integration of advertisement in this latter. Therefore the revenue formula for the second model becomes:

$$\text{REVENUE} = A + B_1(\text{TRAFFIC}, \text{INDIVIDUAL RENT}) + B_2(\text{TRAFFIC}, \text{ADS})$$

Same as in the first model, we assume that the traffic is statistically determined by the quality of the media content as well as the number and quality of the advertisement ***Traffic=f(Media Content, Number of Ads)***. In the second model, virtual world firms also try to increase revenues from advertisements that are placed on the page of the game and related links. For instance, one way used to increase revenues is through selling advertisement spaces to different brands. For example, when a company places an advertisement in a virtual world, and depending on the number of clicks/views, it creates a profit for both the media developer and the advertisers.
It is worth to underline that in this revenue model the brands willing to advertise in a specific virtual world will pay the advertisement space that they purchase according to different traffic areas and time allocation. Therefore placing an advertisement in a high-traffic area will cost more than placing the same advertisement in a low-traffic area. Various auction mechanisms are designed as dynamic pricing systems.
The revenue from virtual media goods sales is added to the sales from advertisement spaces in the virtual world, as in the first model. The dilemma comes from the contradiction of increased advertisement and decreased traffic (Zhou et al. 2009). The VW firms need to strategically balance between these two contradictory factors that would directly impact the media goods market and the advertising market. These are the fundamental parameters, according to which the developers and vendors will develop the media content in order to maximize profits in this second model are:

- **The fee structure:** This will be tailored according to level of activity. The more you use it, the less you have to pay. This attracts more and more people, and works as an effective revenue model for the company.
- **Social Status:** The games online have a social status factor attached to them. Players who have been active for long command higher positions and more powers or benefits. This incites other players to play more and in the process spend more on the website.
- **Use of an expert:** Human experts attract players and also sometimes to help them tackle difficult situations. These experts act as the control link between players and the virtual world.
- **Rules and mechanics that developers use to lead to virtual good purchases:** instead of obliging users to pay a subscription fee to access the virtual world, operators allow members to enter the service for free, with the expectation that some users will spend money on virtual good transactions.

The most successful example of such a revenue model is probably Second Life. Nowadays, companies, traditional media, government, universities and academic institutions are immersing themselves in Second Life to try to advertise their products and services through this new powerful channel. With reduced rent, the VW would be able to increase traffic. Increased traffic would help increasing the ads

revenue. The two major revenue mechanisms in this model are the information goods market and a two sided advertisement market. In most cases, the optimal strategies for these two markets don't converge at the same point. Thus, the VW firm would need to fine tune its strategy to balance these two markets.

2.3 Third model (Vertical and Horizontal Integration)

In addition to digital goods sales and advertising revenues, there are also other opportunities for value creation in virtual communities by integrating vertically with its suppliers and buyers. Supply chain integration in the digital media industry helps the intermediary to better understand both consumers' and supplier' profiles as well as their common interest. It creates a network externality effect that helps the firm to optimize its marketing position and achieve better buyer/supplier satisfaction. The revenue mechanism of the third model is presented as:

$$\text{REVENUE} = A + B_1(\text{TRAFFIC}, \text{INDIVIDUAL RENT}) + B_2(\text{TRAFFIC}, \text{ADS}) + B_3(\text{TRAFFIC}, \text{EXTERNALITY})$$

This new opportunity would consist in the creation of an innovative revenue mechanism in which the virtual world will shift from a neutral position, mainly focused on maximizing the community's activity and consequently revenues, to pre-designed supply chain integrated strategy. The traffic is a function of ***Traffic=f(Media Content, Number of Ads, Supply Chain Externality)***. Thus, in this innovative media development model, the virtual world will be much more involved in customizing the services provided, enhancing the members' experience and influencing users' real behaviours through the virtual world itself and its suppliers and other users. Virtual world firms will be able to generate much higher profits and possibly higher social welfare in this third model through four main channels.

- **Access fees:** sale of monthly, weekly or hourly subscription services to users. At present, this is the opportunity that vendors have been using the most. However, in order to attract more customers, some of the virtual worlds have now started to drop the subscription requirement.
- **Sale of virtual goods or services:** selling some form of virtual items, "avatars" or currencies to users. It is an increasingly popular tool to generate revenues. The design of a virtual world, its rules and internal economy can be somehow regarded as a marketing tool to create the underlying needs and conditions for customers to buy virtual goods.
- **Strategic Alliance:** creating strategic collaborations with real or virtual partners in the attempt to vertically integrate the media supply chain and share consequent profits.
- **Tailored Advertisements:** generating customized advertisement campaigns through artificial intelligence and experts.

Tailored advertisement is highly related to the vertical integration where asymmetric information between the ads seller and the VW operator can be reduced. In this model, the VW service provider acts as the centre in the social media supply chain. It incorporates information goods market, two-sided market of advertisements, a physical goods market by integration both horizontal media producers and vertical suppliers/users. In this model, it's more convenient to consider the VW firm in a supply chain of content development that consists of various types of products and services.

Manchanda et al. (2006) analyse the phenomenon that an increasing number of advertisement would distract and decrease users' interest in the main content, leading to reduced traffic. Unlike a generic advertisement, tailored ads could alleviate this negative impact. It poses an operational challenge for the VW owner to deeply understand the consumers' profile as well as its suppliers' profile. As a result, it motivates the supply chain integration of digital media industry.

3 Strategic Implications

There are several strategic implications from the VW media development model that include: reduce the barriers between real and virtual world; tailored advertisements; and undertaking strategic alliances with real and virtual partners.

3.1 Reduce the barriers between real and virtual world

As previously said, a key point of this new business model will be the vendors' ability of influence users' behaviours in real life. Boundaries between the physical and the virtual are becoming more fluid as individuals are interacting with digitally constructed entities and this might successfully be exploited by virtual world vendors to influence real-life behaviours and increase revenues streams.

In this perspective we advise the use of two tools:

1. Promotion of the virtual world in the real world
2. Use of experts to alter/influence users' behaviour

The first tool – the promotion of the virtual world in the real world – has a key role in attracting new potential customers, currently unaware of the existence of virtual worlds. For instance, a real-life brand could become a virtual world partner by promoting a certain virtual world in exchange for free advertisement within the same virtual world. For example, a real-life brand such as American Apparel could provide customers purchasing at their shops with a promotional code that allow clients to get some percentage discount when purchasing at the American Apparel virtual stores in Second Life. In this way the customer would get to know abut the existence of Second Life and will be incentivized to visit that specific virtual world and eventually even buy at the American Apparel virtual store. In exchange for such free advertisement Second Life could provide the American Apparel with some sort of free advertisement within the virtual world.

This is a powerful tool to promote virtual worlds to those customers' segments that are not so much into the web yet and therefore have to be attracted through traditional real-life channels. Furthermore, such a tool could be successfully used for both interactive, collaborative and commercial virtual worlds (such as Second Life), as explained in the example, as well as for game-oriented environments (such as World of Warcraft) where you could imagine some sort of partnership with cinemas or science and fiction movies.

The second tool to reduce the boundaries between real and virtual world would be the use of artificial intelligence and experts to influence users' behaviours and actions in real life. Virtual world vendors can employ "avatars" - whose actions are animated not by a person at a keyboard but by a computer - to enhance the depth of the virtual world experience and drive people actions and beliefs in both virtual and real world. The use of such "avatars" can be towards the purchase of certain brands and products in both virtual and real world as well as political and social behaviours.

3.2 Tailored Advertisements

Tailored advertisement strategy is specific to the second and the third model. The objective is to maximize profits through higher chances of ad exposure and click-through (enabled by the targeted and customized advertisement) and higher premiums that can be charged due to the intense work done to tailor the advertisements and its positive consequences. As previously explained the main pitfall in the

second revenue model is the inability to develop a dynamic pricing system to charge brands willing to advertise on the basis of the proportion of customers attracted. Would it be useful to read through members' conversations, understand what a specific member is interested in and target him/her with a range of selected advertisements that exactly match his/her interests and passion? This would translate in higher probability of purchase and therefore it would allow virtual world firms to charge a premium.

Another objective here is to influence users' behaviours through the adaptation of the virtual world to their expectations. Thanks to this strategy, not only may the virtual world impact behaviours but also it can influence the perception that the users have on brands. We will see how this can be done through a right selection and placement of advertisements. Furthermore this method will maximise the satisfaction of the virtual traveller. Indeed, the user will feel cared for and welcomed in this rather « familiar » virtual world. In order to reach this objective, the virtual world's strategy may be focused on the cultural and social perspective. Focus must be placed on behaviours, attitudes and perceptions of end users. The virtual world must be highly involved in the lives of its members in order to understand their dynamics and anticipate their preferences. Once this analysis is done it will enable the vendors to select and place advertisements at the right place, at the right time and for the right people. As previously said, virtual world firms will pass from an objective and impersonal attitude to a highly subjective and customer-oriented approach.

The tailoring of virtual marketing can be done thanks to two main tools. The first one would be the use of business intelligence. An information system may be developed in order to gather and process a large amount of data. For example, by processing information on the characteristics of virtual players, the tendencies and evolution of virtual "places", but also the numerous conversation between virtual players and the place and time at which they take place it can be possible to analyse the collected information and draw conclusions on how to better place advertisements. For example, this would enable a virtual world such as Second Life to know that in street X there is a large number of fashionable and virtually wealthy women who are sensible to famous brands. Having seen that the virtual world could place advertisements of luxury products. This advertisements will be much more likely to be taken into consideration by these specific users and therefore Second Life might be able to charge higher premiums and expect a higher return. Choosing the right place for the advertisements is also a way to control the perception people have of the brand. Similarly this could imply placing advertisement of beers in a virtual bar that is often full of young football fans. As explained above, these examples illustrate well that not only you maximise profits by giving access to products to people who will appreciate them but also it enables to influence their behaviour through the placement of items they may aspire to.
The second tool would be the use of virtual experts hired to act as virtual players. This can enable even further analysis and influence. Today people are paid to create debates and stimulate activity in order to increase websites' traffic. This could be taken a step further by having experts with their own "avatar" to influence behaviours in the virtual world. This can imply influencing people towards special type of activities, social status, places in the virtual world, political sensibilities but also brands and products. Indeed, the expert can either guide people towards specific advertisements, gather information or even serve as an advertisement in itself by holding specific products or recommending them. The use of expert must first serve a role of information gathering and then processing. However this role could be taken even further by using experts as the promoter of specific brands. This informal advertising could be very powerful as long as it remains perceived as informal and more as user-friendly recommendations. This new method could be pursued through the strategic alliances that we will now explain in details as the third future parameter or strategy for the virtual worlds.

Furthermore, the marketing information about demographics and psychographics of members, their attitudes and beliefs about products, services and issues, their behavior data about business transactions within communities, and information on their interactions and interaction dynamics which is generated within communities; it is valuable to marketers and advertisers. The communities could sell the information to marketers and advertisers.

Finally, the virtual world could be used as a virtual stage to test new products and services and be able to predict their future success by looking at the virtual response. In this way, for instance, a band willing to launch a new album could buy a virtual space to play the new compilation and test the public reaction. Similarly a brand willing to launch a new product could previously test the concept online. Virtual world vendors could create specific spaces allocated to this "new product" development and test and charge brands willing to use them a premium price. Indeed, brands would be ready to pay a large amount considering how expensive nowadays is the development, test and launch of a new product and how high the risk of failure is.

3.3 Strategic Alliances

A third key parameter to focus on to maximise profits are strategic alliances in the virtual world. One of the objectives of strategic alliances is to increase brand awareness and perception. Strategic alliances are specific strategic contracts undertaken with pre-identified companies. These can take as many forms as one can think of. For example, it could be the promotion of products for a given period of time for the users of the virtual world; it could imply exclusivity offers of new products for the virtual world, events sponsored by brands, the launch online of new products as testers of markets. Revenues coming from these initiatives would be shared between the virtual world and the partner company.

A major effect of this strategy would be the exponential impact on brand awareness that this would represent. Indeed, brands that are involved in this kind of strategy (for example American Apparel), are perceived by clients as innovators and this gives them a great competitive advantage. This advantage is in terms of future fidelity and recognition by the clients but also in terms of know-how and experience. Indeed not only it is a new source of revenues but also premiums will be much higher due to the previous tailoring of the placement of the products. Here we believe strategic alliances can be maximised through the previously mentioned analysis by the artificial intelligence.

There are two important implications of this strategy. Firstly it opens the door to two ways strategic alliances. For example, one could think of Microsoft offering Farmville money to their clients in the real world. Strategic alliances can be foreseen both ways. Also this opens the doors to a whole new world of marketing and a new dimension of advertising. For example, thanks to the artificial intelligence and the virtual experts, some "avatars" may be created in order to "place" products in the virtual world. Today in the real world well-known personalities are often given products to promote, this could be one in the virtual world undercover of respected "avatars" which are in reality remunerated by the company.

4 Concluding Remarks

This paper conceptualizes three hierarchical digital media development models from current virtual world practices. We suggest several strategic implications that facilitate the VW operations, increase revenue, and enhance customer experience, including strategic alliance, reduction of virtual-real world barriers, and tailored advertisement.

The media development models described in this paper is driven by the underlying economic incentives. The core value of digital media development is illustrated by the first model, which considers digital media as information goods. Pricing, quality differentiation, quantity discrimination, and media design combined determine the VW popularity and the financial performance. Based on the first model, the second model incorporates the advertising revenue. It becomes essential to optimize both information goods revenue and advertising revenue, while increasing one would decrease the other due to the traffic dynamics. Based on the first two models, the third model considers both vertical and horizontal supply chain integration in the digital media industry. In this model, we add one extra dimension of network externality by which we are able to better understand consumers, suppliers, and their mutual interest. Consequently, we are able to maximize all the key elements of digital media development in VW: traffic, revenue, network size, and overall demand/supply satisfaction.

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