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A Brief History of Virtual Economy

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Abstract

The virtual world economy is a multibillion-dollar industry. There is significant evidence for the growth of virtual economies within a variety of virtual worlds. There is an increasing demand from users to buy, sell, and invest in virtual items and services, including virtual properties. However, there is also evidence suggesting that many companies struggle to succeed in the virtual economy platform. In order to facilitate and drive success in virtual business strategies, it is necessary to have a framework for classifying elements of virtual economies. This paper proposes a classification framework of virtual economy elements based upon the characteristics of products and services, the transaction and marketplace, as well as the currency and exchange systems present in these economic environments. In addition, this research highlights the opportunities and challenges presented to both users and companies within the virtual economy platform.

1. Introduction

The term 'virtual economy' (VE) refers to the process of exchanging virtual items and services with virtual currency within a virtual world. A virtual world (VW) is an avatar-based 3D platform, in which avatars represent real-world users. An "avatar" – in the context of virtual world – is a graphical representation of the user, in a three dimensional (3D) form, through which the user can interact with his/her surrounding virtual environment, participate in virtual events and activities, and communicate with other avatars (Henttonen et al., 2009; Liu & Williams, 2008; Nah, Schiller, & Mennecke, 2011). Avatars can exchange Instant Messages (IM), virtual currency, and virtual objects.

In the last 10 years, there has been extensive growth in both the number of virtual world users and the VE market size. For example, in the last decade, Second Life (SL) virtual world – one of the most popular social virtual worlds – recorded a significant increase in its land size, from 64 acres in 2003, to 448,000 acres in 2013. SL's population also increased, from 2 million residents in 2006, to more than 36 million residents in 2013. In 2014 there were over 1 million active users in SL, with over 1.2 million transactions each day for virtual items (Hendaoui, Limayem, & Thompson, 2008; Linden Lab, 2013a). Similarly, virtual worlds such as World of Warcraft (WoW) and Entropia Universe (EU) have also experienced a significant growth in the last decade, in terms of both the number of users, and the economy market (Gapper, 2006).

As of 2014, the total transaction value among users in SL alone was US$ 3.2 billion, which is more than the total annual trade that was expected of all the virtual economies combined in 2004 (Castronova, 2001; Linden Lab, 2013a). Alongside this, users created more than 2.1 million virtual items for sale in 2013, compared to just 28,000 items in 2004 (Linden Lab, 2013a). Even though these transactions occur inside the virtual world, they still have real world financial impact: the virtual currencies in these virtual worlds can be converted to real money. Hence, VE and real economy are not isolated; together, they have created what is called a "dual economy".

The evidence for the massive growth seen in the VE attracted not only real world companies, but also individual entrepreneurs. Both companies and individuals are seeking the new and growing commercial opportunities presented by the virtual world economy. Although there is increasing evidence for the growth of VEs, businesses remain concerned about the potential return of investment from investing in the VE: it is, after all, an untested economy (Seiler, 2008; Zhang & Shrestha, 2010).

Some projects within the virtual worlds have been terminated due to a perceived lack of benefits. These include projects such as Oracle's Darkstar (Takahashi, 2010) and Google's Lively (The Lively Team, 2008). However, individuals appear to have fared better: Ashe Chung, one of the most successful VE entrepreneurs, managed to generate over US$1 million of wealth from SL (Hof, 2006).

With the increase in virtual economies and related business activities, as well as the differences between different virtual world platforms, this research aims to explore the unique characteristics and elements of the different VEs, looking at SL, EU, and WoW as representatives of different types of VW. This research discusses the opportunities, challenges, and the classifications of the VE. This article also highlights the key milestones and economic success cases in VWs. Issues related to ownership and taxation are also discussed.

A unique set of characteristics and elements are involved with the VE. These characteristics and elements are different from those in traditional, real world economies. Why, we can ask, are certain virtual world sellers or companies able to monetarise virtual products successfully, while some fail to do so? Understanding the unique characteristics of virtual economics will allow us to look at some possible

reasons for this. In turn, this research will help to develop successful virtual business strategies. Therefore, clarifying these characteristics will help in developing innovative forms of business and economics in the VW marketplace.

This article is organized as follows: Firstly, we will review the research background, history, and the development of VE. Secondly, we will investigate selected success stories in the VE. Lastly, we will provide a proposed classification of the VE elements, followed by challenges faced by the VE.

2. Background

2.1 Virtual Worlds

VWs can be divided into "scripted virtual worlds" and "unscripted virtual worlds (Castronova, 2004). This classification is based on whether users need to follow a specific pattern in the game, or whether they are free to do anything. A more detailed classification has been provided by Henttonen et al. (2009) (Figure 1) which is based on two main factors: 1) limitation of creating content and 2) orientation (motivation) Based on these two factors, four categories of VW can be defined (Figure 1). These four categories are: static game virtual world (game oriented environment with limited content creation); dynamic game virtual world (game oriented environment with unlimited content creation); static social virtual world (social oriented environment with unlimited content creation); and dynamic social virtual world (social oriented environment with unlimited content creation).

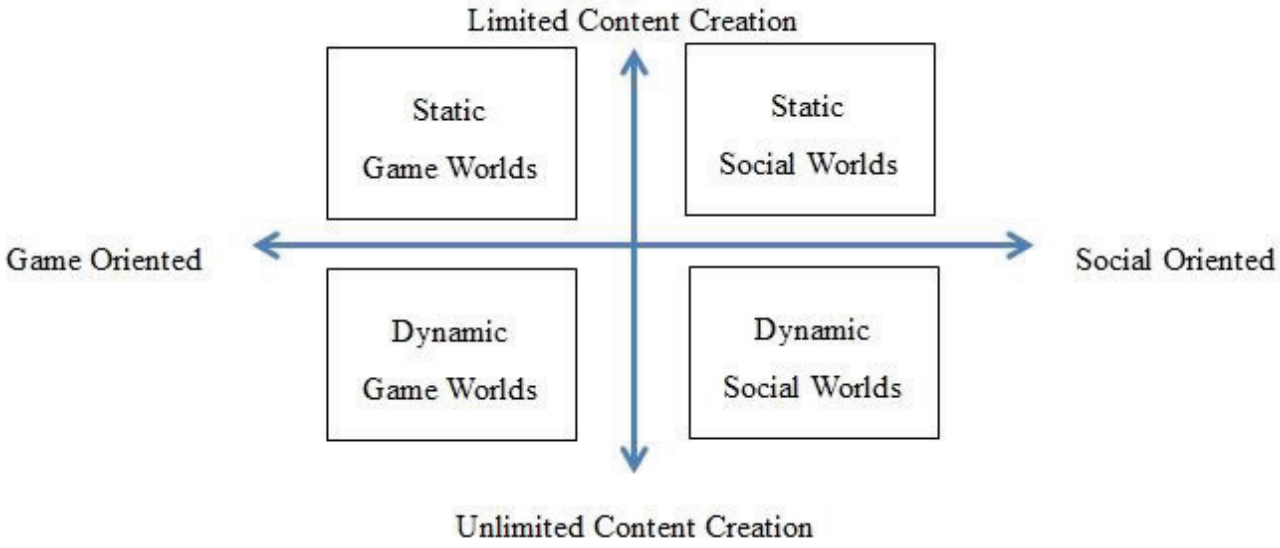

Figure 1. A categorization of virtual worlds (Henttonen et al., 2009)

2.1.1 Milestones of VE

Exploring the key milestones of the virtual world economy is important in order to illustrate the history and development of VE. This research looks at the significant milestones for three main virtual worlds (SL, EU, and WoW). These three virtual worlds also represent different types of VW, in terms of the classification suggested by Henttonen et al. (2009). SL represents the dynamic social virtual world, EU represents the dynamic gaming virtual world, and WoW represents the semi-dynamic virtual world. Each of these VWs has its own virtual currency.

The lists of VE key milestones in SL, EU, and WoW are presented below. The VE key milestones presented are a selective, but not exhaustive list of all virtual economic activities in these three virtual worlds. These milestones are chosen to illustrate the different forms of VE in the three different VWs, and the unique characteristics of VE.

2.1.2 Key VE milestones in SL

SL is widely considered the most popular social virtual world. Gadalla et al. (2013) reported that SL had achieved one billion users in the second quarter of 2013. Users can participate in SL VE by buying and selling virtual goods and services. SL users are able to earn Linden Dollars (L$) by selling virtual items in-world or out-world, either through direct transactions or through direct exchange. Linden dollars are SL's in-world currency, that is exchangeable for real currency, which can either be obtained by exchanging U.S. dollars via the SL Exchange or by searching for a job for the avatar that pays for his or her living (Kaplan & Haenlein, 2009; Ke, Ba, Stallaert, & Zhang, 2012).

SL residents can earn Linden Dollars by working in one of the SL virtual jobs, investing in real estate, or by directly exchanging real money for Linden Dollar using the LindeX exchange market. Virtual currency can be used to purchase different items such as clothes and fashion, virtual property, virtual vehicles and pets.

Table 1. Selected List of Key milestones of VE in SL

Timeline	VE Milestones	VE Characteristics / Phenomena
Dec 2003	Linden Dollar was introduced	Introduction of virtual currency
Oct 2005	LindeX currency exchange for Linden Dollar was introduced	Free market exchange rate of virtual currency
Dec 2006	Anshe Chung was reported to be the first real-life millionaire due to her virtual activities in SL (Hof, 2006)	Entrepreneurship use of VE for sustainable real world outcomes
Mar 2007	Kevin Alderman sold the virtual city of Amsterdam for US$50,000 (Chiang, 2010)	
Dec 2007	Cao Fei sold a virtual art world called RMB city for US$100,000 for 2 years access rights to the art world (Yap, 2008)	
Jan 2008	SL closed in-world virtual bank GinKo Financial (Brandstetter, 2009; Zhang & Shrestha, 2010)	Crimes and Fraud related to VE
July 2008	AnsheX a virtual goods exchanges became available (Korolov, 2013)	Business related to VE
2008	PeaceFest fund-raising event was successfully able to raise 870,000 Linden dollars (around US$3,359) from users from all over the world (Teigland, 2009).	Using social virtual world for successful events and meetings
Jan 2009	SL Marketplace was launched (Ke et al., 2012)	Marketplace for virtual goods and services
Nov 2011	Capital Exchange provides stock exchange simulation game where users buy and sell shares with Linden Dollars (Kieger, 2010)	Investment in virtual business virtual currency
Nov 2013	Linden Lab launched Authorized Reseller program with 5 Linden exchanges companies to sell Linden Dollars (Linden Lab, 2013b)	More flexibility to exchange virtual currency with other real world currency
Jun 2014	Over 50 private estate management companies provide rent/sell service of private estate land of SL (Bray & Konsynski, 2007)	Marketing of virtual business activities and appearance of related business outside SL

In March 2002, the first resident joined SL (Nino, 2010). In 2003, Linden Lab introduced the Linden Dollar as the virtual currency used in SL; this was the first step toward the development of a VE in SL. LindeX – a currency exchange service of Linden Dollar – was introduced in Oct 2005. LindeX allows users to buy Linden Dollars using real money (e.g. US$) and vice versa. The exchange rate of Linden

Dollar is based on a free market, so the exchange rate is subject to fluctuation based on the supply and demand on the Linden Dollars. In this sense, it is similar to a real world economy.

In 2006, Anshe Chung (a SL resident) became the first real life millionaire to have accumulated her wealth purely from SL economy (Hof, 2006). Anshe earned over one million US$ of net wealth from VE inside SL. She accumulated this wealth over a period of just two and a half years, with an initial investment of only US$ 9.95 for opening a premium account in SL (Hof, 2006). Her wealth was gained from building virtual property, landscape, and resorts, each of which she sells and rents to SL residents. There are also some other significant VE transactions that took place in SL: Kevin Alderman was able to sell the virtual city of Amsterdam for US$ 50,000; another transaction was the selling the virtual art work called "RMB city" (which was created by Cao Fei) for US$ 100,000 to collectors (Yap, 2008).

Banks started to find their way into SL by Jan 2008. Banks began by offering similar services to those provided by banks in real life. Virtual banks start to provide an attractive interest rate to deposits made by SL residents. One of these early virtual banks was "GinKo Financial", which has subsequently collapsed as a result of not being able to pay the interest rate promised to the depositors, resulting in the depositors losing all their investments deposited with the bank. As a response to this failure, Linden Lab banned this virtual bank and all other banking related activities in SL (Brandstetter, 2009; Zhang & Shrestha, 2010).

SL terms of use have since been updated, prohibiting any virtual entity to provide interest or similar types of direct return on investment unless the entity has an applicable government registration statement or financial institution charter in real life. Later in 2008, Anshe Chung launched her own web portal for the exchange of virtual goods, which she called "AnsheX" (Korolov, 2013). Another significant milestone in VE occurred in November 2011, with the launch of Capital Exchange, a virtual stock exchange market where SL residents have the ability to buy and sell shares of virtual companies in SL (Kieger, 2010).

The authorized Linden Dollar reseller program launched in 2013, initially with five authorized third-party exchange institutions to resell Linden Dollars to SL residents in different international currencies, with a variety of payment options. There are now around twenty authorized Linden Dollar resellers, but none of them is able to purchase Linden Dollars from SL residents (Linden Lab, 2008).

Given all the discussed examples of success, the virtual real estate business appears to be very promising. This has resulted in strong attraction to this business sector. In 2014, it was reported that there were more than 50 private real estate management companies in SL, which provide virtual properties for rent and sale. These private estate management companies vary in size, ranging from individual SL residents to real world companies holding dozens of privately owned islands in SL. (Table 1) shows selected key milestones for SL VE.

2.1.3 Key milestones in Entropia Universe VE

Entropia Universe is one of the largest Massive Multiplayer Online VE games. Project Entropia Dollar (PED) is the virtual currency used in EU. PED have a fixed exchange rate of 10 PED for US$1. There are a range of different ways of earning PED in EU, such as selling valuable items or resources that can be gained by hunting or mining. Mainly two elements determine the value of the virtual product: How rare the virtual item is, and the cost of time spent in the VW to gain, or create, the virtual product (Huhh, 2005; Ondrejka, 2004). EU users can gain PED by completing mission. In addition, skills acquired in EU can be sold to other players.

Investment opportunities are also available in EU, where users can hold land deeds. Investment in weapons and armour is critical for hunting, while investment in mining equipment and tools is required for mining in EU. Over time, as in the real world, hunting and mining tools become worn through use, costing the user in order to maintain them or purchase new tools.

Table 2. Entropia Universe VE selected List of Key milestones

Timeline	VE Milestones	VE Characteristics / Phenomena
Jan 2003	Entropia Universe was launched in by Mindark located in Gothenburg in Sweden (MindArk, 2009)	Introduction of virtual platform
Dec 2004	Virtual Treasure Island sold for US$26,500 (The Economist, 2005)	Entrepreneurship and investment in VE for sustainable real world outcomes
Oct 2005	Jon Jacobs bought a virtual asteroid for US$100,000 (Bates, 2010)	
Dec 2006	3 virtual shopping malls Entropia Universe sold for US$179,688 (Irvine, 2007)	
May 2007	5 banking licenses issued in Entropia Universe with users paying US$59,000 to US$90,000 for each license (Albanesius, 2007)	Virtual banks and banking services in virtual world
Dec 2009	Crystal Palace Space Station sold for US$330,000 (Thomas, 2010)	Entrepreneurship and investment in virtual worlds economy for sustainable real world outcomes
Nov 2010	Jon Jacobs sold the Asteroid Space Resort to various Entropia Universe participants for a total of US$635,000 (Bates, 2010)	Significant return of investment in VE
Nov 2011	Introduction of citizenship and revenues sharing system in Planet Calypso with voting rights for US$100 (Jones, 2011)	Collaborative investment and profit sharing in VE
May 2013	Players create contest to give away US$10,000 to other players (Games Press, 2013)	Emergent unscripted virtual economic activities from players
Oct 2013	A Player earn over US$33,000 by bringing down monster in Entropia Universe (Tractenberg, 2013)	Significant return of investment from VE
Nov 2013	Players invested US$150,000 for their own moon in Entropia Universe (McGlaun, 2013)	Collaborative investment and profit sharing from VE
Mar 2014	Planet Arkadia became the world's first $1 million virtual property, by offering 200,000 deeds at US$5 each (Batt, 2014)	
Jun 2014	Stable Estates available for Auction (Entropia Universe, 2014; Virtual Sense, 2014)	Game developer control of VE in virtual world

In 2004, virtual Treasure Island was sold for US$26,500 to David Storey, a 22-year-old player (Lehdonvirta, 2005a; MindArk, 2009). In 2006, three virtual shopping malls sold at a total price of US$179,688 (Irvine, 2007). In October 2005, English actor Jon Jacobs bought a virtual asteroid for about US$100,000, to pay for which he mortgaged his house in real life (Bates, 2010). In November 2010 Jon Jacobs sold the asteroid for US$635,000, thereby generating over half a million US dollars return on investment in 5 years (Bates, 2010).

In 2011, Planet Calypso in EU introduced citizenship, revenues sharing system, and Calypso Land Deeds (Jones, 2011). Calypso Land Deeds holders received a share of 50% of the planet's gross revenue, payable monthly, and also had political voting rights in the planet (Jones, 2011). Planet Arkadia also provides Arkadia Underground Deeds, which allow holders to share in the revenue of Arkadia Underground, and to receive dividends in a daily basis. These deeds represent the collaborative investment in EU and profit sharing scheme in this virtual world economy. In 2013, a group of EU users managed to collaborate to raise funding of US$150,000 in order to obtain the development and management rights of their own moon in EU. This highlights the power of social capital and collaboration in the VW platform (McGlaun, 2013).

In June 2014, Stable Estates were available for auction in various planets in EU (Entropia Universe, 2014; Virtual Sense, 2014). The players who own the stable can generate revenue by charging other players for services supplied by the stables. These services include hosting and training others players' pets. Better services provided by the stables enable the players' pets to progress faster and to perform better in contests and competitions. The Stables were placed in strategic positions and put up for auction on each planet, with starting bids of 20,000 PED (Entropia Universe, 2014; Virtual Sense, 2014). Table 2 shows a selected list of key milestones of VE in EU.

2.1.4 Key VE milestones in SL (WoW)

WoW is one of the largest Massive Multiplayer Online virtual games (Takahashi, 2014). In 2004, Blizzard Entertainment announced the launch of WoW, which allows users to just explore landscape, fight monsters, and complete quests (Calvert, 2010). Since its introduction, WoW has seen massive growth around the world, in United States, Canada, Europe, Australia, South America, and Asia. In WoW, each player character has a specific set of skills and abilities that define that character's role. The virtual currency used in WoW is Gold. In the past, exchanging gold with real money happened illegally, outside the control of Blizzard Entertainment (WoW game developer). In April 2015, the new token trading system was introduced by Blizzard for its WoW virtual worlds (BBC News, 2015).

It has been reported that initially the exchange rate for $20 climbed past the 30,000 gold coins at the launch of the new system, but fell sharply within hours to 22,000 gold coins (BBC News, 2015). The new token trading system is available for only North American WoW players (BBC News, 2015). Players can exchange gold with valuable resources and items in WoW, such as weapons and armour. Essentially, the core gameplay of WoW revolves around fighting monsters and completing quests to get Gold.

Table 3. Selected List of Key milestones of VE in WoW

Timeline	VE Milestones	VE Characteristics / Phenomena
Nov 2004	WoW created in 2004 by Blizzard Entertainment.	
May 2007	Blizzard filed a complaint against in Game Dollar LLC (trading as peons4hire) in U.S. federal court against using any WoW chat or communication to advertise any business or sell any services relating to WoW.	Using the WoW virtual platform to advertising and sell services related to WoW for real money.
Early 2007	Marketplace have created as a result to the need for exchanging extra rewards received and on the other side other users need these rewards for character progress (Nelson, 2010)	Generating of a marketplace for exchanging well-equipped characters and accounts due to the high demand and supple on such options.
Sep 2007	A WoW user bought another user account who reached level 70 for £5000 (US$9,900). The price was very high because user at this level can own a very unique items that only a handful of users can own these items (Jimenez, 2007).	Investment in VE with high risk
Oct 2007	The game has been used to advertise unrelated products, such as Toyota Tacoma truck ad (Cunningham, 2007).	Using gaming virtual world for advertising
Late 2010	WoW's paying members peaked at 12 million member (Brown, 2010)	Significant attraction to the virtual user which increases the market
Nov 2013	WoW revenue reached more than 1 billion US$ in 2013, with a 36% market share (Tassi, 2014).	Profit from virtual world economy
Mar 2015	WoW have more than 7.1 million monthly paying members. WoW is currently the world's most-subscribed MMORPG (Chalk, 2015; Weinberger, 2015a)	External to the virtual world platform for managing virtual world economic activities
Apr 2015	Blizzard Entertainment have introduced new token trading system which allow users to buy WoW Gold with real money (only for users from North America). (BBC News, 2015)	Officially annoyance WoW to enter the VE platform.

In 2007, with this spread of WoW, some companies - such as Game Dollar LLC - attempted to use the platform to market and sell WoW services for WoW users through chatting and communicating with them inside the virtual world (Spring Leap, 2015). In the same year, Blizzard filed a complaint against Game Dollar LLC (trading as peons4hire) in the U.S. federal court, as a result of which action Game Dollar LLC promised to stop such actions (Spring Leap, 2015).

The marketplace for WoW Gold and accounts is generated due to the high demand to exchange extra rewards with real money. On the other hand, there are users who need to improve their character's progress by buying these items or accounts (Nelson, 2010). 2007 saw the record for the highest WoW account trade: £5,000 (almost US$9,900 at the time of transaction (Jimenez, 2007). The price was very high because the user is able to acquire special items that only a handful of other users can own. However, Blizzard banned the account five days after the purchase as this kind of transaction was considered illegal (before April 2015) , as it is contradicting with WoW terms of use where Blizzard disallowed the trading of virtual goods on external marketplaces (BBC News, 2015; Jimenez, 2007).

A summary of WoW VE Key milestones is explained in (Table 3).

3. Challenges and Opportunities of VE

Dell is one of the first companies that attempted to use VWs for making transactions, by selling physical computers through SL interface (Menchaca, 2006). However, the process of updating the products, virtual objects, and information was very costly when compared to the limited number of sales generated through SL. Dell has since stopped trading computers through SL. This may be possible at some future date when costs of configuration are lower, or the demographic of VW is more likely to make purchases through the virtual interface, or due to a combination of both of these factors. Initially, the fact that SL residents are likely to be computer customers made entry into this market attractive. However, SL was not designed as a transaction-oriented environment; therefore the residents were not inclined to buy computers through the virtual interface (Spaulding, 2010).

American Apparel - a very successful brand in real life - closed its shop in SL just one year after opening. When asked about the failure of American Apparel, Adam Pasick, a Reuters avatar journalist said: "It isn't a subject we like to revisit." (Hansen, 2009). The quick closure of American Apparel in SL has been attributed to the fact that American Apparel failed to respect SL culture (without understanding SL users' characteristics) by simply building a virtual store with very limited interaction options. They assumed that customers would come, without devoting any specific effort to attracting them within this new platform (Design, Limited, & Storey, 2007).

Also, big brands such as Coke, Nissan, Pontiac, H&R Block and others have stores with no visitors (Hansen, 2009). These companies rushed to this VW's business platform without understanding how to operate within VW successfully to promote their brands and products (Rose, 2007). VWs do not have a clear framework for businesses to follow, unlike other online communities such as Facebook, which have created interfaces for businesses to create a presence for a targeted advertising campaign (Spaulding, 2010).

Although initial attempts of VE by big brands resulted in a very high failure rate (Gartner Group, 2008), VE has enabled some new business opportunities, while encouraging entrepreneurship both inside and outside VW. Dynamic virtual worlds, such as SL, allow and encourage VE by granting participants intellectual property (IP) rights to their self-created virtual assets (Castronova, 2004). Using the built-in tools provided by SL, users can create their content in their virtual world (Bainbridge, 2007; Ondrejka, 2004). Several successful entrepreneurs, who have successfully adapted to VE, are highlighted in the key

milestones in the previous section. Recent research (Chandra & Leenders, 2012) also suggests that VW infrastructure can facilitate user innovation and entrepreneurship. The free flow of information and free transfer of digital goods and services provides a trading environment that lowers the difference between the lead and mass users, as well as large brands and individual entrepreneurs.

Communication features - such as instant messaging, voice chatting, groups and memberships in virtual worlds - provide an effective way for users to collect information, communicate, and interact. These are all important aspects and sources of new knowledge and resources to promote innovation and entrepreneurship. Moreover, these information exchanges also facilitate the formation of social networks and communities. Interesting behaviours have also emerged in VE, where users - not limited to dynamic social virtual worlds but also dynamic social game world - try to organize events and contests within the world. For example, one of the most effective virtual fund-raising events that took place in SL is PeaceFest. PeaceFest effectively attracted between 8,000 to 10,000 avatars and was able to raise 870,000 Linden dollars from nearly 3,000 users from all over the world. This money was then donated to 10 real world charitable organizations, including UNICEF and Amnesty International (Teigland, 2009).

It is not only entrepreneurship and new business forms inside WSs that benefit from this new market; we also observe the indirect impact of VE through the creation of other associated businesses outside of the VW market. A good example of this trend is the virtual real estate management services that operate both inside and outside of the virtual world, such as the Italian real estate company Gabetti Property Solutions (Cagnina & Poian, 2007). Websites and social media pages are used to present their real estate listings external to the virtual world.

What are the unique characteristics of virtual economics related to the successes and failures of virtual business? This is an urgent need for the systematic exploration and investigation of different types of virtual economies, in order to allow for the development of successful virtual business strategies.

4. Understand VE Classification

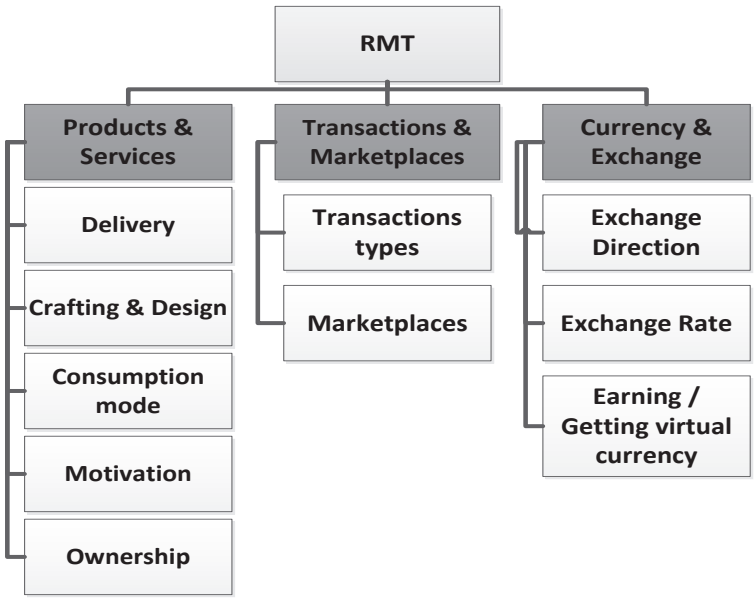

Figure 2. VE Classification Framework

To create a better understanding of different forms of VE and their potential implications for business strategies, a classification framework of VE is proposed based upon the characteristics of

products and services, the transaction and marketplace, as well as the currency and exchange systems as explained in (Figure 2). Products and services include: delivery of the virtual goods; possibility of crafting virtual items; different ways of consumption; motivation to invest in virtual items; and the ownership issues. Transactions and market place category includes two sub-categories: different transaction types; and marketplaces available. Currency exchange investigates; exchange directions, exchange rate and factors affecting it, and different ways of earning the virtual currencies.

4.1 Products and Services

The types of products and services delivered to the customers form the value proposition of a business model (Osterwalder, Pigneur, & Tucci, 2005). Products and services in VE can be classified in terms of: 1) different ways for delivering the products or services for customers; 2) possibility for users to create or design virtual products and services; 3) different cost models of the products or services; 4) different utility of the virtual products or services from virtual worlds; and 5) different kind of ownership of the products created by users (including issues of ownership of these products), as explained in (Figure 3).

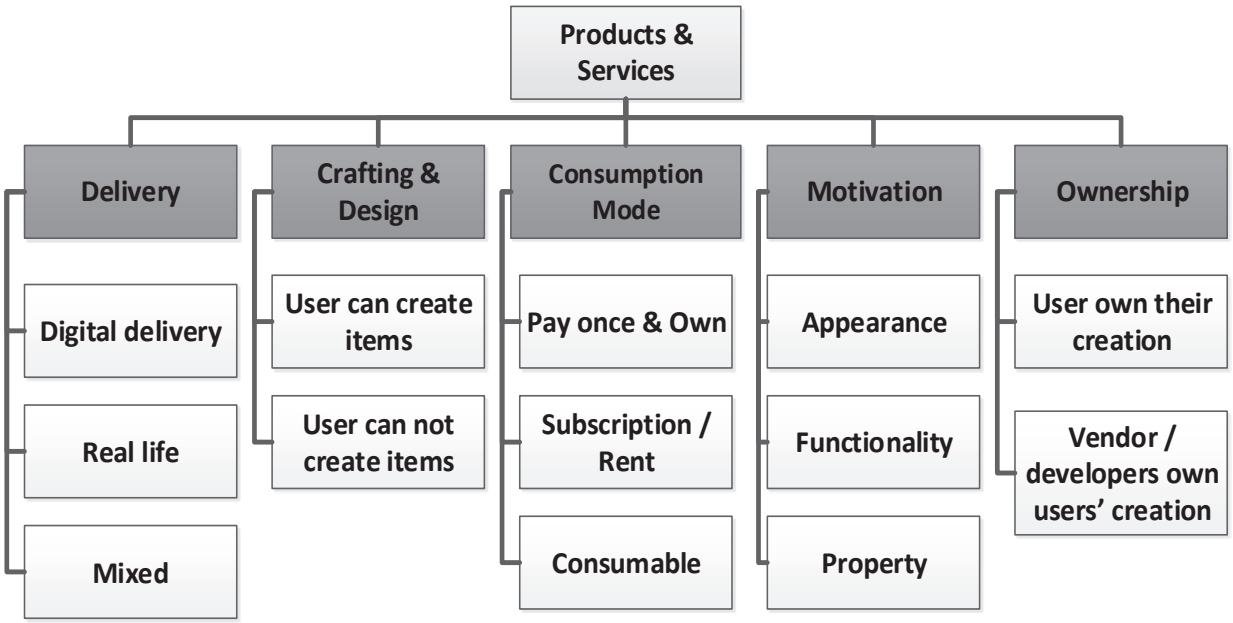

Figure 3. Virtual world products and services classification

4.1.1 Delivery

Delivery of the virtual products and services in the VE can be accomplished through a variety of means. The most common way is digital in-world delivery, which happens when a user buys a virtual item and has it delivered to their virtual presence, without leaving the VW. Another way for delivering products and services in VW is physical delivery, which occurs when a user buys a real product or services with virtual currency in a VW. There is also a mixed delivery method in which users can get both the virtual item in a VW and an equivalent of it in real life. VE strategies need to consider the differences of these delivery modes. For instance, the real world car manufacturer Toyota realized that launching a digital version of a car with the same appearance and features of the real life model in VW – an environment in which users can fly or teleport, and which may not, therefore, be attractive to the virtual world users (Jana & McConnon, 2006).

Exchanging virtual currency with virtual goods is the most common type of VE transaction. Users can purchase virtual goods - including clothes, cars, furniture, and pets - with virtual currency. These virtual goods can then be delivered digitally to the avatar representing the users in virtual world. Users can also pay for virtual services such as real estate, education, health care, and governmental services (Harris & Novobilski, 2008; Zhou, Jin, Vogel, Fang, & Chen, 2011). This type of VE began in game-oriented virtual worlds, where users exchange virtual currency, weapons and armour, to enhance the appearance of their avatars, and improve their gaming experience. Virtual currency and items are obtained through a variety of means: looting the corpses of fallen enemies; as rewards for completing quests; by using trade skills such as blacksmithing; and by trading (Lehdonvirta, 2005b). Similarly, in social-oriented virtual world (such as SL), digital delivered virtual goods, in particular virtual fashion items, are the most popular type of product (Weinberger, 2015b).

SL has been used by many well-known real world brands in the last few years for promoting and marketing their real world products. Some of the well-known companies that have joined SL for promoting, marketing, and brand awareness purposes include 1-800-Flowers.com, Adidas, Calvin Klein, Dell, IBM, Nike, Nissan, Toyota, and Mercedes-Benz (Zhang & Shrestha, 2010). Users can browse the virtual representation of the products, or the product catalogue in a virtual world, and click to purchase a real world version of those products. These transactions can happen within the virtual world, or users can be redirected from the virtual world to the company website to finalize the purchase and payment processes. For example, 1-800-Flowers allows SL users to browse different flower arrangements in its SL store front, and click to order and send real flowers (Tedeschi, 2007).

Delivering virtual products and services can also have a mixed delivery model. Users can interact with virtual products that have identical presence in real life and purchase both the digital and real life versions (Kim, Lyons, & Cunningham, 2008). American Apparel provided identical products in both their virtual and real stores, in which case the customer and his avatar can wear the same model and color of jeans or t-shirt. This innovative idea combines the virtual shopping experience with the real life shopping experience (Holden, 2006). Similarly, Dell has setup a shop in SL offering PCs to SL users, and also allows them to order new PCs for real life (Krazit, 2006).

4.1.2 Crafting and design

Crafting and design of virtual products and services refers to the possibility, flexibility, and limitations for users of VWs to create virtual items. Each VW has its own designing tools, and its own set of limitations for user-created virtual items. The various methods of user-created virtual items enable a range of different types of market structure and business opportunities in VE.

Virtual worlds allow users to create virtual items only using the built-in designing tools. For example, SL users can create virtual items by clicking the Build button, which brings up a menu of 3D shapes: box, cylinder, prism, spheres, torus, tube, ring, sculpted, tree, and grass. By modifying and combining these shapes in various ways, users can create virtual items. Different VWs have different levels of flexibility for user-created virtual items. SL also provides the Linden Scripting Language, allowing users with programming skills to design the interactions of virtual items. Companies and users can use these design tools and scripting language to create virtual items such as houses, clothes, electronics, and furniture, which they can then sell to other users. Companies also leverage the creativity and capability of these design tools to collect customer feedback for real product development. For example, car makers such as General Motors and Nissan provide customizable cars in SL, in order to gather customer feedback from the modified vehicles (Jana & McConnon, 2006).

In some VWs, users unable to create virtual items, and can obtain and use only virtual items designed by the VW developers. Most of these VWs are game oriented, such as SL, WoW, and EverQuest. For example, WoW users can use the virtual currency (gold), to bid for virtual items such as clothing gear and guardian pets in the Auction House within the game. Gold can also be used to purchase virtual items from vendor non-player characters (Lehdonvirta, 2005b). In this type of VE, the VW developer has exclusive control of the products and/or services offered to its users.

4.1.3 Consumption mode

Virtual products and services in VE have various cost models. Users may pay once to own virtual items, or pay weekly, monthly, or yearly to subscribe to virtual services. Users can also pay for virtual consumables. Different consumption modes may influences sellers pricing strategies and users' willingness to pay for virtual items and services (Cha, 2011).

In a similar fashion to real life, purchasers pay once for a virtual item and then can own/possess that item (e.g., can of coke or meal in a restaurant). Some VWs allow the transfer of ownership of the virtual item after the purchase from one user to another user. Some even allow the purchaser to edit and modify, then resell the virtual item they bought, which is the case with SL virtual items (Blizzard Entertainment, 2012; Daybreak Game Company, 2015; Hallett-Hook, 2008; Harris & Novobilski, 2008).

Users may subscribe or rent virtual items and services in VWs. In SL, users need to subscribe (rent) the land from the VW developer, Linden Lab, in order to use the land for developing or building real estate or any property. Users are allowed to use the land as long as they keep paying the subscription fees (Kiondo, Kowalsk, & Yngström, 2011). The same concept applies for renting a unit or a house in SL from other users; you need to keep paying weekly or monthly in order for you to be able to stay on the property.

Virtual world experience or consumables are items that users pay for once and then consume. As in the real world, once used, consumable virtual items no longer exist in the VW. Sellers can earn from providing live performances or hosting virtual art galleries. Professional singers have conducted live music concerts in SL via their avatars, and they can also have conversations with their listeners (Grayson, 2009). VW users can also trade virtual consumables such as virtual foods. For example, in SL marketplace, users can purchase virtual food and drink such as a virtual pizza with eight slices that are shareable, so that users can share it with other SL friends (Neurolab Inc., n.d.). In EU, tools used for hunting, crafting and mining are consumables: the tools will deteriorate when used repeatedly. Each tool in EU has a decay value assigned to determine how many times the tool can be used before it requires maintenance (Entropia Planets, 2014).

4.1.4 Motivation

Users have different motivations for buying virtual products and services, including enhancing the appearance of their avatars, the functionality and interactions in which the avatars can perform and participate, and investment in virtual property. Appearance mainly motivates users who would like to have a unique appearance; functionality motivates mainly gaming users who want to have stronger and more powerful avatars. Some users who spend money buying property, houses, and land may be motivated by the investment value of virtual property.

Users in VWs would like to feel that their avatars are unique in a variety of different ways, starting from appearance, clothes, features, and items owned. This leads to the trend that users would like to buy different and unique items even if they have to pay real money for them (Lehdonvirta, 2005b).

Users of VWs, who are game oriented, are more attracted to developing their avatars functionalities, beginning with their avatar's strength in different ways - such as attacking techniques, defending techniques, strategy, and intelligence. For this reason users are willing to spend hours in-game developing these functionalities, or, where possible, to buy these functionalities (Lehdonvirta, 2005b).

Owning and renting property is also attractive to a specific type of user in VWs. These users are motivated to buy their different kinds of property, such as land, units, houses, and businesses. VWs provide different housing options with different sizes, features, and landscapes. An example of property investment is an Australian EU player named David Storey, who bought a virtual island in EU for PED 265,000 (US$26,500). The property itself is a lush tropical island complete with a castle, "Storey says he considers it an investment and aims to make a profit as MindArk continues to develop the island. In June he said he had already recovered approximately US$9,000 through taxation and property sales" (Krotoski, 2005; Lehdonvirta, 2005b).

4.1.5 Ownership

Ownership rights used to be one of the main issues in VE. Ownership rights and terms of service vary significantly from one VW to another. Virtual item ownership is defined by the terms of services of each VW.

VWs such as SL have given the ownership rights to the users who create their virtual items inside the VW. Sellers can give specific permissions for their virtual item created by themselves when they sell it. For example, SL gives the users the ownership rights for the virtual items they create, with the possibility of transferring the ownerships to other SL users by selling the virtual item to other SL users or transferring the items as gifts to other SL users. Virtual item creators can give permission for the buyer to edit, modify, and resell when transferring the ownership of the virtual items to the buyers (Hallett-Hook, 2008).

On the other hand, most of the MMORPGs require users to forgo any intellectual property rights to access their VW. For example, Mythic Entertainment and EU terms of service stipulate that whatever the users created in the virtual worlds, will be owned by the respective VW developers (Hallett-Hook, 2008).

4.2 Transactions and Marketplaces

Transaction and market environment can greatly impact the nature of an economy. The characteristics of the transaction nature of the marketplace are discussed in this section (Figure 4).

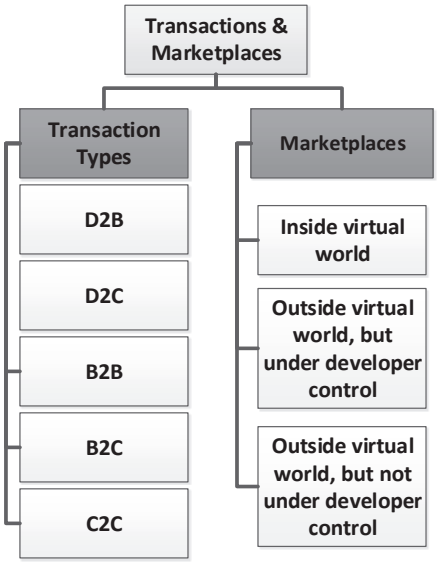

Figure 4. Virtual world economy transactions and market environment classification

4.2.1 Transaction Type

Transactions in VW can be divided to five main types based on the characteristics of the two entities involved in the transaction. These include: Developer-to-Business (D2B); Developer-to-Customer (D2C); Business-to-Business (B2B); Business-to-Customer (B2C); or Customer-to-Customer (C2C).

Developer to Business (D2B) virtual business refers to the transactions that take place between real world businesses and VW developers. For example, the transaction between Linden Lab, SL developer and companies, such as Dell, IBM, and Toyota, to rent or buy land in SL for hosting their virtual storefronts, are considered to be D2B VE transactions (Cagnina & Poian, 2007; Hendaoui et al., 2008).

Developer to Customer (D2C) VE transactions refer to the transactions that take place between VW developers and virtual world individual users. For example, WoW users purchasing tokens from Blizzard, the developer of WoW, for exchange of gold in the game, and SL users purchasing land from Linden Lab, are considered as D2C VE transactions (Cagnina & Poian, 2007; Hendaoui et al., 2008).

Business-to-Business (B2B) VE transactions can take place between companies for activities in VW. Companies, such as The Electric Sheep Company, The New Media Consortium, and New Business Horizons Ltd., are service providers offering services to businesses and organizations that wish to create a presence within VW (Cagnina & Poian, 2007).

Many companies get attracted to VWs, more particularly to the social oriented VWs such as SL. Companies, such as IBM, acquired more than 20 islands in 2007. Thousands of its employees have created avatars in SL. The CEO of IBM announced that his company has invested US$10 million to develop the 3D internet. Leading brands, such as Nike, Lacoste, and Toyota, use SL to expand their brand image products awareness (Hendaoui et al., 2008). The main target of these companies is to sell either the virtual product to virtual users or attract them to buy the real products. This type of virtual transaction is considered as Business to Consumer (B2C) VE.

Virtual world users have earned profits by selling virtual items that they have created, or services and experience they have provided. This kind of VE transaction takes place between two VW users is

considered as Consumer to Consumer (C2C) VE (Zhang & Shrestha, 2010). EU users collecting virtual objects and trading these to other users, is an example of C2C VE. The transaction that happens between Anshe Chung and other SL users before she professionally managed her real estate business was considered as C2C VE. She subsequently expanded her business and officially had her VW real estate business established in SL, and turned from a small individual business to an official business with more employees working for it (Zhang & Shrestha, 2010).

4.2.2 Marketplaces

There are different types of marketplaces both inside and outside VWs to support and facilitate the VE (Ke et al., 2012). These marketplaces can be classified into three types: 1) in-world marketplaces, where the exchange of virtual items take place inside the virtual world; 2) out-world marketplaces, which are developed by the virtual world developer, usually in form of a website site; and 3) 3rd party marketplaces which have emerged due to the need to exchange virtual items when no marketplaces have been provided by the game developers.

VWs such as WoW, EU, and SL have VE transactions that take place directly inside the VW (in-world). WoW users and EU users can bid for virtual items in the Auction House. They can then use, share, and exchange the virtual items within a guild. In SL, users can also purchase from and sell to one another directly (Ke et al., 2012). These in-world marketplaces provide an immersive VW shopping experience that resembles the shopping experience in real life.

Virtual worlds such as SL have a website, which is called SL Marketplace (www.marketplace.secondlife.com), in which users can list for sale virtual items that they have created, and where they can search for virtual items available for purchase. This marketplace provides a completely open trading platform between users, with the transactions using L$ (Ke et al., 2012).

Some VWs do not have a marketplace for virtual item exchange. For example, before introducing the Station Exchange service, EverQuest did not have a dedicated marketplace. For such VWs there are different kinds of marketplace, generated outside the virtual worlds and outside the game developers' control (Kim et al., 2008; Kiondo et al., 2011). Users may also make use of online marketplaces such as eBay for e-commence, to post their virtual items for sale or auction. The buyer can buy or bid on the items, then pay through credit cards or via PayPal, with both the buyer and seller agreeing on the delivery method (Kim et al., 2008; Kiondo et al., 2011).

4.3 Currency & Exchange Market

Monetary systems for VE are different between the different VWs, with various types of virtual currency and currency exchange systems. For the transaction to take place in the VW there is a need for a monetary system. There have been two common monetary systems in the VW, which are: virtual currency (such as PED in EU or L$ in SL) and gold, which is used in WoW and EverQuest.

Users have different ways to obtain virtual currency, and different virtual currencies could have an exchange rate that is determined by different mechanisms. This section discusses these unique characteristics of the monetary systems used in the VW economic systems.

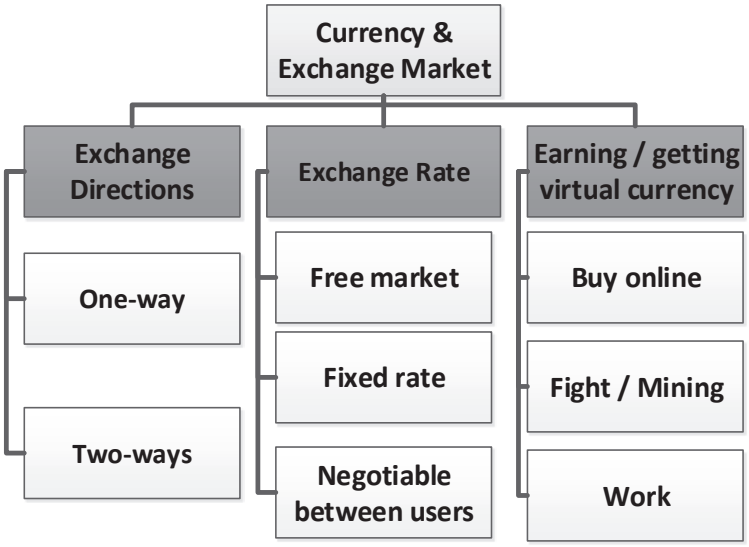

Figure 5. VE currency and exchange rate classification

4.3.1 Currency Exchange Direction

As outlined in Figure 5, there are two main types of currency exchange directions in VWs: One-way direction, in which users can exchange the real money to virtual currency and cannot exchange the virtual currency back to real money (such as WoW Gold). Alternatively, two-ways virtual currency exchange, such as the exchange of real money to L$ and PED, where users can exchange real money to virtual currency as well as exchanging virtual currency back to real money.

VWs such as WoW and EverQuest offer only one-way direction of exchanging currency through their exchange systems. Users can buy gold using real money through different transaction methods such as PayPal or credit/debit cards. But if users have more gold than they need, they will only be able to exchange the gold with virtual items in the VWs, and will not be able to change gold back to real money (Kiondo et al., 2011; Zhang & Shrestha, 2010). The only way WoW users will be able exchange gold back to real money is to carry out that transaction outside the developers' control, using a 3rd party websites. However, users caught performing such transactions outside WoW can have their accounts terminated or be banned (Blizzard Entertainment, 2012; Daybreak Game Company, 2015).

Both SL and EU have their own exchange rates; SL has free market exchange rates, while EU has a fixed exchange rate (Kiondo et al., 2011; Osterwalder et al., 2005). Both EU and SL provide the two-way transactions, meaning users can exchange U.S. dollars to PED or L$ and vice versa, using the developer/vendor exchange system. Players can buy virtual currencies from game developers by using a credit card, PayPal, bank transfer, or various online payment systems. When players wish to sell their extra virtual currency back to the developer using the current exchange rate, the developer sends the money using an international bank transfer (Lehdonvirta, 2005b; Zhang & Shrestha, 2010).

4.3.2 Exchange Rate

Virtual currencies used for VE in different VWs have different currency exchange systems. The exchange rate of the virtual currency can be free market exchange rate changing (based on the demand and supply), or pre-determined fixed exchange rate (determined by the virtual world developers), and a flexible exchange rate (negotiable between users). Different exchange rates of virtual currency will have a

significant impact and risk on pricing and business strategies for VE, similar to those of international trade.

L$ has a free market exchange rate on the demand and supply of the currency. User can exchange L$ with real money using SL's official L$ Exchange, LindeX, or through other 3rd party L$ exchange services. In 2011, it is reported that users were able to buy L$ at L$260 for US$1 plus the service fees, while in 2010 the exchange rate was about L$ 269 for US$1 (Kiondo et al., 2011; Zhang & Shrestha, 2010). Another example of the free currency exchange rate is the new token trading system introduced in April 2015 by Blizzard for its WoW VW.

On the other hand, VWs such as EU have a fixed exchange rate determined by the developer at $1 for 10 PED (Lehdonvirta, 2005b). The new token trading system introduced for WoW is designed only for North America users. However, against WoW's terms of service, unofficial online transactions are known to be taking place between users from other regions than North America, for gold, items, and user's account transfer. These websites specialize in buying gold from users at a low price, and selling that gold to other user with higher prices, thereby generating profits (Lehdonvirta, 2005b). Users can sell gold, virtual items, and user's accounts directly to each other, the selling and buying rate were negotiated between the buyer and seller. The same kind of transactions between EverQuest users is found in online marketplaces such as eBay and in PlayerAuctions.com. However, EverQuest developer, Sony Online Entertainment, has subsequently banned this kind of unauthorised transaction.

4.3.3 Earning / Getting Virtual Currency

There are different ways that users can gain virtual currency, differing from one VW to another. Most of the gaming VW users need to fight or complete missions in order to gain gold (such as WoW and EU). Other virtual users can work in the VWs, working as a sales person and real estate agent is common in SL. The other easiest option is by exchanging real money with virtual currency based on the exchange market rate.

SL, EU and WoW have promoted their virtual currencies to have a real value. In SL, users can buy L$ in-world paying real money using online payment methods such as credit card or PayPal. SL also has a virtual exchange office where user can buy L$ for the current market rate or request a limited buy offer with better exchange rate (Robinson, 2014; Zhang & Shrestha, 2010). In EU, users can purchase PED with real money and can also withdraw PED to their real world bank account, through the company website. In April 2015 Blizzard, developer of WoW, allows North American WoW players to swap real cash for game gold (BBC News, 2015).

In both EU and WoW, users can gain items or gold, which can then be used or sold. In EU, after completing some fighting/ quests, items will be dropped for users to collect. These collected items can then be sold to other users for PED. Similarly, in WoW, when users slay monsters or accomplish the quests they gain virtual items, which can be sold to computer-controlled merchants for gold, in the player-to-game economy (Harris & Novobilski, 2008; Robinson, 2014).

Getting employed in the VW is another way to attain virtual currency. In SL, for example, users can work in one of many businesses which are established there, in order to earn Linden Dollars (L$). There are different types of jobs that SL users can undertake to earn L$. These jobs include serving as a real estate agent, a salesperson, customer service and support staff, a disc jockey, or a dancer (Kiondo et al., 2011; Zhang & Shrestha, 2010). Avatars can also work as a freelancer, where they can use their skills in producing virtual items such as pets, cars, clothes, houses, and electronics, which they can then sell to other users in return for L$.

5. Conclusions

New online platforms enable users' active participation in the VW. This innovative platform allows users to communicate in different ways, thus empowering them. User response keeps changing in these VEs, with new technologies emerging and expanding the boundaries of privacy, security, and legality. This study is one of the first research projects that attempt to understand the virtual economy platforms in the different VWs.

Because of the enormous and continuing growth of virtual economies in VWs, there are various emerging business opportunities, and many related issues. In May 2014, SL announced that "Oculus Rift" is compatible with SL VW (Linden Lab, 2014). Oculus Rift will overcome some limitations of the computer monitor by providing an immersive 3D virtual representation for the VW, having the capability to simulate the head movement, enabling users to look around in SL. Oculus Rift and other similar devices can be considered as the new technological revolution in VW. Similar advancements in virtual reality (VR) technologies will continue to create new VE landscapes in VW. Hence, longitudinal research efforts for the suggested research questions in this research, related to VE in virtual world, are required to understand new phenomena created by new VE market, and new experience demanded by virtual world users.

Various attempts of VE activities by well-known brands have not yet received the returns on investment as expected. At the same time, there is some evidence to suggest that there are significant transactions and new forms of promising VE business emerging within VW. How much companies can capitalize on the growth of VE depends upon how much we understand the characteristics of this new VE and marketplace.

In this research, we have outlined a classification framework for VE based on the characteristics of products and services, the transaction and marketplace, as well as the currency and exchange systems. Such a classification is necessary because the market environment, and the products and services offered in VE can be very different from those in traditional markets and e-business.

There are several limitations in this study, creating opportunities for further studies: our study focuses mainly on three VWs, without collecting qualitative information from users of virtual worlds, especially in terms of their expectations, concerns, opinions, and attitudes. Future research could conduct a similar investigation, taking into account more MMORPGS platforms, based on different platform bases and economic systems. This extension would add robustness to our research. Empirical investigation is necessary in future research, to further validate the findings in this study by examining the different MMORPGS.

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