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# **MEASURING SUCCESS OF COMMERCE SYSTEMS IN VIRTUAL WORLDS**

**Abstract:** Recently, there has been an advent of virtual worlds like Second Life and Entropia Universe; however little is published on these worlds, the virtual goods and their commerce systems. In this paper central elements of virtual worlds are discussed. In a further step, a classification of virtual goods is proposed. Based on the updated DeLone and McLean IS Success Model and their application to eCommerce systems, we adapted and identified success measures for commerce systems in virtual worlds. A total of 43 success measures are discussed and classified according to their success dimensions. The resulting measures are then applied to two case examples showing the respective success model of each commerce system.

**Keywords:** virtual worlds, evaluation of information systems, information systems success, Second Life

## **1. Introduction**

Over the past years information technology and the internet have changed the way business operations are conducted. Nowadays online shops are a common feature for internet sites. With the advent of virtual worlds like Second Life, There.com and Entropia Universe new business models arise for the sales and distribution of virtual goods. Traditional companies as well as virtual entrepreneurs make large investments in the infrastructure that includes planning, production, marketing and distribution of virtual goods. Since this type of commerce is only in its early stages the companies are under pressure to evaluate the success of their commerce systems. However, especially the success of commerce systems in virtual worlds is structured in multi-layered dimensions. For some companies the focus on traditional business objectives

like increased sales and market share shifts towards aspects of brand awareness and customer loyalty in virtual worlds. The aim of this contribution is to develop an instrument for measuring the success of commerce systems in virtual worlds. Therefore, a model is developed that incorporates the different dimensions of success.

This paper proposes that even though new business models are emerging, the fundamental role of IT has not changed, and on this account the methodology for measuring the success of information systems should not change. This text applies the eCommerce success metrics identified by DeLone and McLean to the context of commerce in virtual worlds. The DeLone and McLean Information Systems Success Model is an existing success measurement framework that has found wide application since its publication in 1992 [2]. The updated version of the model has already been applied to the eCommerce context by the authors [3] [4]. Others have applied the model to areas like the evaluation of social software or online communities [23] [10].

The paper begins with the theoretical foundations of virtual worlds, virtual goods and commerce in virtual worlds. In a next step the measures of the updated DeLone and McLean IS success model are applied to commerce systems in virtual worlds. Two case examples demonstrate how the model can be used to guide the identification and specification of success metrics for commerce systems in virtual worlds. The paper ends with a summary of the findings and an outlook on future research.

## **2. Theoretical Background**

### **2.1 Virtual Worlds**

A significant portion of the world population spends time online in the Internet. A number of different services such as email, weblogs, instant messaging or chat rooms are used to communicate with each other. Special forms of these online environments are the massive multiplayer online games (MMOGs) and virtual world simulations. Griffith et al. report that millions of users spend an average of 22 hours a week in virtual worlds like Second Life, Entropia Universe, There.com or World of Warcraft and Lineage [8]. Second Life alone has more than 14.7 million registered accounts with more than 1.2 million that have logged-in the past 60 days.

Most definitions for virtual worlds mainly focus on the technical aspects of these worlds. They highlight the computer-based simulated environment with interactive features where designs range from simple 2D environments to complex 3D worlds. Castronova simply defines a virtual world as "crafted places inside computers that are designed to accommodate large numbers of

people." [1]. Hunter and Lastowka point out that virtual worlds are unreal in the sense that they are artificial, fictitious, imaginary, intangible and invented [15].

Generally, a virtual world can be seen as a special form or further development of a virtual community. As early as 1993 author Howard Rheingold wrote about the cultural and political implications of virtual communities [24]. The term *virtual community* was first introduced by the two internet pioneers Licklider and Taylor in 1968 [16]. In the 1970s mailing lists and newsgroups became a popular medium for the exchange of ideas in the academic community without a commercial focus [24]. Thus, virtual communities can be regarded as a subset of communities in general. The literature has identified certain elements that are mandatory for the creation of persistent virtual and non-virtual communities. According to Eppler and Diemmers these elements are *common interest*, *shared norms and values*, and a *common platform for interaction*, whereas *emotional binding*, *continuity* and *reciprocity* represent optional elements that have a constitutive character [5]. Other authors also include the factor of *self-determination* in their definitions [24] [19].

### *Common Interest*

Every community requires a purpose that represents a common focal point and serves as the community's binding element [9] [6] [26]. Crucial for virtual communities is the fact that individuals share common interests independent of their geographical position.

### *Shared Norms and Values*

The interaction of members within a community is regulated through shared norms and values. Implicit and explicit codes of conduct play an important role [6] and form the basis for communication in the community [26]. Fundamental is a common knowledge base among the individuals [13].

### *Common Platform for Interaction*

A common platform for interaction allows the members of a community to meet and thus, it facilitates the collective communication. For non-virtual communities the interaction takes place at a central place or e.g. via a periodical journal. By contrast, members of a virtual community do not gather in a real but computer-generated environment. These environments can be chat forums or virtual worlds like Second Life and There.com.

A sense of community is helpful for creating a collective bond among the members of a community. Continuity is equally important since a common

history or tradition tightens the sense of belonging to the community [6]. Additionally, the repeated interaction supports the familiarization with the interaction partners over time [28]. Komito states that reciprocal relationships of a high degree can be observed in communities [14]. Already in 1993 Rheingold reported that members often provide mutual assistance in virtual communities [24]. Even though virtual communities are mostly free of predetermined hierarchies and members often decide over rules, duties and goals, the degree of self-determination varies according to the virtual world.

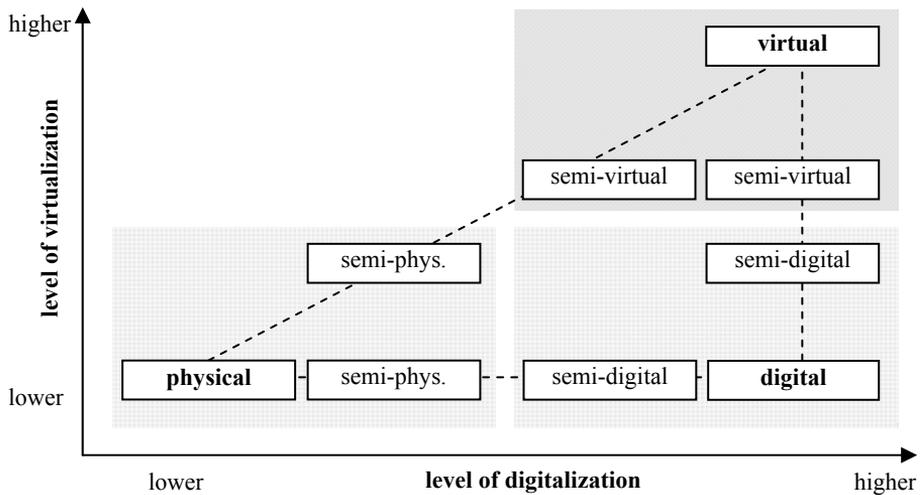
On the one hand there are rather game-oriented worlds with a certain objective like World of Warcraft or Entropia Universe and on the other hand there are worlds like Second Life, where only the technical infrastructure and grid are provided. Furthermore, Morris and Morgan as well as Hagel and Armstrong emphasize the importance of network effects for virtual communities, since only a sufficient amount of content in the virtual community or virtual world is appealing enough to attract users [20] [9].

Virtual worlds incorporate the preceding elements and therefore represent the technically most advanced form of virtual communities where most of the interaction takes place through avatars.

## **2.2 Virtual Goods**

In analogy to virtual communities the central element of virtual worlds are its members. But in contrast to traditional virtual communities virtual goods exist in most virtual worlds. A characteristic feature of these goods is their dependence on a data storage medium. Additionally, these virtual goods can only be obtained and consumed in virtual worlds. Even though the single elements can be transferred independent of the physical data storage medium these goods need the virtual environment to be consumed. Accordingly, their utility and a respective value only derives from their connection to the virtual world. Examples for these types of goods are virtual avatars and their items or virtual real estate.

The proposed classification scheme for physical and digital goods from Illik serves as a basis for the classification of virtual goods. Illik distinguishes between a main component and a minor component that constitute physical and digital goods. Along the dimension of digitalization physical goods have a physical main component and can exhibit a digital minor component [12]. The main component of digital goods is digital, whereas the minor component may be physical, like an associated service or documentation. This classification scheme from Illik fails to incorporate the distinctive features of virtual goods.



**Figure 1.** Classification Scheme for Virtual Goods

Therefore, we have introduced an additional dimension for the degree of virtualization. Figure 1 shows the classification scheme from Illik extended for the dimension of virtualization. Virtual goods are in line with digital goods since they require the digital format for storage. Minor components of virtual goods can be physical or digital. Examples for these minor components are associated services or online documentation. By contrast, the main part of a virtual good can only be consumed in virtual worlds.

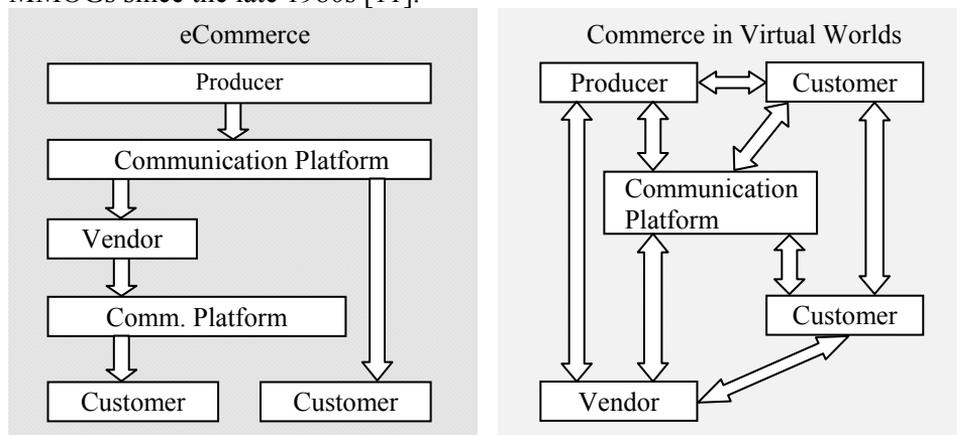
### 2.3 Commerce in Virtual Worlds

In virtual worlds like Second Life or Entropia that provide free virtual economies the market mechanism of supply and demand determines the price level for virtual goods. In a number of virtual worlds trading virtual goods represents an essential component of the system. Many worlds offer the functionality of a virtual market place where transaction partners congregate. Correspondingly, quite similar to electronic market places a virtual market place describes a specific location that does not exist for real, but where market participants gather though the means of electronic data links. This virtual market place facilitates transactions among buyers and sellers. The distinguishing feature is the exclusive setting in a virtual worlds and the trading focus on virtual goods. A constitutive element for this type of market place is a superior authority that supervises the execution of the transactions [14].

In traditional eCommerce the relationship between producer and customer is mainly unidirectional, whereas the customer is at the end of the whole transaction process. In virtual worlds the focus shifts more clearly and directly

towards the customer and the communication platform. Figure 2 shows the different transaction and interaction relationships. In virtual worlds the relationships between transaction partners are predominantly bidirectional. This form of commerce does not only focus on the actual transaction but additional activities like the exchange of product information, feedback and evaluation become essential components of the commerce systems. The communication platform is fully embedded in the virtual world and serves as a critical conjunctive element for all transaction partners [13].

Traditional eCommerce shows signs of integrating such elements as well but they are less predominant than in virtual worlds, where these aspects receive priority. This stems from the fact that apart from the actual transaction additional aspects like interpersonal relationships and interactions are of major importance in virtual worlds. In the interrelation between producers, retailers and customers virtual worlds play an essential role as a common platform of communication since they exhibit the features of virtual communities on the one hand and facilitate the bidirectional flow of goods and information on the other hand. It is useful to distinguish between worlds where trading virtual goods for real currency is allowed and those worlds where this form of trade is forbidden. Nonetheless, real money trade (RMT) with virtual goods can be observed in MMOGs since the late 1980s [11].



**Figure 2.** eCommerce vs. Commerce in Virtual Worlds, adapted from [13]

Most virtual worlds offer different ways to trade virtual goods. One fairly popular method of selling virtual items is the direct trade between two members of the online world. Another way is setting up online vendors like virtual shops and malls. Second Life offers a wide range of trading virtual goods. One of the most common forms of trading virtual goods in Second Life is via virtual shops. These shops operate quite similar to internet shops, with the difference that they are placed in a virtual environment and therefore can only be accessed by

avatars. But the underlying commerce systems of such shops show strong similarities to eCommerce systems. Entropia Universe and World of Warcraft even have implemented auctioning systems that offer similar functions as eBay.

As mentioned before, the concept of RMT trade has been introduced to virtual worlds. Some communities like Second Life or Entropia Universe have sophisticated financial and economical systems that allow the purchase of virtual goods for real money. Therefore, a real currency is converted into the local currency of the respective virtual world. In the case of Second Life the money is converted into Linden-Dollars (L\$). One US-Dollar is roughly worth 270 Linden-Dollars. Within Second Life users can create, buy and sell any number of goods and services. The company that created Second Life does not produce any content. It only provides the tools to construct these items. Over time a vital community has evolved with a daily turnover of more than 1 Mio. US\$.

Thus, the term real money trade describes the range of activities where virtual goods of online worlds can be traded against a real currency. Virtual worlds that offer the conversion of their local synthetic currency into a real currency like the US-Dollar or Euro are characterized as real cash communities. The features of a real cash community coupled with the establishment of an integrated platform for communication lead to a common point of reference for producers, vendors and customers within the virtual world. In some virtual worlds members are not only customers of virtual goods but are offered the opportunity to create virtual objects they can sell themselves. The most prominent examples for virtual worlds with RMT are Second Life and Entropia Universe.

## **2.4 Updated DeLone and McLean IS Success Model**

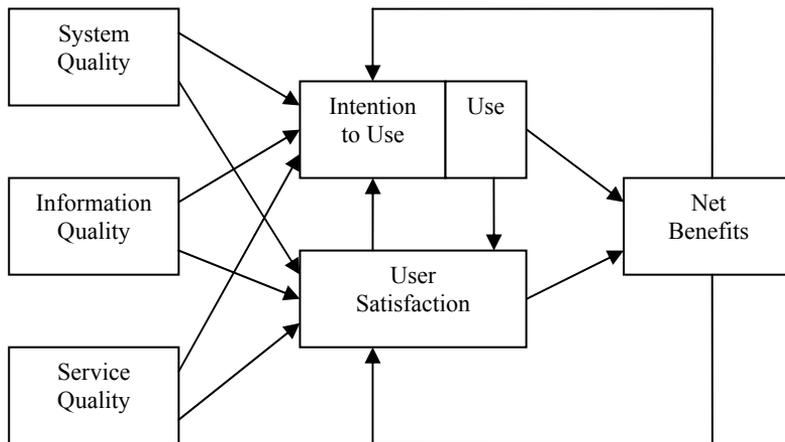
The DeLone and McLean success model provides a framework for measuring the performance of information systems [2]. It is based on the communications research of Shannon and Weaver [27] as well as on the information “influence” theory of Mason [17]. Additionally, empirical management information systems (MIS) research studies were analyzed. This extensive literature review on IS success resulted in a comprehensive framework to measure the dependent variable “IS success”. The original model proposed six dimensions of IS success. Since its publication in 1992 this multidimensional model has been referred to by many researchers.

In 2003 DeLone and McLean published an updated version. In this model the dimensions of IS success were updated as a result of their own research as well as findings of other researchers [2] [3] [4]. The IS success dimension presented in the original model were *system quality*, *information quality*, *use*, *user satisfaction*, *individual impact* and *organizational impact*. The assumed

relationships between these IS success dimensions were supported by empirical findings [2]. Despite this positive validation of the chosen dimensions a new dimension called *service quality* was added to the model. This was based on criticism by Pitt, Watson and Kavan who argued IS success could be mis-measured if IS service quality aspects were not taken into account [22].

In addition, the two independent variables *individual impact* and *organizational impact* were aggregated to a more comprehensive construct named *net benefits*. This was done to include impacts not only on the individual or organization level. Using the *benefit* construct allows capturing impacts on group, inter-organizational, industry, consumer or society level. Replacing *impacts* with *benefits* and adding *net* as a prefix indicates that no outcome is wholly positive and free of any negative consequences [3]. Therefore, the term *net benefits* seems to be a more appropriate expression.

In the updated DeLone and McLean IS success model, *system quality*, *information quality* and *service quality* influence *user satisfaction* and *intention to use*, which in turn have to direct impact on *net benefits* (see figure 3).



**Figure 3.** Updated DeLone and McLean IS Success Model

This updated model was applied to eCommerce systems in order to measure the respective eCommerce success and understand its drivers [4]. Therefore, DeLone and McLean conducted a literature review and identified additional eCommerce success measures for each of the dimensions. They stated that in the eCommerce context there is a shift in the primary users of the model. Traditionally, those were internal users whereas now they consist of customers and suppliers.

### 3. Model Adaptation

#### 3.1 IS Success Model for Commerce Systems in Virtual Worlds

Commerce systems in virtual worlds differ from other systems, e.g. from traditional eCommerce systems. In virtual worlds the product or service offered is not solely a real good. In many cases it can be a virtual good. As defined in chapter 2.2 this good can only be consumed in that particular virtual world.

The primary system users of commerce systems in virtual worlds differ from users of other systems. This type of users comprises vendors as well as customers but also suppliers and potential customers and eventually other stakeholders. The system is mainly used for carrying out sales transactions. Though many users do not execute the whole selling process, they make use of the system to retrieve information, to communicate with others or to provide feedback to future customers.

We adapted the updated DeLone und McLean IS success model [3]. The eCommerce measures identified by DeLone and McLean in 2004 [4] are included because commerce systems in virtual worlds can be considered as eCommerce systems expanded and adjusted to the virtual world environment. The six success dimensions can be applied to commerce in virtual worlds as follows:

- *System quality* in internet-based virtual worlds measures the desired characteristics of a commerce system in these worlds. *Usability, secure transactions, customization and privacy* are examples of qualities that are valued by users of these commerce systems.
- *Information quality* captures the commerce systems content issue in virtual worlds. The content issues include *variety, clarity, format and appearance of information, content personalization* as well as *accuracy and timeliness*.
- *Service quality* represents the overall user assessment and service delivery assessment as well as the support for all stakeholders participating in the virtual marketplace. Measures of service quality for commerce systems in virtual worlds include *assurance, (quick) responsiveness, support capabilities, (technical) competence and accessibility*. This dimension is of prominent importance as failure in service quality results in the loss of system users because in the virtual world environment customers are system users.
- *Use* measures the nature and amount of system use in all forms. *Number of visits, purchases completed, users and repeat customers, as well as the frequency of access, the duration of use and the ratio*

*of customers using community functions* are measures for the use of commerce systems in virtual worlds.

- *User satisfaction* measures the attitude of the stakeholders towards the commerce system and should reflect the whole customer experience cycle from information retrieval through purchasing, payment, service and communication (including providing feedback). User satisfaction includes *system satisfaction*, *information satisfaction* and *service satisfaction*, *enjoyment*, *overall and specific satisfaction* and the *difference in received and desired information*.
- *Net benefits* are (still) the most significant success measures. They capture the positive and negative impacts on all stakeholders of commerce systems in virtual worlds. Net benefits cover traditional measures such as *growth in customer base*, *increased sales*, *competitive advantage* and *market share*. Additionally, new measures like *customer loyalty*, *brand awareness*, *global reach*, *entertainment* and *improved customer experience* are added to this dimension.

### 3.2 Metrics for Commerce Systems in Virtual Worlds

A literature review reveals that up to now no analysis of relevant metrics for measuring the success of commerce systems in virtual worlds has been conducted. Above all, there is an absence of any empirical research dealing with identifying success measures for these commerce systems in virtual worlds.

Therefore, this study aims to identify a set of measures covering the success of commerce systems in virtual worlds. The main focus is on the traditional MIS measures including the measures for eCommerce systems already identified by DeLone and McLean [2] [3]. We completed the model by adding measures matching the new application context. The proposed compilation of success measures provides a first and tentative version of a model to measure the success of commerce systems in virtual worlds. Table 1 shows the summary of the success measures.

#### *System Quality*

The identified measures for the *system quality* dimension consist of the original measures proposed in the first version of the DeLone and McLean model. *Usability* and *system flexibility* still represent the most important elements. However, with the model adaptation to the virtual world environment there is a shift in the relative importance of the measures in comparison to each other. Usability with its *ease-of-use* and *ease-of-learning* gains in importance as a result of the fact that there are fewer restrictions to the interface design in

virtual 3D worlds than there are to classical website creation. The measure *ease-of-navigation* has also to be taken into account because system users, especially customers and potential customers, navigate through the system to fulfill their needs. The successful use of the system by active and mainly voluntary customers requires a high level of usability.

DeLone and McLean suggest new measures while applying their model to eCommerce systems [4]. Some of these measures are of increased importance in the context of virtual worlds. The level of *personalization* and *customization* are added as new measures to this model. A high degree of customization (and personalization) allows versatile application of the commerce system in virtual worlds. Other issues of importance are *security* related aspects. Commerce systems deal with business transactions of all kinds. Therefore, secure transactions and trust in the system are required. This is crucial when business is conducted via the internet in virtual worlds. Along with security issues a measure of *privacy* is of great relevance. It is easy to store almost all information related to the system users and to use it for any kind of analysis or marketing purposes.

Finally, the *usefulness of the system features and system functions* to the user has to be measured. Commerce systems in virtual worlds offer a variety of different functions and features. Besides the ordinary purchase process users can provide feedback, receive product information or communicate with others. All these functions and features have to be in accordance with the system's overall purpose.

### *Information Quality*

This dimension covers the quality of the content stored in and provided by commerce systems in virtual worlds. Besides information on products or services the information on the system users in particular on (potential) customers is of relevance. Therefore, the success measures of this dimension comprise aspects related to content as well as structural aspects of *information quality*.

For commerce systems in virtual worlds the *variety of information* is of particular importance. With a wide range of available information the system gains attention by the users. If the number of products available in such a system is high, more customers are willing to buy those products. At the same time the *clarity, format* and *appearance* of the given information are profound elements to determine the success based on information quality. Those measures were originally identified by DeLone and McLean [2] and are also included in the adaptation to the virtual world context. The way information (e.g. on products) is provided influences the customers decision whether to buy the product or not.

Commerce systems in virtual worlds differ from ordinary commerce systems. Products and services offered by these systems can be completely virtual. When the customer buys the product it will be received immediately. No delivery time is required. Due to the fact, the *timeliness* of the information on these products is of significant relevance because the cycle time is reduced to a minimum. In addition to this, mostly dynamic content such as feedback or recommendations on products from past customers have to be *up-to-date*, *accurate* and *relevant*. Making all these features available in a commerce system in virtual worlds can provide *personalized content* to the system users. Customers can receive product recommendations based on their prior activities or on other customers' buying decisions. The system operator can obtain his desired information (e.g. on customer traffic, sales growth of any kind or system activity).

### *Service Quality*

In the original version of the DeLone and McLean model this dimension was not included. In the revised model from 2003 [3] the authors proposed measures based on the SERVQUAL instrument [21] to be included in this new success dimension. These new measures such as *competence*, *trust* and *transparency* are also valid for commerce systems in virtual worlds. Beside these measures additional measures have to be identified to determine the *service quality*.

*Quick responsiveness* is a main element of service quality. Any actions within the system (e.g. sending out order confirmations or replying to customer requests) have to be immediate. Otherwise the success of the system will suffer from this shortcoming. In this dimension the measure of *online service support* is included. Making FAQs or bulletin boards available to the system users is a crucial element for the *online support capabilities*. This support feature deals with technical or product related issues. If questions cannot be answered by this kind of support or if problems are not solved a *follow-up service* to deal with the remaining issues is required.

The *accessibility* of the service is another essential measure. A high level of (*technical*) *competence* is required where system users have direct contact with the service personnel (on- or offline). Is the service not as the customer expects it to be there will be a loss in *assurance*. Assurance is necessary because the system use is mainly voluntary and could therefore be reduced by the customer if the quality of the support is insufficient.

## *Use*

*System use* includes many qualifying measures. The amount and duration of use are important elements. The following section will give an overview of the measures applicable to commerce systems in virtual worlds.

All systems need to measure the *number of users*. In connection with this measure the *number of visits* has to be determined. The purpose of many users is to fulfill their shopping process by accessing the system. Therefore, capturing the amount of time a user spends within the system provides another measure for system use. Besides including a measure for the *duration of system use* the *frequency of access* is of interest. Knowing the ratio of customers that are first-time customers or repeat customers helps to measure the success in the system use dimension. A high number of customers repeating their purchase actions provide the system with a sufficient customer base. Due to the fact that not all system users are customers or do not complete their initial purchase process, the *number of purchases completed* is of relevance. Knowing how many customers are interrupted in their purchase process and do not proceed to the final order can provide information on hidden problems within the use of the functions available by the commerce system. It is important to determine the *amount* and *type of products* sold to the customer through the commerce system in order to find out more about the customer's behavior.

Commerce systems in virtual worlds offer additional services like product information, product recommendations or feedback from customers. In many cases a bulletin board is available where all system users can participate. These additional services provide added value to the customer. Therefore, a success measure providing sufficient information on the amount of customer activities using these additional services is required.

## *User Satisfaction*

*User satisfaction* covers the user's opinion on the whole system. This dimension provides an all-embracing perspective of this user opinion. For measuring the user satisfaction some elements of the system quality, information quality and service quality dimension are considered. It is important to measure the difference in expected and perceived information quality or service given by the system. This results in an individual level of satisfaction with the use for each dimension and can be aggregated to an *overall satisfaction* with that particular commerce system in its virtual world. By adding *specific measures* a comprehensive level of user satisfaction is covered in this dimension.

Another element of user satisfaction is *enjoyment*. If the user enjoys participating in the system s/he will develop a positive attitude towards the

whole commerce system and eventually become a repeat customer. For this reason the *number of repeat customers* is added to the user satisfaction dimension.

### *Net Benefits*

*Net benefits* is the most important dimension to measure the success of commerce systems in virtual worlds. The influence on commerce systems has to be looked at from different levels. There are impacts on the individual, group, organizational and inter-organizational level. Many of the already identified success measures [2] [3] [4] apply to the context of commerce systems in virtual worlds. Impacts on three levels are of special interest in this context.

Individual impacts such as being *entertained* by the system and its functions are important for the customer. The system operator or vendor could desire to *improve the customer experience* within his system.

Besides individual impacts, impacts on the organizational level are of greater interest for commerce systems success. The organization providing the service in virtual worlds can focus on identifying the characteristics of their *customer loyalty*. Knowledge of the customers can lead to a *growth in customer base* or even *increase sales*. Besides the financial impacts on the organization there are other impacts. Improved *brand awareness* or a greater (global) *reach* to the customer come along with an *increased market share*. Providing services to potential customers in virtual worlds results in a *competitive advantage* for the organization.

In addition to this it is easier and faster to *improve the relationships among trading partners*. In virtual worlds communication along users is fairly easy, as it is to react to recent changes of any kind. Thus, this environment can foster a good relationship to any trading partner or customer.

A summary of the identified success measures is displayed in the following table 1.

**Table 1.** Success Measures for Commerce Systems in Virtual Worlds

<b>System Quality</b>	<b>Information Quality</b>	<b>Service Quality</b>
usability security ease-of-navigation customization usefulness of features and functions flexibility privacy	variety of information clarity, format and appearance content personalization accuracy timeliness relevance	assurance responsiveness follow-up service online support capabilities competence (technical) accessibility
<b>Use</b>	<b>User Satisfaction</b>	<b>Net Benefits</b>
no. of visits no. of purchases completed no. of users frequency of access duration of use ratio of customers using community functions no. of products sold type of products offered	Satisfaction <ul style="list-style-type: none"> <li>• System</li> <li>• Information</li> <li>• service</li> </ul> enjoyment overall satisfaction specific satisfaction difference in received and desired information no. of repeat customers	entertainment improved customer experience customer loyalty brand awareness reach (global) growth in customer base increased sales competitive advantage market share improved trading partner relationships

#### **4. Applying the Success Model for Commerce Systems in Virtual Worlds: Two Case Examples**

The utility of the updated DeLone and McLean IS Success Model and related metrics for commerce systems in virtual worlds can be demonstrated on the basis of two case examples. Therefore, two companies are chosen that have subsidiaries in the virtual world Second Life. One involves a company that can be described as a virtual venture. It was founded with an exclusive focus on the

sale of virtual goods. The other business is an online division of a large traditional car manufacturer. The purpose of these case examples is not to discuss the wisdom of the according strategies but to demonstrate the utility of the adapted success model.

The proposed commerce metrics are meant to be demonstrative rather than exhaustive. Even though the examples are logically compelling, the metrics will have to be tested empirically in a further step.

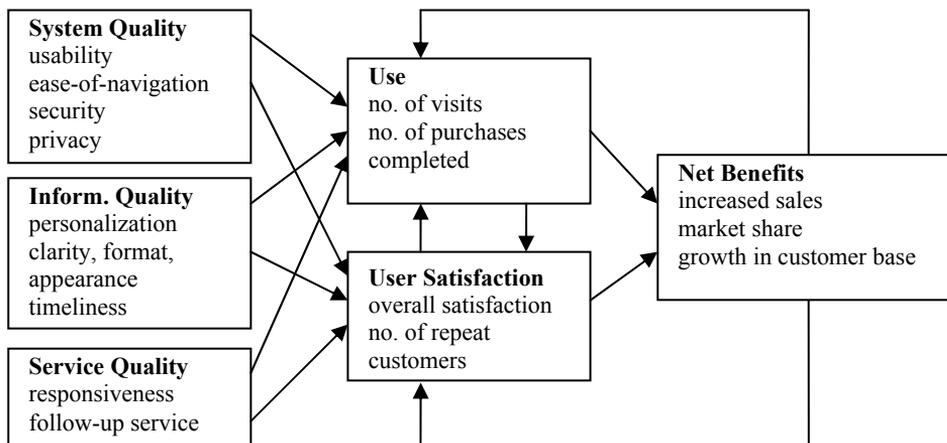
### *Case 1: Anshe Chung Studios*

Anshe Chung Studios (ACS) was founded by Ailin Graef in June 2004. In the beginning she focussed on providing services for other members of the virtual world Second Life. But soon the activities of ACS diversified and centered on several business divisions. These include Dreamland, Corporate Customers, AnsheX, Fashion and activities for other virtual communities. The Dreamland segment pools all activities relating to the development of virtual real estate communities for the B2C market, whereas the segment for Corporate Customers focuses on the development of individual real estate projects for corporate companies. The AnsheX is an exchange service for real currencies into the local currency Linden-Dollars. Currently US-Dollar, Euro, British Pound Sterling, Australian Dollar and Swiss Francs can be converted at a fixed conversion rate into Linden-Dollars. The Fashion division includes the design of virtual objects like fashion for avatars. Besides these activities related to the virtual world Second Life ACS conducts business in other virtual communities and worlds like Entropia Universe or IMVU.com. In May 2007 ACS acquired the first virtual banking license in Entropia Universe for 60,000 US-Dollar.

For the development of real estate, large areas of virtual land are purchased and carefully developed around different themes. Virtual world residents can then buy or lease the land or completely developed properties for a fixed price. The distribution channel for the land and property is either through the in-world office or via the website of ACS. Due to the scope and complexity of the projects business for corporate customers is conducted in person. The currency services are offered solely through the website. The fashion is mainly distributed through the commercial website of SLExchange where Second Life residents can trade created goods. The company was incorporated in early 2006 and is based in Wuhan, China. As of November 2007 there are around 100 people employed full time, with most of them being programming and design staff.

With diverse sources of revenue and an exclusive focus on virtual goods the ultimate measures for success for Anshe Chung Studios are *increased sales, market share and growth in the customer base*. To understand these net benefits, the quality of the information, the system and the service as well as its usage and the user satisfaction have to be measured. The commerce system of ACS must be *easy to*

*access* and *use* and it has to offer a *secure* service that takes account of *privacy* issues. The display of *relevant* and *timeliness* information receives higher attention than in traditional media since these virtual goods are sold in a 3D environment. *Clarity in format* and *appearance* as well as *personalized content* are important aspects because of the virtual nature of the product and the customer's limitation to a visual experience. *Quick responsiveness* as well as a *follow-up service* for the real estate development department are issues within the service quality dimension. The customer's usage can be measured by the *number of visits* to the virtual shops as well as the *purchases completed*. Their satisfaction can be measured by the *overall satisfaction* and the *number of repeat customers*. All these measures, as displayed in figure 4, represent a comprehensive, yet not exhaustive success measurement model for Anshe Chung Studios, based on the updated DeLone and McLean model and additional metrics for commerce systems in virtual worlds.



**Figure 4.** Anshe Chung Studios IS Success Model

### *Case 2: Mercedes Benz Island*

The Mercedes Benz Island was opened in February 2007 with a celebration party and a concert. Every guest was presented with a free racing outfit for the avatar. A month later the new model of the Mercedes C-Class was introduced. A virtual counterpart of the original model was made available for sale to the residents of Second Life.

The price for a car is L\$ 1,500 allowing the buyer to customize the color, wheels and license plate. A track to test the car under different simulated weather conditions was made available on the island the same day. By mid 2007 additional features like a playable golf course were integrated into the Island. To keep the interest high in the virtual Mercedes subsidiary contests and

events take place in sporadic occurrences. There is a picture of the week section where users can submit their picture of their avatar with the car. For one hour a day a representative is available to answer questions of residents.

With the focus on residents experiencing the brand through fun activities and events the concept of Mercedes is exclusively aimed at private customers. The sales of the virtual car that is offered in-world are not intended to generate a significant revenue stream. The car manufacturer does not offer its products and information through intermediaries. Two months after the launch Mercedes Benz Island was among the most popular places in Second Life [7].

The strategic objective of Mercedes Benz new strategy in Second Life focuses on increasing the *brand awareness* of the car manufacturer. Further measures of the net benefits dimension are *improved customer experience* and *entertainment*. The *usability*, the *ease-of-navigation* and the *usefulness of features and functions* are more important measures than security or privacy issues since the generation of high income streams is not the prime objective. For increasing the brand awareness, the company has to offer *timeliness* information as well as a *variety of information* and the *responsiveness* for requests must be short. *Online support capabilities* are essential for increasing brand awareness in Second Life. In comparison to ACS the number of purchases completed is less important than the *number of visits* and the *frequency of access* as well as the *duration of use*. For the measurement of the user satisfaction the *enjoyment* and the *satisfaction with the system, the information and the service* are of relevance.

All these measures, as displayed in figure 5, represent a comprehensive, yet not exhaustive success measurement model for the Mercedes Benz Island in Second Life, that is partly based on the updated DeLone and McLean model.

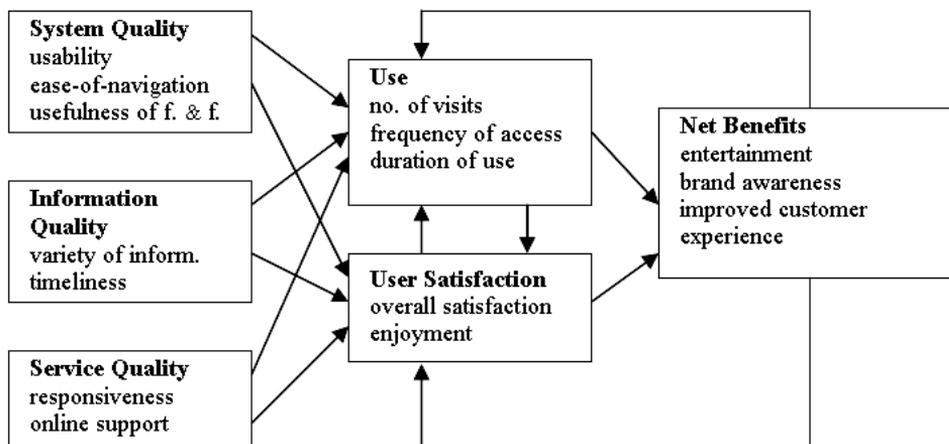


Figure 5. Mercedes Benz Island IS Success Model

## 5. Conclusion

This paper proposes a concept for measuring the success of commerce systems in virtual worlds. It adapts the well-established updated DeLone and McLean IS Success Model to the challenges of new commerce systems in virtual worlds [3]. The transfer of several measures to the context of virtual worlds is discussed in detail and the resulting measures were displayed in summary. The main focus is on the adaptation and application of the existing success measures of the DeLone and McLean IS Success Model. Of particular significance is the shift in relevancy in some measures for the context of virtual worlds. The six dimensions of the success model for commerce systems in virtual worlds comprise a parsimonious framework for organizing the various success metrics identified by DeLone and McLean and in the literature. Two case examples demonstrate the utility of the adapted DeLone and McLean IS Success Model and related metrics for commerce systems in virtual worlds. These examples indicate which of the metrics may be chosen for measuring the success of different subsidiaries in virtual worlds. Although currently many companies primarily make use of virtual worlds like Second Life for the purpose of brand recognition rather than the generation of actual sales. The importance of virtual markets will increase with their increasing maturity.

Special attention should be paid to the fact that the success model itself is inherently complex, even without the addition of further measures to the dimensions. As a consequence the high empirical effort has to be taken into account in the planning phase of the success measurement.

The aim of the model derived in this paper is to provide a framework that supports the identification of relevant measures for the evaluation of commerce systems in virtual worlds. This conceptual proposal needs further specification such as operationalization of all variables and empirical validation which may result in further adaptations. Additionally, the proposed framework could be applied to the distinct features of commerce systems in MMOGs.

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