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# Economics of Virtual Communities – A Financial Analysis of a Case Study at the Berlin Stock Exchange

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**Economics of Virtual Communities –  
A Financial Analysis of a Case Study  
at the Berlin Stock Exchange**

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**Abstract**

New web based technologies such as social software enables users to interact and collaborate over the internet. Virtual communities are set up by companies in order to bridge the gap between customers and companies and thus serve as a customer relationship management tool. As a result of a continuous dialogue with customers or with companies' employees innovations and improvements of products and processes can be generated. Despite intensive discussions about the technical aspects of virtual communities and their value proposition, hardly any research explicitly addresses a financial perspective. Thus, the objective of this paper is therefore to develop a measurement system for the financial performance of a virtual community platform reflecting specific economic conditions relevant in a certain situation. As a proof of concept, the theoretical model is then applied to a case study conducted at the Berlin stock exchange.

**Keywords:** Virtual Communities, Financial Performance, Value-Based Management

## **1 A Financial Perspective on Web 2.0 Platforms**

Web 2.0 platforms are technologies which enable users to form up virtual communities in order to interact and communicate over the internet. A virtual community can be defined as a group of people sharing common interests by using internet applications. Nowadays an increasing number of companies and non-governmental and non-profit organizations set up virtual communities (McAfee 2005, O'Reilly 2005, Wenger et al. 2002). Virtual communities implemented by companies promise to improve the knowledge management by integrating customers in the value creation chain. As a means of customer relationship management, virtual communities contribute to increase the customer loyalty and a deeper understanding of customer needs (Lattemann & Stieglitz 2007).

Though highly relevant there is still a lack of efficiency approval for virtual communities. Hence, there might be a potential demand for methodological support considering the assessment of financial implications of a virtual community. This contribution aims at providing a methodological approach considering the assessment of financial implications of a web 2.0 platform. In and out-payments brought about by a virtual community comprise a variety of aspects, ranging from development, purchase, set-up and adaptation of a platform to community maintenance and business model related turnovers. In the majority of web 2.0 cases only out-payments would be quantifiable in financial figures. Hence, the financial performance of virtual communities can be indicated by means of Total Costs of Ownership (TCO). However, to identify and assess relevant payments within economic analysis, support for structuring, deriving and consolidating payments is required.

In this paper design principles of an appropriate measurement system for the financial performance of a web 2.0 initiative will be presented. In order to find these principles, a design science approach is applied (Hevner et al. 2004). Therefore, the concept of an appropriate measurement system is introduced on the basis of basic principles of decision theory and capital budgeting. This system is then applied to the case of the Berlin stock exchange which serves as a proof of concept. The case describes the evaluation of a virtual community which was implemented and managed according to a community engineering process. Therefore, costs of the whole process are summed up and compared to qualitative success factors such as the number of members. Finally, the most significant results as well as limitations are discussed and the demand for future research is pointed out.

## **2 Related Work**

The term web 2.0 was coined around the year 2005 and describes new interactive applications on the internet (O'Reilly 2005). However most technological improvements comprised by the term web 2.0 have already been invented years before (O'Reilly 2005, Sester et al. 2006, McAfee 2005). Web 2.0 applications are often associated with "social software". Whereas traditional software focuses on productivity and process support, web 2.0 applications focus on enabling communication, cooperation, and collaboration of individuals and groups over the internet. Social software is based on different services for setting up networks and

supporting the distribution of information within the network (e.g. e-mail, instant messaging, chats, or blogs).

HIPPNER & WILDE (2005) define five characteristics of social software. (1) Social software focuses on individuals or groups. (2) Social software relies on the self organization of the participants. (3) Each individual contributes voluntarily. (4) The actors' roles change from an information consumer to an information provider. (5) The linkage of information is of crucial importance, instead of the information of individuals. Internet forums, wikis, web logs, instant messaging, RSS, pod casts, and social bookmarking are social software tools (O'Reilly 2005; Bächle 2006).

Web 2.0-driven social software comprises a couple of innovative technological approaches, which in particular are key elements of virtual community infrastructures. Virtual communities allow members to share knowledge, experiences, opinions, and ideas with each other. Community members can even be integrated into the value creation process of a firm, e.g. by generating and discussing innovations for products (Lattemann & Robra-Bissantz 2005). Furthermore, virtual communities provide the means for enhancing the quality and efficiency of a customer relationship management (CRM). If customers can be successfully incited to participate in a virtual community, there is a significant chance that they increase the loyalty to the company, its products and services (Lattemann & Stieglitz 2007).

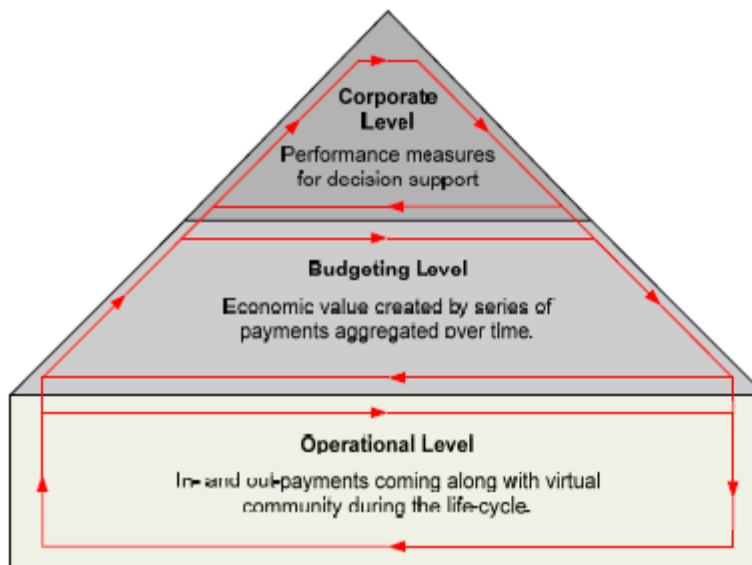
With their seminal work "Net Gain - Expanding Markets through Virtual Communities" HAGEL and ARMSTRONG (1997) developed a framework for the implementation of virtual communities. They proposed four stages for the implementation. The first stage concentrates on attracting community members, the second stage focuses on fostering the members in the community, the third stage reflects loyalty aspects and the fourth stage finally refers to business model issues. Subsequent community engineering approaches encompass five (Leimeister & Krcmar 2006) or six stages (Lattemann & Stieglitz 2007), which refer to environment analysis, design, operation, governance, controlling and evaluation. WENGER et al. (2002) described social communities (communities of practice) from a lifecycle perspective which is characterized by five phases "potential", "coalescing", "maturing", "stewardship", and "transformation". Other attempts reflect business processes and communities (Lechner & Hummel 2002) or business models (Koh & Kim 2004). But none of these approaches refer explicitly to the measurement of the financial performance.

However, in recent studies the emerging field of Value-based Process Management (VBPM) is currently been elaborated. By reasoning in terms of Business-IT-Alignment these studies suggest several approaches for measuring financial implications of information system implementation and operation (Grob & vom Brocke 2005, vom Brocke & Buddendick 2007, vom Brocke 2007). As these approaches have been successfully applied in real life case studies, it seems promising to employ the methodological and empirical findings for measuring the financial performance of virtual communities. Hence, a corresponding framework will be introduced in the following chapter and then is applied in order to develop a financial perspective on virtual communities.

### 3 Introduction of a Measurement System for the Financial Performance of a Virtual Community Platform

The measurement system presented in this paper considers three levels for calculating the economic efficiency of virtual communities: the operational level, the budgeting level, and the corporate level. The operational level provides a basis for the entire evaluation of the financial performance of a virtual community. On this level, payments (out-payments) and receivables (in-payments) brought about by the virtual community design and operation are analyzed and summed up into a series of payments. On the budgeting level, additional parameters are taken into account. These are relevant in order to estimate the economic value created by the respective series of payments. Relevant parameters are derived from specific conditions of funding and taxes that a company has to face. These series of payments are consolidated over time by applying methods of capital budgeting. That way, a survey of financial consequences is created. Finally, on a corporate level, the profitability of the virtual community design and operation has to be judged by means of financial performance measures. Measures like the Total Cost of Ownership (TCO) and the Return on Investment (ROI) help to consider relevant parameters for this purpose (Seitz & Ellison 2004, Shapiro 2004).

The level structure of the framework allows for separation of analysis concerns. Therefore, special interest calculations can be employed in order to analyze how changes on individual levels affect payments or measures on other levels.



**Figure 1:** Framework of the Measurement System

As for the budgeting and corporate level, well-established methods already exist (Grob 1993, Higgins 2006, Peterson & Fabozzi 2002). Hence, the framework is designed in a way so that these methods can be reused and integrated for the purpose of measuring the financial implication of virtual communities. In doing so the challenge is to find relevant in- and out-payments on the operational level. On the operational level different types of payments have to be taken into account. With respect to the specific payments that come along with the set-up of a virtual community platform, monetary consequences for development, operation,

maintenance, adaptation, and disintegration need to be assessed properly. A life cycle perspective (Wynn 2004) helps to identify characteristic in-payments and out-payments accruing during particular stages of a virtual community adoption. Since a life cycle perspective sets a long-term timeframe, the assessment and calculation of relevant payments has to be conducted over a planning horizon spanning multiple successive periods. Possible types of payments for assessment on the operational level are presented in Figure 2. In addition to the listing of relevant payments, their distribution over the planning horizon is highlighted by marking the main emphasis of each payment over the planning horizon.

Estimated Series of Payments for setting up a Virtual Community Platform				
Point in Time	Start	Year 1	...	Year n
<b>Phase of Development (Analysis, Design, Implementation)</b>				
Out-Payments				
- Definition of target group, analysis of preferences of target group				
- Building up know-how				
- Expertise of technical, legal, social, and economic environment				
- For project manager, analysis and preparation activities including project controlling (external part time position)				
- Implementation (in house)				
- For licenses with service providers				
<b>Phase of Operation</b>				
Out-Payments				
- Expertise of technical, legal, social, and economic environment				
- Research and analysis (external part time position)				
- For additional activities of department of public relations of Berlin Stock Exchange (in house)				
- For additional activities of market supervision (in house)				
- For moderation				
- For project manager, operational activities including project controlling (external part time position)				
- Awards and prizes				
- For online-advertisement				
- Technical support (in house)				
- For running licenses				
In-Payments				
+ Savings due to increases customer self service				
+ Advertisement placements				
+ Membership fees				
<b>Phase of Adaptation (Evolution)</b>				
Out-Payments				
- Benchmarking analysis				
- Online survey				
- Project meetings (board, IT, PR) (in house)				
<b>Phase Disintegration</b>				
Out-Payments				
- for migration to another platform				
- for ongoing contracts				
- replacement of technology				
<b>Series of Payments According to Partial Calculation</b>				

Figure 2: Measurement on the operational level

Following a life cycle approach distinct phases can be derived (Wynn 2004). Our research shows that specific types of payments go along with virtual community implementation.

Payments for development typically relate to hard- and software provision, platform implementation efforts, build-up of know-how, administration and initial project

management. In-payments will barely occur in this phase. During operations, costs for the maintenance work on information systems and user support usually apply (Faye, Borthick & Roth 1994). In the context of virtual communities additional payments, which are specific for virtual community operations have to be considered. Out-payments for moderation, online advertisements or service provider hosting a virtual community platform serve as examples. In the course of time adaptations concerning the virtual community's design and the underlying platform need to be carried out. These adaptations might be necessary in order to implement new or modify existing functionalities or to adapt the scope of a virtual community. Examples for drivers of such adaptations are new insights on customer behavior or demand alterations. Finally, it has to be analyzed, what kind of payments can be foreseen in the phase of disintegration. Contractual payments like license fees or penalty costs as well as payments for platform migration can serve as examples.

Once payments are planned on the operational level, calculations are employed on a budgeting and corporate level. Thereby payments are gradually aggregated until the financial performance of the virtual community is indicated by common financial measures (aggregation within the framework of the system is expressed by giving the upper levels the shape of a roof, see Figure 1).

## **4 Application of the measurement system for financial performance of virtual community platforms in the Stock exchange industry**

### **4.1 Introduction**

To demonstrate the applicability of the proposed measurement system, the case of the Berlin stock exchange will be analyzed, since a web 2.0 platform for retail investors was implemented here in a joint project with the Potsdam University. Hence, the authors have deep insights from the project.

The retail exchange industry lacks information from retail customers, e.g. about their needs and wishes for trading mechanisms, which is caused by intermediation of investment banks. As private retail investors have only a link to their investment banks, but not to the stock exchanges and v.v., there is no direct information flow and interaction between retail investors and stock exchanges. This causes a lack of information with respect to customer's preferences and wishes of stock exchange micro structures. Moreover, the industry still lacks adequate trading facilities. To overcome these shortcomings a project was set up by the Berlin stock exchange in order to build up an innovative web 2.0 community platform for CRM purposes.

### **4.2 Community Engineering Process**

The project started in January 2006 with analyzing the business environment. Consequently a web portal was implemented in July 2006. To build up and operate an interactive web 2.0 platform consisting of a discussion board, a weblog, a chat system, and RSS-feeds several aspects which have to be considered prior to the platform launch. LATTEMANN and STIEGLITZ (2007) developed a community engineering model which describes the process of community building and

management. This approach was adopted in the described project. The community engineering approach includes the following six steps: (1) analysis, (2) design, (3) implementation and operation, (4) governance, (5) controlling, and (6) evolution.

*Analysis of Target Group and Environment:* As mentioned above, the focus of the project is lying on the implementation of a platform for a continuous communication between retail investors and the stock exchange. As experiences from other corporate web based communities depict (e.g. Deutsche Postbank AG), CRM platforms should be started with a closed small user group consisting of competent and interested customers. In the first (test-) phase until July 2006, the target group consisted of about 30 exclusively selected retail investors. Only wellinformed and highly-interested investors were invited to join the platform.

Access to daily changing information is of pivotal relevance for the retail investors. Thus, it can be assumed that social aspects such as identity (Haring 2002), values and ideologies (Gabriel & Goldmann 2001, Raymond 1999), and affiliation (Haring 2002, Raymond 1999) are of less importance in these financial communities, since the motivation is strongly influenced by the need for new information updates (Raymond 1999, Shah 2003), the enjoyment and the desire to create and improve (Gabriel & Goldmann 2001) and training, learning and career concerns (Lakhani & von Hippel 2003, Lerner & Tirole 2002, Raymond 1999). This has been considered in the design and functionalities of the platform by introducing appropriate governance mechanisms.

*Design:* One of the major aspects in setting up a virtual community is to choose a specific technology. Following an evaluation of eight different open sources and proprietary programmes it was decided to use widespread software that received the highest score in a ranking according to the requirements of the Berlin stock exchange (costs, functionality, technical support, compatibility to existing technology and know-how etc.). In a later stage, additional software was implemented in order to offer additional services (e.g. chats with experts).

The initial structure of the discussion board was mainly influenced by results from interviews and a workshop with private investors. Prior to the platform launch relevant topics were pre-processed by experts. According to Leimeister and Krcmar (Leimeister & Krcmar 2006) and Markus (Markus 2002), the uploading of high quality content into the empty platform, before the start of the operation, is one of the success factors in realizing network effects. After the launch of the platform the quantity of topics was rapidly growing and content was added by retail investors. However, discussions about the market model of the stock exchange were initiated only slowly.

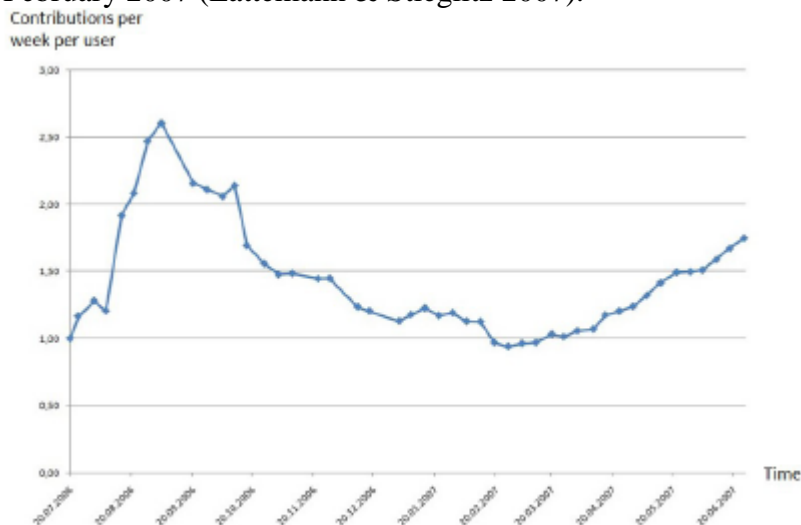
*Implementation and Operation:* It is of crucial importance to know why users participate in social networks and why they contribute information to the community voluntarily. Based on this information, an appropriate incentive system can be designed and implemented. (Lakhani & Wolf 2005, Lattemann & Stieglitz 2006, Lerner & Tirole 2002). As SHAH (2003) depicts, the need for information and fun, as well as reputation reasons within social communities are the dominating motivations as to why people contribute voluntarily. Thus, a governance system referring to these motives was set up. Incentives to increase the willingness for participation were set up and a reputation system focusing on the number of published member contributions was applied.



Because of their traditional independent and objective status, stock exchanges have a high reputation. This promises high quality content, especially with regard to their associated virtual communities. Hence, the assurance of high content quality is one of the dominating factors for success (Sester et al. 2006). Because of the stringent legal framework for exchanges not only the quality but also the accuracy of the content are of primary importance. Quality management is primarily supervised by the group of moderators who remove certain contributions that do not fulfil the rules of the platform (e.g. advertisements and spam).

*Controlling:* The installation and initialization of the platform was organized according to project management techniques. Work packages and milestones were defined. Functional and technical specifications, deliverables, and measurable targets were set up. A set of six key objectives were controlled and monitored (bilateral communication between private investors and the stock exchange, loyalty of private investors to the operator, enhanced knowledge base of target group, image improvement of a stock exchange with high technologic skills and instruments, collection and conversion of ideas for improvements of a market model for retail investors, increase in number of exchange customers and the number of daily trades). These objectives were measured and analysed continuously.

In January 2007 the outcome of the portal was evaluated by a comparison of key figures such as number of registrations, number of members and the impact on the perceived image of the stock exchange. This information was collected from surveys and technical data and was used to get information about improving the market model. E.g. a new segment of “green funds” containing sustainable and social responsible acting companies was offered. Figure 3 shows the number of new contributions that were published every week per user. A systematic and well planned usage of governance instruments as well as positive network effects could be identified as reasons for the increasing activity of community members since February 2007 (Lattemann & Stieglitz 2007).



**Figure 3:** Contributions of community members

To evaluate the overall performance of the web 2.0 project over the extended planning horizon, the measurement system introduced in section 3 was applied.

### 4.3 Measurement on the Operational Level

As suggested in section 3 and section 4.2 a life cycle perspective on virtual community platforms provides an appropriate means for identifying relevant payments on the operational level. With regard to the process of the virtual community set-up and operation (see section 4.2), the relevant payments on the operational level accrue from analysis, design, implementation, governance, controlling, and maintenance efforts. The steps from the community engineering framework and their respective payments can easily be mapped onto a general life cycle scheme, concluding the phases of development, operation, adaptation and disintegration. Hence, payments for analysis, design, and implementation are jointly assigned to the phase of development. As for the controlling step, it is suggested that payments for controlling are considered to occur throughout the whole life cycle of the virtual community and thus have to be considered within all phases.

Estimated Series of Payments 2008 (Virtual Community at Berlin stock exchange)										
Point In Time	2008								2007	2008
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
<b>Phase of Development</b>										
Out-Payments										
- definition of target group, analysis of preferences of target group	400									
- building up know-how expertise of technical, legal, social, and economic environment	3400	3400								
- for project manager, analysis and preparation activities including project controlling (external part time position)	1000	1000								
- implementation (in house)	1400	1400								
- for licenses with service providers	1500	1500								
	550									
<b>Phase of Operation</b>										
Out-Payments										
- expertise of technical, legal, social, and economic environment			200	200	200	200	200	200	2400	1400
- research and analysis (external part time position) for additional activities of department of public relations of Berlin Stock Exchange (in house)			1400	1400	1400	1400	1400	1400	13200	6900
- for additional activities of market supervision (in house)			500	500	500	500	500	500	6000	4800
- for moderation		1760	1760	1760	1760	1760	1760	1760	18720	18720
- for project manager, operational activities including project controlling (external part time position)			1400	1400	1400	1400	1400	1400	10800	9300
- for online-advertisement					1000	1000	1000	500	600	600
- awards and prizes		100		100		100		100	0	0
- technical support (in house)			500	500	1000	1000	500	500	6000	6000
- for running licenses									550	550
<b>Phase of Adaptation (Evolution)</b>										
Out-Payments										
- benchmarking analysis									600	600
- online survey									600	600
- project meetings (board, IT, PR) (in house)									1000	1000
<b>Phase Disintegration</b>										
Out-Payments										
- for migration to another platform										
- for ongoing contracts										
- replacement of technology										
<b>Series of Payments</b>	<b>-8260</b>	<b>-9180</b>	<b>-5410</b>	<b>-8010</b>	<b>-7410</b>	<b>-7610</b>	<b>-8910</b>	<b>-8610</b>	<b>-82270</b>	<b>-62070</b>

**Figure 4:** Detailed series of payments for the virtual community at Berlin stock exchange (in €)

The assessment of the payments on the operational level led to the following initial situation for the described project: The set-up of a virtual community in May 2006 went along with 3,400 € for building up know how, 1,000 € for project management (preparation, resource allocation and kick off) and 1,400 € for eliciting relevant design requirements. Costs incurred by implementing the virtual community platform at the stock exchange amounted to 1,500 €. Since the virtual community platform is hosted by a service provider 550 € has to be paid annually. The software for the platform has an open source license and therefore no costs incurred.

Observations within the first month of operation show that payments for moderation efforts amount to 1,760 € per month. Continuous research analysis and project management make up another large fraction of relevant payments standing at 1,400 € per month. Further payments of 1,000 € per month are caused by online advertisement in the later stages of operation. Relevant in-payments could not be quantified at the time of writing. However, the Berlin Stock Exchange expects savings due to a relief of call centre personnel. The definitive extend of savings is to be calculated in the subsequent stages of the project.

Our findings from the early stages of the virtual community operation suggest that adaptations are not necessary. However, payments for benchmark analysis and project meetings occurred in the later stages. As for the disintegration phase contractual payments are rendered possible though no judgment on this type of payments could yet be given.

The resulting payments from the first year of the virtual community adoption are summed up in Figure 4. In order to allow for a long-term analysis, payments have to be quantified over a planning horizon of more than one year. Therefore, the payments listed in Figure are provided for a planning horizon of three years. As for the year 2007, additional payments could be assessed and partially estimated. Payments for the year 2008 are fully estimated. Since no in-payments could be quantified yet, the resulting series of payments consists of out-payments only. The assessment of relevant payments on the operational level sets the basis for further payment analysis on the budgeting level.

#### **4.4 Measurement on the Budgeting Level**

Financial consequences of the virtual community have been calculated on the budgeting level. The calculation is displayed in Figure 5. It comprises the aggregation of the series of payments and its processing within a VOFI. Since only out-payments are to be considered, the calculation was conducted by means of a Total Costs of Ownership VOFI. The current financial performance of the virtual community adoption is indicated by the terminal value at the planning horizon in  $t=2008$  and can directly be read out of the VOFI spreadsheet. In the present case the terminal value accounts for -93,357 €.

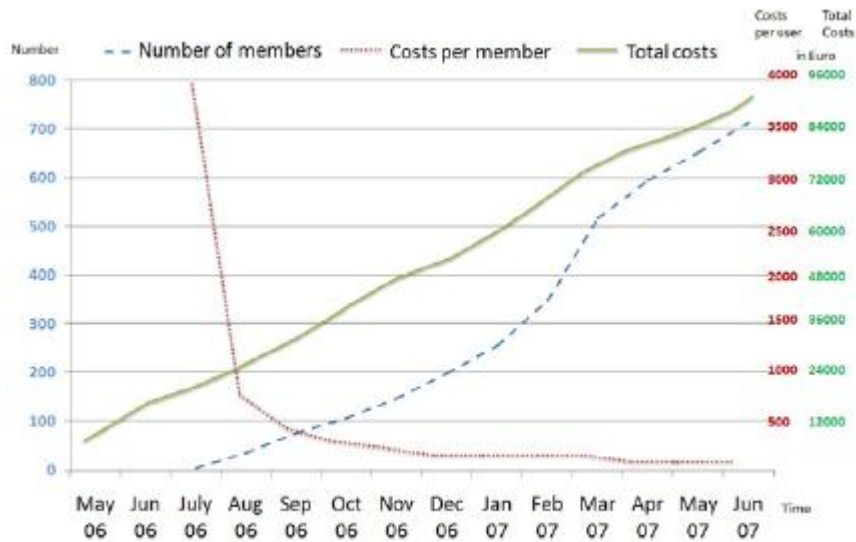
In order to consolidate the series of payments by means of VOFI, a periodic update of the capital stock has to be calculated. Starting in period zero, each period has to be calculated in a way that there is a balance between in- and outpayments. The following example may illustrate the essential procedure. In the first period, usually an out-payment has to be financed. If the internal funds available are insufficient, a loan has to be taken out. As usual, various conditions for loaning can be agreed upon, and also a combination of various loans can be calculated in the VOFI. Correspondingly, multiple forms of funding can be included. As for the calculation above, interest rates for loan in current account and financial investment account for 5 per cent and 3 per cent respectively.

VOFI for Virtual Community-Platform					
Point in time	Start	2006	2007	2008	Sum
Series of Out-Payments	8.250	48.920	62.270	52.070	171.510
<b>Internal Funds</b>					
- Withdrawals	10.000				
+ Equity Capital Cost				1.576	1.576
+ Deposits					
<b>Financial Investment</b>					
+ Reinvestment	1.750				
- Disinvestment		1.750			
- Debtor Interest		53			53
<b>Loan in Current Account</b>					
- Credit Intake		22.684	31.702	28.971	
+ Redemption					
+ Creditor Interest			1.134	2.719	3.853
<b>Tax In-Payments</b>		24.434	31.702	27.395	83.530
<b>Accounting Balance</b>	0	0	0	0	
<b>Capital Stock</b>					
Balance on Financial Investment	1.750	0	0	0	
Equity Capital Employed	10.000	10.000	10.000	10.000	
Balance					
on bullet loan	0	0	0	0	
on current account	0	22.684	54.386	83.357	
<b>Net Balance</b>	-8.250	-32.684	-64.386	-93.357	

**Figure 5:** Aggregation of the series of payments within a modified VOFI

In each period, the periodical in- and out-payments have to be balanced. As a check-up, the net funding value, which is defined as the accounting balance of all in- and out-payments, should be zero. On the basis of these flow figures, the capital stock can be updated periodically. The accounting balance of loans and funds finally results in the net balance of the total investment. Within the spreadsheet, the value of an investment in a virtual community can be monitored for each period during the life-cycle simply by observing the net balance in each relevant period.

As Figure 5 show annual expenses to operate the web 2.0 platform are stable at approximately 32.000 Euro per year. Hence, the majority of the costs are fixed costs. Therefore, benefits generated by the project can be measured by additional variables. One important indicator to determine success of the project is the number of members which were observed continuously over the life cycle of the project. Within the analyzed time frame the number of members increased up to about 800. Therefore the cost per user decreased in the observed period of time (see Figure 6).



**Figure 6:** Total costs, number of members, costs per members

This analysis indicates that virtual communities are generating low benefits and high costs in their initial stages. One reason for this is, as earlier studies show, that a critical mass of users and contribution has to be reached to accelerate the growth of the community. Adequate and effective governance instruments aid to the increase in the number of users and contributions and therefore decrease the cost per member.

Figure 6 shows that the costs per community member are decreasing over time because most of the costs are fixed costs. Hence it can be expected that the amount of coverage per member is increasing with an increasing number of community members. The costs per member tend to be zero. However, two issues have to be considered: members are not always 'active' members hence, only active members have to be taken into account in such an analysis. Additionally, it can be assumed that there are step costs over time occurring as the number of community members increases. These costs are for example costs for additional employees to monitor the system, or new hardware or software. Again, this calls for a dynamic analysis spanning multiple periods, as suggested by the proposed measurement system.

#### 4.5 Measurement on the Corporate Level

On the basis of the detailed assessment on both the budgeting and operational levels, performance measures can be calculated in order to allow for an economic evaluation of the virtual community initiative. Since the project is still in an early stage, only out-payments can be quantified. It is therefore sensible to reason on TCO. The VOFI presented in section 4.4 allows for an easy calculation of TCO. The corresponding TCO-analysis for the virtual community adoption is given in Figure 7.

Total Profit of Ownership	
Total surplus of Payments for the Virtual Community-Platform	-171.510
+ Irregular Revenue	53
- Deprecation	0
= Total Monetary Profit (prior Interest and further Investments)	-171.458
- Interest Expense	3.853
= Monetary Profit II (prior Taxes on Profit)	-175.311
+ Taxes on Profit	83.530
= Monetary Profit III (after Taxes on Profit)	-91.780
- Imputed Interest	1.578
= Total Imputed Profit	-93.357
<b>Total Costs of Ownership</b>	<b>93.357</b>

**Figure 7: Calculation of the Total Costs of Ownership**

As is the case with this project no in-payments can be imputed in the virtual community. In the computation presented above the current Total Imputed Profit of the project is calculated. According to expectations, the calculation yields a loss. However, the negative profit corresponds to the TCO. For reporting the TCO, the value should consequently be transformed into a positive value.

The TCO indicates the actual financial performance of the virtual community platform. However, as no in-payments are quantified yet, the profitability of the platform cannot be revealed by only taking into account the TCO. As in-payments (cost savings) are expected in the future due to reduced complaints and a corresponding call centre relief, a re-calculation in later stages of the project as described might be more expressive. Since virtual communities, that are built up and operated to support CRM activities, do not generate direct profits (as in the present case), non-financial aspects should be considered, too. If financial measures like TCO and subjective qualitative assessments of the economic benefits are put into relation, each decision maker could balance an individual ratio. That way, monetary as well as non-monetary consequences can be considered and judged according to individual preferences of the person in charge of the decision on virtual community adoption. However, calculating the TCO on a regular basis throughout the life cycle of the community platform might contribute to a virtual community controlled by means of financial measures.

## 5 Conclusion and Outlook

Given the economic potential of social software and web 2.0 technologies to enhance a company's value adding activities, the challenge of evaluating the financial performance of respective technology adoptions arises. In particular, different types of payments specific to a virtual community adoption have to be considered appropriately. However, no framework for evaluating the economic efficiency of virtual community platforms has been established yet.

Aiming at a measurement system for assessing the financial performance of a virtual community platform, findings on the financial evaluations on the operational, budgeting and corporate level were presented in this paper. Due to the long-term economic consequences of virtual community projects, means of capital budgeting have to be employed in order to assess the economic consequences properly. From a methodological perspective the findings were summarized in a general framework and then applied by means of a real life example at the Berlin stock exchange.

Since in-payments chargeable to the adoption can hardly be quantified at this stage of the presented project, the profitability is analyzed in terms of Total Costs of Ownership (TCO). However analysis shows that the costs per user ratio is continuously decreasing over time. The first results basically proved the applicability of the measurement system. As the economic success of the implementation of a virtual community has to be proved throughout its life-cycle, the measurement system already constitutes a good tool for controlling and management of a virtual community. As non-monetary consequences of a virtual community adoption may also be analyzed, future research needs to concentrate on the enlargement of the system from various perspectives. Results based on a single case study are limited therefore additional research is needed. The system presented in this paper may provide a basis for further research on this particular field of virtual community management.

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