Governance of web 2.0 platforms in the stock exchanges industry

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Abstract: Existing structures on financial stock markets circumvent a direct
Customer Relationship Management (CRM), particularly the communication
between exchange operators and retail investors, as banks are the legally
enthroned intermediary. As a result, exchange operators have only limited
information about preferences of retail investors. Web 2.0 applications offer
opportunities to bridge this lack. To motivate retail investors to use the
implemented web 2.0 applications governance mechanisms must be in place.
This contribution describes such a web 2.0 concept and their realisation in
practice. First insights about customer acceptance and adoption of such a
concept are empirically analysed.

Keywords: social software; CRM; stock exchange; motivation.

Reference to this paper should be made as follows: Stieglitz, S. and

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1 Introduction

The last decade was faced by a fast evolution of innovative internet applications. One of the most visible changes is the emergence of the so-called ‘web 2.0’ platforms. This term comprises a couple of innovative technological approaches such as Ajax or RSS. These technologies are key elements for the infrastructures of virtual communities or social software, respectively. Several types of social software can be identified such as discussion forums, Wikis, social networks, or blogs, which allow internet users to generate content without a deep knowledge about internet technologies and description languages such as HTML, PHP, or CSS (Bächle, 2006; O’Reilly, 2005).

Virtual communities allow participants to share knowledge, experiences, opinions, and ideas among each other. Establishing and operating a virtual community ensures a wide influence on rules, content, and data. Community members could even be integrated into the value-added process of a firm, e.g., by generating and discussing innovations of products (Lattemann and Robra-Bissantz, 2005).

The opportunities in collaboration between consumers and firms provided by virtual communities enhance the quality and efficiency of Customer Relationship Management (CRM). Customers become more committed and more loyal to the company and their products and services (Lattemann and Stieglitz, 2007).

Therefore, building up and operating a virtual community can provide several positive effects for firms. Earlier studies show that the successful implementation of a virtual community requires a systematic community-engineering approach (Leimeister and Krcmar, 2006). Based on this concept, Lattemann and Stieglitz (2007) show the importance of a well-structured community governance in the community engineering. Community members who work, in general, on voluntary basis have to be motivated to contribute regularly and useful content. Complex and complementary governance tools have to be used to set adequate incentives and therefore increase member’s activities.

This contribution describes the deployment of web 2.0 technologies in the industry of retail stock trading in particular. The retail exchange industry shows a lack of information sharing between the retail investors and the stock exchanges in particular, because of the intermediation of investment banks. As private retail investors have only a direct link to their investment banks and not to the stock exchanges, there is no direct information flow and interaction between retail investors and stock exchanges. Retail exchanges often do not even know their end customers. This causes a lack of information with respect to customer’s preferences and wishes of stock exchange micro-structures. The consequence is a poor CRM and suboptimal market models for retail investors. The industry still lacks adequate trading facilities. To overcome these shortcomings, a joint project was set up by the Berlin Stock Exchange and the Potsdam University, Chair for Corporate Governance and e-Commerce, to build up an innovative web 2.0 community platform for CRM purposes and to increase information transparency.

Although there is a lot of research in the sector of community building, the case of appliance of web 2.0 technologies in the stock exchange sector shows some pivotal peculiarities in comparison with other industries (Lattemann and Stieglitz, 2006; Leimeister and Krcmar, 2006; Markus, 2002). Hence, it is not appropriate to copy web 2.0 community concepts from other industries and overtake them in the stock exchange sector. Stock exchange industry is subject to specific conditions: First, stock exchanges are strongly limited in publishing certain information owing to European and local stock exchange laws. This aspect hampers the implementation of an open
non-restricted communication platform such as Wikipedia or other communities, which is per se one of the premises for non-constrained efficient CRM. Second, stock exchanges are strongly interested in keeping a serious, objective, and independent image owing to their self-regulatory status. With respect to the implementation of web 2.0 platforms, this issue can be solved by implementing specific social mechanisms for governing the community such as the introduction of moderators, peer-review processes, or recommender and quality management systems (Lattemann and Stieglitz, 2006). These instruments have two advantages, information can be validated by the community members themselves as well as from the exchange, and information cannot be manipulated substantially by any particular interest group.

In the following section, specific particularities of the financial industry will be described from a practical and theoretical perspective. Further on, phases of a ‘community engineering’ process will be outlined by referring to the model of Leimeister and Krcmar (2006).

Section 3 gives an overview over the understanding of web 2.0 technologies while Section 4 focuses on research in the field of community governance. The methodology and the research results derived from a case study in the financial industry will be presented in Section 5. The paper ends with a summary and an outlook in the last section.

2 Financial stock markets

Today’s stock exchanges are faced by a fierce competition. The worldwide biggest exchanges are merging, the New York Stock Exchange bought Euronext just recently in 2007, Scandinavian and Baltic Exchanges merged to the OMX markets. The CME acquired the CBoT. The Dubai Exchange announced to buy OMX markets and to collaborate with the NYSE. Furthermore, off-exchange trading platforms such as Electronic Trading Networks (ECN) and Multilateral Trading Facilities (MTFs) harm the position of traditional stock exchanges. The winners of this consolidation process are the world-wide largest and fast acting stock exchanges. Hence, in particular small local retail stock exchanges have to invent and implement new market models to sustain the competition and to attract their trading facilities to investors and to meet new legal standards such as the “European Markets in Financial Instruments Directive–MiFiD” (Gomber et al., 2007). As a consequence, recently retail exchanges have offered more and more retail market oriented elements in their market models, e.g., best execution functionalities (Budimir et al., 2001), ensure best prices or open up new market segments (e.g., for warrant of funds trading). However, the initiatives to implement new trading functionalities, market segments or trading veins are not a result of a well-based customer analysis but rather more from stock exchange internal considerations about retail investor needs. This contribution will show that web 2.0 technologies help to integrate retail investors into the process of market modelling actively and to overcome the limitations in the market modelling process.
3 Web 2.0 and social software

The term web 2.0 describes new interactive applications on the internet. However, the change from web 1.0 to web 2.0 was not a revolutionary step, rather an incremental process on the internet. O’Reilly (2005) characterised the web 2.0 with six trends:

- **Programmes become platforms.** Formerly monolithic and static software programmes turned more and more to platforms, which change constantly and which are characterised by a high embeddedness in an open network. Hence, software code is not the key any more, related services are of increasing importance.

- **The wisdom of crowds.** The integration of many individuals over networks allows the activation and utilisation of knowledge resources. Not the intelligence of single individuals are decisive, but the intelligence of all integrated actors. The wisdom of crowds is based on the fact that groups meet more efficient and cleverer decisions than individuals in most cases (Surowiecki, 2005).

- **Data inside.** Business intelligence systems offer new opportunities for data storage and data mining. Such new techniques can be used to implement new services for customers as well as totally new business models.

- **Customer integration/user-based content.** The customer turns from a buyer to a co-developer of new products and services owing to the new collaboration functionalities of social software platforms.

- **Ubiquity.** Users have access to applications from different platforms and IT systems (e.g., mobile phones, MP3player, navigation systems or handhelds).

- **Dynamic, browser-independent contents.** New technologies (e.g., AJAX–Asynchronous JavaScript + XML) enable to run dynamic contents on different devices and browsers.

Web 2.0 applications are often associated with ‘social software’. Social software differs from traditional software and comprises a couple of technologies and trends that could be identified within the last years in the internet. Traditional software focuses on productivity and process support, whereas web 2.0 applications focus on the linking of individuals and groups. Social software is based on different services, which create networks and which supports the distribution of information within the network (for example, e-mail, instant messaging, SMS, or groupware solutions such as video conferencing or blogs).

Hippner and Wilde (2005) define five characteristics of social software.

- the focus lies on individuals or groups
- social software relies on self-organisation of the participants
- each individual contributes voluntarily
- the role of actors changes from an information consumer to an information provider
- the linkage of information is of crucial importance, not the information of individuals.
Following O’Reilly, internet forums, Wikis, web logs, instant messaging, RSS, pod casts and social bookmarking are tools of social software (O’Reilly, 2005; Bächle, 2006).

Each type is characterised by specific collaboration mechanisms. While internet forum software allows members to carry on discussions in threads, Wiki systems are optimised to collect, link, and administrate knowledge. Content in blogs is usually generated by one author similar to an online diary. Nevertheless, blogs can be used as a technical infrastructure for virtual communities as well. As a next step, three-dimensional virtual worlds such as Second Life gain importance, and can be understood as special forms of social software (Lang et al., 2008). To sum up, social software, in general, describes computer programmes that enable users to interact, share knowledge, and discuss specific topics via internet.

Research shows that members of virtual communities are usually driven by a complex portfolio of intrinsic and extrinsic motivation. This includes fun in creating content or following specific values (Shah, 2003) as well as extrinsic aspects such as gaining reputation in the community or signalling knowledge to companies to increase career chances (Lerner and Tirole, 2002). A governance system, therefore, has to consider all important drivers to increase voluntary contribution of community members.

However, motivation and social linking between members is strongly influenced by the purpose of the community. Markus (2002) classified three different types of virtual communities. Members of communities, which are focused on social aspects, meet for reasons of entertainment (e.g., playing games) or to build up or hold relationships. Next to this, there are communities focusing on professional aspects and deal with specific content that is generated, edited or discussed by experts or interested individuals. As a third type, Markus identifies communities that are focused on business-related topics such as financial transactions, procurement or discussions about specific brands.

In recent years, an increasing number of virtual communities has been found by companies or NGOs with specific purpose. One reason for setting up a virtual community is to improve their own CRM activities. A continuous participation of members can result in an increasing customer loyalty and allows to learn more about preferences and opinions of customers (Lattemann and Stieglitz, 2007). Furthermore, ideas that are generated by the community can be analysed and converted into the company’s value-added process.

4 Governance instruments for virtual communities in stock markets

4.1 Community engineering for the Berlin stock exchange

Governance of virtual communities is complex not only because of changing motives of community members but also because of different phases of development.

Following Wenger (1998), communities of practice are characterised by different lifecycle stages of community development such as

- potential
- coalescing
- maturing
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- stewardship
- transformation.

Each stage shows specific problems and therefore changing demands for a community governance. To implement a virtual community at Berlin Stock Exchange, the community-engineering model from Leimeister and Krcmar was adapted. This model is characterised by five stages:

- analysis
- design
- implementation and operation
- controlling
- evolution.

However, instruments for governing participants in the community are hardly considered. Hence, a sixth stage (governance mechanisms) was introduced into this framework by the authors.

The phase of analysis comprises several elements such as the definition of a target group and an analysis of the legal, economic, and social environment. Regarding the case study of the Berlin Stock Exchange, the target group was private retail investors. A performed market research depicted that many retail banks already operate in virtual retail communities and that a large variety of internet stock investment platforms exist (among others www.wallstreet-online.de; www.tradesignal.com; www.aktienboard.com, www.finance.yahoo.com). However, all these platforms aim at sharing market information for stocks and prices among traders. Joint discussions and forums among retail investors and exchanges about market modelling do not exist. Furthermore, group discussions showed that the reputation and of the brand ‘Berlin Stock Exchange’ increased the willingness to become a member of the community. Therefore, these aspects generate advantages and create a unique position to attract participants.

The design stage reflects the usability and sociability of the system and structure. To guarantee the awareness and the relation between the web 2.0 platform and the stock exchange, the corporate design (including colour, logo etc.) was also used for the platform. Furthermore, to conform to the tight EU and German exchange regulations, rules of conduct and policies about the postings of content in the virtual community were disclosed to the community members. To build up trust and to achieve a broad basis of acceptance, these rules were intensively discussed with and between the community members.

In the next step, the social software was implemented, operated and maintained. The specifications for an adequate concept of rights and roles as well as an efficient set of community governance instruments are essential for this stage. Hence, all registered members were assigned to one of the following groups:

- Administrators who cared about the technical infrastructure.
- Moderators who started discussions and answered questions.
Members who participate in discussions and were able to access all sections such as experts content.

Guests who could read most of the content but were not enabled to enter contributions. Only registered guests became members.

The platform was promoted on the website of the stock exchange, in newspapers, and in the internet (e.g., focus-online.de, freenet.de, boersenreport.de) to increase the awareness.

A most crucial part was to implement a governance system (governance stage), which refers adequately to specific motives of the target group (retail investors). Incentives to increase the willingness to participate were put into action, and a reputation system, which focuses on the number of published contributions by members, was applied. Members were ranked according to their number of contributions. Content provision was restricted and unrestricted, access to certain information and data were provided to certain (power) users.

However, the assurance of high quality within the posted content on the community platform is one of the dominating success factors. Because of the stringent legal framework for exchanges, not only the quality but also the accuracy of the content is of primary importance.

Sester et al. (2006) showed that user’s motivation to contribute to a virtual social network decreases when the average quality of the contents is low. Furthermore, content of bad quality may fall back to the operator and damage his or her image. Quality management is primarily driven by the group of moderators who remove certain contributions that do not fulfil the rules of the platform (e.g., advertisements and spam).

The controlling stage comprises the controlling and measuring of key figures such as the traffic of bilateral communication between private investors and the stock exchange, increasing loyalty of private investors to the operator, enhance knowledge base of target group, improving the image of a stock exchange with high-technologic skills and instruments, collecting and converting ideas for improvements of a market model for retail investors, increasing number of exchange customers and the number of daily trades.

The evolution stage is based on the results of the evaluation and controlling, leading to decisions either to start another community cycle or to terminate the community and stop the project.

4.2 Instruments of community governance

Several motives to participate in virtual communities can be derived from literature. Following Shah et al. (2003), main motives for becoming an active member in a virtual community such as knowledge communities or open source projects are

- need for the product
- enjoying
- affiliation
- values and ideology
- gaining reputation inside and outside of the community.
These motives can be addressed by three fundamental spheres: cooperation, hierarchy, and competition. Following Brand and Schmid (2005), cooperation is a crucial aspect for the success of virtual communities. The ability and willingness to cooperate can be partly controlled by a community operator. Beneath functionalities that are provided by the technical infrastructure, an adequate modularisation of content regarding the needs of the target group is essential.

A formal hierarchy of rights and roles can be implemented by a community coordinator too. Giving specific members certain well-defined rights increases their motivation and can be essential to assure the quality of the content. Regarding the project of implementing a CRM-related virtual community at Berlin Stock Exchange, four different groups of rights and roles were defined as mentioned in the last section (administrators, moderators, members, guests). Each group was provided with different (technical) rights such as enter contributions, read content, administrate content, and open or close sub-forums.

Brand and Schmid (2005) identified a third sphere of governance that is adequate to voluntarily contributing members: competition. There are several ways to set incentives that address this aspect such as publishing a list of the most active users or awarding the best contributions. In the case of the Berlin Stock Exchange, a reputation system was implemented. By measuring the number of contributions of members, specific symbols were ‘earned’ to honour the most active participants.

4.3 Motives of retail investors

The target group of retail investors and the topic of financial investments show several specific characteristics. Research shows that social linking in a virtual community is strongly influenced by the underlying topic (Markus, 2002). Discussions on emotional topics in socially oriented communities such as health topics lead to intensive relations between members (Leimeister and Krcmar, 2006). Contrary to this, the topic of financial investments, which is more often driven by a professional setting (Markus, 2002), changes daily; therefore, long and deep discussions rarely arise, emotional binding can hardly be found. Normally, retail investors who are active in financial online communities are focussing on useful information rather than to discuss or share information. These characteristics had to be considered by creating a portfolio of governance instruments.

5 Analysis of community members

5.1 Methodology and data collection

An explorative approach was used to gain information about the successfullness of different governance instruments in a web 2.0 stock exchange community.

To analyse the effectiveness of different governance instruments, they were implemented step by step to observe the effects after implementation. The first steering instrument was the implementation of an initial content structure that addresses the sphere of cooperation. Second, after several weeks, a team of moderators were set up. They generated content and answered upcoming questions. As the introduction of moderators went along with a more sophisticated right and role management,
this instrument can be dedicated to the hierarchy sphere. Third, a reputation system was implemented to set up a competitive environment for members.

The effectiveness of the different governance instruments was measured by the degree of increase in the number of contributions. However, as Schoberth et al. (2002) depict, the postings in financial communities are highly influenced by external variables such as the volatility and level of prices on the stock market. In this respect, the observation period is influenced by a strongly increasing stock market. This may bias the research results.

An online survey was employed to receive data about skills and preferences of community members, social demographic data from the users, usage patterns, their perception about the ease and usefulness of the platform, and their perception about the implemented governance mechanisms. 697 community members of the stock exchange participated in the survey.

Key figures such as number of contribution were monitored continuously over the time of the project from July 2006 to July 2007 by a build-in tracking system.

5.2 Data analysis

The analyses show that the number of registrations and the number of contributions are accelerating over time. The number of registrations as well as the number of contributions increased strongly since October 2006 (Figures 1 and 2). It can be assumed that network effects were in place after this time.

While the number of new members was characterised by a stable growth, the number of contributions increased continuously. New members were primarily interested in events such as biweekly chats with experts.

The provision of structured and modularised content started in the second week of the project after launching the web 2.0 platform. Moderators were implemented one week later. A reputation system was implemented after three months of operation. Each step resulted by an increasing amount of contributions and new registered members (Figures 1 and 2). It can be assumed that the implementation of moderators is an appropriate tool to increase and accelerate contributions by community members that were operated by stock exchanges.

However, the implementation of a reputation system did not affect as expected. Only a few new members were attracted to the platform, some more contributions were posted. Probably, the lack of social involvements and social linkage between community members (which is a outflow of the more rational topic of finance) leads to a relatively small effect in comparison with other more socialising communities with more emotional topics (Markus, 2002).

In early 2007, free non-moderated, uncensored discussions about single stocks were allowed. Interestingly, this led to more participants but not to more postings (Figures 1 and 2). In May 2007, privileged access to certain market data and resources were granted to power users, and rating systems were introduced. This led to an increased number of contributions but naturally not to an increased number of members because the last two governance instruments were dedicated to already existing members with an average or high activity level.
Governance instruments, which are addressing active users or at least moderately active users, seem to be effective to increase the numbers of contributions. Changes in the governance structure, which are affecting the whole character of the community (allowance of uncensored content), lead to more members but not necessarily to more contributions.

Furthermore, questions exhibit user profiles. The average age of active users was 38.5 years while passive members were 51.6 years in average. 75% of all members were male.

The data of the online survey allowed the clustering of the community members into three groups of community members, the power users, the contributors, and the lurkers.
The group of the so-called ‘power users’ contribute 73% of the content to the community, but encompasses only 3.6% or 25 of all members. The so-called ‘contributors’ delivered 27% of all contributions with 157 members (22.5%). The majority of 73.9% or 515 individuals are participants who did not contribute at all (Table 1).

To provide helpful and useful content to the community, the members need to have a certain level of knowledge about stock market behaviour and stock trading as well as in using online communities. Hence, participants were asked to assess their own skills about stock trading and usage of web 2.0 platforms (Tables 2 and 3).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Degree of activity of community members</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>Power user</td>
<td>25</td>
</tr>
<tr>
<td>Contributors</td>
<td>157</td>
</tr>
<tr>
<td>Lurker</td>
<td>515</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Knowledge in trading financial instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you describe your knowledge in trading financial instruments?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Active members (%)</td>
</tr>
<tr>
<td>Superior</td>
<td>50.00</td>
</tr>
<tr>
<td>Average</td>
<td>31.25</td>
</tr>
<tr>
<td>Weak</td>
<td>18.75</td>
</tr>
<tr>
<td>No answer</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Table 3</th>
<th>Knowledge in using internet applications</th>
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<tbody>
<tr>
<td>How do you describe your knowledge in using internet applications such as discussion forums?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Active members (%)</td>
</tr>
<tr>
<td>Superior</td>
<td>50.00</td>
</tr>
<tr>
<td>Average</td>
<td>50.00</td>
</tr>
<tr>
<td>Weak</td>
<td>0.00</td>
</tr>
<tr>
<td>No answer</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Most of the active users as well as the passive users categorise their own knowledge in trading financial instruments and using discussion forums as average or superior. These results lead to the conclusion that the users must not only be interested in the topic but also have to be at least weakly informed about the discussed topics and about the used web 2.0 platform.

All members of the virtual community were asked to participate in an online survey regarding motivational aspects and incentives for contributing to the community.

It was assumed that increasing reputation inside and outside the community is one of the main motives for users to participate in a financial community, which is driven by the Berlin Stock Exchange. Surprisingly, only 25% of the entire community recognised the implemented reputation system. However, the majority of those who recognised it were not interested in a higher rank within the community (Table 4).
Table 4  Recognition of a reputation system

<table>
<thead>
<tr>
<th>Answer</th>
<th>Active members (%)</th>
<th>Passive members (%)</th>
<th>Entire community (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>25.00</td>
<td>26.92</td>
<td>26.19</td>
</tr>
<tr>
<td>No</td>
<td>62.50</td>
<td>42.31</td>
<td>50.00</td>
</tr>
<tr>
<td>No answer</td>
<td>12.50</td>
<td>30.77</td>
<td>23.81</td>
</tr>
</tbody>
</table>

Activities of moderators were recognised by the majority of active community members. Contrary to this, approximately half (46.15%) of the passive members did not recognise activities of moderators (Table 5).

Table 5  Recognition of moderators

<table>
<thead>
<tr>
<th>Answer</th>
<th>Active members (%)</th>
<th>Passive members (%)</th>
<th>Entire community (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>87.50</td>
<td>34.62</td>
<td>54.76</td>
</tr>
<tr>
<td>No</td>
<td>6.25</td>
<td>46.15</td>
<td>30.95</td>
</tr>
<tr>
<td>No answer</td>
<td>6.25</td>
<td>19.23</td>
<td>14.29</td>
</tr>
</tbody>
</table>

Activities of moderators are crucial for the success of the community. Content that was generated by the team of moderators accelerated network effects and therefore increased the number of contributions that was provided by community members. Furthermore, moderators assure that content that is generated by members keep a certain degree of quality.

6 Conclusion and future work

This web 2.0 research project outlines that an appliance of innovative internet technologies can help to establish a direct link between private investors and stock exchanges and to receive appropriate customer data for the development of a trading facility, which reflects customers’ needs. The successful implementation of a virtual community depends strongly on the way and process of community engineering and management and the implementation of appropriate governance mechanisms, which support the willingness of private investors to post voluntarily and to act actively as a member in the virtual community. However, it has to be recognised that governance mechanisms have different effects in different communities, such as in the health or financial industry. However, even if only a small percentage of the community members recognised the changing governance structures, the arrangement of governance instruments seems to have certain different effects. Governance instruments, which are addressing active users or at least moderately active users, seem to be effective to increase the numbers of contributions. Governance instruments, respectively changes in the governance structures, which are affecting the whole character of the community, lead to more members but not necessarily to more contributions.
Building up a virtual community is a long-term project. To be successful, a critical mass of users and contributions must be attracted to achieve network effects. The enhancement of the system must be aligned with the life cycle and project stages of the platform as well as with the motives of the members and the topic. Therefore, it is important to continuously identify the environment of a virtual community. External developments and market trends, however, may have a strong influence on the number of members and the degree of activity as Schoberth et al. (2003) showed.

Acknowledgement

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