A line of industry fights for survival – systemic strategy development and implementation using the example of a lead brokerage financial service provider

Paul FLACHSKAMPF, Klaus HENNING

Institute for Management Cybernetics (IfU) at RWTH Aachen University
Dennewartstr. 27, 52068 Aachen, Germany
Telephone: +49 241 80911 70
E-Mail: paul.flachskampf@ifu.rwth-aachen.de

ABSTRACT

This paper examines systemic strategy development using the example of a lead brokerage financial service provider. To do so, different elements of several systemic and cybernetic induced theories are combined to a three step approach: 1) system diagnosis to derive redesign actions, 2) identification of critical system variables, 3) creation of a modular software prototype with the help of a control loop model. This approach is induced by action research building on an interactive inquiry process that balances problem solving and actions implemented in a collaborative context. Data-driven collaborative analysis is implemented to better understand underlying causes and to enable future predictions about organisations and processes. The results of the approach application seem promising in two ways: 1) a real benefit for the lead brokerage financial service provider was generated by the operationalisation of its strategies, 2) the approach itself shows potential to be of general applicability to successfully support business processes with IT.

1. INTRODUCTION

Initially, stock exchanges had a fixed function. Selected market participants met at fixed times in fixed locations to trade standardised financial stocks in accordance with firm rules (Gerke 2005, 216-230). But the last ten years have been a decade of radical change and upheaval for the organised capital markets, sparked by vastly improved communications technologies (Schmidt and Gramlich 2004).

In the past, the task of the lead brokerage financial service provider (LB-FSP) was to undertake the role of intermediary between buyers and sellers of (financial) stocks. For this purpose, the LB-FSP now administers an order book in which all buying and selling orders for a specific stock are noted. Based on the value of an order in the book and the existence of a reference market, the LB-FSP establishes the buying (asking) and selling (bidding) prices for stocks and the corresponding quantity (volume), and displays this information to the market. This specification of bidding and asking prices with a corresponding volume of stocks will be referred to as a quote.

Vastly improved communications technologies, the management of organised capital markets, the regulation and the handling of finance transactions (Baum 2004, 677-704), as well as an increase in the automation of finance transactions, have all led to a change in the role of the LB-FSP. As procedures in finance intermediation are essentially remaining constant, the LB-FSPs now no longer act as mere facilitators of trade between buyers and sellers, but now also act as buyers and sellers themselves. In this way they

provide additional liquidity to the market. At the same time, concerning buying and selling orders, this ensures fast order execution, so that trade does not only come about after an agreement is made. The LB-FSP carries out the order as soon as it is within the quote that he displayed to the market. The LB-FSP role altered from pure facilitator to a so-called market maker. For performing these functions, the LB-FSB generates revenue through various order-flow or transaction-fee schemes. In addition to that, they generate profit with the received inventory of stock, which can be traded as seen fit (Cataldo et al. 2003, 10-13).

As a result of November 2007 change in the EU policy "Markets in Financial Instruments directive" (MiFID), established stock exchanges like e.g. Frankfurt or London turned out to be under increasing pressure from new off market trading platforms such as Chi-X, Turquoise and Equiduct (FAZ 2008, 23). Due to sinking costs for the buying and selling of stocks, first reactions to the new competition are already noticeable. Established stock exchanges are losing more and more turnover, as investors conduct their orders with automated, electronic trade or start using new off-market trade platforms. Considering that order volume in the established stock markets is drastically sinking, there is an important medium-term question for the LB-FSPs: that of the ability and survivability of the markets' current business models in the future.

Modern stock markets conform most closely to the theoretical model of the perfect market (Wurm et al. 2007). In reality, it is apparent that this theoretical model stands in stark contrast to many prominent real-world examples a recent one being the speculation by the Société Générale (The Economist 2008). Despite technological advances, it is evidently no longer possible to control the amount of complexity for market participants. In this kind of situation, the technologies employed until recently have not allowed the LB-FSP to react to fluctuation of the market through subtle regulation of the quote. In addition to that, current technologies do not allow for market movement consideration or the incorporation of gut feeling of the LB-FSPs, which is still a very important factor for the actual placement of quotes.

Since the placement of quotes is clearly the only possibility for the LB-FSP to appear visible in the market, this plays a key role in the search for suitable strategies for the actual quoting process. On the one hand, this must proceed mainly on an automatic level, in accordance with the new requirements. On the other hand however, it should also offer the manual input possibility to allow incorporation of gut feeling. That way, when correcting variables, situations can be influenced. This aspect is important in order to be able to react suitably to the ever-changing demands of a market that continues to increase in complexity. This article is thus concerned with answering the following questions:

1.) From a systemic perspective, which strategies can contribute to ensuring the survival of the LB-FSP?

2.) What is the necessary approach when introducing strategies tailored to fit the specific requirements of the LB-FSPs?

3.) With regard to the developed strategies, how can an automated quote be created, which if required is also open to the influence of manually implemented actuating variables?

After a short description of the methodology and the approach implemented, a system for the development and implementation of strategy, as well as the resulting solution approaches for an automatic quotation, will be exemplarily described. If required, this

will remain open to influence from actuating variables. An example will be given in the form of a LB-FSP. Lastly, a critical evaluation will be made.

2. METHODOLOGY AND APPROACH DESCRIPTION

The approach for systemic strategy development and implementation combines different elements of several theories. It is induced by action research building on an interactive inquiry process that balances problem solving and actions implemented in a collaborative context. Data-driven collaborative analysis is implemented to better understand underlying causes and to enable future predictions about organisations and processes (Reason and Bradbury 2001). In a first step the OSTO System Model was used to diagnose the company and to derive redesign actions. In a second step, relevant system variables were obtained by conducting thirteen in-depth interviews with lead brokers. The cybernetic relationships between those variables were analysed with the Sensitivity Model of Vester (Vester 1980). Based on the results of the sensitivity analysis, a modular software prototype was developed in a third step for simulations and testing of the effects on the quoting process. See Figure 1 for a summary of the methodology and approach chosen.

Paragraph 3 and 4 will explain how the different steps of the approach are interlinked and why in the specific case at hand the particular method or theory was applied.

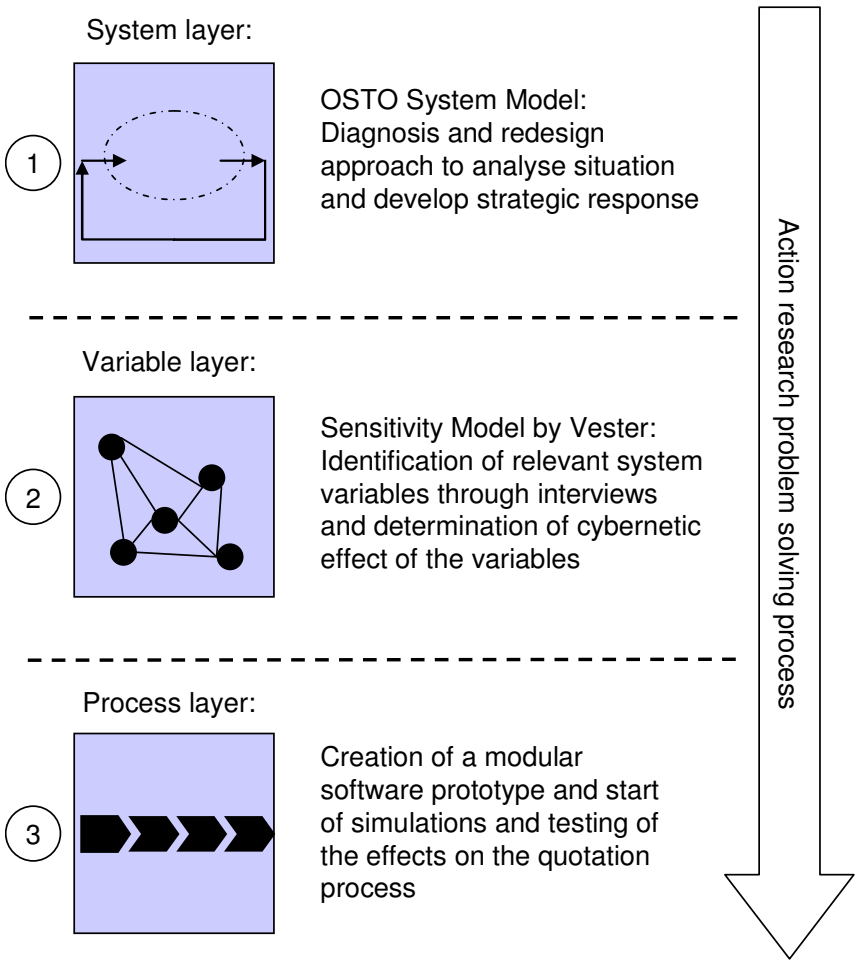

Figure 1: Methodology and Approach Description

3. SYSTEMIC STRATEGY DEVELOPMENT

Enterprises today are socio-technical systems that constantly interact with an increasingly complex environment. The St. Gallen Management Model, the Viable System Model and the OSTO System Model are the relevant theoretical approaches that exist for a systemic strategy development and implementation for such systems.

The St. Gallen Management Model (SGM) (Rüegg-Stürm 2002), (Schwaninger 2001, 1209-1222), (Bleicher 1991), (Ulrich and Krieg 1972, 54) stresses the importance of ethical and normative dimension of management. A process-oriented view of the firm is of great relevance. Also, much emphasis is placed on the interpretative, meaning-based dimension of management. Compared to the OSTO System Model, the SGM lacks diagnosing capabilities, but is more detailed at the structural level.

The Viable Systems Model, or VSM is a model of the organisational structure of any viable or autonomous system (Schwaninger 2004, 411-431), (Türke 2008), (Christopher 2007), (Beer 1985), (Beer 1972). A viable system is composed of five interacting subsystems which may be mapped onto aspects of an organisational structure. In addition to the subsystems that make up the first level of recursion, the environment is represented in the model. The model is derived from the architecture of the brain and nervous system. One conclusion from operation research is that, the VSM is more technical than human centred.

The OSTO System Model (OSM) - a method to analyze, redesign, and monitor socio-technical systems - has specifically been suggested and has been proven to be a very promising approach (Hanna 1988), (Henning and Marks 1992), (Henning and Isenhardt 1992). OSTO stands for “open, socio-technical-economic system.” It builds on the socio-technical system theory, which was considerably influenced by members of the London Tavistock Institute of Human Relations. The OSM focuses on analyzing work processes that are strongly interrelated. They are mainly the result of a combination of technology and human communication on a higher level. The OSM understands systems as “living systems” (open cybernetic systems). Such systems include humans with their processes of work and life. Feedback processes stabilize and renew this open living system. The system structure is characterized by different design elements that are dependent on each other in many complex ways. The main elements are the technical, social, and organizational subsystems: technology, people, and organization (Brandt et al. 1999, 245-252). None of the three models mentioned has been applied before within the context described in paragraph 1. The literature does not address if these approaches could help the LB-FSPs facing a large economic downturn with strategy development. For the case at hand the OSM was chosen. Compared to the other models, the OSM has the advantage of great flexibility. Also the VSM and the SGM are much more complex models compared to the OSM and therefore less easy to apply (Schwaninger 2001, 1209-1222) (Schwaninger 2001, 137-158) (Espejo et al. 1996) (Rapoport 1998).

The research was conducted at a lead brokerage financial service providing company, at the stock exchange in Frankfurt Germany. According to the OSTO approach, in order to derive an appropriate strategic response to the new forces that existed within the relevant market environment (electronic order execution, alternative trading platforms, etc.), it is necessary in a first step to perform a very detailed diagnosis of the company (system) at hand. The seven steps of the diagnosis are described in detail in (Henning and Marks 1992), (Rieckmann 1997). After the completed diagnosis, the five steps of the redesign process have to be carried out. Within the process of the diagnosis, it became quickly apparent that there are two main purposes why LB-FSP companies exist today. The first is the demand from financial marketplaces (stock exchanges) for stock orders to be carried out within the defined performance criteria. The second is the

demand from financial investors (public, private, etc.) for the best price for their stock. The problem with these two purposes was that in the past it was more important to satisfy the needs of the Frankfurt financial marketplace, than to deliver the best price for the investors.

By satisfying the needs of the Frankfurt marketplace, the company ensures the number of stocks that they are responsible for. As investors had little choice in the past between stock exchange places, it was not important for the LB-FSP to focus mainly on their interest. As stated in the introduction, due to changes in the market environment, the priority between these two purposes drifted in favour of the investors. The LB-FSPs were, and still are, loosing order-flow. To summarise the above discussion, the following can be diagnosed:

Diagnosis D1: Lead brokers did not focus on the investors' interest.

Diagnosis D2: Worsening competitive situation for the LB-FSPs due to better alternatives for investors and economic crisis.

The problem is that acting in the best interest for the investor is not always in the interest of the LB-FSP. Giving the investors the best prices for their stock, reduces LB-FSPs' chances to make profits themselves. As the actual trade of stock is handled within seconds, it is almost impossible for the management to control if the best quote is always delivered to the investors. In addition to that, the lead brokers are paid their bonus individually based on their profit making ability. They compete over a limited amount of bonuses, reducing their willingness to share knowledge among each other. Consequently, their ability to earn profits for the company varies. Therefore, they all have a different quote making behaviour. Thus, it can be diagnosed:

Diagnosis D3: It is hard for management to control if the best quote is always delivered to the investors.

Diagnosis D4: The bonus is paid individually based on profit making ability of the lead broker.

Diagnosis D5: Lead brokers compete over a limited amount of bonuses.

Diagnosis D6: Lead brokers have no interest in sharing their knowledge among each other.

Diagnosis D7: The ability to earn profit varies among the lead brokers.

Diagnosis D8: The quote making behaviour varies among the lead brokers.

The complete diagnosis and the interrelations of the findings are depicted in Figure 2.

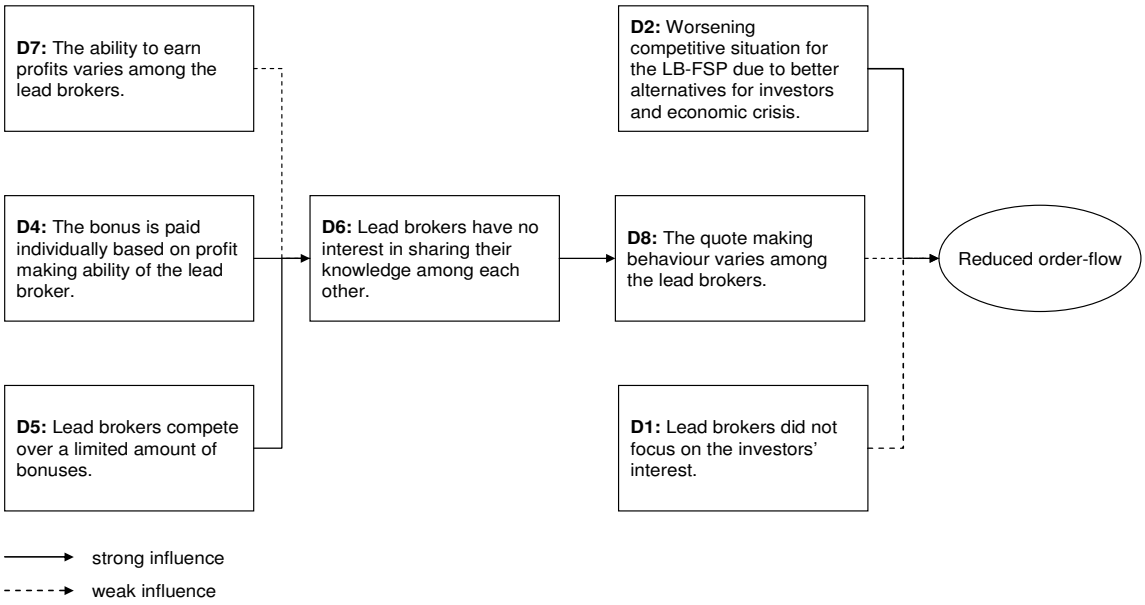

Figure 2: Findings Diagnosis

As order-flow is dramatically reduced due to better alternatives for investors, the existence of the LB-FSPs in Frankfurt is in danger. This was clear to the management. Therefore, the management wanted to implement a new best price strategy. Their bidding and asking prices (quote) should be at least as attractive to investors as the quote of the competitors. The problem with this strategy is that making the quote as attractive as possible to investors reduces directly the profit margin of the LB-FSP. Still, the management believed that even under the new circumstances their best performing lead brokers are able to earn profit for the company. To that end, their intention was to encourage knowledge sharing among their brokers. Accordingly, a teambuilding process was started and the bonus system was adapted to reward team oriented behaviour. The team process should lead to profit making strategies based on explicit knowledge, which can then be incorporated into an assistance decision support system for all lead brokers to use. In summary, the management's decision was to implement three system redesign actions:

Redesign Action RA1: Start teambuilding process with lead brokers.

Redesign Action RA2: Change the bonus system to encourage team oriented behaviour and knowledge sharing.

Redesign Action RA3: Ensure through an assistance decision support system that the quote delivered is just as attractive to investors as the competitors' quote.

Figure 3 shows the interrelation of the diagnoses with the redesign actions.

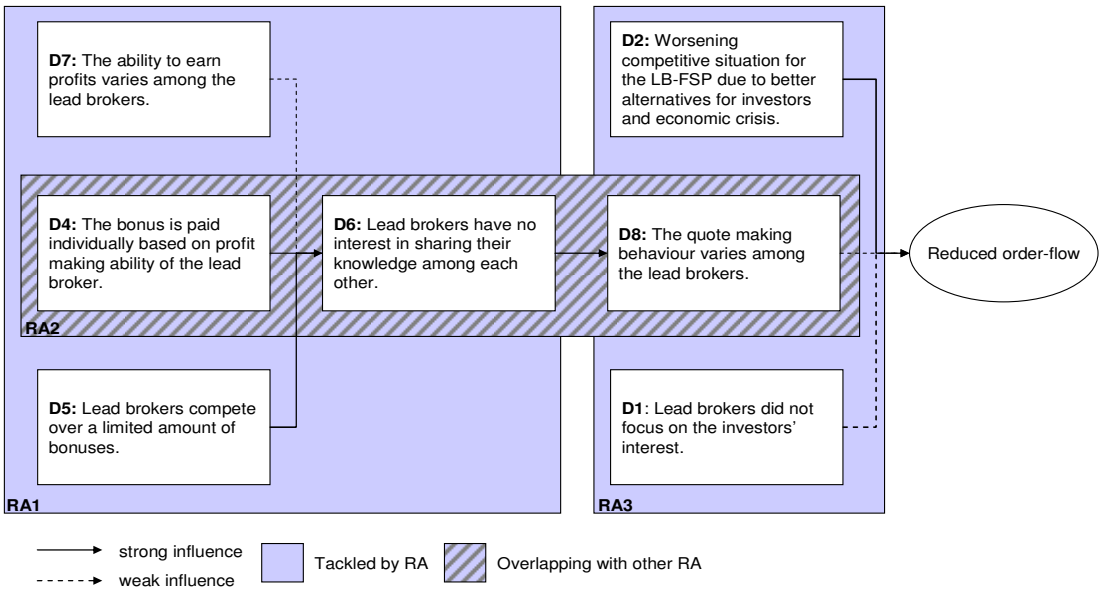

Figure 3: Redesign Actions

These are the diagnosis findings and proposed redesign actions that were the outcome of a systemic strategy development process. Reflecting on the results of the first step, it can be concluded that in this case, the application of the OSTO System Model proved to be helpful. The diagnosis and the resulting redesign action were developed within three workshop days over a period of two month. In the first workshop day the diagnosis of the company was conducted. In the second workshop day the redesign actions were developed.

These two workshops were done with top management participants only. In a third workshop day the developed results were presented and discussed with the whole lead brokerage team resulting in commitment for a stepwise implementation of the redesign actions. The following paragraph will deal with the implementation of the proposed strategies (steps 2/3 Figure 1).

4. Strategy implementation at a LB-FSP (step 2 and 3)

Having decided upon what actions need to be taken to ensure the survival of the company, the next step was to implement the redesign actions. RA1 and RA2 were implemented using state of the art methods and already existing models. For the implementation of RA3 we first have to look closer at the present conciliations of the quote process itself: First the lead broker is subject to certain regulations and policies which define his job. For instance she/he may not use special knowledge for his/hers own advantage and profit. In a second step the lead broker verifies constantly the order book. In a third step, based upon the order book status a quote (bid and ask price of a stock) is displayed to the market. At the same time the quotation itself is also subject to certain regulations and policies set by the stock exchange where the stock is traded. How the quote process works is depicted in Figure 4 in a control loop model.

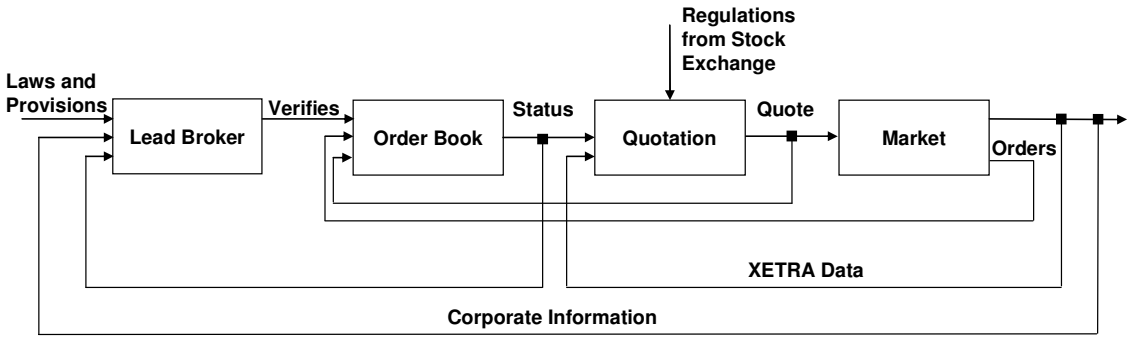

Figure 4: Quotation Process Control Loop Model

This model is the basis form which the implementation of RA3 (ensure through an assistance decision support system that the quote delivered is just as attractive to investors as the competitors' quote) started. How the actual quote is set by the lead broker in each and every case depends upon a number of different interrelating variables which have to be analysed at first. If the assisting decision support system would be built on a too narrow rule description and logic, it would reduce the possibility of implementing the lead brokers' tacit knowledge on stock behaviour. However if the system would be too great in complexity, it cannot help to ensure that the best quote is always delivered to the investors. In order to find those critical variables, thirteen interviews with lead brokers were conducted.[1] Figure 5 shows the variables that influence the quote process.

[1] A full version of the questionnaire used in the interviews - in German - can be obtained from the author of this paper.

No.	Description
1	Liquidity of the paper
2	Spread width of quote
3	Quote volume
4	Spread width of reference market
5	Volume of reference market
6	Number of purchase orders in the order book
7	Number of sales orders in the order book
8	Number of purchase orders on XETRA
9	Number of sales orders on XETRA
10	Short positioning
11	Long positioning
12	Market volatility
13	Paper volatility
14	Correlation with index
15	Position limit
16	Individual volume of orders
17	Individual order limit
18	Seriousness of individual orders (origin)
19	Last ascertained course
20	Price of oil
21	Price of gold
22	Dollar rate
23	Market tendencies / trends
24	Branch tendencies / trends
25	Paper tendencies / trends
26	Prime rates

Figure 5: Variables that Influence the Quotation Process

In order to analyse the cybernetic relationship between these variables, the Sensitivity Model by Vester (Vester, 1980) was applied. The lead brokers estimated the mutual influence of each pair of variables within a matrix of influence (Figure 6).

No.	Affect of ↓on →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	Liquidity of the paper	x	3	3	3	2	2	2	2	2	1	1	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0
2	Spread width of quote	2	x	1	1	1	1	1	0	0	1	1	0	1	0	0	1	0	1	1	0	0	0	0	0	1	0
3	Quote volume	1	1	x	0	1	1	1	0	0	1	1	0	1	0	1	1	1	1	0	0	0	0	0	0	1	0
4	Spread width of reference market	2	3	2	x	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0
5	Volume of reference market	2	1	2	2	x	1	1	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0
6	Number of purchase orders in the order book	2	1	2	0	0	x	0	1	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
7	Number of sales orders in the order book	2	1	2	0	0	0	x	0	1	1	1	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0
8	Number of purchase orders on XETRA	1	1	1	1	1	1	1	x	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
9	Number of sales orders on XETRA	1	1	1	1	1	1	1	1	x	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0
10	Short positioning	0	1	1	0	0	0	0	0	0	x	0	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0
11	Long positioning	0	1	1	0	0	0	0	0	0	0	x	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0
12	Market volatility	2	2	1	2	2	2	2	2	2	2	2	x	2	1	1	1	1	1	1	0	0	0	1	1	1	0
13	Paper volatility	2	2	2	2	2	1	1	1	1	2	2	1	x	1	1	1	1	1	1	0	0	0	1	0	1	0
14	Correlation with index	1	1	1	1	1	1	1	1	1	1	1	0	1	x	0	0	0	0	0	0	0	0	0	0	1	0
15	Position limit	0	1	1	0	0	0	0	0	0	1	1	0	0	0	x	0	0	0	0	0	0	0	0	0	0	0
16	Individual volume of orders	1	1	2	0	0	0	0	0	0	1	1	0	0	0	0	x	0	0	0	0	0	0	0	0	0	0
17	Individual order limit	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	x	0	0	0	0	0	0	0	0	0
18	Seriousness of individual orders (origin)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	0
19	Last ascertained course	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0
20	Price of oil	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0	0	0	x	0	0	2	2	1	0
21	Price of gold	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	x	0	1	1	1	0
22	Dollar rate	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	x	1	1	1	0
23	Market tendencies / trends	1	1	1	1	1	2	2	1	1	2	2	2	2	0	1	1	1	0	1	0	0	0	x	1	2	0
24	Branch tendencies / trends	1	1	1	1	1	1	1	1	1	2	2	1	2	0	1	1	1	0	1	0	0	0	1	x	2	0
25	Paper tendencies / trends	2	1	1	1	1	2	2	2	2	2	2	1	2	1	1	1	1	0	1	0	0	0	1	1	x	0
26	Prime rates	1	0	0	1	1	1	1	1	1	1	1	2	1	1	1	1	1	0	1	1	1	2	2	2	2	x

3 = strong affect; 2 = medium affect; 1 = weak affect; 0 = no affect

Figure 6: Matrix of Influence

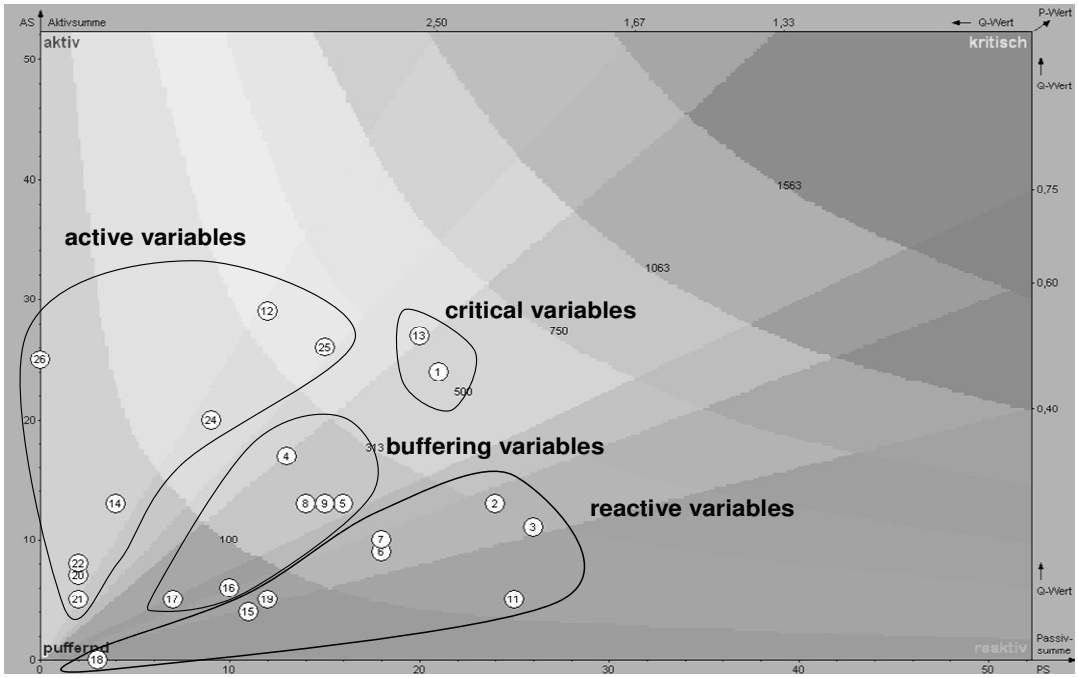

Figure 7: Character of Variables

Here, variables which have an effect on other variables are listed line by line, while those influenced by other variables are listed column by column. By forming the line and column total (the active and passive sum), the identification of active or passive variables becomes possible. The result of this sensitivity analysis is shown in a graph, which illustrates the variables according to their character. Critical variables can be found in the upper right hand sector of the graph (Figure 7). Critical in this context means that these variables have a strong effect on other variables, while at the same time remaining enormously influenced by others. Within this graph, the column total is shown on the x-axis, while the line total can be seen on the y-axis.

This analysis is a critical input for the further development of the intended decision support system for the lead brokers as only this systemic analysis of the cybernetic relationships of the variables ensures a truly holistic view of the situation. In addition to that, simulations can be run to see how changes in one variable affect the others.

Looking at the situation of the lead brokers it is clear that only the clever setting of the quote ensures profit for the broker and the institution he/she works for. The only variables the broker can actively influence are those that correspond directly with the quote itself (spread width of quote and quote volume). However, as this must be done very quickly and for a great number of stocks simultaneously (sometimes only 60 seconds time for the execution of an order and over 30 stocks per broker) a supporting system should help the broker to adapt these variables more quickly to changes in the market situation. In order to achieve that certain modules were developed that can be used to store pre-regulations and –settings by the broker. How these modules work is described in the following paragraph.

4.1 Module description

The broker is subject to certain laws and provisions that build a framework for the setting of the quote. In addition to that certain regulations and policies exist that are specific to the stock market. This framework varies form stock to stock according to the liquidity and volatility of each paper. Combining this framework with the actual state of the order book does usually not lead to a competitive quote as it is too broad, but it leads to a quote that satisfies the regulations and is from that point of view correct. This is our first module (M1) that satisfies the minimum standard according to the stock markets regulations. The second module (M2) reduces the quote spread by the LB-FSP's fee (the so called courtage) to give back the order fees to the investors in the form of a better quote.

The third module (M3) builds on the findings of the sensitivity model that show that the variables "Liquidity of the paper" and "Paper volatility" are most critical to the quotation process. A so called risk-factor was derived form the papers liquidity and volatility. That risk-factor can also reduce the quote's spread even further. The forth module (M4) builds on the same logic to raise the minimum order volume according to calculated risk-factor. As the LB-FSPs hold themselves positions of the stocks they trade (long positioning), or they trade stocks they do not own at the moment of trade (short positioning) they have to keep in mind these positions while stetting the quote. Therefore the fifth module (M5) gives the lead broker the possibility to reduce the spread width automatically even further, if a certain rate of return set by the broker is reached. With that module it is possible to automatically reduce or increase the own positions of stocks. The sixth module (M6) builds on the same logic to raise the minimum order volume. In this module the held volumes of the positions owned by the LB-FSP are incorporated automatically in the quote. The seventh module (M7) allows incorporating the broker's market trend assessment, by setting the quote slightly above or below the reference market within the given regulations of the stock exchange.

The development of these modules has been guided by the matrix of influence. The critical variables liquidity and volatility have incorporated in the modules M3 and M4. The modules M5, M6, M7 deal all with the spread width and the order volume, which are the variables that are directly linked with the quote process as stated before. As these variables were found to be reactive to numerous other variables the modules help the broker to react faster in a turbulent market environment. The module M2 can be viewed as to ensure the baseline of the company's strategy (that the quote delivered is just as attractive to investors as the competitors'). Module M1 is just the basic input factor for

all other modules. How the modules work within the quotation process is depicted in Figure 8.

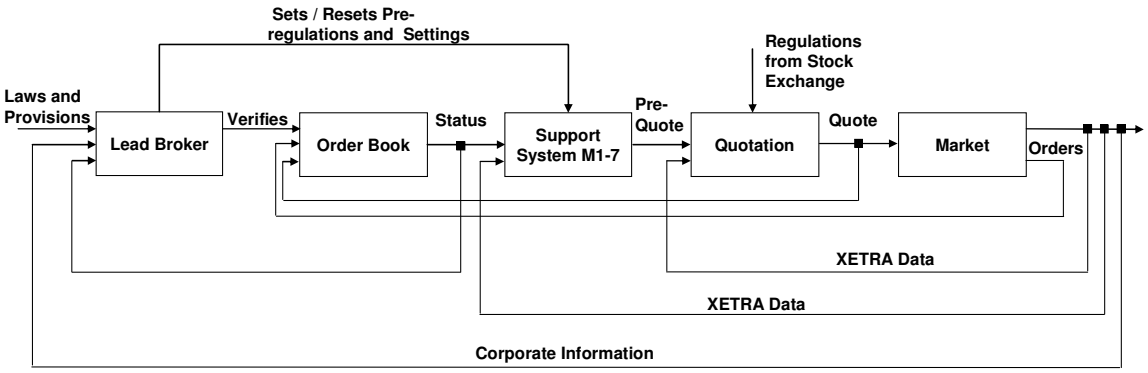

Figure 8: Quotation Process Control Loop Model with Pre-Regulating Modules M1-7

The active variables show further automation potential which could be explored within further research. Here, it has been shown how a systemic approach can add value for the strategy development and implementation in software. The modules have been developed and tested and results have shown promising effects.

5. CONCLUSIONS

The increasing automation of the finance does not only concern the LB-FSPs, but rather all banks on a worldwide scale. Just as the invention of the steam engine in the 1800s meant the replacement of many professions by machines, lead brokers in stock exchanges will also be replaced by machines in the medium-term due to great progress in information and communication technology. It is thus necessary for affected enterprises to adapt to these developments. The article develops strategies that enable affected groups to deal with these expected developments. The established stock markets, and therefore the LB-FSPs, will only be able to exist in the market if they provide better quotes for the stocks they deal with than the competition - this is the only way orders will be placed. If sufficient differentiation is not attainable, the LB-FSPs can only attempt to undertake influence on the markets themselves, for example by effecting the development of additional services.

The developed control loop model for the quote process shows the automation possibilities and offers a good link to further development in the form of software.

At the same time a system was proposed to combine strategy development and realization. The use of systemic approaches has proved to be helpful in this case. Examples include the OSTO model and the sensitivity model for the development of an automated quote, that if required, stays open to manual input should the variables need correcting and at the same time does not consciously disregard human influence.

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