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An Order-Channel Management Framework for Institutional Investors

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Abstract

Efficient *Order-Channel Management*, i.e. the process of information gathering, evaluation, decision and control regarding the setup of the overall trading infrastructure and the actual order routing implementation plays a crucial role for trading success as well as the competitiveness of Institutional Investors. This article introduces a framework intended to support Institutional Investors in establishing an individual *Order-Channel Management* (OCM). For this overall goal, OCM is decomposed into its *strategic* and *operational* constituents and the involved *key entities*, *parameters*, *processes* and their interdependencies are outlined. Based on the identified properties, a *framework* is derived that aims at identifying a suitable mapping from order characteristics to execution venues.

1 Introduction

Investment decisions of Institutional Investors i.e. of buy-side[1] companies typically initiate the process of security trading. Within their quest for liquidity it is essential for execution success and the competitiveness of Institutional Investors to enforce an allocation process that identifies suitable venues as well as execution strategies before orders can be communicated down the value chain. The channeling decision itself is addressed mainly on two levels: First, on a strategic level, a setup for accessing execution venues and building up required infrastructure in terms of people and technology has to be established. Second, on an order by order basis, a suitable venue from this pool has to be selected.

With new upcoming execution venues in the security trading industry, the demand for order-channelling solutions has intensified [Rami06]. Primarily, the changing intermediation relationships, driven by technical innovations within electronic trading, create new pools of execution

[1] Buy-side refers to investment management companies that are ”buying” trading services from the sell-side, i.e. investment banks and brokers [Harr03].

opportunities. Thus, Institutional Investors can choose to execute their orders bilaterally with their brokers at Regulated Markets, Alternative Trading Systems (e.g. Crossing Networks) or via new electronic execution concepts like Smart Order Routing, Direct Market Access (DMA) and Algorithmic Trading. Within this range of execution opportunities the two main entities, execution venues and orders, involved in the process of order-channeling can be described by a bundle of characteristics and interdependencies. Execution venues for instance can be determined by fixed (e.g. market model) and temporary (e.g. market situation and volatility) parameters whereas actual orders typically face a trade-off between urgency and costs. Altogether these bundles of characteristics cause the order-channeling process to become a complex, multidimensional task.

At the same time, new technology-driven solutions enable Institutional Investors to add value to their order processing and thus offer them the opportunity to outperform competitors. This potential for differentiation receives increased attention with the changes of the European regulation in securities trading. Within these changes that will take effect with the implementation of MiFID in November 2007, the topic Best Execution plays a major role as it requires investment firms to set up an individual 'Best Execution Policy' and to realize the best possible result for customer orders according to this policy [GoSe05]. The new regulation enables the buy-side to request evidence of best execution.

In order to support Institutional Investors with the decisions involved in order-channeling, this paper aims at introducing the concept of Order-Channel Management (OCM) and at outlining key parameters for its strategic and operational decisions. Altogether a framework for OCM is set up by identifying and analyzing the key considerations and decision parameters of traders based both on a literature review and an industry screening via interviewing industry representatives. Institutional Investors can utilize the presented results as a structural approach for implementing their own, individual OCM strategy.

To achieve this goal, the remainder of this article is organized as follows: Section 2 presents a brief overview of related work. Based on this, section 3 introduces the concept of OCM by outlining its strategic and operational aspects, their interdependencies, as well as by identifying their key decision parameters. Then, section 4 illustrates the day-to-day handling of operational OCM that maps particular orders to suitable execution venues. Finally section 5 concludes.

2 Related work

On a conceptual level, the overall set of available strategic and operational decision parameters for Institutional Investors and their interdependencies have not been investigated yet. Academic literature focuses on rather specific aspects of the securities trading value chain like *trading styles*, empirical analysis of *markets*, *execution quality* and *order routing decisions*, *market models* as well as *execution costs*:

Behavior of institutional traders, their *trading styles* and related transaction costs are analyzed e.g. in [KeMa97], using proprietary transaction data. There, various hypotheses regarding trading characteristics like the choice of order type, trade duration and immediacy demand are validated. Further, differences between trades initiated by value, index and technical investors are outlined. Focus on informed investors' order types and trading patterns is drawn by [LeFL01, LLRS04, AnWe04, BlOS05, AnCM05], where evidence for the application of hidden limit orders as well as their performance are presented. The impact of order aggressiveness on execution performance is investigated in [GSTW00].

Markets and the dimensions of execution quality and costs are addressed by [BaHo01]. Comparisons of European markets include an analysis of trading costs at the Paris Bourse and London's SEAQ-I [dJNR95]. Similar comparisons for US markets are provided by [BaHJ00, HaBJ01], containing an analysis of market order execution quality [Boeh05] after the introduction of decimals. An overview of the upstairs market for trading of block orders at Paris Bourse is given by [BeVe04]. Altogether an apparent trade-off between costs and execution speed is revealed, emphasizing the demand for models with multiple dimensions of execution quality.

Other investigations address *order flow* and *order routing decisions*. Indications of order flow stickiness to venues despite changes in transaction costs can be found in [AhCC98]. Opportunities to strategically route limit orders to improve execution quality are shown by [BGHJ02]. The negative impact of order flow fragmentation on market quality is depicted in [BeWe06]. Further, a competition-for-order-flow model based on liquidity provision is presented by [PaSe03]. These research results outline the importance of non-price dimensions for execution quality.

Beside these findings, related research also focuses on different *market models*, e.g. the central limit order book [BiHS95, GrHR03], the convergence to order-driven markets in Europe [DeFo98] and the relative advantages of floor versus electronic trading systems [KeKo98]. Market experiments for a comparison of call markets, continuous auctions and dealer markets are conducted by [Thei00]. Performance improvement of floor-based trading systems through information sharing among floor brokers can be found in [FoLe01].

Institutional *execution costs* across major US exchanges are compared by [JoLi99], suggesting that institutions consider characteristics of the used markets. A dynamic model of an order-driven market populated by discretionary liquidity traders that have to trade but can choose their strategy is developed by [FoKK01]. This generates a set of predictions on the relation between market parameters, time to execution and spreads. A model for strategic trading is developed by [HoRa02], where traders have to learn about liquidity from past prices and trading volume. The model implies that strategic trades and market statistics are path-dependent on past market outcomes. The decision of traders to supply or to demand liquidity in a limit order market is modeled by [HMSS02]. Simulations of alternative trading strategies based on a detailed data set from a large US investor indicate that the strategy of initially trying to cross all stocks is cost effective [NaSk03]. A look at best execution obligations can be found in [McCl04].

Beside these rather singular investigations, the contribution of this article can be compared best to the work of Wagner describing a hierarchy of trading decisions [Wagn06]. The framework derived in this article goes beyond Wagner's operational decision tree model as it creates a generic setup including a strategic level. Another related article that is focused on the operative level is [YaJi06] where a quantitative approach for the selection of the most suitable Algorithmic Trading Solution is derived.

3 Introducing the concept of Order-Channel Management

With the evolution of new execution opportunities, the security trading industry has undergone massive changes in recent years. Order execution transforms itself from a broker intermediated market access to one which is controlled mainly by electronic means at the buy-side trading desk. Furthermore, new execution venues (e.g. Alternative Trading Systems), trying to meet the requirements of institutional order flow, have been launched. Altogether these changes offer Institutional Investors potential for cost-savings and improvements in order execution quality.

Definition: Order-Channel Management
Order-Channel Management *(OCM) is the process of information gathering, evaluation, decision and control of Institutional Investors concerning the setup of the overall trading infrastructure (strategic OCM) and the actual order routing implementation (operational OCM).*

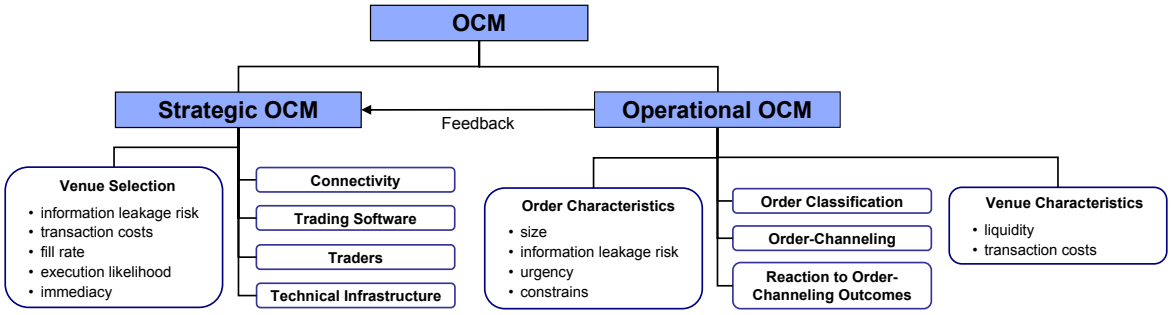

Figure 1: Decomposition of Order-Channel Management responsibilities.

OCM focuses on two interdependent levels that are depicted in figure 1: First, on the strategic level the focus is laid on a pre-selection from a pool of accessible venues. For this purpose, an introspection of the investment strategy is required in order to identify the expected oder flow which provides the basis for the pre-selection. Further, within the strategic level the required personnel skills of traders, the technical and trading software infrastructure for the usage of new execution concepts like Algorithmic Trading and the connectivity to sell-side[2] companies and to markets have to be determined and set up. Second, within the environment defined by

[2]Sell-side refers to firms that trade for customers and earn money with fees, commissions and research [Harr03].

strategic OCM, on the operational level the actual routing of orders to the pre-selected venues has to be managed on an order by order basis. This is established by a comparison of venue characteristics (e.g. liquidity and transaction costs) with actual order parameters (e.g. size, information leakage risk and urgency) as well as execution constraints to be fulfilled. In order to achieve sound routing decisions, an analysis of order characteristic by combining Pre- and Post-Trade Analysis shall be incorporated. These two types of analyses provide important feedback information for future adjustments of the decisions within the strategic level.

3.1 Strategic Order-Channel Management

Traditionally, the infrastructure setup of Institutional Investors for the implementation of their investment decisions refers to their business relationships to brokers. The buy-side traders are responsible for order specifications, order releases to brokers and for phone-based over-the-counter trading, while brokers execute these orders at exchanges or OTC. New execution venues and access channels as well as Information Technology (IT) solutions expand the decision set and thus require a structured approach. Strategic decisions include the overall setup of a trading desk as well as its equipment, technological choices (e.g. usage of DMA or Algorithmic Trading), relationship management with execution brokers and the selection of execution venues as targets for actual investment decisions. This involves a make-or-buy decision for infrastructure provision and the services necessary to setup execution channels.

Definition: Strategic Order-Channel Management
Strategic Order-Channel Management *(strategic OCM) is the process of information gathering, identification, selection and decision for implementation regarding execution venues, their connectivity, trading software, traders as well as the stipulation of technical infrastructure.*

Figure 2 on the next page gives an overview of the aspects of strategic OCM that are described in detail in the following sections. Within the considerations of strategic OCM the investment strategy of a buy-side company is an important factor influencing the outcome of trades as well as execution costs [KeMa97] and thus has to be reflected in the strategic managerial decisions. Therefore, the first step is to determine the expected order flow via analysis of historical order data, interviewing fund managers or an introspection of quantitative investment models. Further, insights to venue performance collected by Post-Trade Analysis give important feedback for the selection of the trading setup and for its evaluation as well as future adjustments.

3.1.1 Execution Venues

The value propositions of execution venues regarding *information leakage risk*, *transaction costs*, *fill rate*[3], *execution likelihood* and *immediacy* are of high importance for the strategic se-

[3]Fill rate refers to the amount of purchased (sold) shares in relation to order size [Harr03].

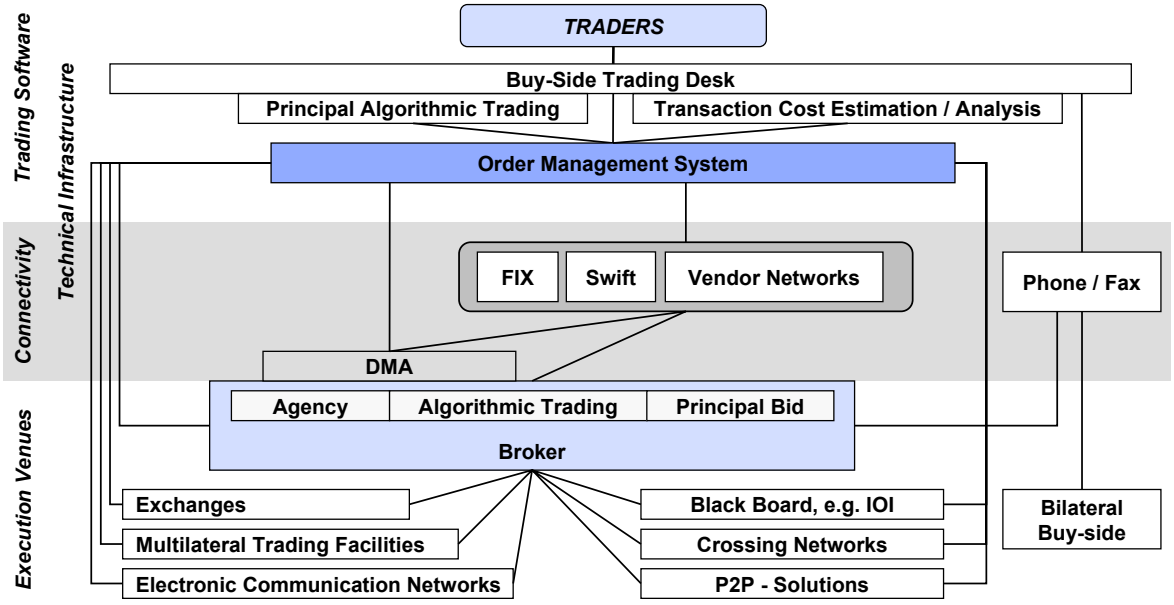

Figure 2: Decision Parameters in Strategic Order Channel Management

lection of venues by Institutional Investors. *Information leakage risk* is addressed by anonymity in one or several phases within a transaction and other functionalities that are offered to camouflage the information provided by order size (e.g. via iceberg orders) [Chak01]. Parameters like low fees and commissions as well as a high level of liquidity[4] [O'Ha98, Kind05] decrease *transaction costs* and are therefore an important proposition to reduce the implementation shortfall. Liquidity also influences *fill rates* and the *likelihood of execution* that is tightly related to order routing and counterparty search.

Further, *immediacy* for executable orders is determined by the degree of automatization as well as the access channel, e.g. electronic access to an electronic market enables faster execution.

The first traditional channel is direct trading, i.e to trade *bilaterally with another buy-side investor*, which typically involves direct communication between the two trading desks. A drawback of this solution are its search costs within the order routing phase, leading to slow execution and high internal costs of manual processing through negotiation and reconciliation.

Another traditional execution path is the delegation of orders to an agency *broker* who acts on behalf of the investor. The broker chooses a venue that is available to him or identifies trading opportunities with other brokers. An advantage of this channel is the specialization and know-how of the brokerage company improving fill rate and execution likelihood. Its disadvantage is increased information leakage risk which is caused by interest conflicts that arise from broker relationships to multiple investors. On top of that, this kind of execution provides lower immediacy because orders are worked successively throughout a trading period.

There exists also the possibility of a *principal bid*, where a sell-side broker guarantees full execution of an order at a given price for a negotiated commission. However, as the commissions

[4]Schwartz defines liquidity as the ability to trade whenever one wants to trade [ScFr04]. A comprehensive overview of liquidity measures can be found in [Kind05].

or the net price provided by brokers compensates them for taking the position as well as the risk on their books, the transaction costs tend to be higher than those for other channels [KiGl03].
To overcome especially the transaction cost issue of these bilateral solutions, buy-side investors can use electronic venues. A first alternative is provided by black board tools, i.e. Indication of Interest (IOI) messages, which allow to locate counterparties' willingness to trade in a particular stock. However, as IOIs only represent indications rather than executable quotes, likelihood of execution is low. More advanced solutions are Crossing Networks like Posit, which are able to match large order sizes by applying closed order books and without dismantling the investment interest to other parties. As Crossing Networks execute orders at the midpoint imported from a reference market and therefore without any market impact, transaction costs are comparably low. Nevertheless, these closed order books have very limited likelihood of execution as well as fill rates. An extension of Crossing Networks is offered by Liquidnet which searches for liquidity using a Peer-to-Peer approach. Once the size on the opposite side has been found, both investors are informed and can bilaterally and anonymously negotiate trade price and volume.
Further, orders can be executed on exchanges, Multilateral Trading Facilities (MTFs) or Electronic Communication Networks (ECNs). Today's exchanges and MTFs enable electronic access and fast, automated execution. Additionally, these markets offer the possibility to forecast the execution price of orders. Unfortunately, exchanges and MTFs incur higher transaction costs, which attributes especially to market impact and immediacy costs. Therefore, market participants slice their orders over time in order to exploit market resiliency.
Algorithmic Trading [GoGW05] can be distinguished as another execution venue, which can be developed in-house, bought from a third party or used as a service from a sell-side provider. Finally, the use of sell-side connectivity for *Direct Market Access* to exchanges while retaining the trading strategies at the buy-side should also be taken into consideration.

3.1.2 Connectivity

Various *connectivity* options exist that enable Institutional Investors to place their orders and receive execution confirmations. Some of them are based on industry standards and are independent from actual execution venues whereas others are proprietary to the respective venues. This requires an own infrastructure, causing operational costs, membership fees and data subscriptions. Standardized connectivity solutions are e.g. the Financial eXchange Protocol (FIX) and third party connectivity infrastructure like S.W.I.F.T's secure IP network to manage the various channels and to transport orders to various venues. Further, as mentioned before, sell-side connectivity like DMA can be used. These connectivity options can be combined depending on the selected channels.

3.1.3 Trading software

Trading desks can utilize various software solutions with different features. The basic software are 'plain vanilla' trading screens that are often offered by venues at no additional costs to the access fee. These solutions provide core functions like order entry, receipt of execution status as well as single venue market data. More advanced solutions are Order Management Systems (e.g. Sungard Decalog or Simcorp Dimension) which allow for integrating multiple venues within a single front-end and additionally offer features for inventory management on quantity and value basis as well as reporting functions. Sophisticated software suites include e.g. Algorithmic Trading engines, Pre-Trade Analysis tools for the prediction of transaction costs, volatility and liquidity development based on historical data as well as tools for position and risk management.

3.1.4 Traders

Even with sophisticated IT support, the need for experienced human traders will prevail. Especially for large orders or orders in illiquid securities human traders provide additional value. This highly skilled type of staff executes strategies for more difficult orders. Additionally, their experience is used to parameterize existing software and to develop new automated strategies. The number and skill level of traders is directly linked to the choice of execution venues, i.e. when DMA or Algorithmic Trading are used, significantly higher trader skills are required than in case of brokers as primary channels.

3.1.5 Technical infrastructure

The infrastructure for trading consists of generic information system components. Because the data processed by these systems represents monetary value, these components have to meet high quality standards. Further constraints for infrastructure result from venues which define authorized components (e.g. network components). Additionally, infrastructure has to meet the criteria of scalability, performance, security and reliability. Especially automated venues like Algorithmic Trading require high computing power to handle real-time market data, which leads to bandwidth requirements in order to ensure real-time data receipt and processing. For example, 1.2 billion trades have been executed over the course of 252 trading days in 2005[5] on one exemplary venue, the New York Stock Exchange, leading to a corresponding number of updates to be processed by the investor's infrastructure, if this venue is used regularly. Thus an infrastructure for multiple venues represents a significant IT investment as well as the corresponding total costs of ownership.

[5] See statistics at World Federation of Exchanges `http://www.world-exchanges.org`.

3.2 Operational Order-Channel Management

Based on the setup defined by the strategic OCM process, *operational OCM* provides a framework for the actual order-channeling decision on an order by order basis. Therefore, it outlines order characteristics that can be utilized for the identification of suitable venues and access strategies according to the venue characterization outlined in section 3.1.1. Further, it provides important feedback about the performance of each venue that is to be considered in future adjustments of the setup established by strategic OCM. As the individual decisions within operational OCM are supposed to reflect *order constraints*, operational OCM is a constrained optimization process.

Definition: Operational Order-Channel Management
Operational Order-Channel Management *(operational OCM) is the decision process concerning the execution of individual orders reflecting order characteristics, constraints as well as access strategies based on the setup established by strategic OCM.*

For the identification of relevant *order characteristics* the focus is drawn on the investment cycle depicted in figure 3, where an order represents the outcome of an investment decision. Because order execution is supposed to take place at venues which meet specified requirements and at the same time are cost-effective, additional information is required, specifying the actual execution characteristics for each order. Within the investment cycle this information can be provided by a combination of Pre-Trade Analysis concerning the venue accessible from the strategic OCM setup and a Post-Trade Analysis after the completed trade [KiGl03].

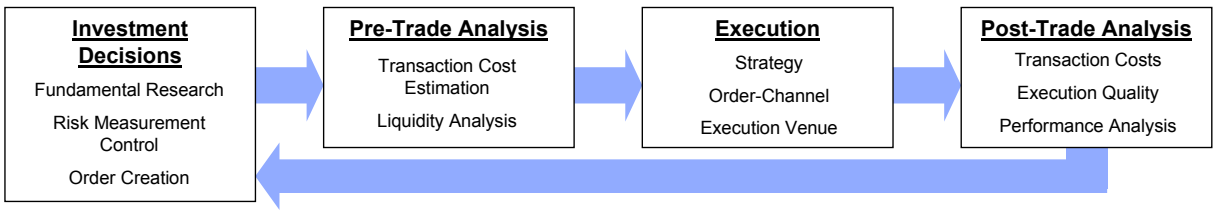

Figure 3: Investment Cycle adopted from [Madh02]

3.2.1 Key characteristics for operational Order-Channel Management

As actual transaction costs play a crucial role for execution success, they constitute the starting point for further investigation. These costs are defined as those associated with the implementation of the investment decision [KiGl03]. They can be further split up into visible costs (e.g. commissions, fees, taxes, spreads) and hidden costs like price appreciation[6], market impact, timing risk and opportunity costs. Hidden costs make the lion share of overall costs, especially

[6] Accordingly to Kissel price appreciation represents the costs of the natural price movement without market impact, i.e. the cost to buy (sell) in a rising (falling) market [KiGl03].

Order Size	Difficulty Level
$0 - 5\%$	Easy: one day
$5 - 15\%$	Relatively Easy: one day with some work
$15 - 25\%$	Difficult: may require multiple days
25% and more	Very Difficult: recommend multiple days

Table 1: Order Size and Difficulty Level from [KiGl03]

when it comes to large orders or block trades [ScFr04]: First of all, large trades create market pressure and thus lead to market impact e.g. because they sweep the book in an order-driven market. One common technique to avoid this market impact is to slice a large order and to trade more passively over multiple periods [KiGl03]. This slicing solution leads to other problems. The enlarged trading period leads to timing risk and an increased risk for price appreciation as prices can develop in an unfavorable direction. Furthermore, the motive can become obsolete or, because of information leakage, other market participants might anticipate the order and perform front-running. Thus, *order size*, *information leakage risk* and the *level of execution urgency* are the relevant characteristics for *operational OCM*.

The crucial role of *order size* arises from the fact that market impact costs are a convex function in order size [BSHvdS06]. This convexity can be outlined by liquidity-measures like the eXchange Liquidity Measure (XLM)[7]. Typically these measures quantify the round trip[8] costs for a specific order size in a security [GoST04]. For instance the round trip costs on XETRA for the DAX listed security Deutsche Bank in June 2006 are $1.4\,bps$ for a $100k$ € order and raise up to $33.3\,bps$ for a $2mn$ € order[9]. As the assessment of *order size* depends on the liquidity of the traded instrument, an estimation of the market's ability to execute the desired *order size* with little or no price movement should incorporate market liquidity statistics like XLM mentioned above. Liquidity is also strongly related to market capitalization [KiGl03]. The most common measure for *order size* that allows comparisons among different securities is the Average Daily Volume (ADV) [KiGl03]. Table 1 depicts different size categories as well as their implications for order execution.

Depending on the information other market participants can collect about the order as well as its motivation the risk of front-running arises. Hence, the *information leakage risk* is tightly related to the motive of the order. If it is initiated by liquidity motives like cash in and out flows or the requirement to track an index it will face lower *information leakage risk*. For orders based on private information the situation is contrary. Orders issued by Institutional Investors rebalancing portfolios accordingly to their research results encounter higher *information leakage risk* because their private information might be figured out. Thus, informed traders, especially prominent Institutional Investors, have to pay appropriate attention to *information leakage risk* in order to avoid other market participants gaining profits from their trading.

[7] XLM is a trademark of Deutsche Börse Group.

[8] A round trip is a purchase and immediate sale of a particular security or vice versa [GoST04].

[9] Data provided by Deutsche Börse Group.

Factor	Traders	CIOs
Lowest execution costs	3.53	3.39
Rewarding good research	3.39	3.42
Fastest possible execution	3.37	3.24
Soft commission obligations	2.45	2.44
Portfolio manager direction	2.39	N/A

Scale: 1 (never) to 5 (very frequently, or 75 to 100 percent of the time)

Factor	Weight
Little or no market impact	3.95
Speed	3.42
Not revealing the full size of order to market	3.40
Not revealing the identity of company or fund	3.21
Within the current market inside spread	3.06
Price better than the VWAP	2.93
Low or no commission	1.29

Table 2: On the left key factors determining how institutions choose brokers are highlighted. The table on the right presents factors important to chief investment officers in judging the quality of execution for large orders. Both tables are adopted from [ScFr04].

Several studies reveal that Institutional Investors commonly posses only trading-related reasons for urgent orders, but in fact do not receive immediacy [ScSt02, ChLa95]. For instance Chan and Lakonishok find out that only about 20% of the value of institutional buy orders are completed within one day, and less than half within four days [ChLa95]. Thus, the *execution urgency level* is also tightly related to information leakage. In this context, most attention is paid to the estimated time that is necessary for the motivation of a trade to become public knowledge [KiGl03]. Hence trades initiated by transient, private information are executed with higher urgency because this allows exploiting knowledge before it is reflected by market prices. This holds especially for human intermediated markets because of the risk that intermediaries like agency brokers might inform other clients about trading intentions [ScFr04]. Furthermore, the expected price appreciation has to be considered because it might convey information about the momentum of the security to be traded. Finally this information can be enriched by statistics for volatility as well as stock classifications like the affiliation to momentum or value growth stocks or the membership to indices that can lead to rapid price movements preceding index reconstructions [KiGl03]. The importance of the three order dimensions *order size* for market impact costs, *information leakage risk* as well as *urgency* in form of execution speed are further stressed by the results of the Schwartz and Steil survey [ScSt02] concerning the assessment of execution quality by chief investment officers which is depicted on the right of table 2.

3.2.2 Order classification within operational Order-Channel Management

With the three classification parameters at hand, we group orders to a total of six classes depicted on the next page in table 3. In a first step small orders are separated because they require less care to prevent market impact. Among these *low touch orders* there is no need for differentiation by information leakage risk because of their low information content. Thus only two further subcategories remain: The first contains *passive low touch orders* with a low level of execution urgency, that can be implemented via liquidity providing means like limit orders. The second class constitutes *active low touch orders* with a higher level of execution urgency which

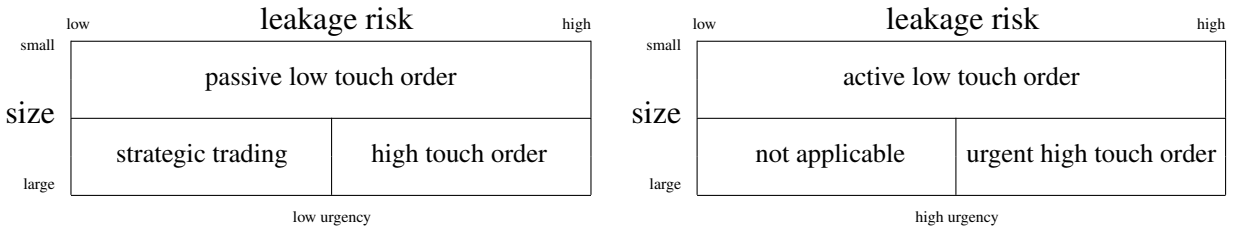

Table 3: Characterization of orders. On the left the order dimension *low urgency* is highlighted, whereas on the right the order dimension *high urgency* is presented.

implies active trading. Among large orders with a low level of execution urgency two additional classes can be specified: Orders with a low leakage risk belong to the class of orders resulting from *strategic trading* like those for share buy-back programs. Orders with higher leakage risk constitute the class of *high touch orders* because they require much attention during their implementation. Finally large orders with a high level of execution urgency can be subdivided into two additional categories: While the parameter setting of high urgency and low leakage risk is reasonably not existent (*not applicable*), orders with a high leakage risk constitute to the class of *urgent high touch orders* being the toughest order type.

3.2.3 Order constraints

Orders might also incorporate constraints which can be constituted already by the order data itself. These constraints narrow the number of possible execution paths or trading venues as wells as the available trading models for a stock. In this context benchmarks like the Volume Weighted Average Price (VWAP) or Arrival Price (AP) are common parameters which are used especially by buy-side companies for an internal execution evaluation or when routing their orders to brokers. Reference prices are also used to measure implementation shortfall [Lehm03], but are not without critique [ScWo03], especially when the overall market moves in an unfavorable direction. Finally, orders can contain restrictions in form of predefined execution styles (e.g. provided by the portfolio managers of an investment fund company), dependencies on venues and proprietary handling instructions. For example in the left part of table 2 the fact is outlined that traders direct 26% of their orders to brokers as a means of rewarding them for non-trading related services like good research [ScSt02].

4 Illustration of actual order handling in operational Order-Channel Management

For the day-to-day handling of operational OCM we propose a subdivision into three phases that are passed by each order. First, *orders have to be classified* according to the three key order characteristics as already depicted in section 3.2.2. Second, the actual *order-channeling*

decision has to take place. In the final step order execution should be controlled which enables *reactions to observed outcomes*.

4.1 Order classification

The first step is the concrete classification of orders based on the three order characteristics defined in section 3.2.1 and the scheme depicted in section 3.2.2. For this purpose, rules as well as processes should be established that try to achieve a non-overlapping segregation. Here, IT infrastructure plays a crucial role for the processing of market data like daily volumes (e.g. for the comparison of order size to ADV), volatility as well as liquidity which are all required within the order classification.
A tight coordination between fund management and the trading desk enables an integrated optimization of this part of the security value chain and thus helps to achieve higher trading success. First, it increases the traders' insight to the motivation of investment decisions which helps them to quantify and mitigate the information leakage risk more appropriately. Second, as the emphasis concerning short and long-term alphas becomes available to the trading desk also the determination of the level of execution urgency should improve.
Together with further instructions (e.g. target trading strategies), a Pre-Trade Analysis should be performed and orders are supposed to be mapped to the corresponding classes. During this step, IT-based tools like artificial neural networks might also be incorporated in order to enforce automation in the classification process. Depending on the class, the number of suitable as well as usable venues is narrowed. The final mapping on an order by order basis and the 'channeling' is done in the following step.

4.2 Actual order-channeling

The actual order-channeling depends on the assignment of individual orders to the order classes. Processing of large *order size* requires usage of multiple liquidity pools. Therefore, state-of-the-art technology allows liquidity consolidation concerning location and time. The former is enabled by advanced Smart Order Routing software seeking hidden liquidity pools [HaId03] whereas the latter can be accomplished by manual as well as automated slicing strategies. In this context, Domowitz and Yegerman have shown that current Algorithmic Trading solutions are not suitable for all kinds of orders yet, as their investigations have identified a performance breakdown for order sizes above 10% of the ADV [DoYe05].
A common strategy to reduce the *information leakage risk* is to hide the complete trading interest or to show only smaller parts. This can be established by using stealth trading techniques that are supported by agency brokers or Algorithmic Trading. Another applicable technique is to select venues which offer an appropriate value proposition, e.g. pre-trade, trade as well as post-trade anonymity.

Finally, for orders with a high *level of execution urgency* a Pre-Trade Analysis shall be utilized to calculate or at least estimate a trade-off between immediacy and opportunity costs and thus to determine an optimized execution strategy.
Based on these general remarks, we focus on the order/strategy types identified in section 3.2.2. *Passive low touch orders* allow the usage of all venues. To optimize the achieved price and therefore trading revenues, passive strategies via limit orders or venues providing price improvement opportunities might be incorporated. In contrast, *active low touch orders* require a more aggressive execution via market or marketable limit orders[10] on venues offering immediacy. Further, *strategic trading* can also benefit from a passive realization throughout a longer period across several venues. As a single release of a *high touch order* would cause a significant market impact, one might initially try to cross them [NaSk03] and if this fails use slicing techniques, splitting the actual order into e.g. hourly or daily packages that can be handled similar to low touch orders. However, an extended execution period bears the risk of opportunity costs and thus has to be continuously tracked. As buy orders tend to convey more information than sell orders [ChLa95], their implementation should incorporate additional techniques to reduce information leakage. Finally for *urgent high touch orders*, constituting the hardest type, automated strategies are not suitable yet. Instead, the full order size or at least large parts of these orders shall be delegated to a broker to whom a trusted relationship has been build up and who either provides a principal bid or who is sophisticated enough to work the order or to 'smoke out' desired liquidity via IOIs within the given time frame.

4.3 Reaction to order-channeling outcomes

As, due to their size, orders from Institutional Investors are far from fire-and-forget tasks *continuous tracking* till their final completion is required. A *readjustment* of a stealth execution strategy becomes necessary when information disseminates or the order cannot be filled. Further exceptional market changes require also strategy reviews. Under such circumstances brokers typically inform their clients while some automated solutions might fail to achieve this and thus require manual tracking and intervention capabilities.
Beside strategy revisions, order-channeling outcomes should be incorporated in a comprehensive *Post-Trade Analysis* that evaluates execution quality relative to the predefined price benchmarks and adjusts the parameters for the actual strategy selection. Simulations based on historical market data allow to evaluate alternative channels. An example in this context is the Penn-Lehman Automated Trading Project that uses real-time data from US ECNs for the investigation of automated trading strategies [KeOr03].

[10] buy (sell) order with a limit equal or above (below) the best offer(bid)

5 Conclusion

For Institutional Investors, new technology-driven execution opportunities allow for self-directed trading and a greater independence from their brokers, their traditional channels for order execution. Thus, the complexity of their trading desks' tasks and infrastructure increases as they face upcoming execution venues, technology developments as well as new trading strategies. The management of this complexity requires a structured approach.

Our paper extends the existing literature on Institutional Equity Trading by introducing the concept of *Order-Channel Management* (OCM) providing a framework for Institutional Investors both on a *strategic* and on an *operational level* (section 3). First, strategic OCM addresses management issues regarding execution venues, connectivity, trading software, traders as well as technical infrastructure (section 3.1) and thus provides the framework for operational OCM on an order by order basis in daily operations. For the latter we have introduced a classification scheme that maps orders into five classes along the three dimensions of order size, information leakage risk and level of execution urgency (section 3.2). Finally, we have outlined how operational OCM can be implemented within three phases (section 4).

As a future research topic, we will empirically validate our framework - that was derived based on bilateral interviews and industry screening - via a series of structured case studies. Further, we intend to analyze strategic and operational topics like Pre- and Post-Trade Analysis for the evaluation of execution quality, especially on multiple venues.

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