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Creating Alternative Electronic Trading Mechanisms in Time-Sensitive Transaction Markets

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Abstract
This chapter discusses the successful launch of Tele Flower Auction (TFA) into the Dutch flower industry. The introduction of TFA was an initiative developed in response to import restrictions by the traditional Dutch flower auctions. TFA is an electronic alternative created to enable buyers to trade at a distance; this alternative is currently exploited by an import organization called East African Flowers (EAF). This chapter examines the entry of a new screen-based rival to the traditional Dutch flower auction houses, using for the analysis a generalizable framework for analyzing the merits of electronic markets. This chapter also stresses the conditions that make this market different from other attempts to launch electronic markets, such as financial services, and emphasizes the difficulties of launching a market whose product – flowers- is both more perishable and less uniform than financial securities products.

1. Introduction

Since the end of the nineteenth century, flower products have been marketed with the help of the Dutch auction mechanism. But recent developments in the Dutch flower industry itself merit close study by researchers interested in the development of electronic markets.

Since 1993, the Dutch flower industry has shown an ongoing debate on the increasing imports of foreign flower products at Dutch flower auctions and about the use of new Information Technology (IT) in this industry. After a referendum in September 1994 the Dutch growers - who also own the Dutch flower auctions - decided to ban foreign participation in their auctions during summer. They feared that foreign competition might decrease prices. The Dutch growers found themselves locked in: they must sell through the auction house. Being banned from the auctions, the foreign growers found themselves locked out. Apparently the Dutch growers did not take into account the possibility that banning foreign suppliers would not prevent foreign supply from reaching the Dutch market through different distribution channels; also the Dutch feared the possibility that reduction of supply could result in reduced demand.

The effort to restrict foreign access to traditional Dutch auctions led buyer organizations and foreign growers to announce the creation of competing auctions. The development and introduction of Tele Flower Auction (TFA) was an initiative in response to import restrictions imposed by the traditional Dutch flower auctions. TFA is an electronic alternative that enables buyers to trade from a distance; this alternative is currently exploited by an import organization called East African Flowers (EAF). Because of the reasonable initial success of TFA and the apparent short-sightedness of the established Dutch flower auctions, important insights may be provided for other managers of established market organizations and entrepreneurial developers of new market systems.

This chapter aims to describe the introduction of TFA in the Netherlands; to describe TFA as an example of an electronic auction market, and the role and impact of IT at TFA; to explain the conditions that made this market different from most liquid financial markets; and explain the difficulties of launching a market whose product - flowers - is both more perishable and less uniform than financial securities.

This chapter shows that IT can enable new ways of competition and coordination, thus changing the ways in which individuals and organizations exchange goods and services. It also demonstrates that

traditional markets may be vulnerable to outside IT-enabled attacks by new entrants. As indicated by Clemons, Croson, and Weber [5], IT has reduced the costs of entry into many industries. Relying on lower overhead costs, new technologies, and new distribution channels, new entrants may challenge the business of historically dominant firms. The TFA case also demonstrates that IT enables fast penetration into an existing market; this speed contributes to the success of such a competitive move.

The chapter is organized as follows. Section 2 gives an overview of the research literature Section 3 presents a new descriptive framework. This framework is used to describe the TFA case. Section 4 discusses characteristics of the Dutch flower industry. It explains the action of imposing import restrictions by Dutch growers and auctions. Section 5 describes the concept and development of TFA, as a reaction to the import restrictions. Section 6 explains the conditions that make this market different compared with financial markets for this purpose two cases in the financial industry are analyzed. Section 7 formulates the lessons learned. Section 8 presents conclusions and further research directions.

2. Review of Research Literature

There are many theoretical and empirical studies on *electronic markets* [1,6,9,13,15,19,20,21,22,29,30] and *auctions* [9,10,16,23,24]. The following discussion summarizes the research literature that is most relevant for this study.

Electronic Markets

Research on the IT effects on exchange organizations and processes is relatively new. Early research applied transaction costs and agency theory to predict shifts from hierarchies to market forms of organizations (the Electronic Market Hypothesis (EMH)) [13,22]. The central argument of this line of research was that IT improves communication, search, monitoring, and information sorting capabilities and thus reduces transaction costs. Reduced transaction costs stimulates the creation of

markets for the exchange of goods and services. Various factors affect the relative importance of production and coordination costs. Malone et al. [[22] argue that two factors, impacted by IT, determine which coordination structures are desirable, viz. asset specificity and complexity of product description. According to Williamson's definition [40] an input used by a firm is highly asset specific if it cannot readily be used by other firms. Acquiring these inputs often depends on long lasting processes of negotiation, development, and adjustments. Asset specificity arises when an input cannot readily be used by other firms because of site specificity, physical asset specificity, or human specificity. Malone et al. [22] propose another type of asset specificity to be added to Williamson's original list: time specificity. An asset is time specific if its value is highly dependent on its reaching the user within a specified, relatively limited period of time; an example is a perishable product. Complexity of product description refers to the amount of information needed to specify the attributes of a product in enough detail to allow potential buyers to make a selection. Malone et al. claim that products that are both highly asset specific and highly complex to describe, are more likely to be obtained through a hierarchical relationship. However items that are not very asset specific and are simple in product description are more likely to be obtained through a market relationship. IT is expected to shift the line between low and high complexity and asset specificity: IT tends to make complex product descriptions relatively simple and tends to reduce the level of asset specificity (e.g. through the use of flexible manufacturing technology which allows a rapid changeover of production lines from one product to another). These developments support the expectation that there will be an overall shift to market modes of coordination.

A critical drawback of Malone et al.'s analysis was the definition and treatment of markets in abstract economic terms (i.e., markets coordinate economic activity through a price mechanism). In reality, different market structures do exist; examples are direct search, brokered, dealer, and auction markets. Each of these structures organizes the trading process and related information processing activities in different ways. The role and impact of IT can vary accordingly. The literature provides some examples. Konsynski et al. [19] provide a descriptive case study of an electronic market in used cars. Clemons and Weber [7] examine the computerization effects on the London

Stock Exchange. Clemons, Reddi, and Row [6] examine the IT impact on the organization of production; they present the 'Move to the Middle' hypothesis. They argue that IT has the ability to lower coordination costs without increasing the associated transaction risks, leading to more outsourcing, but from a reduced set of stable partnerships. Hess and Kemerer [15] test the EMH against the empirical results of five case studies in the home mortgage market. Lee and Clark [21] investigate the impact of the electronic marketplace on transaction cost and market structure. They identify social, economic, and organizational barriers to electronic market usage.

Auctions

In markets, transaction prices may be determined in different ways. Standardized inexpensive items are often sold with posted prices. Expensive customized products or services, especially in industrial markets, require negotiation and bargaining. Auctions are usually preferred in situations where enough competition exists, involving non-standardized products and/or products with unstable prices [Milgrom, 23]. In the most common form of auction the auctioneer is selling goods; the bidders are the potential buyers. Buyers compete by submitting bids, which state a quantity and a maximum price. Different types of auctions exist, depending on how the transaction price is determined [Wilson, 40, Rothkopf and Harstadt, 25].

Auctions are either open or closed. Open auctions announce prices and bids publicly; in closed auctions bids are submitted simultaneously and privately. They are subsequently evaluated by the bid-taker. Open auctions may be progressive or degressive. The English (outcry) auction is a progressive auction: the auctioneer solicits successively better offers; bidders call out increasing bids, until the highest offer remains. The Dutch auction is a degressive auction: the auctioneer (or the auction clock) announces successively lower prices until a buyer bids and acquires the right and obligation to buy the lot. The most common closed auction form is standard sealed bidding, where each bidder independently and privately submits a price to buy the goods. A special type of (closed) auction is the Vickrey auction, where the winner is the person with the highest bid, but the price is set at the level of the second-best bid. This procedure aims at protecting the winner against the

'Winner's Curse'; this curse means that the highest bidder pays more than the market price (as he was the only one willing to pay so much).

Interesting questions in much of recent theory on auctions address issues such as the decision to participate, real differences between auctions, and maximizing expected receipts (such auctions will be chosen by the auctioneer and seller). The answers to these questions are typically revenue-based. The participation of bidders in auctions is expected to depend on expected profits in relation to costs of participation [25]. The 'Revenue Equivalence Theorem' developed by Vickrey proposes that standard auctions such as the English and Dutch auctions all lead to the same expected revenues for sellers [23]. The results of these maximization problems have resulted in very complex non-standard forms of auctions in theory but not in practice, which indicates that 'optimal auction theory' is a poor way to explain today's institutions [23].

Although in theory the 'Revenue Equivalence Theorem' predicts equal revenues for standard auctions, in practice the degressive Dutch auction turns out be extremely efficient compared with the progressive English auction. The former can handle a transaction every four seconds. For example, each day Flower Auction Aalsmeer handles 30,000 transactions via 13 clocks. Toyoake Flower Auction near Nagoya (Japan) is one of the few flower auctions in the world which implemented an English flower auction in 1995 [33]. Buyers bid in ascending order with the highest bid winning. Average transaction cycle times were reported in minutes instead of seconds. For this reason, Toyoake Flower Auction changed to the degressive Dutch flower auction system in September 1997. The Dutch auction also reduces transaction costs as it decreases the amount of time that growers must spend on price discovery and bidding; in Dutch auctions, growers can focus on production.

In general, a gap is observed between the theory and the practice of auctions. For theorists, Rothkopf and Harstadt [25] recommend paying attention to the particularities of how auctions are modeled. They argue that modeling improvements will be of more direct value than use of

equilibrium concepts - more subtle than Nash's or new theorems - applied to oversimplified models. Or, as Milgrom [23] argues, comparisons of auction institutions in terms of 'robustness, efficiency, transaction costs, and immunity to cheating, offer an important alternative to the revenue-based approaches for explaining the popularity of specific institutions' [23]. The research presented in this paper follows their advice.

3. Descriptive Framework

With the convergence of IT and telecommunication, and the proliferation and availability of bandwidth, the impact of electronic markets is quickly expected to increase significantly. The effectiveness of these markets depends on the electronic market design. Research in this new area, as discussed above, provides examples of relevant issues in effective design. But what is lacking, however, is a systematic classification of various complex economic issues that arise when designing and implementing electronic markets. Based on our analysis of these research studies, we have developed a new framework to describe electronic markets. In this paper, we apply this framework to the case of TFA to derive lessons on successes or failures of new entrants, changes in market characteristics, and the role and impact of electronic markets.

This descriptive framework consists of seven elements (see Figure 1):

Here figure 1.

1. Buyers

Buyers can be characterized by their number, by the expectations with which they enter the market - such as the kind of products and services they expect (e.g. standardized or customer specific) - and their buying behavior (e.g. their bidding strategies). To make the market successful, buyer participation has to meet conditions of critical mass; the motives of the buyers will determine the required performance measures of that market.

2. Objects

Marketed objects and exchanged products have certain characteristics. Asset specificity and complexity of product description are proposed as factors affecting the possibility of a product to be traded through an electronic market [22].

3. *Sellers*

Analogous to buyers, sellers can be characterized by their number, the expectations with which they enter the market, and their strategies. Critical mass and sellers' expectations determine the success of the market.

4. Market organization

Market organization refers to the structure of key market processes, such as price discovery, information exchange, and logistics. Basically it refers to how and by whom different tasks are carried out and coordinated.

4.1. Intermediaries

Electronic markets are created by 'market making firms' or 'intermediaries' [20,21]. Intermediaries will primarily be motivated by regular economic performance indicators - such as total revenue, profit, and number of transactions realized - besides specific motives like the ones described in the TFA case.

4.2. Market process design

The effectiveness of electronic markets depends on how critical processes are designed. The literature provides examples of descriptive/qualitative issues supporting an effective design. Kambil and Van Heck [17] specified a generalizable model of exchange processes. They developed a process-stakeholder analysis framework to evaluate alternative market designs. That framework distinguishes five trade processes (search, valuation, logistics, payments and settlements, authentication) and five trade context processes (communication and computing, product

representation, legitimation, influence, and dispute resolution) (see Figure 2). We will apply this framework to analyze the TFA initiative.

Here figure 2.

4.3. IT innovation

Trading processes will be affected by increasing bandwidth and ICT convergence, facilitating electronic communication, electronic coordination, and electronic brokerage [22].

4.4. Trust

Buyers and sellers may be confronted with opportunistic behaviors of their counterparts. Trust can be defined as the belief, or willingness to believe, that one party can rely on the fairness, goodness, strength, and the ability of the other party (e.g. the seller, the buyer). Trust is the expectation that arises within a community of regular, honest, and cooperative agents/parties, based on commonly shared norms on the part of that community [12]. Trust applies to different transaction parts. Buyers expect delivery of the right products, of the right quality, and at the right time. Sellers expect payments as parties have agreed. In recent literature the element of trust has received considerable attention. For example, Sanner [26] defined three bases of trust: (i) be 'Person-based', tied to the characteristics of a person, (ii) 'Enterprise-based', where trust is tied to the enterprise as an entity, and (iii) 'Institution-based' tied to formal mechanisms based on laws and norms in a society. Especially in global markets, where the only contact between buyers and sellers may be the contact through databases and the communication network, 'Enterprise-based trust' and 'Institution-based trust' will need special attention.

5. Market quality

Market quality refers to effectiveness and efficiency of trading on that market. The literature provides some measures. For example Clemons and Weber [7] characterize financial markets in terms of liquidity, volatility, and transparency. Liquidity is an important attribute of a financial

market's attractiveness. It measures the investor's ability to liquidate a position – that is, to convert a security into cash or cash back into a security, without delay, and without the transaction having an excessive effect on the price at which the security is bought and sold. Schwartz [28] measures a market's attractiveness in terms of liquidity, accessibility, transaction costs, accurate price discovery, and adequate information about products, transactions, and quotes. Apparently, specific measures depend on the type of market. In general we propose that quality measures will apply to:

- goods and services traded: e.g. breadth of assortment, available quality and quantity of supply;
- market prices: e.g. the market price level, volatility of prices;
- trading process: e.g. accessibility, availability of information, speed, timeliness of delivery and payments, fairness of trade;
- transaction costs.

Which measures will determine the success of an electronic market in each particular case depends on the specifics of that market and the motives of the stakeholders.

6. Electronic markets success

Success of electronic markets depends on two categories of factors: (I) the motives of (potential) participants, and (II) the level of effectiveness and efficiency of the market – expressed in terms of motives of participants. Markets which meet participants expectations provide an incentive to participate. Because the market depends on the participation of all stakeholders, success of the market requires simultaneously meeting the expectations of different stakeholder groups. Otherwise, one group will not participate and consequently the market will fail. Successful electronic markets stimulate potential buyers and sellers to enter and motivate intermediaries to introduce and maintain the market.

7. Competition with other markets

The literature shows that most researchers view markets as single isolated markets [25]. In Dutch flower auctions, however, this viewpoint is too narrow. Dutch flower auctions are market places in

a global flower market. There are other market channels between sellers and buyers, such as mediation offices. Therefore we introduce an extra element, viz., namely competition with other markets for the "same" product (auctions and market channels). We do not focus on this element, but shall consider it to be an important part of the environment.

In the next two Sections, we explore a practical case in our discussion of competition with other markets for the "same" product. As a comparison, we then include in Section 6 electronic market initiatives in the financial securities industries to highlight the differences between these markets in terms of product characteristics and possible market formation. The nature of this type of case research is explorative, as cases can be used for so-called analytical generalization, not statistical generalization [40]. We use the case study method, because it enables reality to be captured in considerably greater detail than other methods do; it also allows the analysis of a considerably greater number of variables. We present interviews, reports, and archival data for the TFA case.

4. The Dutch Flower Industry

4.1. Industry Background

The Netherlands is the world's leading producer and distributor of cut flowers and potted plants. In 1997, the Dutch dominated the world export market for cut flowers and potted plants, with a 59 and 48 per cent market share, respectively. The Dutch flower auctions play a vital role in this leadership: these auctions provide efficient centers for price discovery and for transactions of flowers between buyers and sellers. Auctions were established as cooperatives by the Dutch growers. These auctions traditionally use the 'Dutch auction' as the mechanism for price discovery. The world's two biggest flower auctions are in two villages: Aalsmeer (Flower Auction Aalsmeer) and Naaldwijk/Bleiswijk (Flower Auction Holland). Every day, on average, 30 million flowers - originating not only from the Netherlands but also from other countries such as Israel, Kenya, and Zimbabwe - are traded in 100,000 transactions. There are seven flower auctions in the Netherlands,

specifically in the villages of Aalsmeer, Naaldwijk/Bleiswijk, Rijnsburg, Grubbenvorst, Eelde, Bemmel, and Vleuten.

4.2. Price Discovery by 'Dutch Auction'

Surprisingly, the economics literature does not pay specific attention to the Dutch flower auction. Davis and Holt [10], among others, do mention the Dutch flower auction, but do not discuss it in great detail. Kambil and Van Heck [17] and Van Heck and Ribbers [34] describe the functioning of Dutch flower auctions in detail, but not from an economics perspective. In this section we will describe the auction rules of the Dutch flower auction concept. We illustrate characteristics of this concept, using empirical data of Flower Auction Aalsmeer.

Auctions provide a central meeting place for buyers. These centers create efficient locations for gathering information on supply, price discovery, quality control, and product distribution. Cut flowers are traded in approximately 3500 varieties, classified into 120 auction groups, according to the variety of the flower, and the size of the lot. The flowers are transported through an auction room and shown to the buyers. Buyers must be physically present in this room. In the room a computerized auction clock provides the buyers with information on producer, product, unit of currency, quality, and minimum purchase quantity. This clock is used for price discovery, as follows: The clock hand starts at a high price - determined by the auctioneer -, and drops until a buyer stops the clock by pushing a button. The auctioneer asks the buyer by intercom, how many units of the lot he or she wants to buy. The buyer provides the number of units. The clock is then reset, and the process begins for the remaining flowers; sometimes a new minimum purchase quantity is introduced, until all units of the lot are sold. This auction has "backtracking" possibilities: though the price movements decrease per sub-lot, the price can be two- multidirectional (up or down) within the whole lot. Buyers can change their willingness to buy: they can ask the auctioneer for fewer or more units than they originally intended to buy at the time they pushed the button. During the auctioning of the lot, buyers produce information on the value of the lot; this information is available to all buyers. Given these characteristics, we call the Dutch flower auction a *multi-unit, multiform price* Dutch auction.

4.3. Imports: Volumes and Restrictions

For a long period, imports of cut flowers into the Netherlands have shown an increasing trend. There was a rise of 78% between 1985 and 1990; there was a dramatic increase in the period 1990 – 1994; finally, also from 1996 to 1998 imports through the auctions rose by approximately 15% per year. There is an increasing share of the European Community (EC) countries, Israel, and African countries such as Kenya, Zambia, and Zimbabwe. These increasing imports led to mixed reactions. Dutch growers felt that one of the main consequences of increasing imports was declining prices for all imported and Dutch products. Indeed, a survey in September 1994 showed that 269 out of 433 growers ranked foreign production as the most important threat, and 144 growers ranked auctioning imports as such [36]. Seventy-four percent of the growers stated that imports had a negative effect on prices at Dutch auctions. The Dutch producers of roses reacted furiously to the decreasing prices, attributed to the increasing production volumes in Southern Europe and Africa. However, not everybody shared this opinion. Actually, twelve percent of the growers claimed imports had a positive effect, because it might attract more buyers. The board of directors of Flower Auction Aalsmeer and Flower Auction Holland intended to continue the liberal import policy. Their argument was that the Dutch flower auctions should be the center of a global flower market, and not a market place for Dutch products only. Nevertheless, in September 1994 both the growers (owners) of Flower Auction Aalsmeer and Flower Auction Holland decided to change their import policies, and to impose strict import limitations. They banned the imports during summer completely (between June 1, 1995, and September 15, 1995); they determined an upper bound of accepted imports for the rest of the year; on top of this they proposed a very tight quality control system for imports. These import reductions gave rise to three main effects (see also [36] and [38]):

1. The imports from Africa, Europe, and North-America decreased in 1995. Table 2 shows the amounts of imported flowers sold at Dutch auctions for 1993 - 1998. The imports via the seven Dutch auctions account for 60% of total imports; the remaining 40% are imported

directly by wholesalers/exporters and retailers. This table shows that in 1994 the supply of imported flowers increased by 16.2%. In 1995 it decreased by 1.3% (total of 1.783 billion stems).

2. Prices in the season 1994/1995 (October-March) decreased, which is explained by weather conditions and currency problems ('the strong guilder'). Lower imports should result in higher prices, as was expected by growers; but that impact is not clearly visible. Some growers and buyers had the impression that flower prices had become more volatile.
3. Importers had to find alternative marketing channels to sell their products.

Here table 2.

5. The Teleflower Auction (TFA) Case

5.1. EAF Reaction to Import Restrictions: The Creation of TFA

One of the biggest importers of cut flowers is East African Flowers (EAF), established in 1984 and located in the Aalsmeer area. EAF specializes in supply from East Africa (Kenya, Tanzania, and Uganda). For EAF, the import restrictions meant that 30% of their imports could no longer be traded via the Dutch auction clocks during the traditional import season; and in the summer season 100% of their imports could not be traded at all. EAF retaliated by introducing an electronic alternative to the traditional Dutch auctions, called Tele Flower Auction (TFA). In the TFA, buyers can bid via their personal computers (PCs) [3,11,34]. Each PC is connected to a fully computerized auction clock. Growers send the flowers to EAF, and EAF stores these flowers in Amstelveen. The distribution of the flowers from the Amstelveen area to the buyer's addresses (near the traditional auctions of Aalsmeer, Naaldwijk, and Rijnsburg) is done by EAF transporters. Transport costs are paid by EAF.

Developments went quickly, as the creation of TFA was announced in December 1994. In January 1995, the system was tested. On March 24, 1995, TFA started with 70 buyers. In the beginning, TFA was restricted to 15 growers who were EAF's main suppliers. In March 1995, TFA and Flower Auction Aalsmeer agreed to use the same type of carts for transport, and they agreed that TFA could deliver its products to buyers who had their facilities in the auction hall of Flower Auction Aalsmeer. After some months, EAF decided that growers from other countries (for example, Spain, Colombia, France, India, and Israel) were also allowed to use TFA. One year later approximately 160 buyers were connected to TFA. In October 1995, EAF decided that TFA would become a permanent electronic auction market. EAF expected a turnover of NLG 100 million for the growing season 1995/1996, which is around 3% of the total turnover of the seven traditional Dutch flower auctions. Their turnover in 1998 was estimated at around NLG 160 million.

5.2. TFA Case Description

1. Buyers

Through the success of the concept, critical mass was realized soon enough to make the system work. TFA started with 70 buyers, mainly wholesalers/exporters, attached to TFA; in March 1995 there were 125 buyers, mainly wholesalers/exporters; in May 1995 there were 160 buyers (50% located in the Aalsmeer area, the other 50% distributed over the Netherlands).

2. Objects

As Malone et al. [22] claim flowers are difficult to trade electronically for two reasons. First, flowers are a perishable product and the time dimension makes them a highly asset specific product. Second, flowers are subtle products and difficult to describe. Some attributes are standardized (product group, product, and length). Some attributes are not standardized (color and scent) at the moment. Some attributes are difficult to standardize (quality). The TFA case makes clear that IT helped in two ways to make flowers tradable through an electronic market. First, uncoupling price discovery and logistics simplifies and speeds up the delivery of the flowers. Also the Dutch Auction system supported a fast price discovery process. Second, the digitized picture together with standardized quality ratings offer an adequate representation of the product and its relevant properties.

3. Sellers

At the sellers' side critical mass was also built up fast. TFA started with two African growers. After the decision to open TFA to others, the number of growers increased rapidly. Now TFA operates with 40 growers, from Southern Europe, Africa, (Kenya, Uganda, Malawi, and South Africa), Equador, and India.

4. Market Organization

4.1 Intermediary

As we saw in the intermediary is East African Flowers (EAF), one of the biggest importers of cut flowers; they specialize in supply from East Africa (Kenya, Tanzania, and Uganda). EAF created TFA as a reaction to the import restrictions imposed by the Dutch Flower Auctions. For EAF, the effect of the import restrictions was that 30% of their imports could no longer be traded via the Dutch auction clocks during the traditional import season; in the summer 100% of their imports could not be traded at all.

4.2. Market process design

Using the Kambil/Van Heck model [17], we describe the design of TFA as follows:

Search: Buyers are connected to the EAF computer through PCs. To obtain information about available supply, buyers can search the supply database. The PC provides information on producer, product unit of currency, quality, and minimum purchase quantity. On the PC the buyer can earmark interesting lots, so at the time these lots are auctioned, the PC will warn the buyer.

Valuation*:* The underlying auction concept remains the Dutch Auction. On the PC the buyer sees the Dutch auction clock.

Logistics**:** Growers send the flowers to EAF, and EAF stores these flowers in Amstelveen. Logistics and price discovery are uncoupled within the auction hall. The distribution of the flowers from the storage room in Amstelveen to the buyers' addresses (near the traditional auctions of Aalsmeer, Naaldwijk, and Rijnsberg) is done by transporters of EAF. Transportation costs are paid by EAF.

Payments and settlements*:* Payments and settlement clearing within 24 hours are guaranteed by the intermediary.

Authentication*:* Although in principle the buyers do not need to see the flowers physically, those who are based nearby can inspect the flowers. Reliable product information and stable quality control are essential. Quality grading occurs on the total lot (not on the sample only). Quality control

is done by TFA quality inspectors at the nurseries where the flowers are grown, at the distribution point in Nairobi (Africa), and at TFA in Amstelveen.

Communication and computing: Simplified phone and data communications enable remote trading.

Product representation: Screen-based representations are provided by quality grades, text, and digital images.

Legitimation: Growers do not have to be an EAF member. EAF is the primary authority.

Influence: Growers and buyers have little influence on auction policies and rules. EAF defines the market rules.

Dispute resolution: Possible dispute resolution is conducted by EAF.

4.3. IT innovation

Compared with traditional auctions, buyers can trade at a distance (the electronic communication, coordination, and brokerage effects). The IT architecture consists of several components. Buyers have to lease a PC, earphone and microphone equipment, and a printer from TFA. The PCs are connected via ISDN to a workstation at TFA in Amstelveen. The TFA workstation includes technology for multi-modem connectivity, and computerized auction clock technology. The ISDN connections are leased by TFA from Dutch PTT Telecom. The workstation is connected to an auction PC, which is handled by the auctioneer. The buyer's PC screen, presents one digital image per lot; this image gives an overview of the lot, to inspect the ripeness of the flowers. There are EDI connections with growers and buyers.

4.4. Trust

Trust in the TFA system can be characterized as enterprise and institution-based. EAF already had an outstanding reputation as a high quality supplier. Moreover, EAF succeeded in building an institution (TFA) with systems and rules in place to guarantee a fair trading process. It soon became clear that one of the main propositions of TFA was that the quality of the flowers determines the buyer's trust in the TFA concept. TFA's motto is: Buyers have to trust the quality blindfold, because

buyers cannot see the product anymore. Reliable product information and stable quality control are essential. On the PC screen the quality is indicated using the standard quality indicators proposed by United Dutch auctions. Moreover, TFA provides positive quality remarks and – as we saw – one image representing a high precision digital picture. The picture gives buyers a better view the quality of the flower than they would have had with their bare eyes in the auction hall. The growers can trust the system as they are directly paid by EAF. Buyers also trust the IT innovation. One of the reason seems to be that the Dutch auction clock is still the price discovery mechanism; buyers are familiar with this mechanism. Technology (PCs and ISDN network connections) are leased from TFA, which guarantees good connections. TFA also has the systems audited on a regular basis.

5. Market Quality

On average, the prices are not higher or lower than in the traditional Dutch flower auctions; supply and quality of the flowers meet the expectations. Not only the auctioning process – the Dutch auction -, but also the after-sales process is very fast; sometimes within half a hour products are delivered at the buyer's address. Buyers lose a minimum of time with the auctioning process, as they can bid from their offices. They pay NLG 430 a month (VAT excluded) to lease the equipment. For each transacted stem, buyers have to pay seven cents per stem. Growers pay commission fees. These transaction costs are at the same level as the transaction costs of the traditional auctions.

6. Electronic Market Success

EAF announced the creation of TFA in December 1994. In June 1995, the Chief Executive Officer (CEO) of EAF/TFA, Mr. Simon van der Burg, stated that results of TFA were better than expected [30]. There is a two-hour auction every day and approximately 2 million stems are auctioned daily [11]. In the traditional auctions in Aalsmeer and Naaldwijk/Bleiswijk 30 million stems are auctioned daily. TFA expected a turnover of NLG 100 million for the growing season 1995/1996. Compared with the seven traditional Dutch auctions, TFA ranks fourth. TFA's turnover for 1998 was estimated as approximately NLG 160 million. The success of TFA is partly due to the fact that foreign flowers were banned from the Dutch auctions. TFA has been able to overcome this

entry barrier by successfully creating an electronic alternative to the existing auctions. The growers benefit from the EAF initiative because they are dependent on EAF's selling power. Growers are also enthusiastic; EAF decided that growers not related to EAF could also use TFA as their marketing channel. The satisfaction of the customers stems from the availability of high quality flowers and a highly efficient transaction process.

7. Competition with other markets

The Dutch growers perceived TFA positively. In June 1995, 68% of 378 Dutch growers interviewed, were in favor of the import restrictions; 55% answered that TFA was the best alternative for imported flowers; 26% would like to re-install the liberal import policy [36]. An interesting development is that 10% of the Dutch growers is thinking of choosing TFA as their marketing channel. In 1995, 229 growers (in 1994: 269) ranked foreign production as the most important threat, and 92 (in 1994: 144) growers ranked auctioning imports as such [36]. Overall, Dutch growers still seem to believe that their position has improved, although prices have not increased.

The development of TFA had an impact on other auctions and on the market acceptance of electronic market mechanisms as an alternative. For example, the imports of Flower Auction Aalsmeer decreased by 23%, whereas the average was a decrease of 10% for all traditional Dutch auctions [4]. Flower Auction Holland decided to copy the TFA concept; they introduced their own Tele Auction System in 1996. The auctions in the villages of Vleuten and Eelde also introduced the Tele Auction principle; approximately five wholesalers/retailers use these two systems. Other additions to the Dutch flower market are 4 Flowers and Floraplex. 4 Flowers is a group of international wholesaler and exporter companies operated in Holland with an annual turnover of approximately US$56 million. Floraplex, part of FPN Trading Systems, is a portal connecting gorcers and wholesalers.

6. Comparison of TFA with other Electronic Markets initiatives in the Financial Securities Sector

6.1. Differences with the Flower Industry

The financial securities sector differs from other industries in general and the flower industry in particular in terms of characteristics of products, transactions and stakeholders. Indeed, stocks and commodities have simple and standardized product descriptions. However, transactions in the financial securities sector are highly complex compared to other industries. In the Securities Transaction Life Cycle (STLC) a transaction is seen as a cycle with series of nine phases [27, 24] (see Figure 3).

Here figure 3.

The STLCillustrates that the securities sector has many stakeholders, such as investors, investment managers, brokers, exchanges, custodians, securities depositories, and regulatory organizations. Each stakeholder can be involved in the various phases of a securities transaction [28]. A special characteristic is that buyers and sellers can switch roles over time. Financial products (securities) can be sold and bought back by a supplier (this can be a different 'supplier' organization). The terms suppliers and buyers can be confusing, because buyers might turn into suppliers when they sell securities again.

6.2. Industry developments

The second sector has changed in many ways over the last decade. The numbers and volumes of transactions in financial securities (stocks, bonds, and derivatives) have grown tremendously over the last few years: currently well over USD 25,000 billion per year in the USA alone [2]. Stakeholder interests of various financial institutions have changed because of increased competition and developments towards electronic markets. Globalization of the industry and increased competition have led to consolidation and diversification in the industry, differentiation in services offered, and increased importance of risk management. Indeed, over the last few years, risk

management has become much more important. This is partly due to a number of recent huge losses and even collapses in the industry. Finally, developments in IT create opportunities for organizations to communicate electronically, thus improving the speed and quality of information exchange, and enabling and supporting the globalization of the industry.

Financial service organizations have initiated changes in transaction processing: they use information systems to automate manual activities, which has resulted in fewer errors and more efficient processing. However, market forces have also forced organizations to speed up consecutive phases in the transaction process in order to reduce the risks of non-payment and non-delivery. The Group of 30 recommendations (see the report of the Morgan Guaranty Trust Company, 1993), for example, recommended transactions to be settled at "T+3 rolling settlement" (recommendation no.7); that is, the whole life cycle should be dealt with within 3 days.

6.3. Electronic Market Initiatives in Securities Industry

To illustrate the differences of the TFA creation of an electronic market to other industries, the following two cases are offered for comparison:

Institutional Trading: The OptiMark System

The OptiMark case is based on Clemons and Weber [8], who present an overview of the restructuring of Institutional Block Trading (the trading of large numbers of securities) using the OptiMark System. One important problem in institutional trading is *market liquidity*, i.e., the ability of a market to complete large trades without significant price impacts or delays in order execution. Clemons and Weber indicate that the total institutional trading costs amount to nearly 1.36% percent of the total trade value. In consideration of the fact that an institutional investor plans to eventually sell the securities again, these costs are deducted from the return of the investment. One of the alternatives fund managers have for the trading of large quantities of securities, is OptiMark. The system has a unique functionality: the investor can enter his/her trading profile (price, quantity, and satisfaction weight). This trading profile can be composed any way the investor wants. OptiMark

will execute transactions based on mutual satisfaction following the trading profiles. Trades with a higher mutual satisfaction will be executed first, which results in lower trading costs. It is obvious that the success of the system is not guaranteed. The liquidity problem might be solved using the system, but other factors are crucial critical mass, cost advantages, perceptions, and reaction by other trading options (like traditional exchanges) and traders.

Retail Mutual Fund Trading: OneSource

The globalization trend in the financial sector has been accelerated by the rise of Internet technology. In the US, more retail clients are moving to executing transactions through the Internet [2,27]. The introduction of OneSource by Charles Schwab has had a tremendous effect. Schwab's Mutual Fund OneSource was launched in 1992, providing the industry's first no-load, no transaction fee marketplace, with more than 80 funds from eight different families. The marketplace enabled investors for the first time to buy or sell mutual funds with no load from numerous fund families in one easy-to-manage brokerage account -- for the same cost as investing directly with the fund company itself.

Schwab, being a distributor of mutual funds of other fund management companies, manages approximately USD 450 billion (May 1998) in assets, of which USD 115 billion is traded through the Internet. Schwab has about 4.8 million active accounts, of which about 1.5 million are active on-line through the Internet. The number of trades is about 105,000 a day, which is around 55% of the total transactions by Schwab, compared to around 5,000 a day some 5 years ago. However Schwab's success is under attack. Schwab is now confronted with discount brokers and organizations such as E-trade, Suretrade, and Ameritrade who offer transactions traded through the Internet for about USD 8 per trade (a trade via touch phone costs USD 30, via Schwab around USD 75; via a full service broker – such as Merrill Lynch - USD 250]. These price developments have lead to a segmentation of clients, namely clients who are just interested in trading and clients who seek advice. The Internet is not only used as a means for trading, but also to provide the information the client might ask. One of the success factors for Schwab's OneSource is Schwab's

ability in selecting mutual funds that meet the high standards of Schwab. Trust in Schwab is very important in the success of Schwab's OneSource electronic fund supermarket.

Analysis of OptiMark and OneSource: The Need for Critical Mass and for Trust

OptiMark failed to deliver and changed market structure in 2000, whereas Schwab's OneSource has succeeded remarkably. What can be seen from these outcomes?

OptiMark created a new electronic market by entering a very competitive environment where different, private electronic commercial networks were operated by various exchange participants. OptiMark wanted nothing less than to revolutionize the way stock markets worked. It provided servers, software, access, training, and support free of charge. But its interface was too complicated, its supercomputer-powered algorithms too arcane, and it could not deliver the one thing all traders want: liquidity. By October 2000, OptiMark became merely another consulting firm, selling its expertise and technology to Nasdaq. Co-CEO Robert Warshaw said in a trade article that the lessons of OptiMark's failure in trading stocks are that "it is tough to build liquidity from scratch, and as a facility of an exchange, we have none of the tools of a broker to do that independently". He went on to say "a system needs to be much more a part of the way people that use the system do their work, and this system made too much of an effort to change the way people work".

Complex technology was the least of OptiMark's problems. Even when institutional traders could use its interface, they often could not find anyone to trade with, as the level of trust in this system had not been fully established. This is a challenge all new markets face. In an established market such as the New York Stock Exchange, buyers are matched with sellers, but fledgling exchanges run a higher risk.

OneSource assets have grown rapidly as the marketplace expanded its listing of quality funds from America's leading fund families. Marketplace assets grew to over $8 billion in its first year of

operations, and to US$100 billion in less than seven years. Schwab, with OneSource, put the power of the Internet in the consumers' hands and allowed them to sort mutual funds by various criteria and then make the most informed decision. OneSource also caused a profound shift in the economics of the retail mutual fund industry in the US. It effectively converted the brand equity of various mutual funds into a number (i.e. performance over the last six months/one year/three years, etc). By doing this, Schwab could move the brand loyalty away from those mutual funds to Schwab itself. The money flowed into and through Schwab whichever mutual fund the consumers invested in, shifting the primary brand loyalty to Schwab and increased its pricing power viz. the mutual funds. Schwab already had a trusted reputation in the market, and the increased brand loyalty added to that. In the design of the TFA, trust in the quality of product was established already in this market as EAF already had an outstanding reputation as a high quality supplier.

The success of OptiMark depended on achieving critical mass, which was been difficult because the incentives of the stakeholders are various (market makers will lose profits). Like the TFA case, OneSource offers an example of a fast success for electronic markets. The success of OneSource is partly due to the fact Schwab has been able to leverage this entry barrier of critical mass by successfully creating its transaction service via the Internet. The suppliers of mutual funds pay Schwab for selling their products; they benefit from Schwab's initiative because they depend on Schwab's sales pull in the market. The satisfaction of the client stems from accessibility to up-to-date information and easy access to trading in mutual funds. The difference between Schwab's OneSource and discount Internet broke (E-trade, Ameritrade and Suretrade) is client segmentation. Clients of Schwab are not only interested in obtaining the best price, but they also value the advice. The TFA and Schwab cases also support the assumption that the success of electronic markets is supported by converging incentives for stakeholders.

7. Observations

Based on the in-depth analysis of the TFA case and the comparison of that case with examples of

electronic market initiatives in the financial industry, we provide a series of observations on the market impacts of IT as well as critical success factors for electronic market design.

1. The Framework

This paper specifies a descriptive framework of market design, which can be applied to analyze IT initiatives in different market settings. The analysis of the TFA case and the discussion of current developments in the financial securities sector demonstrate that the model provides support for the analysis of the complex issues that arise when building electronic markets in a particular industry.

2. IT innovation changes product attributes

Complexities of product description and asset specificity are indicators that determine the tradability of products and services on electronic markets. Stocks and commodities have simple and standardized product descriptions. Flowers however have more subtle and complex descriptions. Some flower attributes are standardized (quality) and some attributes are not standardized at the moment (color and scent of flowers). The TFA case shows that existing product standardization, in combination with information and high precision images on screens, offer reliable and precise product (quality) representations that enable screen based trading. The IT innovation moreover provides up-to-date supply information, which gives buyers a better overview of the market.

Given the product is perishable, flowers are highly asset specific products; availability of fresh flowers is crucial to the customers. The traditional Dutch auction system requires all flowers to go through the auction hall, which result in traffic congestion and delays in delivery as a result. TFA uncouples logistics and price discovery in the auction hall. Therefore, the internal logistics of the auction hall is much simpler, compared with the traditional auction system. The speed of the process is supported by the Dutch Auction system, which is a highly efficient price discovery mechanism. This explains why in the opinion of the buyers TFA has a much better logistical performance and service level, and therefore a higher time specificity of the product. This better performance is

achieved at the same transaction costs level. EAF paid much attention to the after-sales program providing transport to the buyers.

The discussion of the financial securities sector reveals that because of the risks of non-payment and non-delivery time is also critical in this market. The whole transaction cycle may not take more than 3 days (T+3), which means that in some countries settlement periods have to be reduced from T+15. This reduction is possible only when using IT, especially when the interrelatedness of organizations and the international character of the sector (different time zones) is considered.

3. Market Organization is a determinant of Market Quality.

The performance of a market (market quality) depends on its design. The TFA case and the discussion on the financial securities market showed that process design, use of IT, and trust are important design issues. The Kambil / Van Heck framework proved to be useful to describe the transaction processes in the TFA case. Perceived trustworthiness of the system appears to be an important determinant of success. In general, sellers and buyers find that TFA keeps its promises concerning quality of products, delivery time of products, and reliability of IT performance. Buyers trust the TFA products. Usually, they get better products than expected, given the data and images provided on the PC screen, due to a centralized quality control program. Buyers also trust TFA because the underlying auction concept is familiar: Dutch flower auction. Buyers trust the IT innovation: if a buyer is the first buyer to push the space bar at the PC key board, he or she is certain that the computer network transfers this signal fast and reliably, so he or she will be able to buy (part or all) of the lot. Also the growers trust the system, as they get paid by EAF (instead of potentially unreliable buyers).

4. Market Quality differs per market

The TFA securities case analyses show that Market-Quality based approaches are more effective to describe and assess the functioning of market institutions than traditional revenue based analyses.

What type of measures are important depends on the specifics of particular markets. Liquidity is an important attribute of a financial market's attractiveness, as we demonstrated through the OptiMark case. Liquidity has a number of measures such as the size of the bid-ask spread, the length of time a limit order takes to execute, and the probability that limit orders execute within a given time. While liquidity is a key indicator of market quality for financial markets, it is an inappropriate measure in the case of the Dutch flower auctions. First, order size is limited by lots available. Second, the flowers are traded one way from the sellers via the auction to the buyer, without further resale among buyers. For flower markets adequate product representations and short delivery time to guarantee a fresh supply of flowers are more relevant.

5. *Converging motives are essential for Market Success*

For a market to be successful it must meet the objectives of potential participants better than other alternatives do. If this does not apply for a specific group of stakeholders, that group will decide not to enter the market, and consequently the market will turn out to be a failure. In the TFA case, sellers, intermediary, and buyers have convergent motives. Sellers (foreign growers) like to have a reliable market channel for their products. They wish a fair price for their products. Sellers and TFA concentrate on the quality of their products. Buyers like to get reliable, high-quality products, even if they have to pay a decent price for it. Convergence of motives is a problem in the OptiMark case, as market makers lose profits. In the OneSource case it was shown that specific groups of stakeholders join different markets (e.g., E-trade).

6. *Competition with other markets: IT enables new markets to compete through lower overhead costs, alternative distribution channels, and active targeting of profitable segments*

The two cases illustrate a proposition presented by Clemons, Croson, and Weber [5], which is that new entrants readily apply IT to attract the most profitable market segments. In the OneSource case, we discussed how the high prices charged by full service brokers made it possible for discount

brokers such as E-trade to develop a market position fast by making use of the Internet. The result has been a further segmentation of the market between clients interested in trading and seeking advice.

Today, the TFA does about USD 75 million a year in business and is growing at 15% a year. The entrance of TFA into the Dutch floristry industry definitely had a profound impact on competition. By opening TFA to non-EAF growers and buyers, TFA built critical mass in a short period. Imports of Flower Auction Aalsmeer decreased by 23 %, whereas the average was 10% for all traditional Dutch auctions [3]. In May 1996, Flower Auction Aalsmeer decided to re-install the liberal import policy, and to implement an electronic clearinghouse for cut flowers and potted plants. The main reason is that they would like to remain the central market place for cut flowers and potted plants. EAF/TFA focuses on the high quality market segment of specific imported flowers, such as roses and carnations. Providing a strict quality control program, an excellent logistical performance, and other trust generating mechanisms are essential elements with these profitable market segments. Besides the strengths of TFA, the weaknesses of the traditional Dutch auctions partly explain the success of TFA. Market share of TFA's competitors decreased because of the cooperation structure of the Dutch auctions (every single grower has one vote). Every grower is a member of the cooperation; every grower has the obligation to supply their products to the auction. On the other hand, the cooperative has the obligation to market the products of its members. Average cost pricing policies and the inability to differentiate for specific growers and for specific market segments weakened the position of the traditional Dutch auctions. The complexity of the after-sale logistics (due to the coupling of the logistics with the price discovery process) still results in higher overhead costs. Finally, the Dutch auctions face their inability to implement IT innovations quickly; an example is the failure in 1994 of Flower Auction Aalsmeer to implement the sample-based auction system. In the sample-based auction system the trustworthiness of the sample, as a representation of the lot, was questioned by the buyers. A detailed analysis of this failure is presented in [17]. Other auctions can impact TFA. For example, Flower Auction Holland decided to copy the TFA concept; in August 1996 they introduced their own Tele Auction System. The auctions in Vleuten and Eelde

also introduced the Tele Auction principle. In November 1997, Flower Auction Aalsmeer finally introduced their own Tele Auction System with five buyers. For example, one of the biggest flower exporters, named Hiljo, now has three separate electronic auction connections: one being a connection with the TFA, one with the electronic auction system of Flower Auction Holland, and the other with Flower Auction Aalsmeer.

8. Conclusions

This paper offers three contributions to the literature on electronic markets. First, we identify important factors and processes that underlie electronic market transactions, and we combine these factors and processes in a descriptive framework. Second, we illustrate this framework through the TFA case. This case demonstrates the way a new entrant may use IT in an innovative way, in order to enter a market and compete with dominant players in that market.

In our analysis of this study, we identified constructs relevant to the success of the new entrant and the impact of electronic markets; these constructs are related to market organization, market quality, and convergent motives. The new screen-based rival to the traditional Dutch flower auction houses provides better supply and quality information. It provides excellent logistical service. But it provided product quality and speed of delivery with traditional Dutch auction principles, not changing the way people were used to doing business, as OptiMark did.

Growers, intermediary, and buyers have convergent motives; incentives for growers and buyers to use this new screen-based system are well managed. Growers and buyers consider the intermediary (TFA) as a trustworthy business partner. This trust is explained by the reputation of the intermediary and its current performance. This case further shows that new entrants can quickly build a competitive advantage. It illustrates the conclusion in Clemons, Croson, and Weber [5] concerning the strengths of new entrants in a competitive market. Our framework turned out to be useful to describe the relevant factors and processes of the TFA. Third, we compare electronic markets in

the financial and the flower industries. The financial industry provided a comparison and gave support the proposition that our framework is applicable to different industry settings.

The next step should be to refine these constructs and propositions into variables and hypotheses. With the help of multiple-case analysis, it will be possible to empirically test these hypotheses inside and outside the flower industry. In other industries, it is possible that IT can also affect the new entrants' success. Examples of those industries are given in Clemons, Croson, and Weber [5], as the telephone and telecommunications industry, the retail banking industry, and stock exchange markets. Lee and Clark [21] identify cases in the agricultural and the airline industries. Testing in other industry settings will further generalize our results

9. Acknowledgement

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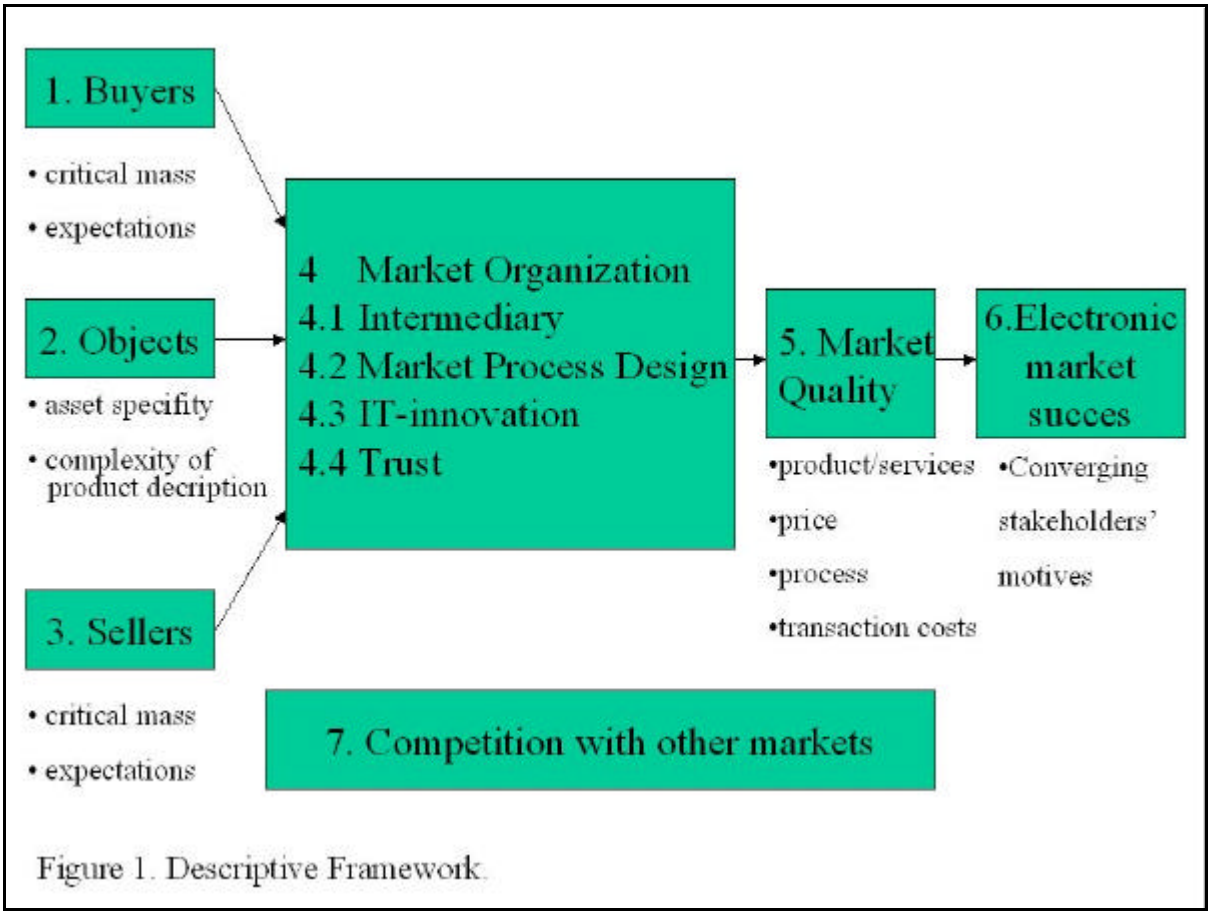


Figure 1. Descriptive Framework.

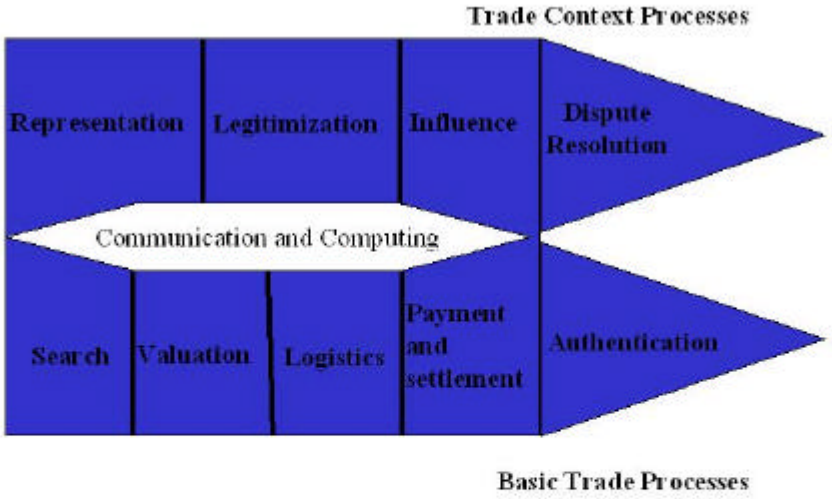


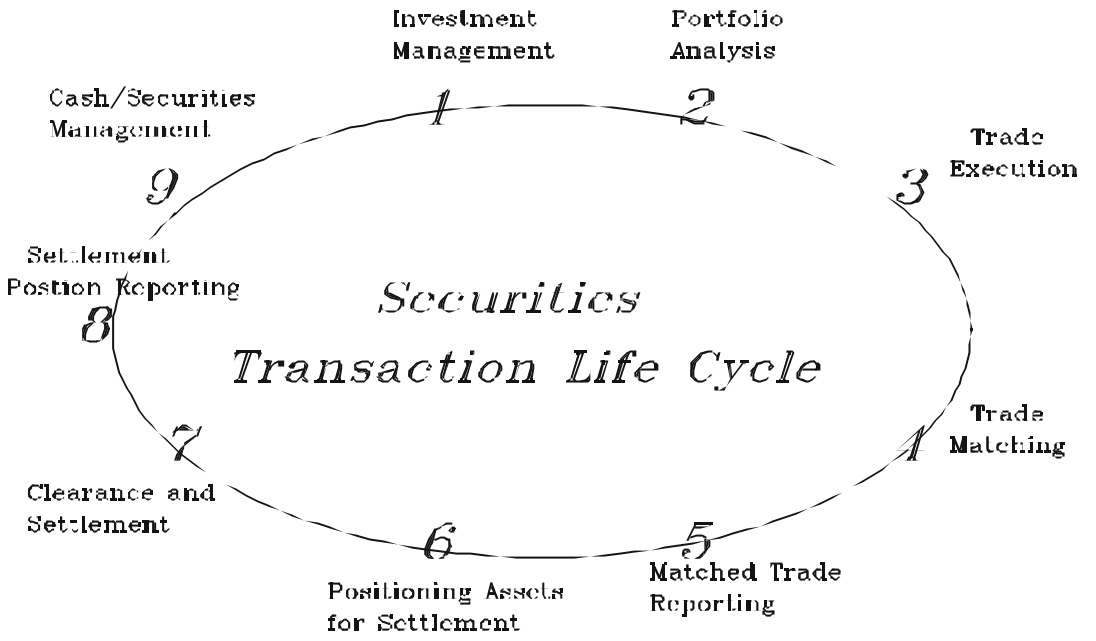
Figure 2: Market Process Design: basis trade and trade context processes.

Change to Table 1:

Table 2: Number of Imported Flower Stems (in millions) at the Dutch Flower Auctions (Source: VBN, 1999)

Import Source	1993	1994	1995	1996	1997	1998
Israel	621	656	703	907	1.090	1.157
Africa	598	693	638	721	820	1.017
Europe	256	398	379	333	384	377
North America	48	34	32	31	30	31
South America	22	18	22	23	25	38
Far East	9	8	9	21	29	32
Total	1.554	1.807	1.783	2.036	2.378	2.652

Figure 3: Securities Transaction Life Cycle



Source: JP Morgan/Euroclear

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