Electronic B2B, Impact and experiences so far

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Abstract

What is the *potential* impact of E-contacts on the nature of network roles and relations, in particular the transportation of goods and the locational requirements that results from this. Various scientific fields have been combined to deal with this issue. Purchasing literature is used to select those goods and services that are E-Contact sensitive. Using portfolio analysis enables a differentiation between goods, suppliers and *relationships.* Regional science literature is used to evaluate the E-Contact sensitivity of relations, based on the degree of routinisation of activities and the nature of contacts required to perform these activities. Extrapolating the results, new opportunities for actors are found, in new roles, with new criteria that actors will be evaluated on. This affects the required characteristics of logistical flows and the optimal location for establishing activities. It results in a dynamic location model for logistical activities. It predicts a continuous process of preferential shifts between locations. New locations with time hazard-free access and a high perceived connectivity to central areas become favourite. When as a result of their popularity congestion rises, they will become unpopular. Another location becomes the new favourite after which the cycle continues. The model and the postulated trends were tested among 26 companies in the Northern part of the Netherlands.

1. E-Contacts: high expectations and disillusions

Electronic Data Interchange (EDI) but especially web-based electronic data communication raised high expectations. Leading multinationals started large, expensive and prestigious E-Commerce and Electronic Procurement projects. However, the bursting dot.com bubble plus the problems encountered when trying to implement all the web-based dreams, resulted in changed attitudes. It now expires that many projects were started ill founded or prompted by greed or fashion arguments rather than sound business or scientific arguments. Now both companies and scientists have a more realistic view about reality, the question may be raised what the impact of the 'E-thing' *potentially can* be. What is the effect on the way companies will deal with each other in the future? What will be the effect on flows of goods and information between firms? What will be the effect on transportation of the goods involved? These questions are the basis for this contribution.

With the term 'E-Contacts' we refer to all information, passing between actors in a network by electronic means. This includes EDI, E-Commerce, E-Business, E-Procurement and E-Mail. According to Forrester Research (2000), the consumer oriented E-Commerce sales value (B2C) in Europe is assumed to grow from US$ 3 million in 1999 to US$ 232 million in the near future. The value of business-to-business transactions (B2B) will be six times as high. For that reason, we will focus on the B2B part, in combination with other E-Contacts that are complementary to these B2B contacts, such as E-mail and EDI.

As stated, the purpose of this contribution is to analyse *(1)* the impact of E-Contacts on the way companies deal with each other in networks; *(2)* the resulting effects on logistical flows and *(3)* the associated effect on locational requirements of companies. The structure of the paper is the following. To establish the possible effects on goods and services, we start with the purchasing literature. This literature enables us to differentiate between various types of goods and services and the type of business relations, associated with them. Using the characteristics of these different type of relations, we will analyse how 'sensitive' they are for impacts of E-Contacts. For this analysis, we will draw on the regional science literature and will use the degree of standardised routines in the activities related to these contacts as a basis. As a result of this analysis, we find new possibilities for actors in the network, with new roles to be played. Associated with these new roles, we will discuss the requirements that the various actors have to fulfil to play these roles successfully. These demands also include logistical aspects. Therefore, we will formulate the expected changes in logistical demands and what it will mean for the locational behaviour of companies in a number of hypotheses. These hypotheses result in a dynamic location model. Having described the model, we will discuss the result of an empirical test of our theoretically based hypotheses and model. This empirical test was based on a series of interviews with different types of actors. We will finish with our conclusions and recommendations for further research.

2. Differentiation in supplier relations: purchasing literature

2.1 The purchasing cube

To enable us to differentiate between the various types of *relations* companies – or, actors, in more general terms – have in a network, we use a concept from the purchasing literature: portfolio analysis (Fisher, 1970; Kraljic, 1983; Hughes et. Al , 1998; Olsen & Elram, 1996). The most recent form of portfolio analysis is the so-called *purchasing cube* (Kamann, 1999a, 2000), which in fact is the assembled result of three matrices (figure 1).

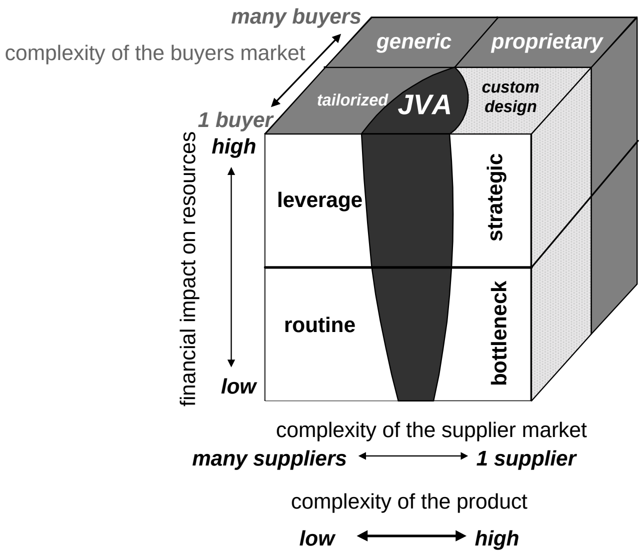


Figure 1. The Purchasing Cube

The role of portfolio analysis here is its ability to differentiate between different types of products, the associated suppliers and relations with those suppliers, including the relevant supplier strategies. By analysing these relations between actors more closely, predictions can be formulated about the effects of E-Contacts and the way actors will deal and interact in networks in the future.

2.2 Differentiated products, suppliers and relations

The front end of the cube contains the Kraljic-matrix. This matrix has four product categories, characterised by two axes: *(1)* the complexity of the supply market, in practice: is it easy to find an other supplier for this product; are there many suppliers? *(2)* the financial impact; how much do we spend on this product category. In theory, the top two matrices contain 80% of the total expenditure in purchasing and 20% of the suppliers. The division line usually hovers at around 2-4% of the total spent. *Product* groups with more than 3% of the total spend are above the line. The resulting four quadrants and their categories are:

- *routine* products: stationary, catering, "small fry" (many suppliers, low purchasing value);
- *leverage* products: steel, oil, energy, standard raw materials/commodities; (many suppliers; high value);
- *bottleneck* products: screws, nuts and bolts of special alloys, special parts of OEM origin, special products; (few suppliers; low value);
- *strategic* products; more expensive special products; results if special product developments by suppliers and co-designers in co-operative projects; (“few suppliers; high value”).

Using the product categories, the associated *suppliers* are categorised along the same lines. Each category is associated with a different supplier strategy, leading to different supplier relations. These are:

- routine: no "messing around with things"; logistics important; complete dependence of a single supplier to optimise Vendor Managed Inventory and other services in the field of ordering (catalogue systems) and paying (purchasing cards; one invoice a month etc.); supplier can be easily substituted; avoidance of organisational costs like handling, ordering, administration receives much attention;
- leverage: optimise contract, supply chain and overheads: supplier visits for audits; supplier has to come up with new ideas to reduce Total Costs; logistical reliability key factor, next to qualifiers as price and (standard) quality;
- bottleneck: try to replace with routine product; try to let leverage supplier deal with it, especially the handling;
- strategic: partnering, durability in relation, trust, high switching costs, small number of suppliers involved, contact intensive, logistics in development stage less important, in production stage and supply it is.

For a number of categories we find that a number of services is added to the products: logistics, supply chain co-ordination, payments, way of ordering. Increasingly, the potential to combine physical flows of goods to combine with digitised information to create an attractive package for the buyer is pursued.

2.3 The supplier's point of view

The second matrix reflects the point of view of the supplier (Hughes et al., 1998). Again, the horizontal axis gives the number of suppliers (many <> few). The vertical axis this time gives the complexity of the buyer's market: many or few buyers. When we flip the matrix and put it on top of the cube, we get four columns:

- *tailorized* products (Dell computers); suppliers combine through mass customisation and flexible production technology a larger amount of market segments;
- *generic* products (oil); standard products, usually with industry norms, traded as commodity; potential spot-markets;
- the *custom design* situation: one-to-one: one supplier – one buyer;
- *proprietary* products (Microsoft): unique (branded) products with a *de facto* monopolistic supplier (selling through agents, distributors, dealers) and many atomistic buyers.

With suppliers of generic and proprietary products, specifications are fixed: no discussion possible. With generic products, logistical services can be added to the product to differentiate it from the 'plain' commodities and spot markets. With tailorized products, specifications vary over a defined range within certain limits. Custom design products are unique in their buyer specifications.

2.4 Joint Value Analysis

The Fisher-matrix (1970) is the third matrix. It resembles the Kraljic-matrix but this time the horizontal axis reflects the complexity of the *product*. For more complex products, more intensive co-operation is likely, especially for high values involved. Co-operation focuses on a trajectory of joint value analysis (JVA) and joint value engineering. All stakeholders in the value chain should be represented in the analysis and re-engineering: how to redesign the product, produce it most efficient, package and transport it and finally, how the product fits best on the display, shelf or freezer. Aimed to reduce total costs of the entire trajectory through the supply chain, from initial producer to final user (and recycler) while maximising user value. Joint Value Analysis (JVA) is assumed to take place in the transcending area between leverage and strategic products. For, with very simple products, it usually makes less sense to go through this type of analysis to change specifications – only the logistics surrounding it. The really very complicated products on the other hand, will fit into the category co-design or co-development.

JVA has two stages: in the first stage, many contacts and discussions are required between the stakeholders. Once the optimal configuration and specifications are established, the second stage starts. From then onwards, it actually blends in with the category of tailorized products.

Above, we found differences between supplier relations. In order to trace the impact potential of E-Contacts, we first have to make a little detour to see *which aspects* of these relations can be used as criteria.

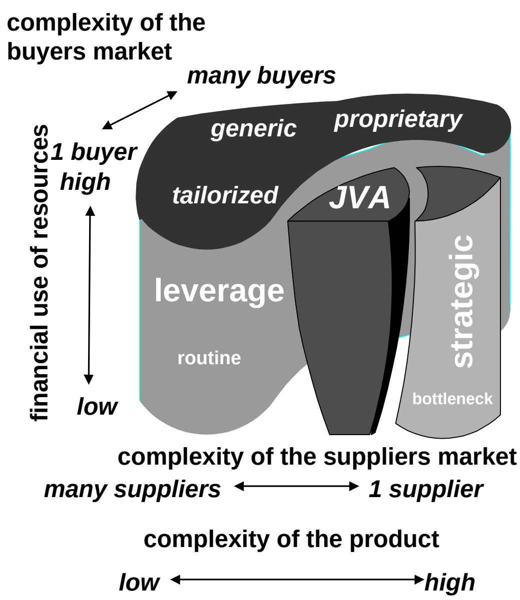
3. E-Contact potential: regional science literature

In order to establish the possibilities of E-Contacts, I use the results of research of the regional sciences (Goddard, 1973). The more routinised activities are, the easier it is to substitute the contacts related to them with telecommunications. The more knowledge intensive – 'paradigm transcending' – activities are, the more the contacts associated with them have to be face-to-face contacts. These are more difficult to replace with telecommunications. Telecommunication does have a complementary effect, but does not substitute. I will assume that E-Contacts in nature and influence do not differ in a significant way from telecommunication contacts when it comes to contact requirements. That means that in case of increasing knowledge intensive face-to-face contacts, substitution with E-Contacts is less likely. This has the following implications for the *relations* and the associated *contacts* with suppliers:

- A large block of *tailorized/generic/proprietary products:* after the routine of comparing similar supplier offers, a standard contract is closed, coming from the database of the buyer/suppler; orders are generated by users in the organisation (using catalogue systems or not), by end-users, by scanners (in check outs or bins/tanks) and/or by vendor managed inventory systems or MRP-systems; relations are relatively impersonal and routine based; exceptions can be found in the first stage (negotiation and contracting) and the vendor evaluation stage, where more face-to-face contacts can be found;
- The first stage of JVA contains a high extent of face-to-face contacts, supplemented with E-mail, transfer of drawings and calculations by web based technologies.; the *second stage* falls into the previous category described in terms of ordering and co-ordination;
- For the category of custom design we expect little substitution to take place; less routine activities and relatively many face-to-face contacts discussing new applications, techniques, (in)possibilities and brain storm sessions have to take place; the production stage moves towards the large block in terms of E-Contacts and possible effects.

Figure 2 represents the result.

Figure 2. Clustering inputs and suppliers based on E-contact potential



4 New roles for new players

4.1 Brokers, capacity suppliers and co-developers

Based on the previous section and further extrapolating the impacts, three new *roles* for suppliers can be identified. These roles differ in the type of contacts taking place, the type of activities taking place, the knowledge level and the competence profile.

The first role is played by the *broker*. Brokers do not produce themselves in the traditional sense of the word, they *organise* supply and demand. In their most archetype form, they are virtual organisations. Some brokers may have a *collecting* role: they collect a complete 'shopping basket' of *products* as specified by the buyer among various suppliers. They supply the buyer through orders or through scanners. Brokers also can collect *buyers* to obtain higher volume and because of that discount (leverage effect). In fact, this is the modern version of the purchasing co-operative. Producers can do the same and ask a broker to act as sales co-operative. For both cases applies that when a large market share of producers or buyers would be involved, it is subject to cartel legislation.

The second role is played by the *capacity supplier.* This actor owns and uses production facilities. Buyers reserve a *'time slot'* in the production schedule for a certain time period. Products can be generic, but also tailorized. They can be components, modules or final products. To assemble various components and modules into a final product can be a capacity supplier's job.

The third role is performed by the *co-developer.* The buyer will have an intensive and long-term relation with this type of actor. Sometimes, a *team* of co-developers (Praat & Alders, 1998) will work together, maintaining frequent contacts. When the prototype is ready, decisions have to be taken which capacity supplier will produce certain components and modules or whether he will perform the entire assembly.

The various players only can perform their roles properly, when the respective business processes are well linked up. From the increased emphasis on Supply Chain Management, Materials Management in literature we derive the view that logistics can be seen as the *bonding agent* between the business processes of all actors involved.

Actually, within the group of all logistical activities, we again differentiate between *brokers* (arrange and co-ordinate transport, distribution etc.), *capacity suppliers* ('wheels': the 'mamma-daddy companies but also the specialists in co-packing, order picking, boxing and other logistical services) and finally the *co-developers* (design the entire supply chain and logistics).

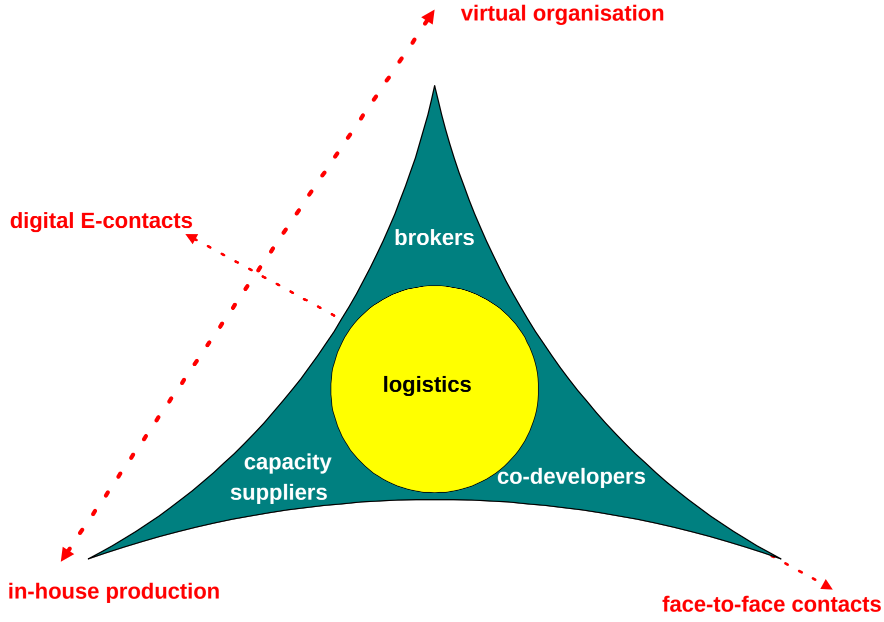
4.2 The new triangle of players

The three new types of players are ordered using two bi-polar scales:

- reflecting the nature of *relations* and *contacts:* "high extent of (possible) use of E-Contacts " versus "high level of non-substitutable face-to-face contacts"; the more routinized an activity associated with the contact, the more likely E-Contacts can be used;
- reflecting the nature of *activities* of the player: "virtual organisation" (without physical production) versus "in-house production".

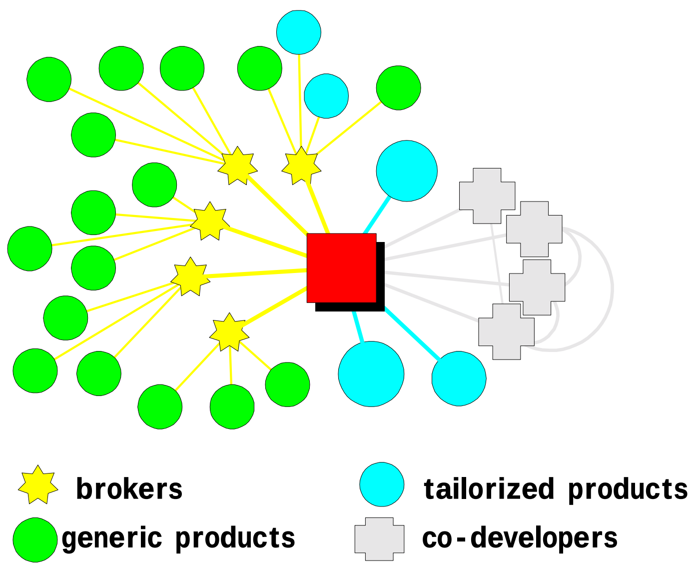
Logistics is located in the middle as bonding agent (figure 3).

Figure 3. New players in new roles



From figure 3, we come to *"the network of the future":* a focal company, surrounded by brokers, co-designers (sometimes), capacity suppliers and brokers, surrounded by capacity suppliers and so on (figure 4).

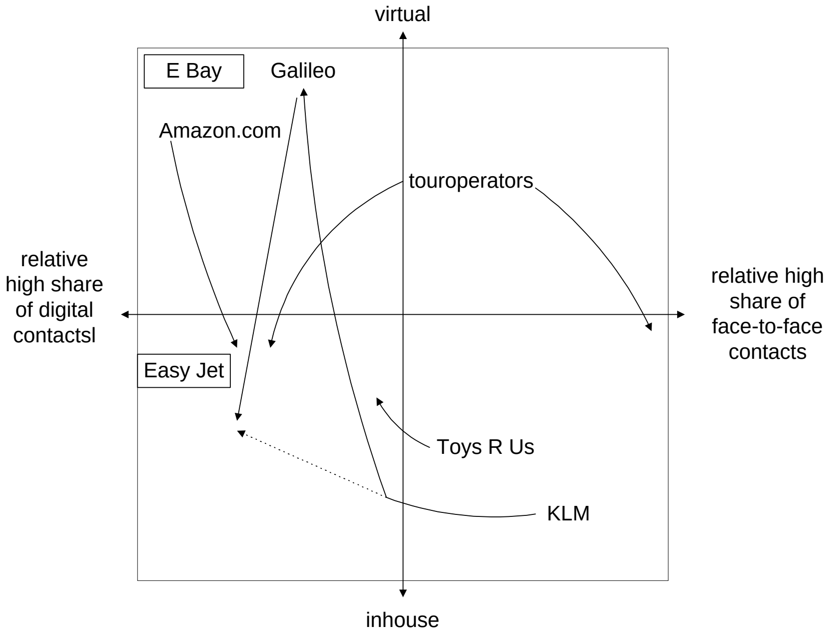
Figure 4: The network of the future



5. Towards our model: empirical support

Our model describes three archetypes of actors. real life rarely consists of archetypes. For this reason, we looked at different sectors to see what trends could be derived (Kamann, 1988, 1999b). These trends should either support our predictions or contradict them. Figure 5 represents some of our findings. We specially focused on the questions, related to the scales used in figure 3.

Figure 5: Some types of companies and their trends

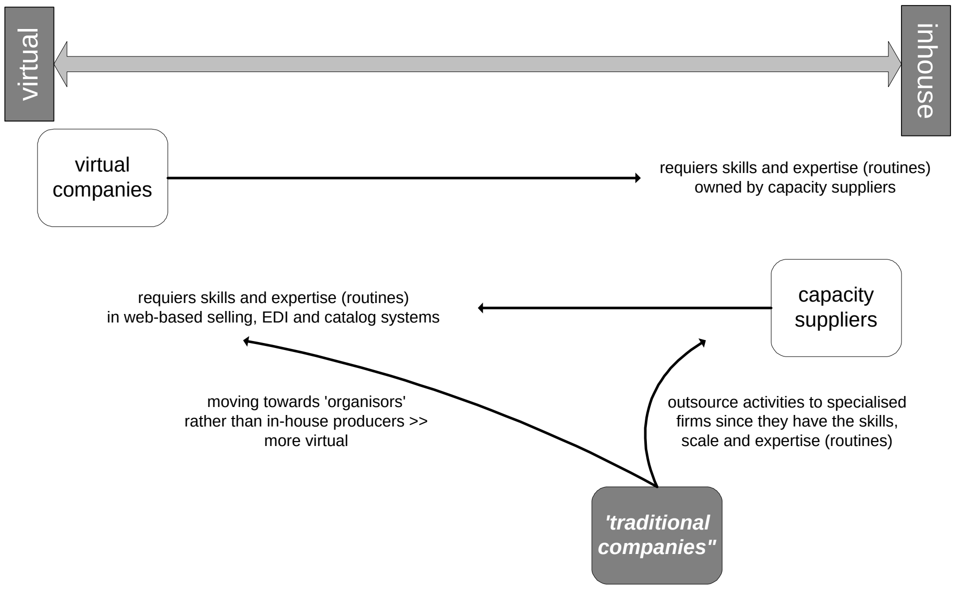


In figure 5, we found among the companies and industries different strategies. The first type consists of typical *' true' virtual companies* like internet auctions that just are market places. Transport of the goods purchased is provided and arranged by the seller (e.g. E-bay). As long as they stick to their original concept, they remain true virtual, based on digital contacts. The second type is the *virtual company that moves into more in-house activities:* keeping stock, distribution houses etc.: the Amazon-com example. A third category is the *'direct selling' company* that uses web based selling: Easy Jet. We will find that for instance mail order companies will fit this category as well. For them, internet is just a substitute for telephone orders: a new channel. Airlines had outsourced their ' digital contacts' on the sales side to a shared reservation system: Galileo or Amadeus for example. We find these days that airlines sell their shares in these reservation systems and move into direct selling through internet. As a company, they therefore move towards the left in the matrix. We have included tour operators as a type of company with a *mixture of strategies:* through vertical integration, the large multinational tour operators move towards more in-house production. At the sales side, the face-to-face contacts increase through the ownership of travel agents. On the other hand, they also moved into web based direct selling. Contacts with suppliers – the hotels, airlines, catering and so on, usually is electronic: EDI, E-mail or through electronic reservation systems. Or, by fax or telex.

What we see is two different movements:
1. some true virtual web-based companies may move towards more in-house activities;
2. some true in-house based companies (the 'brick-and-mortar' companies) start using the web as a new sales channel which makes them move towards companies with a higher share of digital standard contacts

However, the moment the true virtual companies start moving towards more in-house production, they have to compete with specialised capacity suppliers: e.g. in distribution, stock keeping, order picking, etc. They have to possess the proper *capabilities* (Kay, 1993). However, these do not belong to their core capabilities that was the very reason for their existence (creative marketing concept for instance). This makes them vulnerable, since they may not have the managerial skills – and routines – to fulfil those activities in an appropriate way. A rather different situation exists for companies that start from the opposite side – the in-house producers that just add web-based selling to their sales activity as a new channel. They already have the appropriate skills – routines - to run the 'physical' parts of the business. All they have to do is to buy the expertise – skills, routines - that are required to set up and run a web based sales activity. Which actually is more difficult that just starting a home page. For these companies, the challenge lies in making the company processes fit the new sales techniques. Companies that fail to do so will fail to reap the benefits from their web sales activity and may end up with the same fate as the virtual companies that moved away from virtuallity towards more in-house activities. Finally, a trend we did not mention here is a rather general trend to outsource activities to specialised suppliers. In less inventive companies, these are leverage suppliers, in more innovative companies, these are more strategic partners. Figure 6 gives a summary.

Figure 6: Trends among companies



6. Location demands

6.1 The players in their new roles

Having checked our model with real life, we will return to our main issue: what is the impact of this all on logistics and the specific locational demands of the various actors in their new roles. Of course, these actors can be new *and* existing actors, developing new roles. in fact, what we see happening at the moment is, that many existing companies move towards new roles. From existing network literature with a spatial dimension (Kamann, 1988, 1999b) we can derive conclusions as to whether actors are:

- relatively foot-loose or not; that means: location *indifferent;*
- focused on *industrial agglomeration effects;* that means they want to be located close to their buyers and/or suppliers;
- focused on *urban agglomeration-effects;* that means they want to be located near large urban areas (cf. central place theory, Christaller, 1933);

Table 1. Location requirements players in their new roles

Category player	*Sub-group*	*Foot-loose or agglomeration oriented*
Brokers	General	*Foot-loose;* in 'purest virtual' form, brokers can be located anywhere.
	Commodity specialists	In case of clear *(inter)national centres* in the trade of certain, these centres are likely locations because of the presence of (informal) contacts (cf. the focus concept; Kamann, 1989, 1999b).
	Hybrid brokers	Broker activities originating from existing wholesale activities will follow the locational preferences of these wholesalers, close to large urban areas; oriented on urban agglomerations
Capacity suppliers		Will follow 'normal' industrial location preferences: varying from relatively foot-loose to focussed on *industrial agglomerations;* access to good physical infrastructure is precondition for increased importance of just-in-time, zero-stock and vendor managed inventory
Co-developer		Because of high content of face-to-face contacts predominant focus on *industrial agglomerations;* in practice, buyers are internationally dispersed and industrial agglomeration is in economic space rather than in geographical space

The questions that come up from the previous sections are related to the nature of *(1)* the demand logistics is facing in order to fulfil the function of 'bonding agent' *(2)* the demand in terms of locational requirements and preferences that are the result of that; what will be the locational preferences of the logistics firms.

6.2 The logistics service providers: time hazard free access

In order to fulfil the requirements of the various players in the network in its function as bonding agent, predictability and reliability of supply times are becoming more important. Given, the increased needs for fine tuning of the logistical processes. For the transport company, reliable *access time* – to suppliers and buyers – becomes an important factor. This implies that as part of their locational behaviour, both suppliers (the capacity suppliers) *and* buyers (divided over other capacity suppliers, retailers and final customers) will look for proper infrastructural facilities. Distance *per se* plays a less important role. For, distance is translated into cost price, time uncertainty is reflected in the reliability of delivery. To arrive too late can result in a production stop of a plant of one hour, or, the *time slot* in which the particular batch of raw materials had to be used, has expired. The financial consequences of such a thing can be higher than the additional (predictable) costs of distance *per se.* Logistic service providers therefore will have a preference for locations with risk or *time hazard free* *access* to *(1) industrial* agglomeration for collecting goods and delivering goods; *(2)* large *urban agglomerations* for deliveries with buyers in those areas (retailers, wholesalers and urban oriented firms on industrial estates around the cities).

Logistic service providers live in a paradoxical situation: on the one hand they want to be as close as possible to the market (for inputs and delivery points). On the other hand, they want to reach scale effects which favours centralised locations. Centralisation may result in larger distances (and therefore longer travel time); an optimisation model may help to make the right choice.

Summarising: brokers can be relatively foot-loose, capacity suppliers and logistical service providers on the contrary prefer locations with hazard free access times. For capacity suppliers, these locations usually can be found on industrial estates with proper infrastructural connectivity within the context of industrial agglomerations. Logistics providers will prefer central locations with hazard free access times to suppliers and delivery points. In the case of co-developers, it all depends of the role and importance of actual production of the products developed. The larger that part becomes, the more they move into the direction of capacity suppliers.

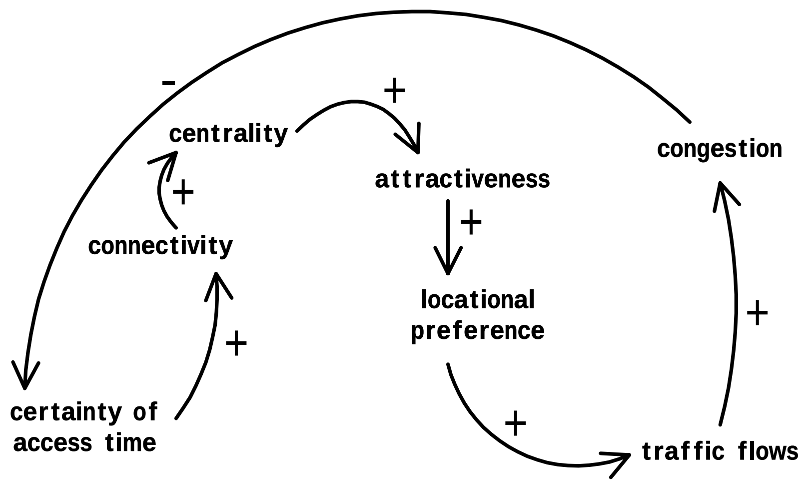
7. A dynamic model for locational behaviour for logistics providers

Given the purpose of this contribution, the locational preference of logistics providers will be discussed in more detail. These companies aim for

- *centrality* in their locational behaviour; close to industrial- and urban agglomerations;
- *certainty in access time;* or, differently put: *minimising time hazards*.

Because of this, the preferred location should have high *connectivity,* together with a low access time hazard. This results in the following dynamic model (figure 7).

Figure 7. Dynamic locational preference model logistics providers



A high perceived certainty related to access means a location has a good perceived connectivity. That results in improved perceived effective centrality. Because of that, the location will become more attractive for logistics providers. This will have a positive impact on locational preferences. However, that results in more companies moving there, which results in increased traffic flows to and from that particular location. That causes congestion, which has a *negative* impact on the certainty of access time. Then, a negative spiral movement sets in, reducing the locational preference of logistics providers for that location and shifting it towards an other location. In other words: the perception that a location is attractive results in establishment of companies, but a *collectively shared perception* turns it *un*attractive again, causing logistics providers to move out again to a location they find more attractive. Or, new investments will occur in other locations.

We conclude from this, that a continuous reorientation takes place by logistics providers. Again and again, new locations are declared to be 'the' favourite location; as a result, they suffer from their own popularity. A continuous process of 'reorientation' and 'further moving' collection/distribution centres with a perceived optimal mix of centrality and hazard free access follows from our theoretical model.

8. Interview results 26 firms

Our reflections are theoretical. To see whether companies recognize the trends described and act accordingly, we interviewed 26 interviews among various types of companies: transport companies, food producers and suppliers of stationary in the typical ‘routine quadrant’ where logistics and VMI are assumed to be important. The results (table 2) show that companies in general do become aware of the role of time slots and time hazards. Still, few companies actually decided to *relocate* because of it.

Table 2: Interview results from 26 firms

Transport Companies	*Capacity supplier food*	*Wholesalers stationary*
Increased importance of lead-time and time-slots	Stricter time windows buyers	Time slots of importance
Reliability key-element	Strict requirements from suppliers	VMI makes the difference
Locational preferences according to model	Locational indifferent	Follows loc. preference model
More outsourced logistics	Externalises problem (outsourced logistics)	Client comes or delivery service?
Increased awareness of traffic related time hazards	No congestion problems (periphery)	Becoming more traffic risk aware
“Wheels” versus “Full service”		Large Leaders <> small laggers

We did find that more and more companies solve the problem by outsourcing transport and distribution. This way, they externalise the problem to specialists. Transport companies that operate in the relatively congestion free North did agree with the trend and emphasized that for trips into the West, they certainly take it into account. In the North, they only experience the problem in the typical beet sugar season. Companies providing 'routine' products and acting on vendor managed inventory systems – stationary - seem to be most aware of the trend. These typically were the larger companies: they were acting accordingly.

9. Conclusion

Using a differentiation between various product categories, supplier relations and contacts associated with them can be differentiated as well. The level of routinisation of activities and the related contacts are used to predict the potential impact of E-Contacts. Based on these predictions, new roles can be described for brokers, capacity suppliers and co-developers. Logistics would act as a bonding agent of the business processes of the actors in the network. To fulfil this function properly, logistics providers and routine goods suppliers (modern wholesalers) acting on vendor managed inventory will prefer locations with time hazard free access to (and from) industrial- and urban agglomerations. This results in a dynamic process of continuous reorientation where again and again new locations become 'the' favourite location for distribution centres. These favourites end up becoming unpopular because of the resulting congestion.

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