DEVELOPMENTS IN DISTRIBUTION NETWORKS
- A framework for understanding variety

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Introduction

Substantial restructuring of distribution systems for industrial goods is under way (Narus & Andersson 1996, Pitt et al 1999 and Gadde 2000). Primarily restructuring occur owing to increasing service demands from customers and technological development making new strategic options available to suppliers. End-users increasingly ask for solutions that help them solve their particular problems (Anderson et al 1997). The problems of end-users are different – some require low-cost distribution arrangements while other demand complex (and thus more expensive) systems. Therefore, the on-going changes result in more differentiated distribution systems than traditionally has been the case. Technological development has contributed to shaping this variety. Narus & Anderson (1996) studied some successful distribution innovations introduced by US-firms. These solutions had been made possible through 'information technology and integrated logistics systems that can monitor the availability of products and services, process orders, and deliver products and services rapidly from distant locations to customer sites' (ibid. p. 114).

Anderson et al (1997) argue that firms increasingly have recognised that neglecting these opportunities is risky. The authors found that suppliers under pressure from powerful market trends and technological changes are 'vigorously scrutinizing past practices, commitments and relationships' (ibid. p. 59). The main objective of this paper is to illustrate the nature of these changes in practice and to provide a framework for analysis of the ongoing restructuring. A sub-aim is derived from a tentative hypothesis that the changes of the distribution reality are of such a magnitude that established models need reconsideration.

The changing distribution reality

The most important change in distribution is a shift from standardisation to customisation (Lampel & Mintzberg 1996). For long mass production and mass distribution were the main determinants of efficiency in industry. This structure relied to a large extent on standardisation.

> ...standardization of taste that allowed for standardized design, standardization of design that allowed for mechanized mass production, and a resulting standardization of products that allowed for mass distribution. (ibid. p. 21)

The main task in this system was to 'channel' products through an organised system of intermediate firms and warehouses from the factory to the ultimate consumer. Lampel & Mintzberg argue that 'the logic of aggregation' ruled the game at that time. They also illustrate how 'the logic of individualization' over time has come to play an increasingly important role in serving customers. Owing to developments in manufacturing techniques mass production is no longer a prerequisite for economic efficiency. This change combined with developments in IT and logistics have reduced lead times in production and distribution and made customising increasingly common (Pines 1993, Feitzinger & Lee 1997).

Moving from aggregation to individualisation has some profound implications for the distribution structure. In the 'channel' era the main emphasis was on finding efficient means for the output of the factory. This was beneficial for customers as well because it reduced costs. When customisation becomes a key issue it is the input operations of the user that must be of prime concern. In the terms launched by Alderson (1954) the 'technology of use' has become increasingly important in comparison with the 'technology of production' which was emphasised in the era of standardisation.

This shift in the basic perspective of what is the fundamental distribution issue has affected the underlying structure. Ford et al (1998) argue that the evolving structures indicate that a network perspective seems a more appropriate conceptualisation than a channel. Curry & Kenney (1999) present similar recommendations on the basis of a study in the PC-industry where they found that this system is 'perhaps better captured by the metaphor of a network rather than by the notion of a chain' (p. 16). The underlying reasons for such a change in the basic view are nicely expressed in the study of innovative US-companies mentioned above (Narus and Anderson 1996, p. 112):

> The managers [...] view their distribution channels as webs of capabilities embedded in an extended enterprise. They have realized that by sharing their resources and capabilities in novel ways and new situations they can take advantage of profit-making opportunities that they could not exploit on their own

The first conclusion regarding the changes in reality is the need for a network approach. The second issue is to decide on the focus of a network analysis. To be able to do that we need to understand why firms increasingly are 'sharing their resources and capabilities in novel ways'. The main reason seems to be an increasing specialisation of industry, both in production and distribution. Over the last decades outsourcing have entailed reduced degrees of vertical integration, implying that a 'vertical' specialisation has occurred. At the same time distribution is subject to substantial 'horizontal' specialisation. The outcome of this type of specialisation is that the distribution functions have been split up among specialised actors. A number of studies have confirmed the existence of specialised intermediaries like 'information brokers' and 'third party logistics providers'.

The major reason for resource sharing is the changing nature of the activity structure. Firstly, the specialised actors provide opportunities for both efficiency improvements and customisation owing to their specialised resources. Secondly, the horizontal and vertical specialisation of the activity structure increases the need for co-ordination in the network. Thus, the changes of the activity structure are fundamental for the restructuring of distribution. Consequently, the focus of this paper is on the activity layer of the network.

Transvections in activity structures

We have argued that the changing distribution reality presumably calls for reconsideration of prevailing models. In spite of that it does not seem necessary to develop entirely new models. Instead we will rely on a concept developed a long time ago which has been almost neglected. The discussion above indicated that a relevant point of departure for alternative conceptualisation is activity analysis in a network context. We will use a concept developed more than thirty years ago by Alderson (1965): the transvection concept.

> [A transvection)] refers to a single unit of action of the marketing system. This unit of action is consummated when an end product is placed in the hands of the ultimate consumer, but the transvection comprises all prior action necessary to produce this final result, going all the way back to conglomerate resources. (ibid. p.92).

'Transvection' thus seems to be a most appropriate concept for our purpose. It is useful because it 'comprises all prior action' to final delivery. History shows the strong interdependence between production and distribution activities. Mass production required mass distribution. When mass production is no longer a prerequisite for economies of scale in manufacturing, customised distribution becomes an option. Furthermore, transvection analysis is useful owing to the holistic perspective making it possible to capture the impact of both vertical and horizontal specialisation.

The empirical setting of the paper is the PC-industry. There are several reasons underlying this choice. The first is that PC-distribution is characterised by huge variety. Curry & Kenney (1999) shows that 'traditional channels' (illustrated by IBM and Compaq) co-exist with new emerging structures represented by 'local assemblers' and direct marketers like Dell. The second reason is that choosing PC-distribution helps to solve a methodological problem. According to Alderson a transvection is 'going all the way back to conglomerate resources'. Any study relying on transvections must, for practical reasons, delimit the activity structure that is scrutinised. This introduces a problem since going all the way back is the main argument for holistic analysis. In the PC-industry the delimitation problem appears to be less significant than in other industries. A PC consists of six main components: hard-disc, mother-board, disc-drive, cabinet, memory and processor. These components are combined into a functioning PC when installed with software. In this case it seems relevant to consider the six components as the 'conglomerate resources'. The third reason for choosing the PC-industry is the large number of potential transvections available. According to Curry & Kenney (1999) there is a large variety of interchangeable components readily available, implying that 'there are many possible ways to organize the value chain' (ibid. p. 16).

FIGURE 1: The basic research model

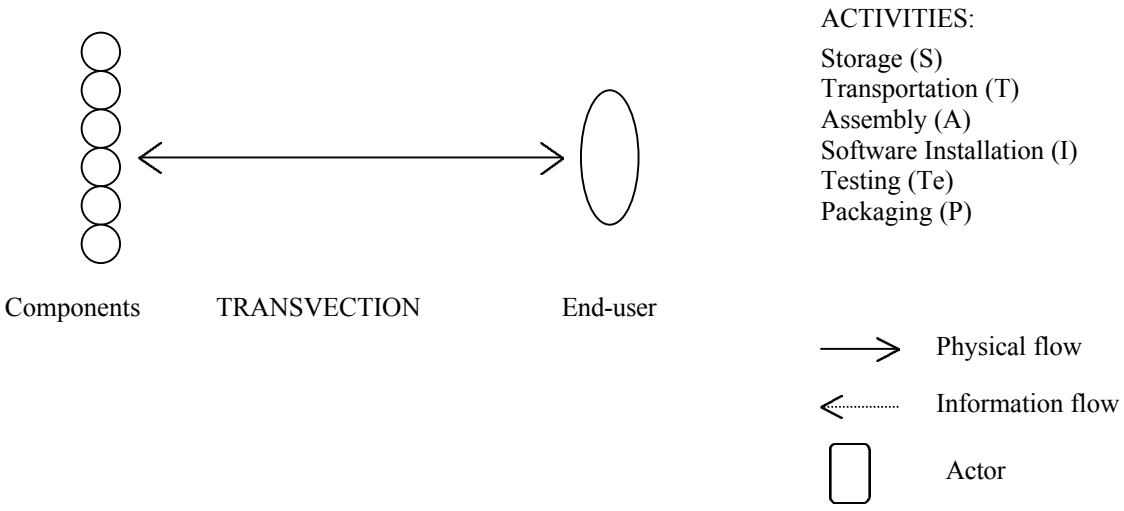


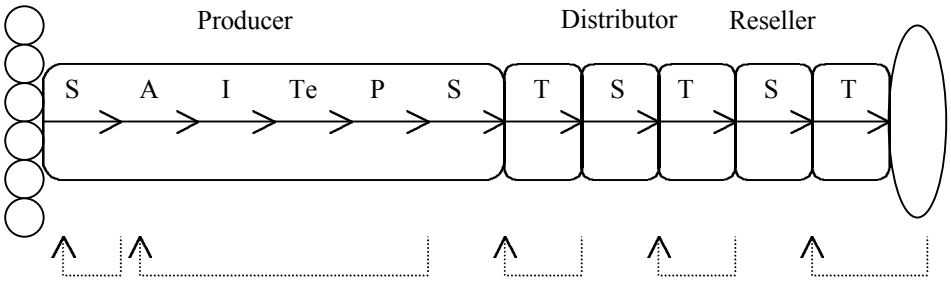
Figure 1 illustrates the basic model of the analysis. The transvection starts with the basic components and ends when a PC is landed in the hands of the end-user. This can be done in a large number of ways implying that many transvections are possible. It means also that the activity structures of the transvections may be very diverse. The analysis in this paper is focused on the activities in figure 1 that are typical for any transvection. Three transvections with very different characteristics will be illustrated. The transvections are described in terms of which activities that are included, how the transvections make use of the resources available and what actors undertake and co-ordinate the activities. After this descriptive part we introduce and elaborate on some concepts that seem useful for the analysis of the transvections. In the concluding discussion we bring up two things. First, we discuss the need for alternative conceptualisations, and second we come up with some implications for practice.

Illustration of three transvections

Transvection 1: Mass production

The first transvection (figure 2) illustrates 'traditional' PC production and distribution. The end-user buys the PC from a reseller offering an assortment of standardised PCs. This reseller hence supplies a variety of different PCs kept in stock, all of which are standardised - no customisation is offered. The reseller has procured the computers from distributors providing a broad assortment of PCs and related products. The distributor in turn has purchased the PCs from the various producers. Producers 'manufacture' the computers by assembling components bought from the suppliers of 'conglomerate resources'. After assembly, software is installed, the PC is tested, packaged, stored and shipped. In this transvection all PCs are standardised and production and assembly is scheduled according to forecasts of demand.

FIGURE 2: Transvection illustrating mass production

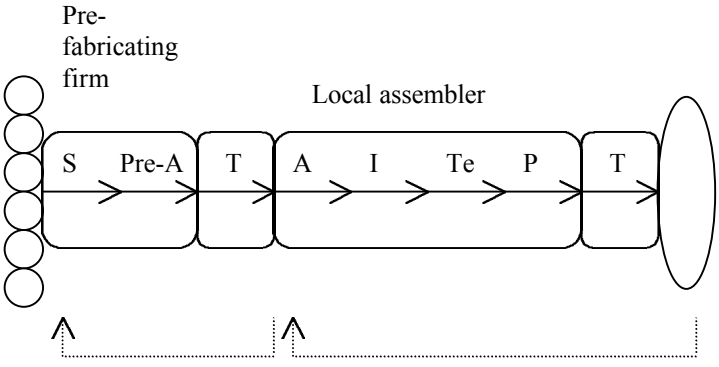


The firms involved in this transvection are 'pure' buyers and sellers of standardised products and co-ordinate their respective parts of the total activity structure without considering a specific end-user. The first transvection thus represents an activity structure characterised by the principle of 'mass-production', which in turn requires mass-distribution. Design, manufacturing, assembly and physical distribution are undertaken without active end-user involvement. The end-user can make a choice among a number of standardised models where design is determined by some average interpretation of end-user requirements.

Transvection 2: Local assembly

The second example deals with the situation often referred to as 'local assembly' by firms involved in the PC-industry (figure 3). In this transvection some of the basic components are combined into a limited variety of pre-fabricated modules. For example, two types of chassis and two types of motherboards - making up four different modules – are supplied by a pre-fabricating firm. The local assembler combines these modules with supplementary hardware components and installs the software. The local assembler can be either a firm specialising in assembly or a so-called VAR (value-added reseller). In this case the end-user can be involved in the specification of the PC, preferably assisted by the local assembler. These firms, in general, are more technically skilled than the traditional reseller in the first transvection.

FIGURE 3: Transvection illustrating local assembly

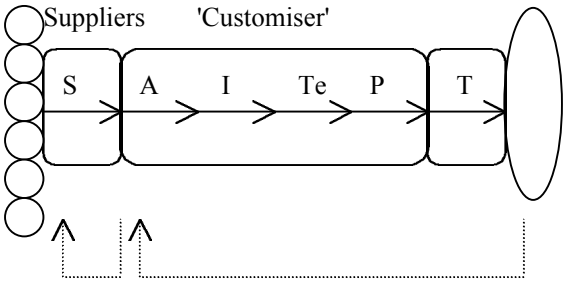


Concerning transportation the deliveries to end-users sometimes are organised by the local assembler, sometimes by the end-user. When it comes to deliveries of the prefabricated modules the local assembler has two options. One alternative is to order the modules once a

customer has ordered a PC, while the other alternative is to maintain an in-house inventory of modules.

Transvection 3: Customisation
The third transvection illustrates a 'just-in-time approach' to PC production and distribution (figure 4). Dell is one of the suppliers working according to this principle. In this case no assembly is undertaken until an end-user has ordered a specific PC. In contrast to transvection two there is no prefabrication of modules. Therefore, the end-user may have a considerable impact on the specification of the PC.

FIGURE 4: The transvection illustrating customisation



Assembly operations are initiated when an order arrives from en end-user. Components are supplied 'just-in-time' from consignment inventories close to the assembly line of the 'customising' firm. Standardised and specialised hardware are assembled simultaneously as are standardised and specialised software. Specific options may involve logotypes or security devices. Some of these options may be attached to the PC in between testing and packaging. Transportation to end-users can take various forms. Sometimes the computer(s) are delivered separately, while in other cases they are combined to a collective consignment with screen, mouse and key-board arriving form other factories.

The main characteristic of the third transvection is that it allows customisation to end-user requirements. It should be observed, however, that the choices of the end-user are restricted, owing to the fact that reducing the number of available combinations improves economies of scale.

Concepts for transvection analysis
The first part of the framework is based on Richardson (1972) and is focused on the relation between activity co-ordination and economic efficiency. The analysis relies on two central concepts: complementary and similar activities. Activities are complementary when they represent 'different phases of a process of production'. The complementarity is thus related to the sequential interdependence among activities. Furthermore, activities are closely complementary when it is necessary 'to match not the aggregate output of a general-purpose input with the aggregate output for which it is needed, but with particular activities' (ibid. p. 891). Sequential activities thus become closely complementary at the point where the object of the refinement process is made specific (or directed) to a particular use. When activities are closely complementary it is necessary that 'two or more independent organisations agree to match their related plans in advance' (ibid. p. 890). This matching may concern both

quantitative and qualitative aspects, i.e. it deals with *how much* as well as *what* is produced and exchanged.

Activities are similar when they require the same kind of resources for their undertaking. Manufacturing activities can be similar in terms of input material or equipment utilisation. Distribution activities can be similar with regard to the facilities used for physical distribution or in terms of the sales force. Similarity among activities is a prerequisite for specialisation. Increasing similarity among activities may improve economic efficiency if economies of scale prevail. These concepts have been applied and developed in other studies of distribution restructuring (Hulthén 1998, Dubois et al 1999).

The second part of the framework springs from the distribution literature and builds on two concepts that are relevant for transvection analysis - postponement and speculation. The postponement concept was introduced by Alderson (1950) and further developed by Bucklin (1965) who analysed the principle of postponement in comparison to the principle of speculation. Postponement is related to the complementarity among activities and affects the possibilities to capture similarities. Alderson (1957) describes the marketing process as a series of steps that needs to be arranged in the most effective sequence. This process is marked by a definite direction that can be defined in terms of how the product changes along the way.

> The product starts out as materials which are relatively raw and unspecified. It ends up as a relatively refined and specialised article, shaped to a type of need fitted to the specific requirements of the individual consumer who buys it. To serve the individual consumer, the product must assume a special character as to its use qualities; these qualities must be adequately identified in relation to the proposed use; and it must be available at a convenient place when the consumer wants it. (ibid. p. 423)

The 'special character' – or the differentiation - of the product is successively developed in the various steps that together constitute the sequential chain of activities. The closer the product comes to the point of consumer purchase and use, the more differentiated it becomes. Differentiation is important because the needs and requirements of users are diverse. The problem indicated by Alderson is that 'every differentiation which makes a product more suitable for a specified segment of the market makes it less suitable for other segments' (ibid. p. 424). Differentiation thus is associated with risk. In general, therefore, postponement of differentiation reduces this risk by moving the differentiation nearer to the time of purchase.

According to Alderson the differentiation of the product involves three aspects. The product is changed in terms of form, identity and location. Changes in form can take various shapes, ranging from elaborate fabrication and combination of raw materials to various styles of packaging. The changes in form are not necessarily adaptations to individual end-users, but efforts to secure an efficient movement of the physical product along the activity chain. One example is that activities in the refinement processes that reduce the weight of raw material and components must be applied soon enough to avoid unnecessary costs in transportation. Changes in identity are adaptations of product features to a specific end-user. Applying the concepts introduced above, the change of identity entails closely complementary activities since the activities from this point has become directed to a particular end-user. For example, some customers may require a certain quality that is not used by other buyers. Changes in

location are a way to differentiate as well, mainly in terms of delivery times. Once a product has been shipped to a specific geographical destination the marketing risk is introduced.

When the principle of postponement is applied the changes in form and identity occur at the latest possible point in the activity chain, while changes in location occur at the latest possible point in time. For a manufacturer the ultimate postponement would be to initiate production activities only when an order from a specific end-user has arrived. By doing so the manufacturer can reduce the risks associated with differentiation. However, this is only one of the factors determining economic efficiency in operations. If manufacturing activities (and distribution activities) are postponed as much as possible it becomes difficult to utilise manufacturing and distribution equipment in the most efficient way. Postponement reduces the possibility to capture similarities among activities. This means that the possibilities to capture economies of scale become circumscribed. Therefore, the principle of postponement has to be balanced against the principle of speculation.

According to the principle of speculation differentiation in form and identity should be undertaken as early as possible in the transvection. The principle of speculation relies on forecasts of coming demand. Speculation generally supports capturing of scale economies, but in turn it may result in substantial inventories. Traditionally, speculation has been the dominating principle since long lead times in production and distribution has made it difficult to rely on postponement. However, the developments of information technology, transportation equipment and manufacturing techniques have made this option increasingly available.

Analysing the three transvections

Mass production

In the mass-production transvection there are no closely complementary activities until the final delivery from reseller to end-user. Hence, all activities are 'general' in the sense that they are performed in relation to (forecasted) aggregated market demands. No adaptations are made towards specific customers either in form, identity or location. The fact that the transvection is not directed towards any specific end-user until the product lands in the hands of the end-user makes it possible to capture similarities, that, in turn, fosters economies of scale in operations. Scale economies may be obtained in both assembly and transportation. This transvection, hence, is characterised by the principle of 'pure' speculation. However, there are differences in the nature of speculation of the actors involved in terms of risk taking. The risk on behalf of the producer relates to the assembly activities undertaken without knowing whether the assembled PCs will be demanded or not. In the same way distributors and resellers speculate in inventories. Intermediaries have to balance this risk with the risk of not having products available when potential buyers ask for them. Therefore, the size of the inventory will be a compromise when handling these risks.

The 'speculative' transvection implies that the actors involved must rely on forecasts of end-user demand, both concerning qualitative and quantitative aspects. Abrahamsson (1992) reports on a study of a transvection of this type and illustrates the problems of getting the appropriate 'feed-back' from end-users concerning changes in demand. The findings indicate that the further away from the end-user in the transvection, the harder it is for actors to make reliable predictions of demand. Therefore, quantitative changes in end-user demand tend to multiply when they are transferred through the activity chain.

These problems are partly handled through inventories that function as buffers in the transvection. Owing to these buffers the sequential interdependencies among activities is rather low, which means that there is no particular need for the actors to match their plans in advance. Co-ordination of activities across firm boundaries is no major concern in the mass-production transvection. What is more important in this case is how an individual firm co-ordinates the in-house activities and how potential similarities are exploited. By co-ordinating activities in an appropriate way a firm can improve its resource utilisation and thereby obtain economies of scale. Therefore, in this transvection the interdependencies among activities tend to be stronger within firms than between them. For example, the 'distributors' and 'resellers' strive to use their resources as efficiently as possible, from their individual perspectives. In order to accomplish this they work with a huge number of counterparts, to be able to capture similarities among the activities. By using the same sales-force and warehouse for products from many suppliers they can make use of their resources in an efficient way and provide their customers with a wide assortment. In the same way, the producer takes care of similarities gained in production and assembly. However, working with many counterparts calls for co-ordination and compromises. Each firm has certain requirements that must be taken into consideration implying that the individual firm can not optimise the resource utilisation only from its own point of view but needs to compromise with the requirements of its counterparts.

Local assembly

In the 'local assembly' transvection pre-fabrication activities are based on forecasts and thus initiated without specific orders from end-users. Therefore, pre-fabrication is ruled by the principle of speculation enabling economies of scale in operations. In this part of the transvection similarities among activities are captured through limiting the number of pre-determined modules. Furthermore, the firm involved in prefabrication may exploit similarities by supplying a large number of local assemblers, thus increasing efficiency also for the user. The prefabrication firm faces a strategic situation similar to the intermediaries in the first transvection.

However, at the local assembler the activities become closely complementary as the transvection is directed towards a specific end-user. Since the activities following pre-fabrication are initiated by a specific order from an end-user, this transvection relies on postponement after this point. The market risk of the local assembler is low, because no assembly is initiated without an order. On the other hand the assembler can not deliver 'off the shelf' implying that end-users requiring immediate supply may prefer to make use of the inventory of a traditional reseller. Furthermore, postponing assembly most likely reduces the similarities of the assembly operations and increases the need for co-ordination with the activities of the prefabricating firm, unless the assembler keeps an inventory of its own. It is possible for the local assembler to affect the degree of similarity in operations through its involvement in specification. However, increasing similarities means reducing differentiation of end-user choices. In this case it is mainly the option for 'form' differentiation that can be used by the local assembler.

This transvection illustrates a mixed approach trying to combine the principle of speculation to gain economies of scale and the principle of postponement enabling customer involvement in specification.

Customisation
The 'customisation' transvection is characterised by a chain of closely complementary activities starting from the very first activity. Each one of the activities performed is directed towards a specific end-user and no activity is performed unless it is initiated by an order from a specific end-user. Consequently this transvection illustrates the case where the principle of 'pure' postponement is applied.

In this transvection there is a high degree of sequential interdependence among activities due to the distinct direction towards individual end-users. Coping with this type of interdependency requires what Richardson identified as 'matching of plans'. The capacity of the resources of one company has to be matched with the capacity of the resources of the other companies involved in the transvection in order to match the requirements of a specific end-user. This matching involves both quantitative and qualitative plans. Co-ordinating the closely complementary activities require 'transparent' interfaces between the firms. Each company that is involved in the transvection is dependent on information about the activities of the other companies. In some cases the prevailing complexity is so great that information exchange and common plans may be insufficient means of co-ordination. In these cases adaptations among the firms involved are required. These adaptations can take various forms such as joint information systems and complex logistical adaptations.

The risks facing the 'customising' firm are the same as those for the local assembler when it comes to the demand side – the main problem being delivery time. On the supply side there is no prefabrication of modules that reduces the risk of being 'stuck' with modules never demanded. The full postponement strategy increases the opportunities for differentiation to include 'identity' as well. End-users are increasingly capable of determining the design of the products. On the other hand similarity is reduced and the need for activity co-ordination is increased in comparison with local assembly. Most likely, therefore, full differentiation will increase costs that ultimately have to be paid by the end-user. Therefore, customising firms normally delimits the number of available options making assembly operations more similar. However, in comparison with local assembly a multitude of choices are offered in this transvection. Transportation, in turn, is individualised from the perspective of the buying firm. The similarities of these activities become substantial when large scaled operators in logistics are used.

Concluding discussion

The analysis illustrated that the framework proposed is useful for understanding the characteristics of the evolving distribution structure in the PC-industry. Postponement-speculation on the one hand and similarity and complementarity on the other hand revealed some basic distinctions between the three transvections. Furthermore, the analysis illustrated the relationships between the concepts of the framework. Postponement increases the opportunities for differentiation that should be of value for a supplier as long as customer requirements are diverse. On the other hand postponement imposes costs and reduced benefits. Postponement decreases the opportunities to capture similarities among activities in comparison with speculation. Furthermore, postponement makes activities closely complementary which in turn calls for a more extensive co-ordination need than what is necessary when speculation is applied. However, the principle of speculation requires substantial amounts of inventory increasing costs as well as risks.

This final discussion will bring up some implications of the analysis. The first is related to the need for new conceptualisations due to ongoing changes of distribution reality, the second to some implications for firms involved in the transvections.

The benefits of transvection analysis

We started the paper by questioning the 'channel' view of distribution. We argued that the current distribution reality is more network-like than channel-like. The analysis of PC-distribution revealed that the three transvections bridge the gap between production and distribution in entirely different ways. One of them is representative for the conventional channel perspective for distribution of standard products, while the others are not. The gap between production and distribution appears because the actual product that is subject to exchange belongs to 'the technology of production' at the one stage and 'the technology of use' at the other (Alderson, 1965, p. 12), which in turn causes 'discrepancies'. The most fundamental of these discrepancies is that between 'producer stocks and consumer assortment'. This 'discrepancy of assortment' arises because 'the most convenient and constructive association of goods changes at each stage in the flow of merchandise from producer to consumer'. Our analysis shows that the three transvections take care of this discrepancy in different ways.

In the mass production transvection the technology of production rules the game. Consequently, the end-user has to take what is available – on the other hand it can be taken off the shelf. The customisation transvection relies on the technology of use. End-user involvement in specification improves the fit with the user's other activities and resources. On the other hand a certain lead-time is required which delays use. The local assembly is somewhere in-between. Customers can choose among different options that to some extent makes it possible to consider the technology of use. However, standardisation and prefabricated modules guarantee the impact of the technology of production.

The discrepancy of assortment is handled in quite different ways in the three transvections. In fact, the actual assortment appears in very different settings. The mass production transvection is characterised by an assortment of standardised PCs. Standards are developed by the producers, while intermediaries organise the assortment. In the local assembly transvection there is no assortment of 'end products'. The prevailing assortment instead consists of prefabricated modules. These modules are standardised by the prefabricating firm and then combined by the end-user and the local assembler. In the third transvection standardised components make up the assortment. Standards are set by component manufacturers but are affected by the 'customising' firms – which in some cases are the same firms as the 'producers' in the mass production transvection. The discrepancy of assortment is only one of the aspects in which 'traditional' mass production transvections differ from the evolving ones. In fact the deviations are so substantial that the whole set of distribution conceptualisations seem to be in need of reconsideration. Our examples from PC-distribution illustrate some of these deviations.

Firstly, 'traditional' channels for standard products relied on a number of intermediate inventories. Those inventories were established because they improved efficiency in the sorting operations – the means of handling the discrepancy of assortment at that time (Alderson 1957, p. 199). The second and third transvection in this paper illustrate that this discrepancy takes other forms when postponement is used as the basic principle for gap bridging. In this way opportunities are provided for transvections without inventories of 'end products'.

Secondly, these inventories served as buffers in the channel. Owing to that 'production' activities and 'distribution' activities were clearly separated. There where no strong interdependency among these activities. In the mass production transvections it is more important to co-ordinate the in-house activities than the ones crossing firm boundaries. The evolving distribution arrangements based on customisation build on transvections where the activity interdependence is substantial.

Thirdly, the clear separation of production and distribution activities implies strict roles for the actors. In traditional channels manufacturing firms are involved in production, while intermediaries deal with distribution. This is a characteristic of the first transvection as well. In evolving structures, however, the roles are quite blurred. The assembler in the second transvection may be a firm that traditionally was called a retailer. For the 'customising' firm in the third transvection 'distribution' skills seems to be more important than manufacturing excellence. It is noteworthy also that Dell in 1998 was appointed the best PC-dealer in Sweden.

Altogether this means that established distribution theories need be supplemented with models and conceptualisations that may explain the current developments in distribution. According to our findings the transvection concept seems to be a fruitful starting point in this respect. The main advantage being the holistic perspective taking the total activity structure as the point-of-departure.

Implications for practice

The analysis of the transvections is centred on the economic efficiency of the activity structure that in turn is contingent on the resource utilisation. It has been shown that the resource utilisation, and thus the cost structure, is different in the three transvections. However, the cost structure is only one of the determinants of the perceived performance of a transvection. End-users evaluate distribution arrangements not only in terms of which costs they impose but also in what value they represent (Anderson and Narus 1999). Customised solutions obviously may be of value to end-users because they provide opportunities for improved efficiency in other operations. In the framework we identified three ways of differentiating offerings which for end-users show up as opportunities for finding customised solutions. Since the transvections to varying extents rely on postponement the opportunities for customisation are different as illustrated by figure 5.

FIGURE 5: Opportunities for differentiation in the three transvections

		Transvections	
	Mass production	***Local assembly***	***Customisation***
Differentiation			
Form	None	Some	Yes
Location	None	Partly	Yes
Identity	None	None	Some

In local assembly, location and form differentiation occur because the customer can choose among some combinations of standardised modules owing to the fact that final assembly is postponed. However, this transvection seldom makes it possible to adjust the product more than marginally to the working conditions of the user – i.e. the options for identity differentiation are severely limited. The main reason is that pre-fabrication of modules introduces lots of restrictions of what can be achieved in local assembly. The opportunities for identity differentiation are increased in the third transvection where no pre-fabrication takes place, thus increasing the degrees of freedom in specification. The customisation transvection is characterised by full postponement in relation to form and location.

Differentiation should be of value to end-users. Adapted arrangements may be costly but these increasing costs are sometimes outweighed by performance improvements. However, for an end-user the most significant effect of differentiation occurs due to the total variety of offerings represented by all three transvections. The value represented by them is dependent not only on the inherent characteristics of the offering. As argued above the context in which the product is applied affects the perceived value of the various offerings. The opportunities to make use of the potential for customisation also require that the end-user has got some knowledge of the individual components, modules and programs and how they can be combined. The scope of this paper does not permit further expansion on the value issue. We refer to Narus and Anderson (1996), Lampel and Mintzberg (1999), Ford and Gadde (2000) for more comprehensive analysis.

However, the analysis has revealed one important implication concerning the relationship between cost and value. In many cases it has been considered a fairly simple trade-off relation – the higher the value, the higher the cost. But this is not necessarily the case. The perceived value of the output of a transvection is to a large extent determined by the way the solution fits with the context of the end-user, i.e. it is evaluated in terms of the technology of use. Costs, on the other hand, are determined by the technology of production. The realised costs are functions of the resource utilisation and the activity co-ordination in the production/distribution network in which the individual transvection takes place. Therefore, the relationship between cost and value is more complicated than a simple trade-off. The fact that the technology of production and the technology of use rely on different resource

combinations and co-ordination mechanisms constitute the theoretical foundation for the occurrence of 'win-win-situations'.

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