

A RYTHMANALYTIC APPROACH TO UNDERSTAND THE PROBLEMATIC NATURE OF SUPPLY CHAIN INTEGRATION

THE CASE OF A CUSTOMER ORDERED PRODUCTION STRATEGY

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ABSTRACT

Implementing a customer ordered production strategy involves changes in supply chain integration compared to if production was based on forecasts of demand. In a study of Volvo Cars' customer ordered strategy it was found that the degree of implementation changed over time, especially in relation to business cycles. It seems, with reference to statements made by respondents involved in practice at different stages in the supply chain, that there exists different "world views" and logics of action depending of the actors' position in the chain: A business logic downstream and an industrial logic upstream from the assembler (Volvo Cars split in "manufacturing" and "sales"). Time, space and energy are different in the logics. Transport providers adapt and coordinate activities with logic of their own.

To understand time, space and energy we refer to the ideas put forward by Lefebvre on rhythm in everyday life. It is important to be aware of ongoing changes in the everydayness for supply chain integration knowledge. Integration needs to be handled as a process, it is not given by plans and procedures as state.

We interpret the empirical findings by applying Lefebvre's conceptual framework. The approach facilitates a better understanding of the supply chain integration process and potentialities of temporal alignment.

INTRODUCTION

Two major, and related, management ideas during the last decades are that firms should be customer-oriented and to a larger extent base production on customer orders rather than on demand forecasts (e.g. Gilmore and Pine II 1997). Customer ordered production was implemented by Volvo Cars in 1993 with far-reaching implications in the supply chain of consumers, dealers, sales companies, functional departments, suppliers, and transporters (Hertz 1999; Hertz, Johansson and Jager 2001). After a considerable restructuring of the order-to-delivery process, flexibility was achieved that made possible to build a car in response to an order within acceptable delivery time. Activities and resources in conjunction to the order-to-delivery process were integrated to dramatically decrease lead times, which positively affected, among others, tied up capital and dealer/customer relationship. Over time the situation and the behavior of different actors changed. Supply chain integration and coordination for customer orientation and customer ordered production, proved to be problematic. In times of good sales, the major part of production was customer ordered; dealers coordinated with customers that choose among many different possible car configurations. In times of recessed sales, concerns of customer ordered production were raised about dealers' way of acting and cost levels of production. The volume of sales and scale of production became important which affected the customer orientation in the sales situation and increased inventories of forecasted cars. A different and situated pattern of actions was revealed, but how can we better understand the differences?

Styhre and Kohn (2006) found in a study of Volvo Car two different worldviews ('production and design oriented' and 'market oriented'), which might be problematic for coordination towards effectiveness of industrial networks (Håkansson and Snehota 2006). The working procedures and coordination of Volvo Cars distribution diverges considerably from Volvo Cars supply management in which the former might be described as driven by a business logic and the latter by an industrial logic (Borgström 2010). What differences in different logics are problematic? Differences over time indicate that something new and unforeseen is introduced into the repetitive processes.

We believe that reasons for the encountered difficulties to fully implement a customer ordered production and customer orientation strategy are related to the different and changing situations that different network actors experience. In this paper we will apply a conceptual framework developed by French sociologist Henri Lefebvre (2004). He supplies a framework of investigating space, time and everyday life by *rhythmanalysis*. Such an interpretative method is of importance to better understand lived differences related to a supply chain's upstream and downstream contradictions.

The framework is applied by Verduyn (2010) who explores the temporal process by which events unfold in a development. Production of a new car and sales of a new car are taking place in different social landscapes and tensions between these are logical because of their differences in terms of actors and structures (Borgström 2010). There is difference between industrial logic and business logic and also difference in each over time. Repetition in time and space indicates a rhythm; everywhere where there is interaction between a place, a time

and an expenditure of energy, there is rhythm (Lefebvre 2004:15). Rhythm might create understanding of differences, especially the dynamic and complex happening that are a part of differences. Andersson and Mattsson (2011) draw on Orlikowski and Yates' (2002) concept of temporal structuring, and argue that with a network perspective on business interactions, alignments of time and space interdependencies are crucial in development issues. We will in this paper explore the idea that temporal alignments are better understood as alignments of different rhythms.

Departing from rhythm analysis, we will further investigate development of customer ordered production, especially the indicated distribution and supply ambiguities (Borgström 2010). More might be learnt of the contradictions, ambiguities and tensions by a method of analysis that is more empathetic to the idiosyncrasy of the empirical material. More specifically, thus, we will a) explore distribution and supply ambiguities by rhythm analyze empirical material related to Volvo Cars supply chain strategy, and b) analyse potentialities of dynamic coordination.

In the continuation of the paper we will start to describe logics that are proposed in Volvo Cars' integrated supply chain and thereafter what a rhythm analysis is describing and for what purposes it serves. Rhythm is a part of the performativity of everyday life. Then the next section explains what we know about temporal alignment. By explicating overlapping and interacting worlds of place/time/energy the concept of temporal alignment convey a complementary view of supply chain integration that accounts for the continuous coordination. This is followed by a methodological discussion and a description of the case a supply chain rhythm. Simultaneous contrasting rhythms are analyzed. Before the conclusion, a discussion is provided.

“WORLD VIEWS” AND LOGICS OF ACTION

Within Volvo Cars appeared two different worldviews: One was production and design oriented and the other was market oriented (Styhre and Kohn 2006). They were seen and interpreted as oppositions within the organization. There were perceived differences between the market and production operations; in the short- and the long-term perspective; and also between the dominant 'old' logic of senior top management and the challenging 'new' logic of younger employees and junior management. Differences in meaning influence everyday action. Different worldviews and relative little interaction hinder dynamic coordination towards effectiveness of industrial networks (Håkansson and Snehota 2006). It was observed that the working procedures and coordination of Volvo Cars distribution diverges considerably from Volvo Cars supply management in which the former might be described as driven by a business logic and the latter by an industrial logic (Borgström 2010). Logistics service providers facilitated supply chain integration in the implementation phase, but is depicted to have a logic of low cost transport action in combination to innovative solutions, which is illustrated in Figure 1 as "service providers with an adaptive but own logic related to transports". What differences in different logics are problematic? Differences over time indicate that something new and unforeseen is introduced into the repetitive processes. Borgström (2010) used a structuration analysis (Giddens 1984), in order to understand the

differences over time in use of customer ordered production. Other ways of studying reproduction in processes are available (Araujo, Finch and Kjellberg 2010; Callon 2007; Law 2008) (Czarniawska 2004). But ongoing changes in the everydayness of those that shares logic of action is a focus on the specific – taking seriously the moment of reproduction of processes.

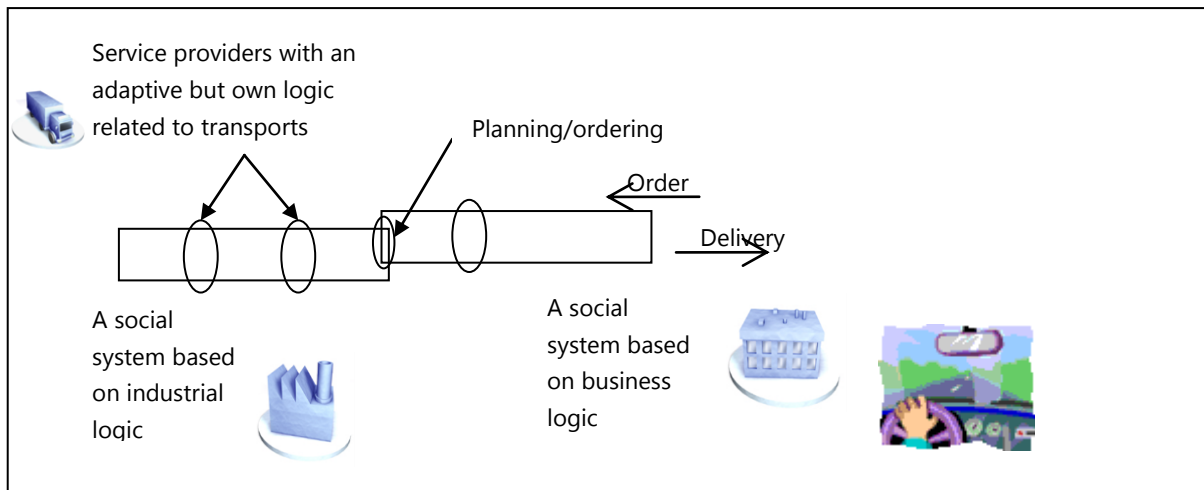


Figure 1 Customer ordered production sets out to coordinate an order-to-delivery process involving social subsystems with different business logics. Source: Adapted from Borgström 2010, Figure 10.1, page 197)

“One needs to understand that there is a difference between the business logic and the industrial logic”, a manager in the area of order/planning, Figure 1, stated. She expressed consequences of less waste in the system. The expression of the different logics was made in hectic financial downturn period when sales were decreasing, costs were too high, exchange relationships were questioned and coordination of resource interdependencies in the industrial system was problematic. If we stop here and questions what was in the everyday in the different systems related to the order-to-delivery process, another meaning of supply chain integration might be won.

Upstream of Volvo Cars Production units, industrial activities are highly coordinated and much management efforts aim to further improvements. Downstream of Volvo Cars, sales companies and dealers interact with administrative units of Volvo Cars about planning and ordering information, among others, in another setting and another logic. The supply side development is basically not integrated with the distribution side development when it comes to customer ordered production. This disintegrated supply chain is remarkable. Especially as Volvo Cars strives to be customer oriented. How is it possible that a firm that coordinates all production activities based on customer orders and that works intensively with customer orientation has little interaction with customers and with dealers (see also Dahlsten 2004)? Potentially because of everyday life of the different actors; time and space.

RHYTHMANALYSIS

In Lefebvre's introduction to rhythmanalysis, it is stated "*To begin with, a definition. What is rhythm? What do we understand by it, be it in everyday life, or in the established sectors of knowledge and creation?*". Rhythm is the most concrete in arguments of becoming (Lefebvre 2004:3). What Lefebvre aims at is a complementary understanding of action, one that "ride with the movement" in performative analysis (p. 16). One that seeks repetition and difference in everyday life, defines mechanical and organic aspects of movements, and analyzes the interfering cyclical and linear repetitions. Rhythm, Lefebvre defines, seems natural and spontaneous. Yet rhythm has specificity, for example, musicians reduce rhythm to counting. Rhythm always implies a measure; "Rhythm appears as regulated time, governed by rational laws, but in contact with what is least rational in human being: the lived, the carnal, the body." (Lefebvre 2004:9). In interaction between a place, a time and an expenditure of energy, there is rhythm (Lefebvre 2004:15).

Movement is on-going and by imposing a rhythm, a social group can imprint a change in it. In an analysis different notions of rhythm are polyrhythmia, eurhythmia and arrhythmia. Polyrhythmia reveals a multiplicity of rhythms from the noticeable everydayness. Despite the multiplicity each is unique. Eurhythmia is united rhythms that work together while arrhythmia is the dissonant and pathological state, which brings disorder. The rhythmanalysis is a way of thinking for exploring and expressing practice. It works as a sensible conception also of what do not present itself, in order to change our perspective. For example, the secret versus the public rhythms: The secret are felt and relates to the said and the non-said, while the public rhythms relate to social celebrations or expressions. Another example, the fictional versus the dominating-dominated rhythms: The fictional rhythms relate to the imaginary such as short-, medium- and long-term calculations and estimations expressed in words, gestures and learning processes. Dominating-dominated rhythms are completely made up for an everyday or long-lasting effect. Practice involves such internal and external rhythms. As a more or less well-used tool, rhythmanalysis is a discourse that will modify the lived by knowledge.

The body, our body matters in the analysis. Lefebvre (p. 20) argues that the body consists of a bundle of rhythms, different but in tune, and it is not only in music that one produces perfect harmonies. Harmony often exists.

"The eu-rhythmic body, composed of diverse rhythms – each organ, each function, having its own – keeps them in metastable equilibrium, which is always understood and often recovered, with the exception of disturbances (arrhythmia) that sooner or later become illness (the pathological state)."
(Lefebvre 2004:20)

Also the surroundings of bodies are bundles of rhythms, by nature or by the social. In the analysis, rhythms are listened to as a whole and by reference to the analyst's rhythms. The rhythmanalytical results are based on temporalities and their relations within wholes. Data collection, thus, relates to listening and perceiving the *present* with the body and by recognizing representations by their phases and recurrences. Yet, the present is but an image

that will fall short of its goal of being sensible, affective and moral rather than imaginary, unless it is taken for what it seeks to evoke (Lefebvre 2004).

Sensible, affective and moral research is in line with Czarniawska's (1993) view; to free practitioners from the trap of the world they have constructed for themselves, by convincing them that it does not exist "out there" objectively, but is constructed by people in a common effort. The multiplicity is what Law (2008) describes as an ontological multiplicity, in which politics exists and in which the research goal is to make the problem smaller or better, to make it more specific.

TEMPORAL ALIGNMENT AND BUSINESS DEVELOPMENT

Industrial systems are dynamic entities with direct and indirect interdependencies (Johanson and Mattsson 1992). The interaction in Figure 2 is ongoing among different resources, actors, and objectives. Any durability or stability is likely to demand continuous coordination. The interactions are performed with differences in time and space that are related to production and consumption. Orlikowski and Yates (2002) suggest that in everyday action, actors produce and reproduce a variety of temporal structures which in turn shape the temporal rhythm and form of their ongoing practices.

The temporal structures are constituted in action and become taken for granted, serving as powerful templates for the timing and rhythm of members' social action within the community. If we assume different parts of the industrial system as temporal structures then we might also assume rhythm and practices to be somewhat idiosyncratic to these structures.

Managing temporal and spatial distance in business networks relates to efficiency of production activity chains, adaptation to different demands of delivery, to outsourcing and /rearranged activities to new localities. Thus, time and space matters. Temporal alignment is to reduce, bridge, or increase temporal structures (Andersson and Mattsson 2011).

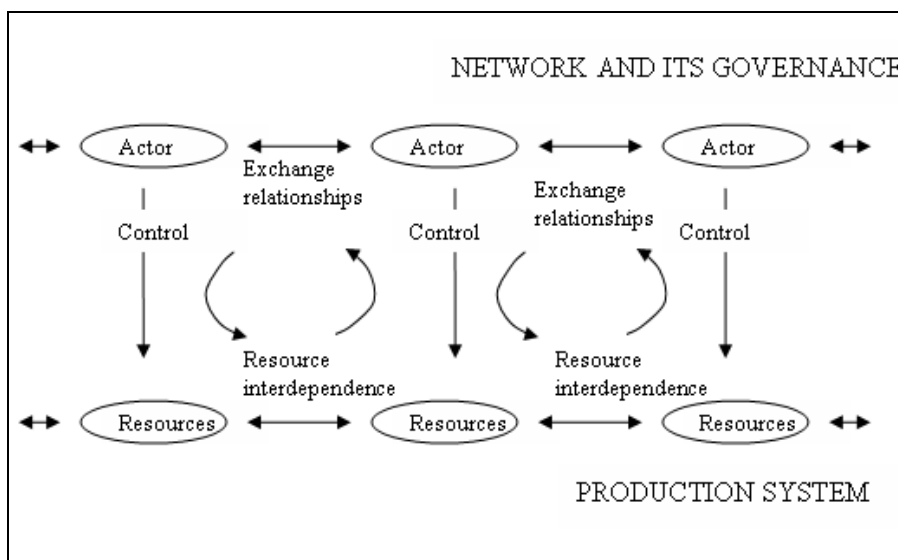


Figure 2 The industrial system. Source: Johanson and Mattsson (1992).

In an industrial system (Figure 2) many different actors enact different temporal structures that they need to adapt to or change in their use of the object. Under the assumption that there is an industrial side and a business side of the system as two objects it is reasonable that trajectories of change develops differently. The trajectories might be described as strategizing in that the value system is enforced and lived.

Strategizing in industrial networks is continuous combining and recombining of resources (Gadde, Huemer and Håkansson 2003), it is self-organizing adaptation of actions and objectives that emerge through local interaction of network members (Wilkinson and Young 2002). The combining and adaptation affects identities and positioning (Johanson and Mattsson 1992). The industrial system as depicted in Figure 1 should be noticed as intertwined actors and resources in overlapping regimes in which trajectories of change influence each other (Hertz 2006). The dynamic process associated with the self-organizing adaptation is a process of daily efforts. Strategizing involves processes and practices in which day-to-day activities of inter-organizational life are related to strategic outcomes (Borgström 2010). The overlapping regimes' temporal alignment might, for example, reduce lead times, bridge by developing common procedures, or increase learning of each other's temporal structures.

A way to understand coordination of different regimes is to grasp rhythms within the industrial network, the industrial side, and the business side. Differences between industrial logic and business logic imply differences in relation to it's' time (of a becoming) and place of action. In order to develop an understanding of strategizing in industrial networks we propose engagement in the post-social relationships that involve the industrial side and the business side. Human actors need to 'enter' these life forms cognitively and emotionally, and to become parts of them. The life forms are separated in time and in space. The relation of a time to a space (temporalized space) are rhythm (Lefebvre 2004:89). In order to analyze a rhythm, one must get outside it yet sympathize and be grasped by it (Lefebvre 2004:88). The rhythmanalytical approach will be explained in the next section.

METHODOLOGY

Stuart Eden who has studied and translated Lefebvre's writing, and written an introduction in the English translation says that Lefebvre uses rhythm as a tool of analysis to examine and re-examine a range of objects (Lefebvre 2004:xii). In this paper, we do a rhythm analytical reinterpretation of supply chain strategizing, in order to think space and time differently, and to think them together (in line with suggestion of Lefebvre 2004: ix).

The supply chain strategizing was investigated by a case of customer ordered production in Borgström's (2010) doctoral thesis: A longitudinal case study of customer ordered production, which illustrated that the degree of customer ordered production varied. The original analysis was based on structuration theory. It involved actors that were engaged in and bounded by the order-to-delivery process of a new car; a rather stable interconnected set of actors (Borgström 2010). Customers, dealers, sales companies are buying, selling, and engaged in distribution the new car. The manufacturer (among others product development, purchasing, planning and ordering) and suppliers are building the car just in time. Information

technology and transporters are facilitating the actors. The actors engaged in many different structures whereof customer ordered production was one. The structuration analysis discussed the ongoing action by the supply chain actors and one issue that came up regarded the different business logic of the actors. The actors are described on a level that approximate between in-depth knowledge for readers and data suffocation for the readers.

Responsiveness in the order-to-delivery process was implemented in the inception of customer ordered production, in which the actors integrated processes such as product development and resources such as the production systems. Different social systems with different logics in relation to demands of the order-to delivery process crystallized in the long-term development involving change and stability in different dimensions. The industrial logic, the business logic and the adaptive transport/service provider logic involved different actors and they had different types of worlds with different structural properties. Giddens (1979; 1984) separates between social integration and system integration. Social integration is reciprocity between actors in contexts of co-presence, while system integration is reciprocity between actors or collectives across extended time-space. In this sense it is reasonable to expect increased knowledge of the problematic nature of supply chain action, involving social as well as system integration, by an analysis that engages in time, space and energy. What can we learn about the co-presence and extended time-space?

The rhythm analytical re-interpretation of customer ordered production results in new understanding of differences of the worlds enacted and potentialities of temporal alignment in relation to supply chain integration. Change and stability in industrial networks has attracted great interest of IMP researchers. Dynamics and complexity that are related to interactions in the network are important in IMP conceptualizations that, for example engages in domino effects (Hertz 1993; 1998) or in contradictions, tensions and ambiguity in a moving context involving marketing change (Andersson 1996a; 1996b). The rhythm analytical approach is an interpretative-constructive method that enables an analysis of the everyday movement. It adds insights to the action-net approach (developed by Czarniawska 2004; and used by Kjellberg and Helgesson 2007) and assemblage studies (Araujo et al 2010 inspired by Callon) in that it takes seriously the lived context, and explores temporal processes of the becoming moment or sequences of events and actions. The re-interpretation might be seen as a way to talk about and appreciate complexity, in order to fend off the simplicities of the objects we study (Law 1999). Law strongly argues that there are always more than one and less than many, meaning that simplicity should not displace the complexities of tension. We suggest that tensions are in the rhythms lived.

Temporal processes are influenced by various rhythms. In Verduyn's (2010) case are linear, cyclic, work and natural rhythms enacted. It was a case of business venturing that Verduyn discussed as to the rhythms of two of the founders, and the business itself, in order to understand the temporal events associated with the emergence of a new venture as an ongoing and dynamic process. Verduyn identifies one founder's rhythm as emancipated, free, slow, and idle. The other's rhythm is mechanical, linear, repetitive, and purposeful. The business has a rhythm of its own that relate to the venturers' and unfolds in its own natural way. Multiple rhythms moves at their own pace and should in the "theory of moments", i.e.

rhythmanalysis, be understood in moments as passages when things have the potential to be overturned or radically altered. In market making studies inspired by Callon (see, e.g., Kjellberg 2010) the process of adjustment involves detailed processes making up development. In relation to such an analysis, the rhythmanalysis moves along a chosen sequence, in order to sensitize the ongoing and appreciate its repetitions and measures.

The unit of analysis is the repetition that might be linear and cyclical. Mathematicians separate and have different measures for rotations and trajectories while the rhythmanalysis take a perspective of seeing them together; whether rhythms strengthen and weaken each other. A rhythm is in relation to other rhythms, i.e. in a polyrhythmic happening. Eurhythmia and arrhythmia denote relations. *“Rhythms unite with one another in the state of health, in normal (which is to say normed!) everydayness; when they are discordant, there is suffering, a pathological state (of which arrhythmia is generally, at the same time, symptom, cause and effect).”* (Lefebvre 2004:16). A daily routine is repetitive organization of time of which Lefebvre distinguishes between cyclic events such as dawn or spring and linear events such as reproduction of the same kind of activity. The cyclic and the linear are relative to each other in the meaning that one becomes the measure of the other. The cyclic generally has measures based on twelve and the linear often has a mechanical measure based on the metric system of decimal multiples.

In Verduyn’s analysis the rhythms clearly discerned are of two entrepreneurs (Mel and Bill) and the emerging venture. Mel refuses the dichotomy between work time and leisure time and lives a natural, slow rhythm. Bill is busy of a goal-oriented movement and fears that the emergence of the new will fail. Demands determine Bill’s rhythm, demands of mechanical and linear rhythm in which every moment has an aim. Bill makes things happen in a high rate of activity. The emerging venture is seen with possibilities that interact with the entrepreneurs’ rhythms. It needed an emancipatory move – the emancipation of Bill’s rhythm and emancipation from the repetition of the interactions between Mel and Bill – in order to open up for the flow. In Verduyn’s analysis time is not pre-given but enacted during interaction of multiple rhythms including the new venture’s, which challenges generally hold assumptions of business creation. Opportunities are not discovered or in relation to a time frame but are creating themselves in interaction with other rhythms that give them space to grow.

Verduyn emphasized the relative between work time and natural time. Lefebvre argues that this opposition and others such as repetition/difference, mechanical/organic, discovery/creation, cyclical/linear, continuous/discontinuous, quantitative/qualitative need to include a third element; measure. It makes a relation of the logical and the dialectical, which is to say of the identical and the contradictory (Lefebvre 2004:11). It seeks to grasp the relative rather than the substantial. Lefebvre (2004:12) argues that the analysis does not isolate an object, or a subject, or a relation. It seeks to grasp a moving but determinate complexity of the contradictions of the real (see Table 1). Different rhythms unite with another in the everydayness. Diverse rhythms are slow or lively in relation to us and take on different notions that might be sensitized such as the said and the non-said, or those that everyone knows of such as public, social rhythms of celebrations or of expressions, or those

assumed fictional rhythms that are imagined calculations and estimations and even dominating-dominated rhythms that are completely made up in order to achieve an effect that is beyond themselves. Lefebvre argues that arrhythmia; at the same time are symptom, cause and effect. If so, then its repetitive flow might be self-increasing, which might be managed by a super-imposed state of health, i.e. normed everydayness.

Table 1 An analytical model of polyrhythmic momentum, i.e. of rhythms in relation to others

Repetition (a rhythm in relation to others)		Difference, whether rhythms strengthen each other or weaken each other.
Linear	Cyclical	Rhythms measure each other in a <i>relative</i> form rather than substantive, such as slow vs. lively, said vs. non-said or public vs. fictional imagined calculations.
Mechanical	Organic	
Continuous	Discontinuous	
Quantitative	Qualitative	

Temporal processes include eurhythmia and arrhythmia in which temporal alignment might be a way to open up for potentialities of the processes. Analyzing temporal processes is important for the use; for a more informed practice.

RHYTHM OF A SUPPLY CHAIN

In line with Lefebvre’s (2004) suggestion we will start the empirical description in the abstract, namely a conceptualization of different business logics (Borgström 2010) and take it to the lived tensions of the real. This means that we sensitize three figures that from interviews and observations were recognized as the Others to each other. The Others because the logics of their action differed even though all were included in the order-to-delivery process. The production system’s actors that are informed by an industrial logic, the distributing system’s actors and the transport system’s actors.

The actors will be elaborated more below but we might mention already here that the *industrial actor* is made up of different people in different firms that manufacture and assemble parts, systems and finally cars, these are interdependent because of the order-to-delivery process. The point marked as planning/ordering in Figure 2 is decisive in terms of what industrial actions are demanded and interprets customer orders to production orders. In the inception of customer ordered production, it was decided that no car would be assembled unless it was customer ordered – a decision that is well known but not always practiced. The order-to-delivery process lives its own life despite it is regulated rules and agreements. Before customer ordered production, production related to economies of scale and an ambition to utilize production capacity. The customer ordered production brought in economies of flexibility (short lead times, precision, and less tied up capital). Changes in customer ordered production relate to sales challenges constructed in order to increase volume of sales. The

business actor is made up of people that sell and market the products, also the users of the cars and actors, such as institutes related to use of cars and media. Most influential in terms of customer ordered production changes of the positions of the *business actor* in the order-to-delivery process are dealers and national sales companies. The *transport actor* is made up of the transporter of goods acting on the production system level and its “back-office” operator that coordinates the action.

The industrial actor

A timid comment of a manufacturing manager at the outset of customer ordered production expressed worries because the coming week’s production was yet to be planned; it was unknown! This was a source of anxiety and very different from the experience of other manufacturing managers in similar firms. Planning is a central activity of the industrial actor that wants to avoid shortage of material, high inventory levels and transportation costs and wants to promote stability.

Planning takes account to a homogeneous and mechanical time, day and night shifts involve similar activities. Orders and deliveries are coordinated in schedules and plans in relation to other’s schedules. Time is an exact sequence – deviations in the daily rhythm are not because of natural causes but because of break downs. The human needs are disturbing the repetitive rhythm. Customer ordered production made the supplier increase responsiveness, among others, by a multi-skilled work force that was flexible in time and adjusted working-hours to the need of a variety of jobs. The flexibility to handle different variants of the engines was a way to extend activities possible within the order-to-delivery time. The suppliers had adjusted to the needs of short lead times and changes in demand by presuming that the volume would be somewhat stable and the content of the volume might change to a certain degree. Related to planning are costs. Each sequence of time has a huge price tag because of resources, thereof the importance of resource utilization. The production system is seen as a costly machine with potentialities that engineers can improve. Time is money. Costs are in every moment engaging the industrial actor.

The industrial actor is cost focused, especially in a period of economic down-turn. Beside demands of predictability in terms of quality and delivery time different ways to decrease costs are key in the development. The economic down-turn was a societal demand that determined the rhythmic structure and a new owner (an acquisition and merger with a big competitor) was another type of demand that determines the rhythmic structure via managerial directives. Organizational functions of the car assembler are specialized and contribute to the order-to-delivery process in different ways. Purchasing, for example, work intensively with operational output, such as quality and delivery reliability, but also strategic costs of material – it takes part in the rhythmic structure of the industrial actor. The purchasing function did well and in line with managerial directives to lower costs by global sourcing. Functional demands differed dependent on specialization and affected the rhythm. The degree of purchasing far away for cost reasons slowed down and shaped the flow of material in that transportation time increased.

The industrial network is global and highly coordinated. Also, it is complex and most involved people cannot fully understand existing interdependencies among resources in use. Its repetitive flow is made possible by control from exchange relationships, for example, contracts drawn by the purchasing function of the car assembler. Some general principles are employed by the industrial actors, such as the concept of lean. There is a continuous flow of best practice principles that influence work time behavior. Obviously, there is differences in rhythms of customer ordered production and forecasted based production, of different intra- and inter-organizational actors, of business level and operative level in the industrial network, and there are many ongoing rhythms. Importantly, the linear rhythm driven by the mechanical is dominating the differences in rhythms within the industrial actor's logic.

The business actor

Customer ordered production was seen as needed in a premium-brand business model in which the cars and accessories involve advanced product development in relentless search to match evolving demands of customers. Customers are willing to pay for value they decide upon themselves by choosing different options. Dealers are knowledgeable parties at hand for the customers' sake and to guide their choices for long-term benefit but they are also the face of the premium-brand. Therefore the business model had left behind stocks of new cars and relied on showroom exemplars and short order-to-delivery times facilitating the dealer-customer interaction in the sales. The sales situation is a prolonged set of sequences, potentially a couple of months of decision process, which is completely different from off the shelves sales, where the customers decision process is pretty much over when meeting a dealer. The rhythm of the customer is taken in, in the customer-ordered-production sales model.

The national sales company interacted closely with the manufacturer in order to secure capacity for sales. The new management directives that followed after the merger and acquisition did enforce cost objectives for industrial activities but also pressured volumes in a way that differed from the business model in use. The rhythm of the customer differs from the one related to volume numbers. Control of sales was managed by enforcing sales challenges. The challenges encouraged dealers to take on stocks and to treat these challenges as an actor with demands not necessarily in line with customers' demands. The challenges left behind stocks of cars needed to be sold. The old saying that dealers need to be pushed in order to actively sell was used to justify the changes from flexibility to interact with cyclical and individual rhythm of customers to imposing a rhythm that interacted with capacity of the industrial actor and the monetary value offered by the car assembler.

Sales challenges were facilitated by quick sellers, i.e. a standardized set of options offered to a special price during a limited period, promotion campaigns and all sorts of gimmickry at the showrooms, in order to attract people to come and convince them to leave after they have signed a contract. The other way to deal with sales challenges by dealers was by taking on a risk and buy the number of cars needed based on the challenge, i.e. order for stock and change the options if a customer could be matched to the order during the delivery time. In that way variability in orders to the industrial network increased and together with a general need to

lower costs the industrial network reacted and tried to decrease possibilities to customize cars in the industrial network.

Customers are individuals that share time in the sense of day and night. In their interaction with dealers there is the extension of time offered by internet, such as the car assembler's web page that facilitates the decision process by a car configurator and also evaluations offered by automotive institutions. When the car dealer closes in the evening the customer continues the search and might return with more detailed questions. The cyclical rhythm of customers relates to the natural. It relates to increasing knowledge, to an experience not only of knowledge but also of life. Experience of shifting demands with age and situation. Time is not money but opportunities to meet those demands. Dealers' time is related to others, such as colleagues talking about experiences, to be with customers preparing or doing a sales agreement, to interact in order to understand what next move would be appropriate. The repetition is determined but always has a new beginning.

The dealers' showrooms are in close connection to spaces that customers and non-customers visit. Dealers want to attract people to interact with them more or less regularly, not only to sell the next car but because of services and extras related to post-sales are profitable. Meetings with customers and dealers are a temporal place first often situated in the showroom and then the service of facilitating a new car might be by the phone. A dealer expressed with satisfaction that the company car purchase of a family firm nearby was done over the phone in an easy-going manner. The dealer knew the products offered and the customer demands. The customer wanted to have the service of using a new car. Another dealer expressed that the interaction with the customer and the virtual car configurator was fantastic because the customers became a pretty good sales person themselves and the dealer was more of a facilitator.

The adaptive service provider

The service provider wants to be an innovative facilitator that connects the supply chain. Coordination and development of transportation both related to distribution and supply are key issues, they argue and describe that they are born and bred out of the automotive industry and know the industrial logic. Actually, they have to a great extent been developing the systems that customer ordered production relies upon.

The logistics service provider's knowledge of transportation solutions is unquestioned. They used to be an integral part of the car assembler and are now working more or less as a sole provider that coordinates supplying transporters. Reliability and costs are important performance indicators that they enact. Thus, schedules arranged according to sequences or predetermined delivery times form their everyday despite that weather might interfere with their tasks and traffic might limit their accessibility, or other natural causes create disturbances.

The order-to-delivery process of customer ordered production relates to manufacturing practices but also to transportation principles; full trailers, milk rounds, precision in deliveries of new cars. Transportation of supplies to the assembler and cars to dealers is regulated by

rules and agreements. Costs and fill rate are holding a grip of the daily work. The logistics service provider facilitated customer ordered production by streamlining transports to demands of production – the supplier, logistics service provider, and the buyer have agreements of the services offered. The logistics service provider coordinates transports but use transporters in the operation in the order flow, and it is in the operations that frequent changes need to handled, especially in times of extraordinary changes in demand. The transporters need to resist changes because of agreements. Changes in customer orders that are natural in the business logic are difficult to handle because of the transport system’s capacities. The outbound manager argues that planned cut-off times, planned transports and pre-booked transports demand a stable production that is forecast based. For inbound transports, the service provider is adapting to some needs and is driving the development related to transports but are resisting the extra flexibility for changes in the short term that the actors of the order-to-delivery process try to impose upon them.

Service providers are adaptive and pro-active, their progress relate to technical solutions. The evolving needs that are dynamic because of continuous coordination in the order-to-delivery process are not their business. More flexibility, they fear will lead to rising costs and environmental problems.

Simultaneous contrasting rhythms; the polyrhythmic supply chain happening

There are different rhythms of different actors that together make up polyrhythmic momentums, Table 2. These measure each other in a relative manner and might both strengthen and weaken each other. Based on the actors’ logic the rhythm of their everyday differs. The industrial actor’s logic relate to a repetition in the everydayness that is linear, mechanical, continuous and quantitative. The business actor’s logic relate to the cyclical, organic, discontinuous and qualitative of the everydayness. The adaptive service provider’s logic enforces the organic, discontinuous and qualitative fitting to demands based on a strategic discussion but employs continuous and quantitative resources in the everydayness. If the rhythms of these actors are listened to in specific instances, then the polyrhythmic supply chain step up. The polyrhythmic supply chain consists of two or more simultaneous rhythms, sometimes definable to a specific subset. The numbers of rhythms against each other are less important than their relation, e.g., eurhythmia or arrhythmia.

Table 2 A polyrhythmic momentum of rhythms in relation to others

<i>Situation</i>	<i>Rhythm of the industrial actor</i>	<i>Rhythm of the business actor</i>	<i>Rhythm of the adaptive service provider</i>	<i>Rhythms in the polyrhythmic supply chain</i>
<i>Ongoing activities</i>	Planning involves homogeneous and mechanical time, Activities are coordinated in schedules and plans	Activities relates to premium-brand and relationship of ongoing service interactions, in which customer ordered production enforced the organic and qualitative knowledge sharing between users and dealers in the sales situation and between	Born and bred out of the automotive industry and play along the industrial logic. They adapt to the business actor by accommodating demands of delivery.	Eurhythmia by ongoing adjustments and evolving rules of conduct.

		dealers and sales company in planning.		
<i>Managing plurality of objectives</i>	Work force adjusted working-hours to the need of a variety of jobs but the customer ordered production procedures did not anticipate the swings emerging out of sales challenges and could not match the unanticipated direction of demands.	Sales are cyclical and activities are planned based premium attributes but emancipated from the industrial logic because of the customer ordered strategy. The sales challenges that were putted on the top of the strategy made a linear, mechanical, continuous and quantitative sales model natural.	Coordinates strategic solutions by experience and innovative ideas. Employ transporters to do low cost transportations that cannot adapt in the short time to changes in demand.	Arrhythmia; a pathological state in the supply chain with different types of atypical problems arising for all actors. Potentially, the change in rhythms are not as troublesome as the lack of communications regarding symptoms, causes and effects,
<i>Effects of contradictory objectives</i>	Enforced quantitative measures and programs. Management by objectives of head counting, costs, synergism seeking, quality and precisions prescribed by lean and similar management concepts.	Volume challenges changed the business rhythm of the organic sales cycles to a superimposed rhythm of sales volume per period. If the dealers decided to order to stock, then with peaks in the end of the period influencing their sales model. Also the dealer-sales company's forecast process changed from an organic and iterative qualitative process to a number crunching process.	Management is regulated by rules and prescriptions from different stakeholders. Full trailers and milk rounds are practices that match the industrial actors' and the business actors' superficially divergent demands in an integrative manner. Cannot coordinate for extraordinary changes in demand created by volume challenges because demands arise from the operative rather than from a strategic discussion.	
<i>Relation to time</i>	The mechanical production system's continuous rhythm is decisive in terms of cost performance. Time is money.	Work time is intertwined with natural time. Dealers' opening hours and the national sales companies' web-based configuration tool are adjusted to users' natural time and discontinuous decision process. Time is not money.	The transport system's reliability is key. Its continuous rhythm is decisive in terms of cost performance. Time is money.	The actors' subset of rhythms is definable to one slow and natural and the other two more intensive and mechanical. The assumed calculations of the customer ordered production strategy's opportunities are converging and reinforcing the movement.
<i>Coordinating; supply chain strategizing for the sake of customer ordered production.</i>	Flexibility is achieved by many minor projects, involving people's working time, routine for securing material, and shorter lead times, among others.	Customers are willing to wait for delivery and pay for value as they learn of premium attributes. Dealer and customer create the product together. The sales model of customer order produced cars is facilitated by information technology but enforced in the qualitative meeting.	Flexibility is achieved by a great deal of coordination because nature and traffic demand an organic, discontinuous and qualitative approach.	

The ongoing coordination needs to take into account the difference, the relation between subsets of rhythms. The pathological state of suffering that Lefebvre (2004) argues that

arrhythmia is; generally are at the same time, symptom, cause and effect. What moves that state to another, to one of eurhythmia? Differences come from time, space and energy.

DISCUSSION

Upstream actors' industrial activities are highly coordinated. Downstream actors coordinate activities in another setting, logic and energy. Supply chain integration, involving upstream and downstream actors is problematic as the social systems differ. They differ in relation to time, space and energy. Also a third identified social system, the adaptive service provider need to be accounted for. Differences are not only between the different systems, also within the rhythm change. The order-to-delivery process was guided by rules and procedures of customer ordered production strategy that developed on the basis of the different actors. Over time the different rhythms have been accompanied but not in relation to each other's different logics but in relation to superimposed restrictions that potentially create arrhythmia in the supply chain. The supply side development coordinates on the basis of cost demands, in similarity to the adaptive service provider even though they otherwise have different rhythms. Downstream development coordinated based on volume. The cost and volume objectives are on the top of the common strategy.

A disintegrated supply chain is in this way natural, because integration between the systems is in special dimensions at a time and is dynamic over time. The everyday life of the different actors; time, space and energy be might aligned in common structures such as temporally spaces by temporal alignment. This is based on the assumption that *different network actors have different and changing situations*. Social integration relates to rhythm and ways to understand the polyrhythmic scenario. System integration might stabilize temporal structures.

Contradictions of interdependent social systems are natural on the basis that differences over time indicate that something new and unforeseen is introduced into the repetitive processes. The discussed empirical material illustrates two influential forms of repetition but three instantiations of these. Each social system has different repetitions that in a moment strengthen or weaken each other. For example, the industrial rhythm had a linear repetition, the business rhythm had cyclical repetition and so had the transporters' adaptive rhythm. The distribution side and the transporters might both have cyclical rhythms but there are differences in between these that relates to their composition.

Borgström (2010) argued that integration in supply chain management literature need to be seen as continuous coordination rather than integration as a thing. The rhythm analysis describes overlapping and interacting worlds of place/time/energy that open up for a more informed way of discussing integration. The concept of temporal alignment conveys a complementary view of supply chain integration in that the continuous coordination becomes a practical accomplishment. The supply chain polyrhythmia is on the one hand inevitable but, on the other hand, the episodes of eurhythmia and arrhythmia are accomplishments.

Temporal alignment is a useful concept for integration-in-motion of different supply chain sub-systems. Andersson and Mattson {Andersson, 2011 #1005} (Andersson and Mattson 2011) refer to activity chains' alignment by reducing, bridging, or increasing. Likewise,

rhythm might be aligned temporally by the same methods. Reducing arrhythmia, bridging rhythms and acknowledge a polyrhythmic scenario, or increasing the repetition of rhythm in order to move from one polyrhythmia to another. The origin of rhythms is in some instances clearly discernible, such as the cases of the business actor and the industrial actor. However, the transporters role in differences is not always clear. An industrial system, such as Johanson and Mattsson (1992) depicted might therefore include a set of actors that matters in a rhythmanalysis.

CONCLUSION

The paper contributes to a methodological development by introducing rhythmanalysis as a tool in industrial network research. Studies of market practice continues to ask questions about the reproduction marketing and markets (see, e.g., Araujo et al. 2010). The rhythmanalysis focus on a moment in time at a place with a specific energy and relates this to another. Different rhythms exists that might strengthen or weaken each other.

In the case of customer ordered production strategy we investigated three simultaneous rhythms of a controversial time period and differences between these together with a discussion of temporal alignment. The polyrhythmic supply chain consisted of the distinct actors, each having different rhythms indicating its everydayness. The combination of different actors' rhythms in a supply chain shifts over time that might be eurhythmic or arrhythmic. The temporal alignment is a way to reduce, bridge, or increase in order to facilitate eurhythmia.

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