

Logistics Organizations: Ideologies, Principles and Practice

Stig Johannessen and Olav Solem

Norwegian University of Science and Technology

The expanding focus on logistics management makes it necessary to rethink the concept of logistics organizations. In addition, there is a need for clarification of the relations between the practices of these organizations and the basic thinking that underlies their behavior. The paper presents a framework for understanding these relations by identifying certain teleological and ontological fundamentals of logistics organizational ideologies. We suggest certain principles and organizational practices that are underpinned by these ideologies. Furthermore, given the changes logistics organizations are experiencing today, we discuss how the changes are viewed within the various ideologies. We conclude that there is a need for improved ability to deal with change within logistics organizations, and that this can be achieved by adopting new theoretical and practical perspectives into the established ideologies of these organizations.

The globalization of the economy and the technological development of electronic- based business have stimulated many firms to see logistics capabilities to be at the very heart of their competitive power.

The concept of logistics organizations is not clearly defined. The term has traditionally been used for the part or function in an organization that deals with purchasing, storage and transportation of materials and products [1]. However, many firms today are strategically committed to logistics thinking for their competitive advantage [2]. This calls for the whole business organization to be built around principles of logistics. The globalization of the economy and the technological development of electronic-based business have stimulated many firms to see logistics capabilities to be at the very heart of their competitive power [3].

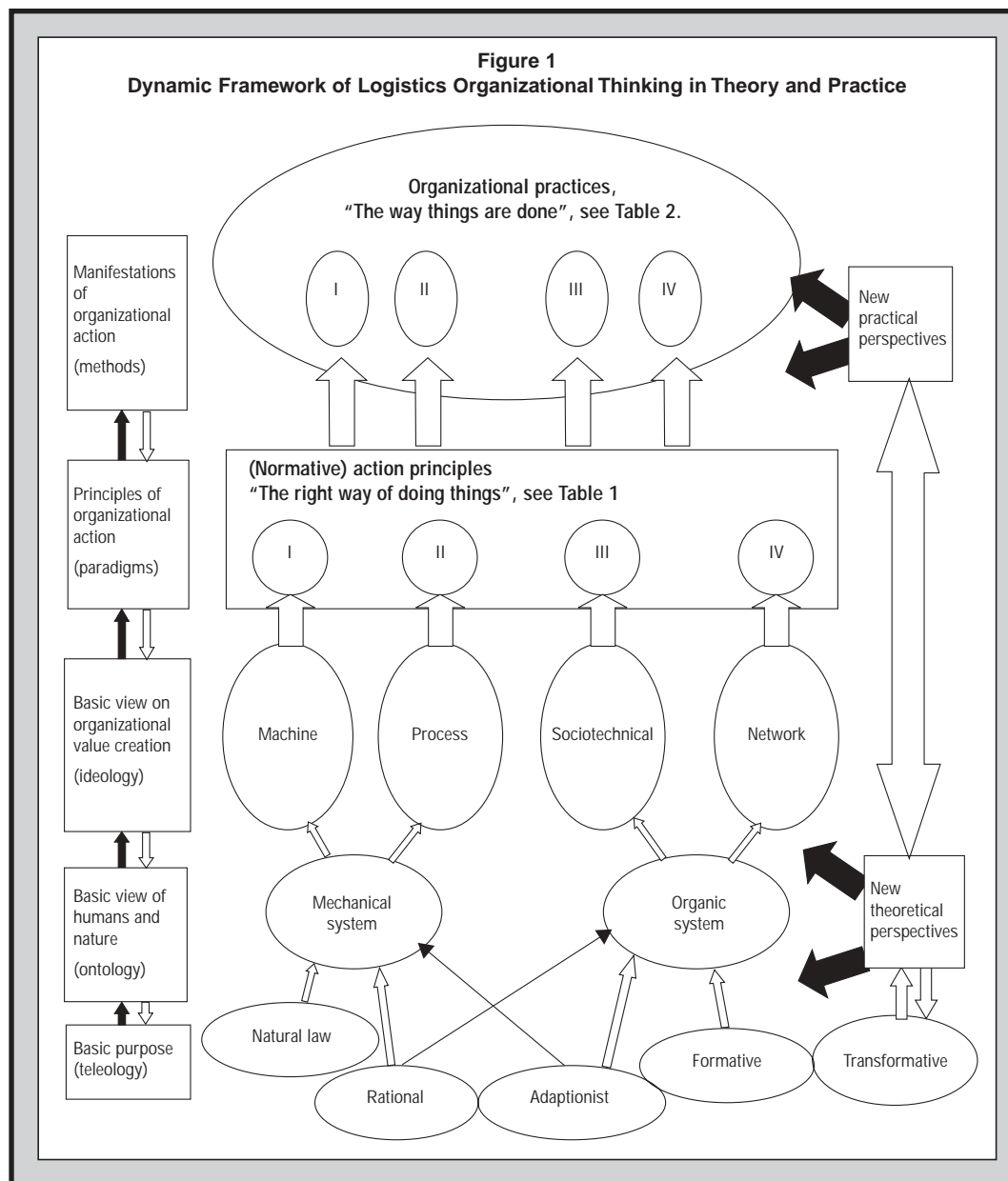
Recognizing this development, we find it necessary to define - or at least to have a conceptual understanding of - logistics organizations as any business organization where logistics activities and logistics management are of critical importance for competitiveness and survival. Both in the past and today we find many manufacturing businesses that fit this description. Furthermore, the large number of companies that rely on the flow of information and services could also be named logistics organizations.

Given this background, we will argue that certain dominating ways of organizational

thinking exist in logistics organizations. In order to understand how this thinking has evolved, influenced and transformed organizational practice, it would be useful to develop an understanding of the relationships between the underlying teleological and ontological assumptions, and the ideologies, principles of action and organizational practice. We suggest that this insight could have implications for organizational change and competitive power.

Logistics Organizational Thinking

Figure 1 attempts to capture in one picture how various perspectives on reality might relate to normative organizational thinking and subsequent organizational practice in logistics organizations. The framework consists of two ways of understanding reality, that is, two ontological views. We have chosen to call them the mechanical systems view and the organic systems view. Underneath or perhaps simultaneously interwoven in ontology, are the teleological suppositions. These concern questions about the purpose and goals of nature and humans and consequently our organizational activities. The teleological suppositions are identified as four different kinds with respect to logistics organizations.



They are named natural law, rational, adaptionist and formative [4]. In addition, a fifth kind is identified, which might influence the development of thinking. This is called transformative teleology [5].

Out of these basic views, theories for logistics organizations are constructed. The mechanical systems view generates two directions of organizational ideologies - the machine ideology and the process ideology. The former is linked to Tayloristic ways of thinking about value creation, the latter to modern logistical principles of Just-in-Time (JIT) and customer-orientation.

The organic systems view also gives rise to two organizational ideologies. In the

sociotechnical ideology, supreme value is created by incorporating ideas on human needs for social activity and psychological development into organizational thinking. The network ideology holds that cooperation through relations and dependencies between organizations produce the basis for competitive advantage.

The practical organizational thinking that primarily is conceived from the teleological, ontological and ideological grounds are the principles of organizational action. Eventually, these principles are manifested in organizational practice. The five action principles, which could be seen as paradigms of organizational behavior, contain

The network ideology holds that cooperation through relations and dependencies between organizations produce the basis for competitive advantage.

different guidelines for successful action in the ideologies. The six areas of organizational practice that we focus on here are various ways of fulfilling the action principles through practical methods of organizational structuring and handling of crucial processes.

The framework in Figure 1 explores some possible relations between theoretical and practical ideas in logistics organizations. It is not to be regarded as a deterministic model of organizational behavior. A certain teleological or ontological view is not a prescription for certain ideological views or paradigms of organizational action. And such paradigms cannot determine the organizational practices of logistics organizations. The relations shown in Figure 1 are the results of new perspectives evolving over time. The arrows point both up and down, indicating that change in underlying assumptions, as well as change in normative actions, can be brought forward by new practical experience and new theoretical perspectives. This is also indicated to the left in the figure, by the directions of the arrows between the boxes.

Teleology and Ontology

Teleology is an Aristotelian concept that is defined as a "doctrine of final causes" [6]. It refers to theories concerned with the marking of nature and history by a purposeful arrangement or design. To refer to teleology might be regarded as unscientific by some, given the association with metaphysical realms. But regardless of how science views teleology, it is reasonable to think that the why? questions addressing the purpose of it all, do influence human endeavor. It is, therefore, relevant to assume that our organizational conduct in some way is influenced by suppositions of a teleological nature. This is not restricted to the view of a divine force designing and preordaining the course of history in the universe. In fact, five different teleologies can be identified [7]. These are the "natural law teleology", "rational teleology", "adaptionist teleology", "formative teleology" and "transformative teleology", as indicated in Figure 1. The various teleologies see the movement toward the future differently. The natural law teleology sees it as a "repetition of the past." The rationalist

teleology sees it as "a goal chosen by reasoning autonomous humans", and formative teleology sees it as "a mature form implied at the start of movement or in the movement, which implies a final state that can be known in advance". Adaptionist teleology sees the movement toward the future as "a stable state adapted to environment that may change in unknowable ways" and finally, the transformative teleology sees it as a movement "under perpetual construction by the movement itself" [8].

These various teleologies are related to different ontologies, or views on the essence of reality. Figure 1 suggests the links between teleologies and the two important ontologies with regard to logistics organizations. The mechanical systems ontology is linked to natural law teleology and rational teleology. Reality is seen as a great mechanical system that works according to given rules (natural laws) and where human choices can be made regarding the evolution of the system (rationalist).

Rational teleology also applies to the organic systems ontology. However, the formative teleology indicates that the system moves towards certain end-states that can be known in advance. At the same time, there is an ability to adapt to changing conditions, which is the view of adaptionist teleology.

As shown in Figure 1, the ontologies of logistics organizations are not linked to a transformative teleology, which states that the future is changing in unpredictable ways, and that the transformations apply to the teleology itself. There are emerging theoretical perspectives on organizations, notably streams of complexity theories, which assume a transformative teleology. Such theories could, if adopted, change logistics organizations in the future.

Ideologies, Action Principles, and Practice

We have identified four logistics organizational ideologies - the machine ideology, the process ideology, the sociotechnical ideology, and the network ideology. We propose five action principles, or organizational paradigms, that are the right way of doing things within these ideologies.

We have identified four logistics organizational ideologies - the machine ideology, the process ideology, the sociotechnical ideology, and the network ideology.

These are the principles that managers, consultants and academics often focus on when logistics organizations are organized and managed. The principles identified are the principles of management, value-creation, human value, information, and change. The contents of these action principles in the various ideological directions are shown in Table 1. It displays the answers to the following normative questions:

Management principle: How is the organization going to be managed?

Value-creation principle: How is value going to be created in the organization?

Human value principle: How are humans going to be valued in the organization?

Information principle: How is information going to be treated in the organization?

Change principle: How is change going to be managed in the organization?

For each ideological direction, we propose six organizational practices that are used to fulfill the action principles. In addition to structure, they are the processes of management, work routines, strategy making, communication and relationships building. The contents of these practices are shown in Table 2.

The Machine Ideology

The machine ideology represents the

classical way of thinking about organizations. The source of inspiration is the ideas of Taylor's Scientific Management [9], and as a practical ideology we might name it Fordism, with reference to the ideas behind the Ford factories in the early 20th century.

Viewed within the scope of a logistics organization, the goal is to overcome problems of fragmented logistics activities. The idea is that efficiency will improve by structuring logistics as a separate organizational unit. Choices must then be made concerning the position of this function in the hierarchy, to what degree it should be centralized and to what degree it should be the responsibility of the line or the staff [10].

The answers to the questions regarding the contents of the five action principles in the machine ideology provide us with an idea of how the organization is to be run if it is to create value. It is important for management to be in total control. The division of work and management is the core idea of Tayloristic thought. Value is seen as being created through coordinated production and humans add to this value in their capacity as productive parts of the "great machine" organization. It is essential that information is restricted so that management can be in control. This is best achieved if the organization is stable and predictable, leaving change as something unwanted.

We have focused on the organizational

The machine ideology represents the classical way of thinking about organizations.

Table 1
Action Principles and Logistics Organizational Ideologies

Ideologies Action Principles	I Machine	II Process	III Sociotechnical	IV Network
Management principle	Total control	Delegated control	Partly delegated control	Shared control and trust
Value-creation principle	Coordinated production	Coordinated supply and delivery	Coordinated production and human responsibility	Coordinated cooperation, learning, supply and delivery
Human value principle	Productive machine parts	Productive and knowledgeable systems parts	Productive and responsible systems parts	Productive and social interactive beings
Information principle	Control of information	Sharing of information	Partly sharing of information	Sharing of information
Change principle	Stability	Adaptation and stability	Adjustment and stability	Adaptation and stability

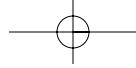


Table 2
Organizational Practice and Logistics Organizational Ideologies

Ideologies Organizational Practice	I Machine	II Process	III Sociotechnical	IV Network
Structure	Mechanical hierarchy	Team-hierarchy	Non-mechanical hierarchy	Network
Management	Production	Production/suppliers/customers	Production/people	Production/network
Work routines	Individualistic	Team-oriented	Team-oriented	Team-oriented
Strategy making	Static planning	Static/adaptive planning	Static planning	Static /adaptive planning
Communication	Extremely restrained	Relatively open	Restrained	Relatively open
Relationships	Internally within same level of status	Internally and externally within teams	Internally within teams	Internally and externally within teams

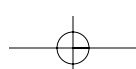
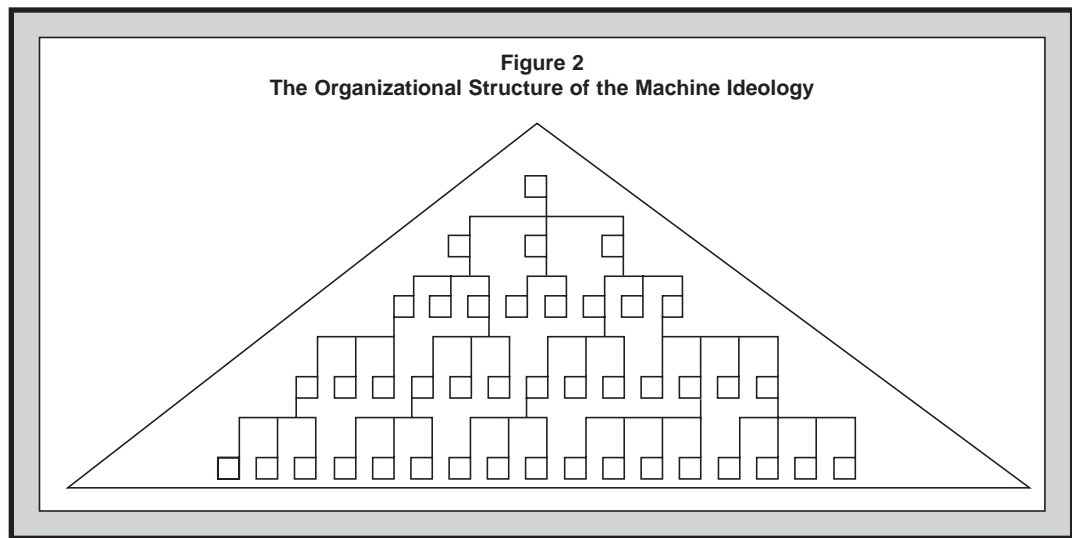
Employees are informed on a “need to know” or perhaps a “need not to know” basis.

practices of structuring, management, work routines, strategy making, communication and relationships. Figure 2 displays the “stovepipe” structure of the functional hierarchy, one of the main remedies for fulfilling the action principles of the machine ideology. One person is assigned to one activity and everyone has one person who is superior. Constructing assembly lines ensures the effective flow of products between workers with individual tasks. Specialists, typically trained as engineers or economists handle any problem that occurs. In carrying out the work routines, there is a clear division between manual and intellectual activities.

Managers control all decisions and

information in this ideology. Employees are informed on a “need to know” or perhaps a “need not to know” basis. Planning activities are an important management task. Strategy making, for instance, is all about planning the long-term future of the organization [11]. It is formulated by top management and deals with predictions on future need for production capacity and efficiency.

Communication is extremely restrained in the machine ideology due to the work routines being individualized, the information flow being controlled, and the strong physical, social and mental barriers between and within the layers in the hierarchy. Relationships form internally between people



of the same status in the hierarchy. This combination of dysfunctional communication within the hierarchy and strong relational ties within groups could eventually lead to the emergence of group identity and strong collective thinking within groups. Traditionally, there have been two strong groups, workers and management, displaying the social phenomenon of one group referring to themselves as “us” and to the other as “them” [12]. In modern organizations, even if they are committed to a machine ideology, the situation is often more complicated. Different groups of workers and managers have divergent interests, but still the relationships are likely to be strongest within groups that share some common ground on the same level in the hierarchy. The relations outside of the organization, with suppliers or customers, are restricted to managers, often high up in the hierarchy.

The Process Ideology

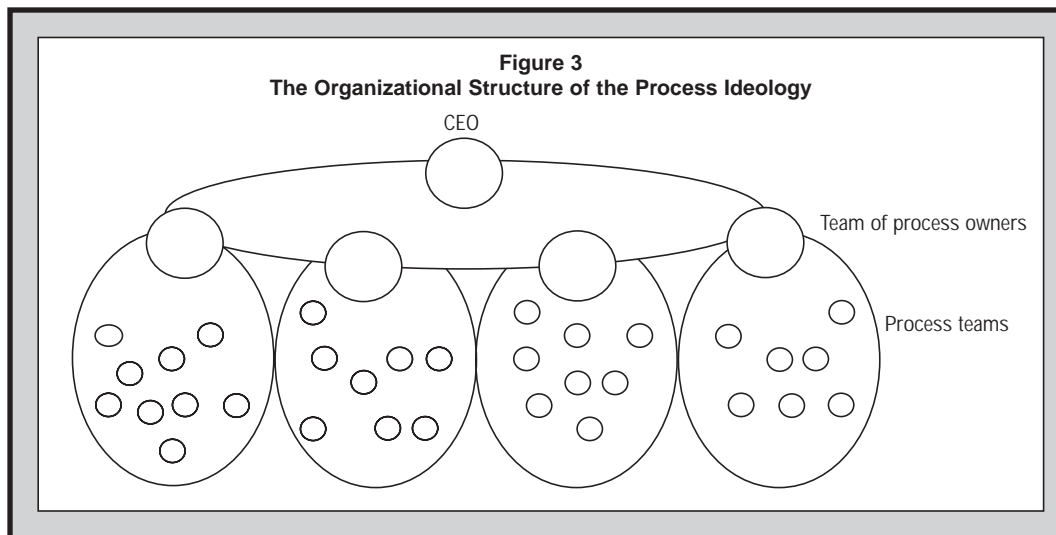
A second logistics organizational ideology has evolved from Japanese management philosophies starting with JIT thinking which has been associated with The Toyota Production System. With respect to logistics, the team philosophy embodied in lean management [13] and time-based management can be regarded as important landmarks in the development of this ideology. Another aspect is the focus on business processes [14]. The radical shift of focus from internal functional “stovepipes” towards customer-oriented “pipelines” calls for internal restructuring of power,

management and competencies, a change procedure generally referred to as Business Process Reengineering (BPR). In our model, this means a change in the contents of the action principles and the organizational practices.

The management principle in the process ideology holds that control is needed in the organization, although power to make operational decisions must be delegated. Value is created through coordinated supply and delivery, that is - efficient flow from supplier to customer. Humans are valued as productive and knowledgeable parts of the system. This means that using humans as productive parts of the processes from supplier to customer are important, but at the same time, the social and intellectual capacity of people in making team decisions, are recognized as valuable. The information principle holds that information must be shared in order for value to be created. And the change principle holds that the most important goal is to obtain stability, but this requires continuously adaptive actions in response to the market.

This leads to the organizational practices of the process ideology. Companies organize themselves according to their business processes. Empowered cross-functional teams are making all the relevant process decisions, leaving the control oriented middle-manager level of the functional organization redundant. The structure is a flat hierarchical team structure, as shown in Figure 3, where activities are seen as processes controlled and “owned” by the teams. Team leaders, or

The radical shift of focus from internal functional “stovepipes” towards customer-oriented “pipelines” calls for internal restructuring of power, management and competencies...



process owners, are the only level between the teams and the CEO. The process teams handle the whole operation of input, transformation, and output. Information flows vertically and horizontally in the organization structure. The management process is focused on planning activities concerning production and on building external relationships towards suppliers and customers.

Strategy making is also a planning process. Management formulates strategies, which is all about long-term expectations, but it is to some extent a continuous, adaptive process with both external and internal focus.

The communication process is somewhat restrained in this ideology. This is because the communication is likely to be rational, operational, information-type communication. Relationships are likely to be more extensive than in both the machine organization and the sociotechnical organization. In addition to the internal relations in teams, there are more opportunities for building relationships outside of the organization with suppliers and customers [15].

The Sociotechnical Ideology

The sociotechnical ideology has its source of inspiration with the "Human Relations School" - reaction to Scientific Management [16], and the systems thinking of Ludwig von Bertalanffy [17], where both social and technological aspects of organization are taken into account. This might be called "Volvoism", as the Swedish car manufacturer was among the first to introduce this thinking in practice.

The management principle is to be in control, but this control is executed through limited delegation of power. Value is seen as being created by coordinated production and people making autonomous decisions. People are valued as productive parts of a system, but with social and psychological needs. It is recognized as important that information is flowing vertically as well as horizontally in the organization. But there is still a "need to know" policy. The change principle states that stability and adjustment is the preferred condition of the organization.

The essence of this logistics organizational ideology is efficient and stable production through cooperation and

teamwork. Semi-autonomous groups and cooperative production activities are promoted by the structure of a nonmechanical hierarchy, shown in Figure 4 [18]. Assembly lines are broken up into clusters of activities, making the working routines team-oriented. Management is focused on the well being and commitment of employees, at the same time being concerned with external affairs and planning activities. The management process is thus focused on both people and production. People are seen to gain motivation and increase their productivity if they participate in decision processes and are given the opportunities to learn, be accepted, and see themselves as having a future in their present job [19].

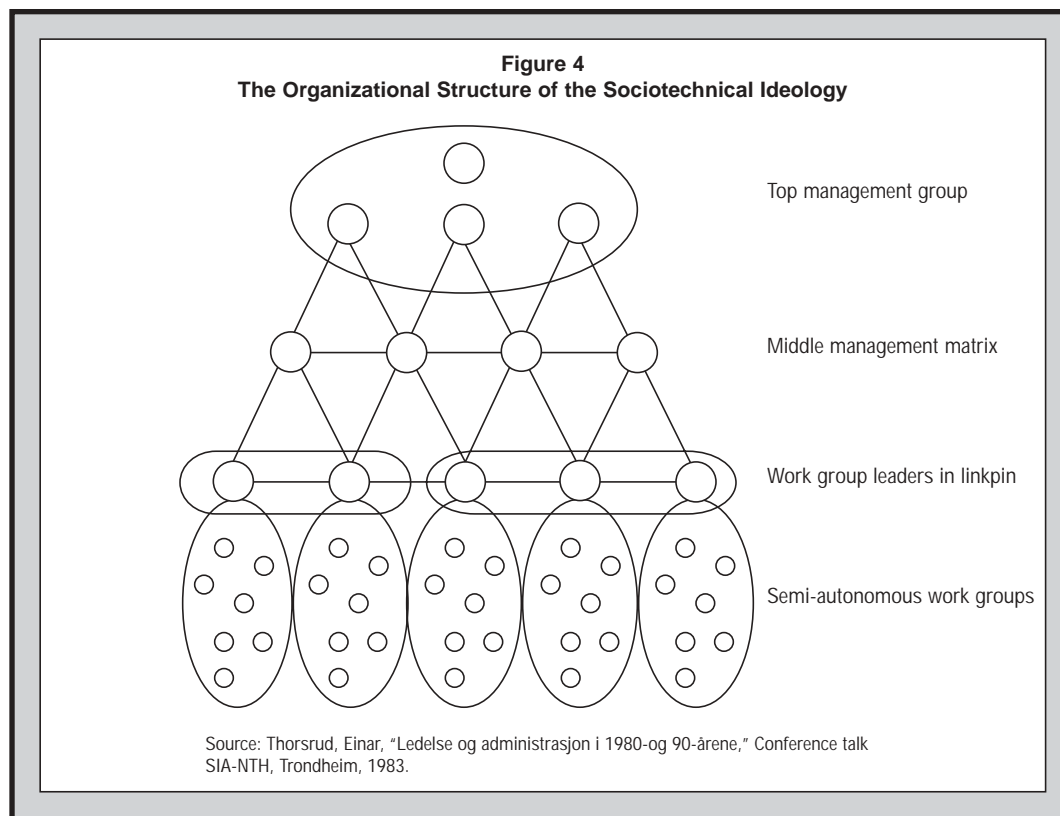
One of the planning processes is the strategy process. Strategic plans are formulated by management and contain long-term predictions and static views with both an external and an internal focus, externally on the market, internally on production and the well being of people. The communication process is reasonably open in this ideology. With respect to relationships, the cooperative spirit and positive view on humans incorporated in this ideology improves internal relationships across the hierarchical levels compared to the organization of the machine ideology. However, few people are involved in external relationships with customers and suppliers.

The Network Ideology

The fourth ideology is the network ideology. It represents similar ideas to the process ideology, but is expanded externally of the single organization to include suppliers and customers in a chain or a network. The supply chain concept is built on transaction cost theory [20] and agent theory [21]. Network theory is rooted in interaction research focusing on trust, transactions by social norms and the development of personal relationships [22].

The key phrase for the business processes internally in the organization, the supply chain and the interactions in the network seems to be cooperative action. Based on this, we suggest that the goal in the network ideology is to create cooperative advantage in order to produce superior value for the customer. This might be named

The sociotechnical ideology has its source of inspiration with the "Human Relations School"...



"extended Toyotaism", as close cooperative networks of suppliers have been one of the key factors of success in the Japanese car industry [23].

The management principle of the network ideology holds that there is only limited control in a network. Management must thus be based on shared control and trust. Value is created by coordinated delivery from the supplier network through the focal organization(s) to the customer network. Cooperation, learning and sharing of knowledge adds to this source of value. People are valued for their ability to be cooperatively productive and be involved in social interaction. Sharing of information is crucial in the network and the network is best served if it is stable, although adaptation to changing market conditions and innovative change are seen as important [24].

The organizational practices resulting from this, lead to the network structure of the super-organization shown in Figure 5. The supplier network could consist of several groups of suppliers, working separately and together on components or parts of a complete system, for example, a car or an airplane. Third-party logistics providers

coordinate and sometimes assemble the system for delivery into the focal firms. The focal firms have a network of customers that sell the final product to a network of end customers. The end customers cooperate in some sense by the aid of the information that is available in the market and by consumer organizations testing, criticizing, and recommending various products. They also to some extent cooperate with the focal firms by engaging in customer-relationships schemes designed to create loyalty to certain brands. However, it would be an exaggeration to claim that the end customers formally are a part of the network organization. The structure that in the network ideology is supposed to operate as one super-organization that consists of the network from the suppliers to the direct customers of the focal firms.

The management process in the network ideology is concerned with social relations both internally and externally, but the managers of a network organization must also be concerned with their own contribution into the network. Thus, a very important management focus is on adjusting and coordinating production with the demands of

The management process in the network ideology is concerned with social relations both internally and externally...

In the process ideology, change is seen as a fact related to customer behavior in a free market.

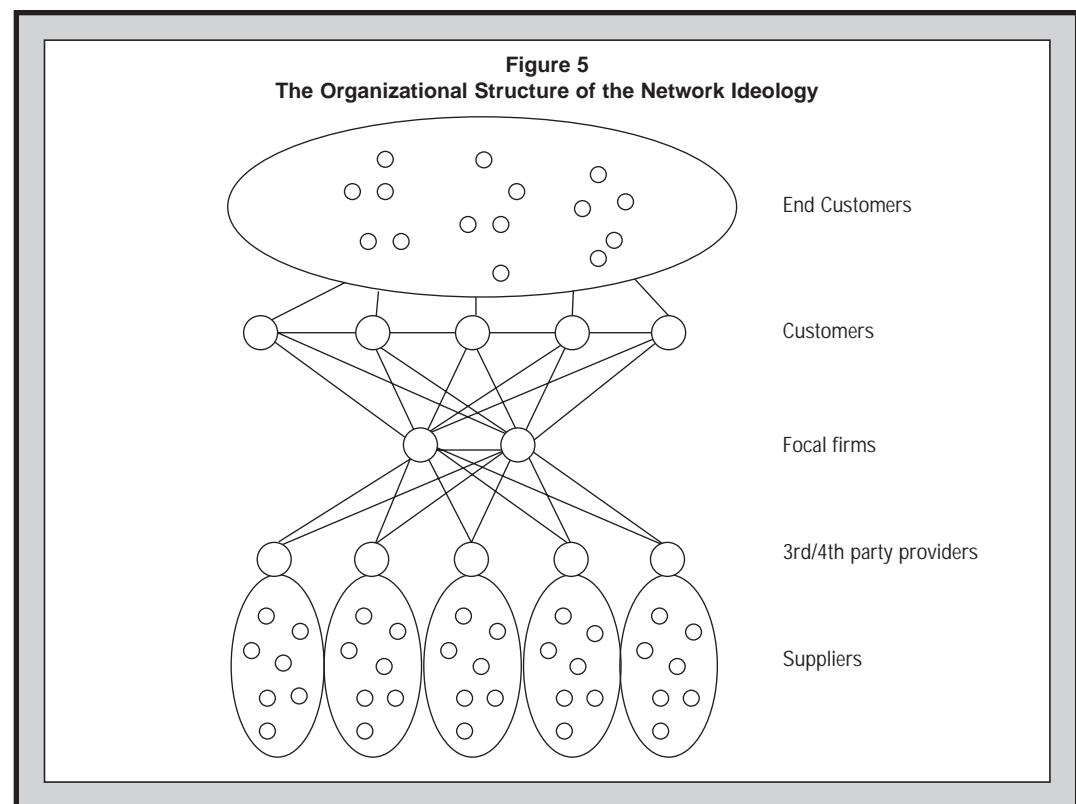
the network. The working routines are team-oriented both internally and externally, enriching the communication processes, although restrictions can be imposed on external communications due to rule-driven interactions. For the same reasons, internal and external relations are respectively formed, tied, and restrained. The process of strategy making is adaptive, with strategies emerging in the network in an unplanned way. But the need to produce long-term strategic partnerships and coherent strategies tends to make the official strategy process a planning process.

Organizational Change

As we have indicated, the various ideologies in logistics organizations differ somewhat in their views towards the phenomena of change. In the machine ideology and the sociotechnical ideology change is seen as something that produces instability in the organizations. Hence, both are seeking stable conditions. The machine ideology sees the organization as a machine-like system and the sociotechnical ideology views the organization as an organic system. In both ideologies the organization must be kept stable to perform optimally,

although the sociotechnical ideology wants planned change and adjustments to the organization.

In the process ideology, change is seen as a fact related to customer behavior in a free market. Hence, it has a more dynamic view of the organization and its environment. The idea is that the dynamics of customer behavior are met by the flexibility of having teams that can be close to the customer to reveal changing demands. But all the long-term planning activities also show that they are seeking organizational stability and predictability. In this ideology they seem to believe that unpredictable changes are primarily something coming from outside the organization. Hence, they must adapt to the changes as they observe and experience them. This is particularly visible when companies are facing difficulties. Managers quickly blame "failing markets" or "global economic recession", or as we have seen recently, "fear of terrorist attacks". It is as if they are helpless victims of changing environments, separated from the world and suddenly struck by terrible outside changes. In such a turbulent world, stability is sought inside the companies by adapting to the environment. This adaptation philosophy



almost automatically triggers downsizing when “markets are failing”, and leans to expansion and growth whenever there is general economic optimism.

The network ideology has much the same view toward change. The building of networks can act as a stabilizing factor in business. By building a strong network, organizations can make themselves more competitive against other networks. Within the network it is recognized that the world changes, and that adjustments of the network might be necessary in order to survive. But at the same time, stability is needed in the network in order to gain predictable behavior, which is seen as a pre-requisite for success. This is obtained amongst other things by planning activities, and control. The network ideology assumes that by joining a network, intentions are good and that these intentions stay fixed for long periods. However, achieving the cooperative advantages in the network together with the flexibility and agility that is required in modern business life seems to be one of the greatest dilemmas of the network ideology.

The resistance to change and desire for stability that is evident in all four ideologies, create difficulties when companies plan to move from one ideological route to another. Conflicting notions about how reality is to be perceived may foster such resistance. The issue of incompatible ideologies is often experienced, but frequently underestimated during change programs. In recent years, this has been particularly evident in programs like BPR, where organizations long devoted to a machine ideology suddenly are supposed to commit themselves to a process ideology. Several reports indicate that the BPR change procedure seems difficult to implement in practice [25]. Too little is known about the underlying explanations of these problems. Caution is suggested when companies change their action principles and organizational practices. If the established ideology is very different from the new one, it might hold back the speed of success for the change process.

Even if change is not planned and forced upon the organization it could be recognized that companies fundamentally create their own lives, their own markets and economic worlds. Changes could be facilitated by the company, instead of the company being the

victim of change. This is a transformative view on change that holds the future as being constructed by continual transformations in the present, and where we are creating and participating in these transformations every day.

The four ideologies and the related action principles and organizational practices proposed in this paper, have all emerged from new ideas on how to make organizations more competitive. We have seen how the two most “modern” ways of giving content to action principles and organizational practices have led to the concepts of the process organization, based on a mechanical view, and the network organization, based on a social view. Both these types of organization are incorporated in newer concepts like the supply chain network, or the netchain [26].

A transformational view holds that new ideas inevitably will emerge and manifest themselves into action principle contents and organizational practices. However, it is not possible to point to what new perspectives may emerge and influence or transform logistics thought. By nature, these new perspectives emerge unpredictably. Nevertheless, it is our view that a group of theories, namely chaos and complexity theories, are starting to reveal their importance. This is precisely because these theories attempt to explain and give insight into the unpredictable phenomena of change in organizations. We have only started the exploration into the promising landscapes of complexity theories in relation to logistics organizational thinking [27]. It is by no means clear how the insights from these theories will affect the way logistics organizations are understood.

Complexity theories are already taking different views towards humans in organized settings. Chaos theories [28] and complex adaptive systems theories [29] are mathematical theories and computer simulation theories that treat humans as programmable objects, a clear mechanical view. Complex responsive process theory [30] look at humans as beings that construct their social and psychological reality through complex unpredictable patterns of interactions, a clear social view.

All these theories can perhaps be helpful in understanding what is going on in the

The building of networks can act as a stabilizing factor in business.

technological and human complexity of organizational structures like supply chains. The theories have the potential of explaining how technological interactions and human social relations are forming the basis for unpredictable actions and ways of learning and changing in organizations. They could fill a hole that present theories like transaction cost theory [31], resource theory [32] and network theory [33] have left open. They can prove important in building more complete logistics theories in the future.

Conclusion

The purpose of this paper was to contribute to building an argument for a stronger focus into logistics organizational research. We have identified the teleological and ontological thinking that have made their mark on logistics organizational ideologies. These various ways of thinking about organizations are seen in principles and the practices of organizations. Today, when globalization and information and communication technology increase the importance of logistics management in many companies, there is a need for reflection on the dominating thinking of these organizations. This could have major implications on their ability to deal with change. In order to understand how novel ideas and practices emerge and transform modern logistics organizations, complexity theories together with established logistics related theories should be taken into account.

In order to understand how novel ideas and practices emerge and transform modern logistics organizations, complexity theories together with established logistics related theories should be taken into account.

References

- [1] Dröge, Cornelia and Richard Germain, "The Design of Logistics Organizations," *Logistics and Transportation Review*, Vol. 34, No. 1 (1998), pp. 25-37.
- [2] Bowersox, Donald J. and Patricia J. Daugherty, "Logistics Paradigms: The Impact of Information Technology," *Journal of Business Logistics*, Vol. 16, No. 1 (1995), pp. 65-80.
- [3] Christopher, Martin, *Logistics and Supply Chain Management*, 2nd edition, London: Pearson Education, 1998.
- [4] Stacey, Ralph D., Douglas Griffin and Patricia Shaw, *Complexity and Management - Fad or Radical Challenge to Systems Thinking?*, London: Routledge, 2001.
- [5] Stacey, Ralph D., Douglas Griffin and Patricia Shaw, *Complexity and Management - Fad or Radical Challenge to Systems Thinking?*, London: Routledge, 2001.
- [6] Fowler, H.W and F. G. Fowler (ed.), *The Concise Oxford Dictionary of Current English*, Oxford: Oxford University Press, 1964.
- [7] Stacey, Ralph D., Douglas Griffin and Patricia Shaw, *Complexity and Management - Fad or Radical Challenge to Systems Thinking?*, London: Routledge, 2001.
- [8] Stacey, Ralph D., Douglas Griffin and Patricia Shaw, *Complexity and Management - Fad or Radical Challenge to Systems Thinking?*, London: Routledge, 2001.
- [9] Taylor, Frederick W., *Scientific Management*, New York: Harper Brothers, 1911.
- [10] Juga, Jari, "Changing Logistics Organization," *The Turku School of Economics and Administration, Sarja/Series A- 7*, Turku, 1996.
- [11] Mintzberg, Henry, *The Rise and Fall of Strategic Planning*, New York: Prentice Hall, 1994.
- [12] Lysgaard, Sverre, *Arbeiderkollektivet*, Oslo: Universitetsforlaget, 1961. (In Norwegian).
- [13] Womack, James P., Daniel T. Jones and Daniel Ross, *The Machine that Changed the World*, New York: Rawson Associates, 1990.
- [14] Davenport, Thomas H. and James E. Short, "The New Industrial Engineering: Information Technology and Business Process Redesign," *Sloan Management Review*, Vol. 31, No. 4 (1990), pp. 11-27; and, Michael Hammer, "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review*, Vol. 68, No. 4 (July-August 1990), pp. 104-112.
- [15] Christopher, Martin and Uta Jüttner, "Developing Strategic Partnerships in the Supply Chain: A Practitioners Perspective," *European Journal of Purchasing & Supply Management*, Vol. 6, (2000), pp. 117-127.
- [16] Mayo, Elton, *The Social Problems of Industrial Civilization*, London: Routledge and Kegan Paul, 1949.
- [17] von Bertalanffy, Ludwig, *General Systems Theory: Foundations, Development, Applications*, New York: George Braziller, 1968.
- [18] Thorsrud, Einar, "Ledelse og administrasjon i 1980-og 90-årene," *Conference talk SIA-NTH*, Trondheim, 1983. (In Norwegian).
- [19] Thorsrud, Einar and Fred Emery, *Mot en ny bedriftsorganisasjon*, Oslo: Tanum, 1969. (In Norwegian).
- [20] Williamson, Oliver E., *The Economic Institutions of Capitalism*, New York: The Free Press, 1985.

[21] Eisenhardt, Kathleen M., "Agency Theory: An Assessment and Review," *Academy of Management Review*, Vol. 14, No. 1 (1989), pp. 57-74.

[22] Håkansson, Håkan, *International Marketing and Purchasing of Industrial Goods: An Interaction Approach*, Chichester, U.K: John Wiley & Sons, 1982.

[23] Nishiguchi, Toshihiro, *Strategic Industrial Sourcing: The Japanese Advantage*, Oxford: Oxford University Press, 1994.

[24] Lazzarini, Sergio, Fabio R. Chaddad and Michael L. Cook, "Integrating Supply Chain and Network Analyses: The Study of Netchains," *Journal on Chain and Network Science*, Vol. 1, No. 1 (2001), pp. 7-22.

[25] Cummings, Thomas G. and Christopher G. Worley, *Organizational Development & Change*, 6th edition, Cincinnati, Ohio: South-Western College Publishing, 1997; and Enid Mumford and Rick Hendricks, "Reengineering Rhetoric and Reality: The Rise and Fall of a Management Fashion," *ESRC Business Processes Resource Center [www.document], URL: http://lbprc.warwick.ac.uk/rc-rep b-6.html*, 1997.

[26] Lazzarini, Sergio, Fabio R. Chaddad and Michael L. Cook, "Integrating Supply Chain

and Network Analyses: The Study of Netchains," *Journal on Chain and Network Science*, Vol. 1, No. 1 (2001), pp. 7-22.

[27] Johannessen, Stig and Olav Solem, "Complexity Thinking: A New Perspective on Strategy and Change in Logistics Organizations," *Proceedings NOFOMA 2001 Conference*, Reykjavik, 2001.

[28] Levy, David, "Chaos Theory and Strategy: Theory, Application, and Managerial Implications," *Strategic Management Journal*, Vol. 15, (1994), pp. 167-178.

[29] Casti, John L., *Would-be Worlds*, Chichester: John Wiley & Sons, 1997.

[30] Stacey, Ralph D., *Strategic Management & Organizational Dynamics: The Challenge of Complexity*, London: Pearson Education Ltd, 2000.

[31] Williamson, Oliver E., *The Economic Institutions of Capitalism*, New York: The Free Press, 1985.

[32] Wernerfelt, Birger, "A Resource-based View of the Firm," *Strategic Management Journal*, Vol. 5, (1984), pp. 171-180.

[33] Håkansson, Håkan, *International Marketing and Purchasing of Industrial Goods: An Interaction Approach*, Chichester, U.K: John Wiley & Sons, 1982.

Stig Johannessen is a Research Fellow in logistics at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. His main research interest is in change processes in logistics organizations, and in his Ph.D. thesis he is studying the strategy process and other organizational processes in international manufacturing companies. He can be reached at Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway. Phone: 47-73-596826. Fax: 47-73-593565. E-mail: stigj@iot.ntnu.no

Olav Solem is Professor of Logistics at the Norwegian University of Science and Technology (NTNU) in Trondheim, Norway. In 1974, he received his PhD in Industrial Management from NTNU. He has extensive experience from various positions in academic, industrial as well as public organizations, and he has been a visiting professor at University of Wisconsin, USA and University of Queensland, Australia. He is currently involved in research projects related to Supply Chain Management, Business Process Reengineering, E-business and Warranty Servicing Logistics. His publications include two books and a number of articles on logistics, and he is currently writing a book, *Strategic and Organizational Logistics*, with Stig Johannessen. He can be reached at Department of Industrial Economics and Technology Management, Norwegian University of Science and Technology, NO-7491 Trondheim, Norway. Phone: 47-73-593501. Fax: 47-73-593565. E-mail: olav.solem@iot.ntnu.no