Managing human resource learning for innovation

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CONTENTS

1 LEARNING, CAPABILITIES AND INNOVATION

Innovation has become more and more important as a strategic clue to handle scarce resources and competition pressure as well as economic instability (Fagerberg, Mowery and Nielson 2005, Aslesen, Isaksen and Karlsen 2011). Building innovative capabilities require active creation, coordination and absorption of useful knowledge related to the deployment of the human resources in the organization and thus a cohesive operational management approach to learning. Most often learning in organizations and work has been approached without direct considerations on how to integrate it in the management of human resources. The outcome of learning, however, has long been considered relevant for management approaches as knowledge management (Nielsen and Rasmussen 2011). This book investigates the empirical conditions for building a more cohesive understanding of human resource learning in firms. With focus on innovative performance the importance of strategic modes of innovation, clues to organizing learning and types of knowledge are considered as main challenges for the management of human resources in a learning perspective.

Developments in the economic, technological and political context the last two decade have positioned human resources in a critical position when it comes to building innovative capabilities in the firm. Innovative capabilities are dynamic routines shaped to catch up with market opportunities in new and innovative ways (Arundel et al. 2007, Kirner & Som 2007, Nielsen et al. 2012). Among the various resources of the firm the human side is unique, meaning that under the right conditions the human resources grow qualitatively by being used. Useful knowledge developed and absorbed in the process of solving complex problems while working can thus be transformed into cumulative building blocks of relational knowledge resources, which may result in unique competitive advantages for the firm (Rasmussen & Nielsen 2011). However, this ability to grow as a learning resource by being challenged in work requires a conscious management in combination with appropriate organizational conditions facilitating the development of human capabilities as a collective strategic resource convertible to employee driven innovation (Fong et al. 2011).

1.1 CONTEXT AND PRESSURE FOR CHANGE

Globalization is a central contextual driver of the increasingly strategic importance of human capabilities in firms (Wang & Ellinger 2011). The growing liberalization and deregulation has boosted and intensified competition on prices as well as on quality in a global economic environment of instability and unpredictability. This means that most firms must develop their internal ability to adapt and reallocate resources rapidly in order not only to innovate the goods or services they are producing but also the way they are producing, in order to maintain or develop their position and strength in the market. Historically, an important milestone was the Japanese automotive industry which in the early eighties threatens to oust the American counterpart on products as well as production processes. This attack on a central part of American production structure brought the importance of human initiatives and insights high on both the theoretical and practical agenda. The challenge became how to mobilize intangible competitive strength by means of human resources management (Sisson 1994). The intensive global competition in the automotive industry is still vibrant after thirty years (Ingeniøren 2008) and has indeed spread to several other industries.

Another central driver is technology development (Michie & Archibugi 1995). Technology is a classic determinant of work organization and the use of human potentials. The important new development is, however, that the contemporary technologies are much more adaptable and flexible in configuring the relations between employee and work techniques (Greenan & Walkowiak 2005). From a former 'deterministic' view of the relation between technology and work organization the new technologies have enabled a much more 'voluntaristic' view, placing leadership rather than management in a central position in configuring and developing potentials of the relation. It is first of all new information and communication technologies which have removed the former view on technology determinism and created voluntaristic leadership opportunities for innovative organization, processes, market relations, products and services. The new technologies bring opportunities for decentralization of decisions and development of local solutions but also increasing interdependency and dynamics between business units. Parallel to this leadership challenge the new technology also supports the increasing strength of globalization as an influential market power. Without information and communication technology it would be impossible for firms to distribute in global value chains (Hyws 2006) and to act rapidly on market change and economic opportunities. At the same time this continuously developing technology is one of the main drivers of the unstable and unpredictable globalization.

The liberalization and deregulation regime of globalization has also influenced the public sector and its production (Kamp m.fl. 2012). The concept of new public management has a long history going back to the eighties and it has invaded most service production of the sector. I broad sense the idea is to create market relations between public production units, contracting out activities and manage the production of services by contracts. In this way competition pressure and efficiency thinking has been expanded. In a more narrow sense new public management is a way of importing techniques from the private sector in order to make public production more efficient. Performance and process management techniques have thus been applied over most of the public sector. This development is principally disputed from a qualitative public service perspective because the sector is dominated by professions and human services which have a long tradition of autonomy, proficiency, responsibility and self-governance (Nielsen 2016). The dilemma has resulted in development of less rigid techniques but also in many unsolved problems of pressure on professional autonomy often affecting work environment.

1.2 COPING WITH CHANGE PRESSURE

Global competition pressure combined with unstable conditions and continuous technology innovation in general demand strategic preparedness at the firm level in order to sense and size the changing conditions and emerging opportunities exposed through the context (Teece 2007). The strategic sensing thus has to be anticipated by internal organizational dynamics and appropriate routines at the tactic level. By the concept of dynamic capabilities is understood meta-routines focused on the abilities to reconfigure and mobilize internal resources in order to meet external changes or opportunities (Kirner and Som op. cit. 2009, Nielsen et al. 2012). Continuous sizing of appropriate meta-routines depends on learning abilities, relations and practices among the human resources. Competence level and socialization to handle complex problem solving in the work situation are important dimensions for developing dynamic capabilities together with decision latitude and influence. Related to this is a contingent organizational and management awareness of the human potentials. In line with this understanding of dynamic capability the concept of innovative capability has been defined as the ability to mobilize the organizational and human resources and bring problem solving ideas that are new to the firm into practical use (Kanter 1983).

Modern human resource management emphasizes the importance of the intentional link between firm strategy and human resource management. Focus is set on planning and organizing the work process and building employee commitment related to the aims and values of the firm. Flexibility and quality in the employment system is also important (Guest 1987, Hendry 1995). Although the above focus points to a large degree are common it has not been possible to incorporate them into a single theory or approach to human resource management. Human resource management is a group of theories with various hard and soft approaches, which has developed continuously since the eighties, mainly in relation to the changing conditions and challenges of the firms (Storey 1994). In spite of the evolving theoretical body of literature on human resource management there is only a tentative and sporadic theoretical understanding of how to handle development of dynamic and innovative capabilities, managing knowledge creation, learning and encouraging innovation in the firm.

1.3 A SYSTEMIC UNDERSTANDING OF MANAGING LEARNING FOR INNOVATION

The aim of this book is to develop a cohesive and systemic understanding of managing human resource learning for innovation in the firm. It is an understanding which is founded on the cognitive potentials of the employees and their work relations as dynamic and innovative resources of the firm. Realization and making use of the cognitive human potentials demand management which acknowledges the importance of facilitating and organizing appropriate frames for new initiatives on various decision levels of the firm. The first step in building the model is to identify and define the aim of innovation capability so we can understand innovative capability as the performance measure of human capabilities. The steps which follow will identify the strategic, tactic and operational frames important for encouraging knowledge production and innovation in organizing the learning relations among the human resources. In this way management of human resources is approached as an open and target oriented system encouraging innovation capabilities in firms. Approaching human resources management as open system management means that the external context has importance as environment for shaping the appropriate orientation, instruments, principles and techniques on the various internal decision levels and not least for the interaction between the levels in order to meet the external context exposure in a dynamic and innovative way. Identification of the instruments, principles and management techniques on the various levels will be based on empirical research, which means generated form theoretical knowledge and empirical panel data covering firms from the private urban sector in Denmark in the period between 2006 and 2010. In this period the global economy has been through an exceptional business cycle, going from growth with high pressure on existing capacity to financial crisis, downturn and serious slump in 2010. In the same period globalization has intensified pressure on markets and firms. Private sector firms find themselves in rapidly changing environment with increasing competition (GOPA 2010) that call for development of internal and external resources and capabilities to manage the challenges. This is the context for developing the empirical founded model.

2 DATA AND METHODS

The data used in the empirical analysis generating the model is a panel of Danish firms, which has been surveyed in five rounds from 1996 up to 2010. Denmark's Statistics was in charge of the data collection from the start. The first four rounds were part of the DISKO[1] data collection, aimed at collecting representative information on product- and service innovations, organizational change and demands to employee on learning, competence development and training in firms from the private urban sector. The 1996 DISKO survey resulted in information from 1990 firms. The next DISKO survey in 2001 was a matched survey design collecting data from both employers and employee representatives. Beside the questions on innovation, organizational changes and competence developments, this survey collected information on employer-employee cooperation and employee participation in change decisions. The result of this survey was 2007 employer responses and 473 employee responses. In order to collect information on innovation strategies a third supplementary survey round were launched in 2004. The fourth round of the DISKO surveys was completed in 2006 on basis of 1552 still economic active firms in the panel. These 'core' firms were supplemented by a sample in order to avoid bias and ensure the research sample to be representative. Denmark's Statistics data collection resulted in 1775 responses from employer representatives. In 2010 there were 1430 of these firms verified as still active and they constituted the GOPA[2] panel sample. The data collection resulted in a research panel of 601 firms, which represented a response rate of 39.6%. This is not a very satisfactory response rate, but the attrition analysis broken down on sector and size indicates no unacceptable bias in the research panel. The research strategy used in the construction of the model is sequential descriptive. The theoretical foundation of the elements in the model is discussed and documented empirically mainly by the 2006–2010 panel data. However, the empirical documentation of the theoretical dimensions sometimes includes data from the first 1996 DISKO round up to the 2010 GOPA round. A scale of learning organization (LO) which has been verified in prior research (Nielsen 2004, Nielsen & Lundvall 2006) has been used to test the relation between innovation performance and learning organization.

3 INNOVATIVE PERFORMANCE

First step in developing our open system model is to relate to the discussion of innovative capabilities and identify which dimensions are target of innovative capability and how we operationally can understand innovative performance in the context of globalization and unstable market conditions. Fundamentally the concept of performance can be considered multidimensional, with the aim of directing the collective efforts of the employees and measure the results of their efforts for the firm. The dimensions constitute in other words the results of rational intention to strengthen the target orientation in the collective efforts of the firm. Operationally the dimensions can be either objective or subjective measurement indicators. Among common objective dimensions of measurement we find quantitative performance aims on turnover, results, value added and productivity. The subjective dimensions are related to appraisal of performance which is more situational or contingency and relational dependent and therefore difficult to measure valid with objective measures. In general objective measures are often preferred because of their precision and in situations where objective measurements are difficult to calibrate, subjective dimensions of measurement are preferable, improving measurement quality compared to objective measures. This is especially the case when performance is measured on combined but time lagged and situational specific dimensions (Meadow consortium 2010).

Performance measurement of dynamic or innovative capabilities is by definition dependent on situational and contingent relations which makes subjective measures on performance preferable, of course given that the measures are valid and reliable. Theoretically our concepts relate to dynamics and innovation and we shall delimit our target concept to innovative capabilities. The dimensions of innovation capabilities should cover the ability to plan, develop and implement ideas shaped as behavioral initiatives which are new for the firm. Innovations dimensions may take shape of new products or services, new markets developed, new technology, organization development or business process development (OECD 2005). An important point is that the dimension mentioned are expected to interact positively in a situational way which establishes the conditions for favorable combinations of innovation performance in the firm: new products or services should preferable result in development of a new market for the firm and implicate use of new technology as well as new organizational developments and business processes. We have asked the firms in 2006 and again in 2010 the degree of priority they have given to the mentioned innovation dimensions and the result is shown in the table below.

	2004–2005*		2007–2009**	
Very high priority/ Very low priority	Very high priority	Very low priority	Very high priority	Very low priority
Product-/service development	23,3	3,5	17,3	1,8
Market development	20,7	4,1	15,1	1,5
Technology development	15,6	5,5	11,5	2,8
Organization development	12,4	4,8	11,5	2,2
Business process development	13,9	7,4	10,5	2,8

Table 1 Priority given to innovation efforts in periods 2004–2005 and 2007–2009 (percent shares)
* How has the firm prioritized last year's innovation efforts?
** How has the firm prioritized innovation effort in 2007–2009?
Source: Disko 4 and GOPA survey

If we compare the share of firms giving very high priority to the innovation dimensions in the first period with the share of firms giving very high priority in the last period it is obvious that the innovation priorities are at a lower level in the last period during the economic slump. Even though the reductions are not dramatic the priority level are approximately 25% lower for most of the dimensions in the last period. One exception is organizational development, which only descended by a bit more than 7% at the last observation. However, it is interesting to notice that the shares of firms giving very low priority to the innovation dimensions are correspondingly decreasing from the first period to the last. In general this indicates that fewer firms give the innovation dimensions very high priority in the period of economic slump. This does not mean that the firms drop innovation initiatives by giving them very low priority. Instead they moderate their priorities and give innovation dimensions high or moderate priorities in the economic tight period.

The observed trend in innovation priority observations probably are result of how the firms cope with the international business cycle. In the booming economy more firms give very high priority to innovation but also the share giving very low priority is higher, compared with the priorities of the firms in the period of economic slump. Innovation activities are expected to be economic favorable for the firms if successful but they are also risky and we may expect that the risk is higher in a depressed economy, which can explain that the firms are more moderate in their priorities. The latent structure of the innovation dimensions has been considered in a factor analysis and all the dimensions show very high loadings on a single factor, which we can name firm's multidimensional innovation priority. In the perspective of innovation capabilities these patterns are particular interesting in relations to accomplished or realized innovations. The introduction of new products or services at the market is most interesting to observe, because it is the dimension that the other innovation activities ultimately are intended for. In the table on next page the firms have stated whether they have introduced new products or services during the two year periods within the fifteen years covered.

	1993–1995*	1998–2000*	2003–2005	2007–2009
Yes, one	51,7	45,4	8,4	14,5
Yes, more than one			45,3	48,3
No	47,4	52,4	43,5	33,9
Don't know	0,4	2,2	2,8	3,3

Table 2 Has the firm introduced new products/services during (period), when excluding minor improvements of existing products? (Percent vertical)
* Response possibilities: Yes, No, Don't know
Source: Disko 1, Disko 2, Disko 4 and GOPA survey

The share of firms which do not innovate products or services increases with five per cent point from the first period to the next period in the nineties. From this level where more than half of the firms do not innovate, this share decreases markedly the following two periods down to one third of the firms. If we look at the share of firms which innovate the decrease between the first and second period is six percent point. In the following periods the firms have indicated one or more than one innovation in their responses. In the period of 2003–2005 the level of firms which innovated is two percent point higher than in 1993–1995. This growth in the propensity to innovate continues up to the following period, where almost 63 percent of the firms state that they have introduced new products or services on the market. This growth takes place both among the firms introducing one and more innovation as well as one innovation on the market in the period. However it is obviously strongest among firms launching only one innovation. This development is interesting compared to what we could observe in the development of strategic priority given to multidimensional innovation in the two periods. Even with the mentioned moderation of innovation priorities the propensity of product and service innovation seems to increase in the economic slump.

The increasing propensity of product and service innovation can of course cover various degrees of innovation. We can find substantial new products or services, new on the world market, which we can categorize as 'radical' innovations. We can also find innovations, known on the world market, but new on the Danish market. We can categorize such innovations 'national'. Finally, we can find innovations already known on the Danish as well as the world market, which means that they are 'local' innovations for the firms producing them.

Yes	1993–1995	1998–2000	2003–2005	2007–2009
On Danish market	76,9	77,9	76,7	78,5
On world market	78,1	87,8	81,3	75,3

Tabel 3 Are similar products/services found? (Percent share 'yes')
Source: Disko 1, Disko 2, Disko 4 and GOPA survey

The table presents responses from the firms on the question whether their introduced product or service innovations already exists on the world market or the Danish market. By far the largest share of the innovations already exists on the world market. The maximum is here in the period 1998–2000 where almost 90 percent of the surveyed firms respond that their innovations already exists on the world market. From this maximum the share decreases towards 2007–2009, where almost one fourth of the innovations are new on the world market. This is evidence of a growing trend of global innovations in a period with tight economic activities, which indicates that part of the Danish firms have gained strong innovation capabilities. If we observe the share of firms responding that their innovations are new on the Danish market, this share is remarkable stable over time. 77% to 79% of the innovating firms respond that their innovations are known on the national Danish market. In general it can be emphasized that by far the largest share of the innovations are local in the sense that they 'only' are new to the firm. In a learning perspective, however, these innovations are results of mobilizing knowledge and learning resources in the firms, with the financial risks and potential gains imbedded in such activities. In the table below we can observe how the firms have evaluated their return on innovation activities in the period of economic boom and in the period of economic slump.

	2003–2005	2007–2009
Large return	26,3	10,2
Some return	57,6	55,1
Poor return	10,2	22,0
No return	1,6	4,7
Don't know	4,3	8,2

Table 4 How is the economic return on the firm's innovation efforts during (period) evaluated? (Percent vertical)
Source: Disko 4 and GOPA survey

In spite of the increasing propensity to innovate in the period up to 2009 it is evident, that lower shares of firms evaluate their return on innovating activities to be large. We can observe a decrease of more than 60% in this share with large returns on innovation. Parallel to this the share of firms evaluating their return as poor increases from 10% in 2003–2005 to 22% in 2007–2009. From a majority on large or some return on innovation 2003–2005, the majority has skidded to some or poor return in 2007–2009. We presume that this trend is determined by the international business cycle and the severe financial crises after 2008, depressing demand on products and services on the international as well as the national markets. The trend is in line with the trend in priority given to innovation dimensions by the firms observed in table 1. The challenge is, however, that innovations as a rule have a long development period, relatively to their period as new on the market. Given this pattern it is a very problematic and a risky strategy to react short sighted in relation to the business cycle with innovation priorities. Looking at the innovation behavior, however, it is far from being the trend. On the contrary it was evident form table 3, that the firms increased their propensity to launch new products – mostly a single – on the market, even though the returns are decreasing in the same period.

With the aim of developing a meaningful and valid indicator of innovative firm performance it is interesting and relevant to combine the measure of management's evaluation of return on the innovation activities with the measure of realized product or service innovation in the period. In this way the innovation behavior becomes the necessary requirement and economic return the sufficient requirement in the measure of innovation performance. The indicator on innovative performance is thus a composite index composed by counting the firm's product or service innovation and management's evaluation on large or some return on innovation activities. The table below shows the result of composing the summative indicator of innovative performance.

	2003–2005	2007–2009
P/S innovation + return	52,2	50,5
No P/S innovation + return	47,8	49,5

Tabel 5 Innovative performance of firms in 2003–2005 and 2007–2009 (Percent vertical)
Source: Disko 4 and GOPA survey

From the perspective of the firm the indicator of innovative performance is plausible because it combines accomplished product or service innovation with large or some economic return. That the product or service innovation should be economic favorable to the firm is a logic and reasonable criteria because firms are dependent on economic surplus in order to stay in market. Thus the positive economic return on innovation becomes a sufficient requirement of innovation performance. The table shows that 52% of the firms fulfilled the criteria of innovative performance in the period 2003–2005 while 51% of the firms fulfilled the criteria in the period 2007–2009. The slightly lower level of firms with innovative performance in the last period is thus a result of a higher level of product or service innovations but a lover level of economic return on the innovations. In the following this indicator of innovation performance will be used as dependent variable when describing or testing the effect of modes and frames which are expected to encourage relational learning and innovation capabilities.

4 INNOVATION MODES AND LEARNING RELATIONS

How can we conceptualize the strategies of innovation in the firm and understand how various strategic modes relate to the organizational learning frames and relations among the employees, which are expected to determine the level of innovation performance? From a theoretical perspective there are two different approaches firms can apply when building a strategy for product and service innovation. Both approaches imply careful management of knowledge in an organizational environment of learning (Christensen et al. 2004, Jensen et al. 2007). One approach "STI" (Science-Technology-Innovation) builds on research and development (R&D), which often are organized in a special department of the firm or perhaps distributed within a cluster of firms and related to research institutions such as universities etc. In this mode formalized and codified knowledge is developed and applied by utilizing scientific and professional agreed methods in the production of explicit intersubjective approved and transferable knowledge. This knowledge is utilized in linear innovation processes by building prototypes, which are tested and veryfied in order to develop new products or services that are finally launched on the market. The other approach "DUI" (Doing-Using-Interacting) builds on inclusive problem solving and learning relations between functional and occupational groups of employees on various levels inside the firm and external related to customers and subcontractors. Fundamental for this strategy is organizing and managing a learning environment by creating organizational structures, cultures and processes encouraging practices of continuous improvements as well as empowering new ideas to more radical product or service innovations (Kanter 1983). The type of knowledge produced and used in this approach is more informal and perhaps even tacit. It is based on experience and experimenting with work related ideas and handling of complex problem solving. Being producer and user driven this mode depends on an all-embracing organizational consciousness of mobilizing learning and awareness of the value of knowledge sources in internal and external relations of the firm.

The two general approaches to innovation thus dependent on different types of knowledge and the challenges for handling learning processes and knowledge flows in the modes seems quite obvious. In fact the two innovation modes represent learning forms which are founded on fundamental different epistemologies (Lundvall 2008). The 'STI' learning form of research and development is based on specific professional educations and additional qualifications where scientific methods are essential for developing a formalized and codified body of knowledge. This body of knowledge relates conceptual systems of understanding to empirical problems and challenges continuously the received understandings by critically testing their empirical implications (Rasmussen & Nielsen 2011). The 'DUI' learning form of doing – using – interacting is based on utilizing organizational principles and relations, enabling and promoting diffusion of knowledge and problem solving in the interaction between various functional and occupational groups. Fundamentally it is organizational relations integrating various occupational or functional approaches to problem solving and confronting modes of understandings, which may produce various kinds of innovative solutions.

However different both approaches and their related learning forms demand careful strategic and tacit consciousness by management on the specific opportunities and implications of using the human resources and their various learning capacities in order to build knowledge resources and flows of problem solving practices in the firm. Empirical studies have shown that firms which are able to combine the two innovation modes have significantly highest chance of accomplished product and service innovation (Christensen et al. ibid. 2004). The empirical challenge of this combination of innovation modes is that the science and technology "STI" approach is found only in less than one fourth of the Danish private sector firms. According to Denmark's Statistics 22% of private sector firms carry out research and development activities (DST statistic bank 2011). Building an operational research and development function in the firm is a resource demanding investment and certainly a challenge for medium and smaller firms. The doing – using – interacting mode "DUI" depends much more on organizational skills, culture of commitment and systematic conscious management of the potentials in human resource's learning processes and knowledge flows in an integrative sense and is in principle accessible for all firms. This is the essential argument for the importance of investigating the conditions and principles of this human resource inclusive innovation mode.

5 ORGANIZING LEARNING RELATIONS

In order to identify which organizational conditions facilitates and stimulates employee's learning and development of useful knowledge for building innovation capabilities, we can commence by resuming what theory can tell us on learning in organizations. From a management perspective at the strategic level it is fundamental to establish appropriate frames facilitating encounters of progressive learning processes and diffusion of useful knowledge. Applying the perspective of configuring progressive learning relations and communication of useful knowledge, theory on learning in organizations has advanced within two approaches: The learning organization (Senge 1990, Pedler et.al. 1991) and organizational learning (Lave & Wenger 1991). Theories on the learning organization attempt to identify organizational configurations by which management can improve the learning propensity among the employees. In this way these theories belong to what has been called "management driven" learning in organizations (Elkjær 2000). Theories on organizational learning, on the other hand, consider learning as informal, practical related and experience based activities. Learning is situated in so called communities of practice, which are informal organized in relation to comprehension areas and learning practices. Beside the cognitive dimension such communities of practice have an affective dimension and give participants a feeling of identity and social belonging (Wenger 1998). Contrary to the first mentioned organizational configurations they are difficult to manage formally. An important challenge in understanding how to establish appropriate organizational frames of progressive relational learning and diffusion of useful knowledge is to understand the conditions and possibilities of syntheses between the two theoretical approaches on learning in firms: the employer driven and the employee driven (Elkjær 2000).

A way of handling this challenge from the employer driven approach would imply organizing structural frames, which can be expected to facilitate learning oriented interactions between individual, group and organizational level, in a way which allow management to cope strategically with the changing external conditions by developing a continuous and high level of innovative performance. Some organizational principles have in common that they facilitate both purposeful external adjustments and internal innovation performance (Lundvall 2008). Diffusion of useful knowledge and relational learning is organizational supported by integration of functions and cross disciplinary work groups. Systems for collecting employee proposals, quality circles and delegation of responsibility to employees are also of importance for learning as well as external cooperation with customers and suppliers. In addition to use of horizontal channels of external and internal knowledge communication another critical point is how the vertical levels in the firms are supporting relational learning. Here work groups or teams can play an integrative role between individual, group and organizational level. The degree of internal autonomy as well as cross discipline in teams thus has significant influence on individual as well as on collective learning (Nielsen 2015). In the table below the specific organizational principles of importance are related to innovation performance in the two periods of different economic conditions: 2003–2005 and 2007–2009.

	2003–2005	2007–2009
Integration of functions	60,5	57,9
Cross disciplinary work groups	60,1	58,8
Autonomy in work groups	56,2	56,1
Delegation of responsibility	53,3	51,5
Systems for employee proposals	60,3	56,6
Quality circles/groups	57,1	55,8
All firms	52,2	50,5

Table 6 Organizational principles and innovative performance two periods. (percent shares)
Source: Disko 4 and GOPA survey

In both periods a positive relation can be observed between each of the individual organizational principles and innovative performance. At the firm level the individual firms will select different combinations of the principles according to their situation, context and management considerations. In general there is much empirical evidence of the effects on performance of bundling organizational principles (Huselid 1995, Huselid et al. 1996, Wood 1999, Osterman 2000, Nielsen 2004). It is therefore appropriate to proceed analytically by exploring how firms have bundled the organizational principles of framing relational learning in the two periods. 13 organizational principles have been identified as potential important for relational learning and knowledge diffusion in the firm (Nielsen 2004, Nielsen & Lundvall 2006). The implementation of these 13 principles has all been measured in the panel of firms in 2005 and in 2009:

Cross disciplinary work groups
Integration of functions
Delegation of responsibility
Autonomous work groups
Quality circles/groups
Systems for collecting employee proposals
Education sequences tailored to firm's needs
Long-term educational planning
*Cooperation with Danish costumers (on product/service development)**
*Cooperation with foreign costumers (on product/service development)**
*Cooperation with Danish subcontractors (on product/service development)**
*Cooperation with foreign subcontractors (on product/service development)**
*Cooperation with universities, knowledge institutions etc. (on product/service dev.)**

* The 2005 measurement of cooperation was not specified on product/service development which is indicated by the brackets

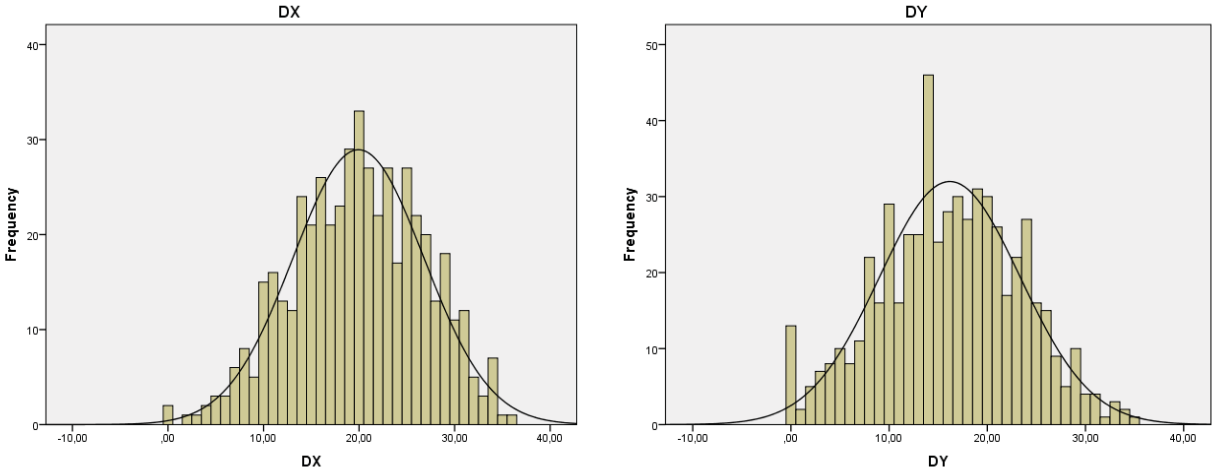


Figure 1 Firm distribution on index of relational learning 2005 (DX) and 2009 (DY)

The two diagrams DX and DY shows the firm distribution of composite index scores for organizational principles of learning used in 2005 (DX) and in 2009 (DY). The index score of each firm depends on the number of organizational principle of relational learning implemented, each weighted after number of employees included or after importance of the principle, according to management of the firm. Both distributions are almost normal, however in different patterns. The differences are caused by variations on use of principles as well as their individual weight in the firm. As we can expect there is a strong and significant correlation between the two distributions (Pearson correlation = 0,473) and a regression of DX on DY shows a significant beta coefficient of 0,452Y and R^2 of 0,229.

Even though the correlation is strong, it also delivers evidence of a comprehensive organizational dynamic between the distributions of organizational principles of relational learning, measured in the firms in 2005 and 2009. Thus there are more than fifty percent chance of variation in use of the distinct principle and its specific internal weight in the individual firm between 2005 and 2009. As explained the index score of the individual firms is weighted by number of employees included or bye the importance, according to management in each of the firms. For analytical purposes both indexes have been categorized into three groups of firms, representing a high-, a medium and a low score on the index of relational learning organization. This has been done in order to minimize the risk of bias in the results due to multilevel differences in data (multilevel structure).

	High	Medium	Low
LO 2005	31,6	32,4	36,0
LO 2009	28,2	37,6	34,3

Table 7 Classification of scores on index of learning organization (LO) into three categories (percent horizontal)

The relation between the two grouped indexes (LO 2005 and LO 2009) is shown in the table below.

	LO 2009 High	LO 2009 Medium	LO 2009 Low
LO 2005 High	55,8	31,4	12,8
LO 2005 Medium	19,3	46,6	34,2
LO 2005 Low	10,6	35,2	54,2

Table 8 Relation between the categorical indexes LO 2005 and LO 2009 (percent horizontal)
χ^2 **P** = 0,000 Gamma = 0,574

A high dynamics between the levels of relational learning principles organized can be observed in the firms, when we compare the status in 2005 with its context of high economic activity and the status in 2009 with depressed economic activity. Among the firms with high level of learning organization (LO) in 2005, 56 percent have maintained high level in 2009 and 13 percent has declined to the lowest level in 2009. Among the firms with medium learning organization in (LO) 2005 47% has maintained this status in 2009 but more than one third has increased their use of relational learning principles to high level. Only 11 percent of the firms in the low category of 2005 has increased to high level in 2009 and a little more than one third of these firms have developed their principles up to medium level in 2009.

As mentioned it is a cardinal point in the theory of organizational learning that learning among employees is informal, practical related and experience based. It is therefore very interesting to explore the relation between the management driven development of learning organization and the occurrence of organizational learning: Does the frames of organizational learning provide leeway for communities of practice where knowledge related to functions, products and services can be generated? The idea is to set focus on the propensity of the formal structures as nourishing or nudging environment of more informal processes of learning in the relations of the firms and the transformation of tacit knowledge to explicit knowledge in order to enhance innovation performance (Nonaka & Takeuchi 1995). From the management perspective this can be considered a major challenge in coordinating relations between learning modes and practical knowledge management. Usually communities of practice are organized around certain areas of knowledge and skills, giving the participants a feeling of identity and social belonging. If an inclusive community can develop having participants from various professions or occupational groups new cross occupational knowledge may break through. Similar outcomes can emerge if employees with comprehensive, but diverse, experience foundation relate in a community of praxis. In this way the learning relations of the community will change from novice and experienced to experienced and experienced (Elkjær 2000).

The structural frame of learning organization thus needs to be complemented with a culture of cross functional and cross occupational learning if the idea of combining the management and the employee driven learning approaches should be synthesized in the firm. Both management and organization should be used consciously as relational drivers of continuous development of skills. By allying both formal and informal relations consciously in problem solving and relational learning, a process of inter-subjective competence development (Jensen & Prahl 2000) can be inaugurated. We have asked management how important this relational learning is in order continuously to develop the competences of the employees in the firm. Focus is set on importance of sparring between management and employees and between individual employees, on job rotation and on team organization, as well as on promoting cooperation and networking across divisions and groups. In the table below the importance of these drivers of relational learning nourishing inter-subjective competence development is related to high level of learning organization and the percent difference to low level of learning organization (in brackets).

	LO high 2005 (diff. LO low)	LO high 2009 (diff. LO low)
Sparring with management etc.	68,5 (35,0)	75,3 (39,2)
Planned job rotation	17,3 (9,6)	23,5 (17,4)
Team organization	66,7 (42,8)	61,7 (46,5)
Cooperation and network	64,9 (48,7)	67,3 (51,6)

Table 9 Decisive or high importance of relational learning for continuous development of employee's competence in firms with high level of organizational learning 2005 and 2009 (percent shares).
Source: Disko 4 and GOPA survey

The general observation from the table is that management recognizes the potentials of organizing work process with the intention continuously to develop the employee's competences in firms with high level of learning organization (LO). This seems to be a growing trend of praxis between 2005 and 2009, apart from organizing work in teams with learning intentions. Perhaps the most interesting observation, however, is that the percent difference between proportions in high level and low level learning organizations are increasing. This indicates that management in high developed learning organizations become much more conscious of the potential of inter-subjective competence development and relational learning in 2009 with its context of economic slump. This consciousness may have influence on the innovation performance. We thus expect innovation performance to be positively related to the levels of learning organization and we will test this relation in logistic models using the low level LO as baseline and controlling for sector and size of the firm. We shall test two models for 2005 and 2009 in order to understand the nature of relation between learning organizations and innovation performance during economic upturn and downturn. Model 1 includes all 13 organizational principles and Model 2 includes only the organizational principles and educational planning without the 5 principles of external cooperation (on product/service innovation).

	2005		2009	
	Model 1**	Model 2***	Model 1**	Model 2***
High developed LO (2005)	6.416*	4.437*	5.007*	4.202*
Medium developed LO (2005)	2.558*	2.085*	2.707*	1.655*
Manufacturing	0.559	0.731	0.705	0.852
Construction	0.174*	0.140*	0.101*	0.108*
Trade & transport	0.629	0.662	0.663	0.773
Finance & Information	1.526	1.388	0.845	0.869
50 – 99 employees	1.288	1.300	1.128	1.119
100+ employees	2.228*	2.353*	2.485*	2.655*
Nagelkerke R	0.277	0.239	0.256	0.241

Table 10 Logistic regression on innovation performance of learning organization level 2005 and 2009, firm sector and size (baseline: Low developed LO; Other services; 1–49 employees) (odd ratios)
* Significant at 0.00 level
** Model 1 includes organizational principles, educational planning and external cooperation
*** Model 2 excludes the external cooperation relations
Source: Disko 4 and GOPA survey – see appendix for complete models.

Model 1 shows effects of learning organization development including organizational principles, educational planning and external cooperation. The effect of development in learning organization frames on innovation performance is strong and significant in the first period (2005) with its high economic activity. The chances of innovation performance are 6 times higher for highly developed learning organizations and 2.6 times higher for medium developed learning organizations compared to the baseline of low developed learning organization. Also in the second period (2009) with lower economic activities the effects of development in learning organization frames stand out clear and hieratical. For highly developed learning organizations the estimated chance of innovation performance is somewhat lower showing 5 times higher chances compared to baseline. The chances of medium developed organizations are 2.7 higher compared to baseline, which is on level with the first period. It is interesting that model 2 which excludes the external cooperation relations, estimate a parallel pattern of effects, however with important differences related to the two periods measured. In the first period with high economic activity the high developed learning organization has 4.4 higher chances of innovation performance and the medium developed have 2.1 higher chances compared to baseline. In the second period with lower economic activity the high developed have 4.2 higher chances and the medium developed have 1.7 higher chances compared to the baseline of low developed learning organizations. These results seem to indicate that the model embracing only internal organizational principles and educational planning is somewhat more robust against the business cycle than the full model embracing also external cooperation. The core of organizational learning model seems thus to be the internal organizational and educational principles. The external cooperation principles are apparently more exposed to the business cycle. In these findings it is important to consider the methodical explanation that the external cooperation principles was measured differently in 2005 than in 2009, where the last measure focused directly on product or service innovation.

6 UTILIZING EMPLOYEE KNOWLEDGE

Configuring the structural frame of learning organization and thus enabling practices of relational learning is not only important but a necessary condition, when establishing the management conditions encouraging employee-driven innovation in the firm. Though necessary it is not the sufficient condition to establish the learning environment for innovative capabilities. A sufficient condition within the structural frames for learning relations is the active commitment of and support from the employees. Without this active culture of commitment it will be difficult for management continuously to mobilize the human resources in dynamic organizational adjustments, which is decisive for internal efficiency of strategic capability management. The employee based cross functional communities of practice would not be inclined to react with the necessary urgency and efficient routines in the direction set by the strategic management level. Most of the organizational principles included in the frames composing relations of the learning organization are dependent on employee involvement as well as relational autonomy within the skillful use of discretion in the work situation and in situations of change. These principles of work and their implications mean that strategic and tactic management has gained importance and operational management has changed its functions. The decisive point is to which degree the employees feel collective ownership of and influence on developing their frames of work. A very important instrument to build sufficient commitment is to involve the employees in organizational development processes. We have asked the management in 2001 and 2010 how important they think cooperation with employees is when changing procedures or developing the organization.

	1998–2000*	2007–2009**
Decisive importance	-	39,2
Great importance	43,3	45,0
Some importance	29,3	10,8
Minor importance	4,5	-
No importance	10,2	3,0
Don't know	6,6	1,5
Not relevant	6,0	-

Table 11 How important is the cooperation with the employees when making organisational changes/ developments in the firm? (Percent vertical)
* No response possibility 'Decisive importance'.
** No response possibility 'Minor possibility' and 'Not relevant'.
Source: Disko 4 and GOPA survey

It is a remarkable development in management evaluation of cooperating on change and development, which can be observed in the table. For the period of 1998–2000 almost 15 percent considered collaboration on organization development of minor or no importance. Ten years later in the period of 2007–2009 only 3 percent considered such collaboration of no importance. The same tendency of decline can be observed in the share considering collaboration of some importance. The share in in the last period is reduced to a little more than a third of what it was in the first period. Observing the decisive and great importance, evaluated in the period of 2007–2009, the management support of collaboration between employees and management represented by 84 percent is quite overwhelming. This is evidence of almost consensus among the management that collaboration with employees is considered important in situations of organizational change. The question which follows is whether and how management makes use of the knowledge resources of the employees in change situations. An indicator of this is how early in the process of change the employees or their representative are involved.

	1998–2000*	2007–2009
Idea phase	21,1	34,5
Decision phase	21,3	24,7
Implementation phase	41,9	32,5
No involvement	15,7	4,2
Don't know	-	4,2

Table 12 At which phase in the change process are the employee representative or/and the employees concerned involved? (Percent vertical)
* No response possibility 'Don't know'.
Kilde: Disko 2 and GOPA survey

Parallel to the development in the management evaluation of collaboration it is quite obvious from the table that management makes increasing use of the human resources in the idea phase of the process of organizational change. From one fifth in the first period the share increases to one third in the last period among firm management which involves the employees or their representative in the idea phase of the change process. Not only the idea phase becomes an important collaboration forum but also the decision phase increases in importance. In sum there is a strong linear tendency of management to involve the employees in early phases of the processes of organizational development of the firms. The early involvement allows the employees to influence the decisions and solutions of the change. In this way process knowledge and operational implications becomes integrated in the development and the implementation of the solutions become more efficient without loss of productivity. Even though the figures only present a superficial picture of the employee involvement and their influence, it seems to indicate the extensive preconditions for mobilizing knowledge, learning meta-routines and gaining commitment in this area which all is important for vibrant dynamic capabilities.

The evidence of involving employees and their representatives in the early phases of organizational development makes it interesting to study the development in use of various collaboration channels. In general the collaboration can take place directly between management and the employees or it can take place between management and employee representative within institutional collaboration channels. In many European countries there is a long tradition for this institutional based collaboration between management and employees in firms. The original idea was to introduce democracy in the employee related decisions and give information and influence on management decisions on implementation of new technology, changes in work organization and personnel policy. The employee influence takes place indirect through elected representatives meeting their management counterpart in the corporation committees or ad hoc project groups. In sum the collaboration cannels seen from the individual employee can be direct or indirect through employee representatives (Knudsen et al. 2009). In the table below the use of direct and indirect channels of collaboration is shown for two periods with almost ten years between.

	1998–2000*	2007–2009**	Employee***
Employee representative participates in management common meetings	17,6	28,8	42,6
Project groups with management and employee representatives	47,3	53,2	49,4
Within the firm's cooperation committee	29,7	33,7	47,5
Employee representative on firm's board	13,7	17,7	32,3
Common meetings with employees concerned	83,3	74,2	60,2
Common meetings with all employees	65,0	63,7	59,1
Direct contact with individual employees concerned	89,4	88,0	72,7

Table 13 How is the cooperation between management and employees arranged in relation to internal change processes in the firm? (Percent shares)

* Percent share: 'Yes'.

** Percent share: 'high degree + some degree'.

*** Employees in the firms answered precisely the same question as their employers in 2010 GOPA-survey and the ansvers are summarized like above: high degree + some degree'.

Source: Disko 2 and GOPA survey

Theoretically the two forms of influence – direct and indirect – have been considered two essentially different approaches to collaboration between management and employees in firms (Hyman & Mason 1995). The direct influence – is based on management initiative and desire of involving employees in decisions concerning their work processes and conditions. This approach is founded on the relation between individual influence, motivation and performance in work. Thus the direct influence as approach is related to Human Relations-, Motivation- and High Performance theories. The indirect influence is based on employee initiative and desire of democracy in work relations and influence also on the tacit and strategic level of management (Knudsen et al. 2009). This approach is founded on the policy of introducing democratic collaboration principles inside the walls of enterprise which emerged after the Second World War. The approached is related to collective interests and the Industrial Relation theories.

Empirically it is quite evident from the response distribution in the table that the channels representing direct form of influence is more frequently used in collaboration between management and employees on change processes than the indirect form of influence. On the other hand there is no indication of the direct form crowding out the indirect form over time. The share of firms using cooperation committee as channel of collaboration has increased with 13 percent form the first period 1998–2000 to the last 2007–2009. In the same way the share mentioning employee representative in management meetings is increased with 64% up to 29 percent of the firms in 2007–2009. Also the share mentioning employee representative in the board has increased between the two periods. Contrary to this tendency of growth in use of indirect channels, the use of direct channels of collaboration has decreased from the first to the last period. Meetings with the affected employees have decreased from 83% to 74% and also common meetings with all employees have decreased from the first to the second period. The most interesting in relation to changes in usage pattern of indirect and direct channels is perhaps that the employees in their responses are much more inclined to mention the indirect channels of collaboration. The distribution between direct and indirect channels is much more even here, compared to the management responses. Even though the units of analysis are different in the two measurements, this can be indication of variations on normative weight put on direct and indirect channels of collaboration from management and employees.

Research on the employer responses both from the first period 1998–2000 (Nielsen 2004) and the last period 2007–2009 (Nielsen et.al. 2012) has shown, that firms with high propensity to innovate product or services as well as organizational processes, frequently combine the two approaches of collaboration and in this way practices a cooperation regime, using both instruments from the collective interest representation and the individual involvement of new organization principles. An important tactic dimension in a model encouraging employee driven innovation in the firm is such a cooperation regime. Basically it combines the individual influence and control of the work processes with relational influence and control within the work group and collective influence in relation to management (Hvid 2009).

It is indeed an interesting question how and to which degree management finds the collaboration furthering or hampering the organization development of the firm. Both the attitude and the qualifications of middle management and of employees on operational level can hamper or further the organizational development just as the more institutional channels of collaboration.

	2000		2010	
	Furthered	Hampered	Furthered	Hampered
Attitudes of employees	32,7	14,7	39,3	6,0
Qualifications of employ.	26,7	11,3	38,0	5,7
Attitudes of middle manag.	43,8	14,8	55,2	5,0
Qualifications of middle m.	35,6	17,8	49,2	6,2
Cooperation committee	21,6	2,0	21,6	3,5
Work environment commit.	-	-	23,1	2,5
Shop stewards	18,8	6,1	17,9	3,7

Table 14 Have the following factors furthered or hampered the organizational development of the firm? (percent shares)
Source: Disko 2 and GOPA survey

Observing patterns in the importance of employee's attitudes and qualifications over time there is clear indication on increase in the share furthering organization development. This is especially the case for employee qualifications. Even more noticeable is the decline of employee's attitudes and qualifications hampering organizational development. The decline is fifty percent for qualifications and sixty percent for attitudes. Looking at middle management this also confirms the above pattern for employees. The share of firms responding furthering attitudes and qualifications is increasing fifty percent and more from the first to the second period and the share responding hampering attitudes and qualifications is essentially declined. This is quite remarkable because of the advanced and vulnerable position of the middle management in situations of organizational development and change. The observations unambiguously reveal a pattern where middle management increasingly is a proactive resource in organizational developments.

Looking at the importance of the institutional channels of collaboration and their representatives it is clear that the pattern is quite stable over time. Importance of the work environment committee is measured for 2010 only and receives the highest score on furthering and the lowest among hampering among the institutional channels. This could be an indication that work environment considerations play a constructive part in some of the firm's organizational development processes.

7 BUILDING INNOVATIVE COMPETENCES

Basically there are two approaches the firm can deploy in order to provide and to ensure that the necessary competences always are presence when needed: The firms can recruit the competences at the external labor market or they can develop the competences internal and use them flexible in the organization. Even though the internal competence development and flexible deployment is essential to developing dynamic capabilities based on employee learning it is also important for the firm to recruit competences at the labor market. The relations and channels to the external labor market are essential both directly and indirectly for providing and maintaining a strategic evolving competence profile. The recruitment channels indirect influence on strategic competence evolvement first of all takes place through the role which social capital building can take as driver of relational learning and intersubjective competence enhancements. In a relational perspective the formal qualification development and the more informal learning processes should be tied together and embedded in social capital, understood as cooperation, trust and justice in the horizontal and vertical work relations and management processes (Olesen et al. 2008). Development and maintenances of social capital in this way becomes a nourishing element in the learning environment and important for innovation capabilities.

Although it is the prerogative of management to recruit and dismiss employees and a fundamental part of managements obligations, the need to develop and maintain human capital in the firm means, that it becomes appropriate to involve the employees in part of the recruitment process. The selection of recruitment cannels this way becomes important. To involve employees in part of the recruitment process demands a certain amount of social capital, however the involvement also produces social capital to the firm. A firm can use formal as well as informal channels in the recruitment process. Among the formal channels are announcements in newspapers, internet job-bases and public job centers. Among the informal channels are direct encounters, contacts through employees and contacts in the business area (Nielsen 1987). Often information from employees concerning job candidates will depend on so called loose network, which may support the social capital and in this way support some of the fundament of competence and capability development in the firm (Larsen & Pedersen 2009). We have asked the management in 2005 which channels they consider very important when recruiting employees to the firm.

	LO high 2005	LO low 2005 (diff. LO high)
Internet job-bases	49,7	22,0 (27,7)
Newspapers	20,1	15,3 (4,8)
Employee contacts	30,6	20,1 (10,5)
Business contacts	24,3	7,9 (16,4)

Table 15 Use of recruitment channels by firms with high level and low level of organizational learning in 2005 (percent shares)
Source: Disko 4 survey

Internet job-bases are of high priority in firms with high developed learning organization (LO). The distance between high developed LO and low developed LO is also the largest here among the various channels. Besides job-bases the informal channels score high among the high developed learning organizations. This is the case for contacts in the business area and especially contacts through employees. The use of employee's loose networks thus has high priority in the learning organizations. Indeed there is a danger of using a 'narrow' recruitment pool, so that the personnel profile becomes conform and similar. Diversity in the personnel profile can empirically enhance innovation capacity and it is important to have a selection phase which is extensive and have potentials. However in the early phase of the recruitment process, the overview of potential candidates based on employee's loose networks play an important part for perception of skills and competences available.

In the internal development of competence we have discussed the importance of relational learning and intersubjective competence development. In such a perspective learning becomes a process closely related to problem solving and creativity in the work relations and competences becomes the result of this process (Holt Larsen 2006). Although the cognitive base of the learning processes are the individual employee, the learning must appear on group and organizational level as changes in relational routines and practices. In this way the pool of individual competences in specific and changing relations will constitute the dynamic capabilities of the firm. It is these capabilities which constitute the firm's integrative ability to adjust and react in relation to a volatile and unstable context (Augier & Teece 2008). Understanding the close relation between relational learning, competence development and dynamic capabilities is of central importance in managing human resource learning for innovation. Management use of organizational frames and work relations, however, are not always sufficient in order to fertilize work relations for product or service innovation. The organization related learning helps to provide an evolving body of what could be called situational knowledge. Such situational or firm specific knowledge has to be supplemented by formal training and qualification measures. In this way the organization related and situated learning is complemented by new qualifications, which helps absorption of new knowledge and methods furthering product or service innovation. In the table below the share of firms where more than 50% of the employees have participated in formal training and qualification are shown for firms with high (and gab to low) develop learning organization (LO) in 2005 and 2009.

	LO high 2005 (diff. LO low)	LO high 2009 (diff. LO low)
High educated	48,3 (30,1)	43,2 (26,4)
Skilled employees	44,8 (23,1)	38,3 (17,5)
Unskilled employees	39,1 (25,6)	36,4 (20,6)

Table 16 More than 50% of employees in vocational groups participated in formal training and qualification in 2003–2005 and 2007–2009 with high level of organizational learning 2005 and 2009.
Source: Disko 4 and GOPA survey

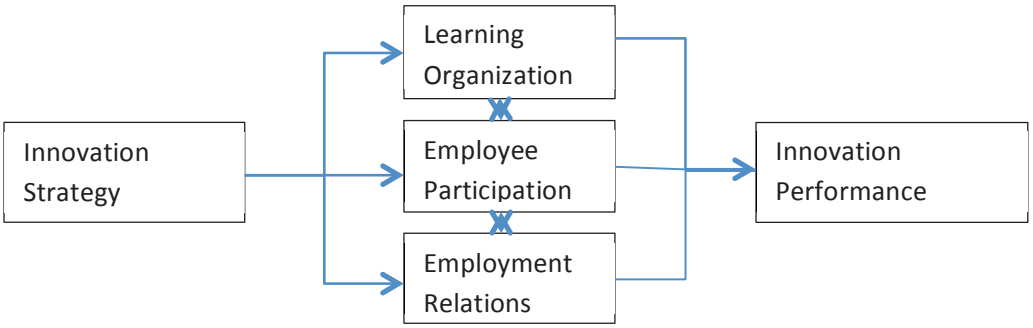
It is the extensity of formal training and qualification in high developed vs. low developed LO which is measured in the table for three educational groups. In the firms with high developed LO more than 50% of the further and higher educated frequently participate in formal training and qualification. In 2003–2005 this characterized 48% of the firms with high developed LO and in 2007–2009 the level for these firms was decreased to 43%. An interesting observation is that the gaps (percent difference) between firms with high developed and with low developed LO are quite large: 30 percent point in the first period in the first period and 26 percent point in the second. For skilled employees the proportion of firms with high developed LO providing formal training and qualification for more than 50% of these employees is somewhat lower than for further and higher educated and the gap is not so wide to low developed LO. The lowest proportion is found among unskilled employees. Here 39% of the highly developed firms provide formal training and qualification for more than 50% of the group in 2003–2005 and 36% does so in 2007–2009. Perhaps the most interesting observation is that the gap between the educational groups is not as wide as the gap between high developed and low developed LO. This indicates a tendency that the high developed LO provide formal training and qualification to all employees in the firm. The tendency complements the organizational related learning in the construct of learning organizations.

MANAGING HUMAN RESOURCE LEARNING FOR
INNOVATION: DISCUSSION AND CONCLUSION

8 MANAGING HUMAN RESOURCE LEARNING FOR INNOVATION: DISCUSSION AND CONCLUSION

Innovation performance has been the target variable in our theoretical search and empirical selection of elements and relations, which have shown empirical important for generating useful knowledge in learning relations, constituting our model of managing learning for innovation. In this last section we shall discuss and conclude on the management challenge of bringing the elements and relations together in order to reconstruct an interrelated and empirical founded model of learning for innovation in firms. Perhaps the most fundamental challenge is that human resource management decisions often are distributed on various actors in both line management and staff members of the firm. The analysis has shown that the initiatives important for human resources learning are situated on all management levels of the firm: the strategic level, the tactic level and the operational level. The first challenge is to integrate human resources management on all levels in a strategic and cognitive architecture of active relational learning and knowledge production in the organization. Managing human resources learning for innovation must constitute a collective shared and deliberate value chain, communicating the propositions and principles for decisions related to organization, developing collaboration channels and operational function of the specific innovation strategy and relational learning.

Recruiting, selecting, training, educating, apprising, rewarding, maintaining and dismissing comprise the basic aspects of human resource management. Often these aspects are controlled and decided without any connection, some of them being controlled by operational line management and other controlled by staff actors (Kolind 2005). Recruitment often depends on decisions without relation to training and education policies important for development of dynamic capabilities. In the same way appraisal and rewarding are often decoupled from motivational drivers of creativity, learning and knowledge development in the firm. The organizational principles in use may reflect strategic priorities, without considerations of how to frame learning relations. The main elements of the model are innovation strategy, learning organization, employee participation and employment relations with innovation performance as target. The relations should be objects of careful value chain coordination. The value is constituted by streams of useful knowledge and routines delivering dynamic cohesion power between the elements, and such streams must be nourished. At the bottom line this dynamic cohesion means that recruitment and competence building is converted to dynamic capabilities and learning relations in order to meet the innovation strategy and performance. Competences and training becomes the fuel of the dynamic relations in the model.



It is essential that learning processes and knowledge absortion deliberately are targeted at innovation performance. This targeting means that recruitment, competence development and training of employees always should be guided by strategic considerations. In order to practice strategic management of employment relations, the communication between the levels in the model must be efficient. On the strategic level it is mainly aligning external relations with the intentional development of learning relations by means of appropriate organizational principles, which are important. The learning relations should materialize from the combined principles of learning organization with organizational learning communities in both vertical and horizontal relations. On the tactical level it is the collaboration between management and employees which should be configured in order to build a culture of commitment and change in the firm. This culture constitutes the foundation of dynamic routines, creativity and capabilities in the organization. An explicit and operative personnel policy is of course important in order to guide human resource aspects in strategic decisions.

The vertical and horizontal relations towards and between the basic aspects of human resource management on the operational level are indeed very important for the functionality of the model. The practical decision pattern represents the implementation of the model configured by organizational frames and personnel policies. As mentioned the practical decision pattern on the operational level concern recruitment, selection, training etc. and the important point is to which degree the decisions of the line manager reflects guidelines and directives from management and staff on strategic and tactical level. The pivotal point in the model, however, is to which degree the relations and decisions work both ways. The competences, learning potentials and capabilities of the employees should, as the most important resource base of the firm, influence development of organizational frames and relations and not least the strategic orientation of the firm. Thus a systematic and dynamic management has as most important assignment to facilitate and fill out a well-functioning communication system, which establishes a top-down as well as a bottom-up value chain of human resource decisions with relevance for dynamic learning practices, knowledge absorption and innovation performance. The information on resources and potentials at the operational level delivers the possibilities and conditions for the firm's resource based positions of strengths, capabilities and innovative performance. In this way a systematic and dynamic human resource management becomes the sufficient condition bringing together the elements in the model of human resources learning for innovation.

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APPENDIX:

	2005		2009	
	Significance	Effect (Exp(B)	Significance	Effect (Exp(B)
High developed LO (2005)	0.000	6.416	0.000	5.007
Medium developed LO (2005)	0.000	2.558	0.000	2.707
Manufacturing	0.118	0.599	0.244	0.705
Construction	0.000	0.174	0.000	0.101
Trade & transport	0.156	0.629	0.168	0.663
Finance & Information	0.350	1.526	0.674	0.845
50 – 99 employees	0.322	1.288	0.614	1.128
100+ employees	0.001	2.228	0.000	2.485

Table 10 Model 1 Logistic regression on innovation performance by learning organization including organizational principles, educational planning and external cooperation level 2005 and 2009, firm sector and size (baseline: Low developed LO; Other services; 1–49 employees).

Nagelkerke R(2005) = 0.227; R(2009) = 0.256

	2005		2009	
	Significance	Effect (Exp(B)	Significance	Effect (Exp(B)
High developed LO (2005)	0.000	4.437	0.000	4.202
Medium developed LO (2005)	0.003	2.085	0.022	1.665
Manufacturing	0.327	0.731	0.590	0.852
Construction	0.000	0.140	0.000	0.108
Trade & transport	0.195	0.662	0.386	0.773
Finance & Information	0.459	1.388	0.869	0.869
50 – 99 employees	0.288	1.300	0.633	1.119
100+ employees	0.000	2.353	0.000	2.655

Table 10 Model 2: Logistic regression on innovation performance of learning organization excluding external cooperation level 2005 and 2009, firm sector and size (baseline: Low developed LO; Other services; 1–49 employees).

Nagelkerke R(2005) = 0.256; R(2009) = 0.241

ENDNOTES

1. DISKO is the Danish acronym for The Danish Innovation System: Comparative analyses of challenges, strenghts and bottlenecks, inaugurated and led by professor Bengt-Åke Lundvall, Aalborg University.
2. GOPA is the Danish acronym for Globalization, Transition Pressure and Psychosocial Work Environment a research project financed by the Work Environdment Foundation in cooperation between [1]Aalborg University Hospital, [2]Aalborg University,[3]Aalborg Psychiatric Hospital; [4]North Denmark Region; [5]Danish Ramazzini Center. Participants in the project are Anker Lund Vinding[4], Simon Grandjean Bamberger[531], Øyvind Omland[152], Pia Ryom[12], Anelia Larsen[3], Kirsten Fonager[21], René Nesgaard Nielsen[3] og Peter Nielsen[3]. The data was financed by grant: 20080053113/12-2008-09 from the Foundation for Research of Work Environment. The funders played no part in the conduct or reporting of the research.