Collaborations for Innovations - Challenges to managers and management theory

Mette Mønsted

Professor mso

Institut for Ledelse, Politik og Filosofi

CBS

Tel. 3815 2655

mm.lpf@cbs.dk

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Abstract på dansk:

Artiklen analyserer, hvordan samarbejder og alliancer indenfor innovation udfordrer ledelse og ledelsesteori. Gennem en empirisk analyse af samarbejder i energisektoren fokuseres på en række udfordringer, som skaber spændinger og ny krav til ledere. Kompleksiteten opbygges af forskelle på en række dimensioner: motivation for samarbejder, udnyttelse af komplementære kompetencer, geografisk spredt viden, højt niveau af usikkerhed, vurdering af størrelse og komplementaritet, samt tillid, som tilsammen skaber en række dilemmaer og problemstillinger, som udfordrer ledelsen konkret. Men som også stiller spørgsmål i hvor høj grad eksisterende ledelsesteori kan dække disse ekstreme forhold, og hvilke ny og anderledes ledelseskompetencer der kræves.

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The pressure for collaboration in research and innovation is an increasing political pressure from national and EU funding. Large research funding demands not only collaborations across universities, but often across countries and involving both university and industry and due to complex co-financing, it is much more complex than corporate management in international industry.

It is a fascinating research theme, as most of the stability and habitual management tools are challenged in these collaborations for innovation. What are the conditions and challenges that managers have to cope with, and how is this management challenge conceptualized? There are a number of challenges and dilemmas that I want to address to illustrate management beyond the boundary of the organization within innovation projects. The concept of and theories of management that are tied to the "position as a manager in an organisation" are challenged or stretched when loose networks have to be managed. The management of inter-organizational networks is difficult (Human and Provan 2000), but what are the dimensions that have to be considered?

The empirical basis for the article is a study of collaboration within the sustainable energy sector. The SUCCESS pilot project[1] was established to develop a model for collaboration, and in this project a survey of successful collaborations and a number of case studies were carried out. The theoretical analysis and the empirical data constitute a kind of "short list" of variables for analysis to be considered.

The survey and analysis show that collaborations and strategic alliances are considered important by both industry and universities. They search for diversity and richness of knowledge beyond the boundaries of organisations. In the energy sector this challenge is accentuated, as the energy industry is based on systemic innovations, and on interdependency of technologies. The technologies have to relate to the other types of technologies of the energy value chain including the distribution net. Therefore they are not isolated creative ideas of invention that can develop a new market. The system of technologies, regulations, and market is quite complex and has to be part of the analysis of the collaboration and alliances to understand the system of innovation.

Most of the traditional models of management and business plans are challenged by a variety of actors from very different contexts and unclear authority structures (Provan & Kenis 2008). Collaborations stretch beyond organizational boundaries, complicating habitual forms of authority and loci of control for managers. Participants are often only on part-time in temporary organizations, and in many cases they also cover different types of institutions and firms, and different national cultures, as well as geographical locations.

Number and characteristics of participants in collaborations are the most analysed variables in the literature. However mostly as an isolated variable and not in relation to other features as in this study (Stuart et al., 1999; Gulati, 1995; Stuart, 2000). Other important variables like previous experience of collaboration (Knudsen 2008), absorptive capacity and technological capacity (Bierly III et al. 2009), which are difficult to access in terms of information were not contemplated.

[1] Searching for Unprecedented Cooperation on Climate and Energy to Ensure Sustainability(SUCCESS) , a pilot project to the Knowledge Innovation Communities. EC Grant Agreement n° 2007-3969/001-001

1. Managing beyond the limits of authority

A manager have to manage people outside their authority, as they may be manager of a cross-organisational project, but as most participants in these cross-organisational projects are involved in the cross-organisational project on part time and temporarily, the local manager responsible for employment and career is more important. The overall manager of a collaboration or in a network have to manage by motivating people to be active and perform. Some of the decisions are part of negotiations with local managers responsible for local co-funding in the involved organisations.

The theoretical contribution of Robert Grant and Charles Baden-Fuller (2004) is based on an analysis of strategic alliances. They find that strategic alliances are not about learning from each other, but about exploiting the differences in access to complementary knowledge from partners. They suggest a relationship that exploits knowledge in a manner that is analogous to supply-chain management. This is very much in line with the findings of Chiesa & Manzini (1997) in the exploitation phase.

Chiesa and Manzini (1997) analyzed collaboration in the pharmaceutical sector, and stressed the differences of the virtual organisation in research within the early stages of exploration, and the subsequently very clear contracts specifying the division of labour for the exploitation phase. This is an interesting perspective for managing innovations at the different stages, and the challenges of both opening up among researchers at an early stage, and closing the contract on the specificities of the exploitation. One of the points of Chiesa & Manzini (1997) is that not only are the types of collaborations different according to types of knowledge workers involved, but they are also related to the stage of the innovation. Whereas much of the literature on networking and network management is focused on strategic networking to reach new relevant partners, and see networks as open organisations and as organising (Burt 2005, Moensted 2003, Grant & Baden-Fuller 2004), the management of “whole networks” suggests a different approach. Provan, Fish and Sydow (2007) review the literature on networks as whole networks, and make a point of shifting the perspective to partnerships, coalitions, cooperative arrangements as closed, inter-organisational hybrids (Williamson 1991).

In many EU projects the manager of the joint project is responsible for the total budget, but only in practice has full decision power over the 25-50 % of the funding coming from the EU-programme. The co-funding is local, and local managers want to decide on the local co-funding. This implies a negotiation with local managers.

Contracts in university-industry relations are not trivial, and the manager has to secure where and in what contexts and projects that collaboration can assist. Often it is a contract at an institutional level, but managers have to look into who among the researchers are involved, as the firms are very precise about whom among the university researchers they want. This is a difficult negotiation of funding, resources and intellectual property rights, which also reflect the different interests of the involved partners and often a gradual negotiation is necessary. This implies that a time perspective on the emerging relations has to be included.

The theoretical perspectives suggest a need for greater emphasis and research on the issues of management of collaborations at the micro level. We need to improve our understanding of how to form the governance structures and how to support management roles. A variety of hybrid or virtual organisations are called for, and there is a growing awareness of how difficult this is.

The decentralized funding and career support undermines the authority of the manager of the collaboration.

2. Managing innovations with embedded uncertainty.

Innovation demand new research and inventions that meet the market, i.e. they are applied. . Radical innovation and research projects are meant to create something new and not seen before, which are creating a high level of uncertainty that challenges rational management methods. This uncertainty challenges the usual project management and planning, and decisions on how to cope with the emerging surprises have to be taken. All innovation managers know this is the case, and have to adjust the programme and planning, but if more organisations are involved in this uncertainty, and the contract with the research funding is very strict, this is a very serious challenge of decision-making and negotiations to readjust, when innovations are not as planned as the application suggests.

In an innovation perspective some alliances have an emphasis on both exploration and opening up for new radically different ideas, and for exploitation of ideas, and the management of these do show differences as expected also from Chiesa & Manzini (1997). The characteristics of collaborative forms that are good at exploration are not necessarily the same as those that are good for exploitation.

The perspectives on management frame and characterize not only the network, but also the challenges tied to management of uncertainty and across organisations. Theoretical perspectives on these challenges are found in Quinn (1988), on the challenges beyond management, in Storey on the management of innovation problem (2000), on the role of champions (Kanter 1980, Howell & Higgins 1990), and on the problems of managing in networks (Moensted 2006). All of these stress the complexity that emerges when the level of uncertainty as an embedded part of innovation is high, and the uncertainty and lack of control increases beyond the boundaries of the organisation. These features of management are a special challenge to managers that go beyond the traditional position as managers in corporations.

The results of how collaboration is affecting innovation are not very clear. Andrés Barge-Gil (2010) finds that, the only robust result is “that firms outside high-tech, smaller firms and, to some extent firms with low R&D intensity are more frequently cooperation-based process of innovators.” (Barge-Gil 2010: 202).

The habitual methods of authority as project manager do not work alone. Persuading, motivating, energizing, and negotiating are a fundamental part of managing networks and collaborations.

3. Managing different interests of partners.

The partners involved in collaborations do not necessarily have similar interests. This implies that some collaborations could be successes for some and failures for others. Management still have to keep all engaged and motivated in order to deliver the promised outcome. We know that universities may look for funding and access to practice and industry looks for access to researchers, recruitment, and new markets (Hansson et al. 2009). The energy sector is, as other modern technology sectors, characterized by the presence of a large number of actors from various disciplinary sub-fields, and the sector is characterised by a high level of interdependence of technologies, firms and public sector.

When motivations for collaborating are different for different participants, then success-criteria are not uniform for all, and the actors will stress different elements of the activities. Provan & Kenis (2008) use goal consensus as one of the important variables for effectiveness, and the study of the

very different agendas and performance criteria for the collaborating partners create some stress in relation to effectiveness.

In our empirical data from the survey, we asked those who were responsible for the collaboration, why they wanted to engage in a collaborative project at the outset. 45 (of 66) interviewees state that they were motivated by the need for new competences. In a little more than 30 projects the reasons for collaborating are to be found in the need to combine research and education, the wish to share research infrastructure or the need for complementary resources. In 36 projects the opportunity to collaborate on funding or application activities is said to be the motivation behind the collaborative project, whereas only 13 partners state that access to financial resources are the reason for their involvement in collaboration (Hansson et al. 2009).

The motivations of individual partners are different, and benefits for the collaboration and for the individuals are not the same, which challenge a consensus seeking management.

4. Diversity and size favours innovation but not management.

Diversity and size are important as input to innovation projects as an input from different disciplines or contexts in order to create new ideas. Looking for complementary competence in a network, would call for diversity and large size to get access to a richness of knowledge. The browsing of large networks reveals new ideas, and these may be very important for later developments. The whole idea of collaborating for innovation includes this browsing for what the other actors are doing in this field, and how can we get ideas and inspiration from complementary types of organisations. In this way large numbers are important for access to a large pool of partners. Richness and diversity give access to complementary competences, which is important for early stages of idea-generation.

Large collaborations may open up for more diversity, but this is not necessarily easy to apply. Browsing for ideas is one aspect, but it is very difficult to manage, and it may be difficult to apply the knowledge from another context or Community of Practice. The dilemma is that large size and diversity favours new ideas and innovation, whereas small homogeneous collaboration teams are much easier to manage, and will easier be able to apply the new knowledge, but are more closed and less rich on ideas.

The respondents in the survey noted that the exploitation of expertise and knowledge is very difficult to handle in large networks, and most of the actors in the surveys and cases, prefer small networks for collaboration because it is much easier to communicate in such contexts, where they are able to specify the relationships and division of labour and communicate at the boundary of their expertise. In the case-studies, one of the most successful collaboration for innovation is a project of five partners working on fuel cells. Three partners are from industry and two from universities (Moensted & Hansson 2009). They stress that this is a very successful collaboration because it is lead by industry, they have frequent meetings of the key core partners, and they have the flexibility to adapt to changes. They are able to react when unforeseen events occur, which is an implicit feature of uncertainty in innovation projects. They scanned the competencies in earlier large EU-collaborations, and decided to pick out promising partners from earlier projects. The leading firm found partners in vertical, nearly supply-chain-style collaboration on fuel cells, where they can rely on each other for deliverables, and they have built up trust through long term personal relations. In this network the earlier large groups created access to new partners as an observatory for whom to trust for contributions to the joint project, but the earlier large collaborations were described as “chaotic and impossible to manage, as too many partners were passive and did not deliver, and the manager had no means to make them deliver”.

Whereas large size is beneficial for access to rich variety of partners and offers new opportunities; it also makes it easy to under-perform on a partner basis. The small network is manageable, and individual partners cannot hide, but does not provide access to many new ideas.

Diversity is a dimension related to 1) knowledge, expertise, and profession; to 2) types of organisations, such as university, industry, and to 3) culture and language. The diversity may cover different technological competence, or disciplines such as the competence for technological development relative to innovation or marketing competence. The difference in culture and language creates diversity in experience, but also challenges for the organisation. All EU projects have to have a dimension of diversity in terms of national culture, as different countries have to be involved.

As a management model for collaborations, it could be useful to look at how the diversity could be coupled together, and how links of unity and translations may be involved in the creation of a useful combination of expertise in a division of labour. The challenge is to exploit joint knowledge, and not just the common denominator of overlapping knowledge, where the potential of the joint knowledge is not used. Therefore knowledge as translators across disciplines to create a joint space of communication becomes important. It could be the need for having at least joint culture and language, i.e. proximity on other variables than the expertise for the innovation.

Diversity is beneficial for creation of new ideas and for a proper division of labour in a strategic alliance or collaboration (Grant & Baden-Fuller 2004). Organisations collaborate to get access to competence they do not have in-house, and thus a need for diversity in terms of knowledge is clear. The diversity is however not easy to handle, as the capacity and knowledge to be able to include complementary knowledge is not necessarily available, and communication and understanding of the input from other disciplines becomes difficult (Justesen 2007).

The dilemma is that closed and homogeneous networks are so much more efficient to manage, and it is easier to exploit knowledge in them as the mutual understanding of technology is similar, but access to new competence is low.

5. Trust is necessary for collaborations and easy to establish in small homogeneous groups.

When we look at the collaborations and assessment by members of the collaborations (Hansson et al. 2008), the building up of trust is mentioned as very important for the collaboration, and several actually emphasize the necessity of building on trust relations. Both Provan & Kenis (2008) and Nooteboom (2008) emphasize the importance of trust for collaborations. In a management perspective this both demands ability to create trust and to use the trust in the collaboration for decentralised responsibility and action. One of the challenges of the managers is to build new relations to new partners to get access to complementarity competences and resources, and then build up trust in the relationships. If managers lean only on existing network relations based on trust, lack of newness and diversity could be the result.

The trust is seen as a necessary pre-condition for sharing knowledge, for giving knowledge to the network and fostering good communication, to get and understand knowledge from the other partners (Nooteboom 2002, 2008, Gilsing & Nooteboom 2005). “It is routinely recognized that collaboration requires trust. Especially in innovation, uncertainty is too large to allow for complete contractual control” (Nooteboom, 2008: 199). Trust is not just lack of control and naïve belief in other institutions or partners. The trust in innovation is tied to legal systems, competence and ability to perform, and personal credibility, which could be based on experience. Reputations and experience is the way to gradually build up trust, and thus the stability of relations is important for high level of mutual trust in collaborations.

Creating division of labour and collaboration for innovation across organisational boundaries and often also across countries demand trust for exchanging knowledge and expertise. We know trust is easier to build with homogeneous teams who have experience with each other, and that building trust across large networks of collaboration is very difficult. This is a special role of the manager to find ways of creating this trust as a basis for motivation and engagement. The idea of the virtual organisation as a hybrid organisation in the inter-organisational space is important for understanding the network and relations to explore, and it is essential in the exploitation of new knowledge for innovations. But it is a very difficult concept for the mobilisation of resources or for the exploitation of economic benefits for innovations. Most of the theoretical literature is focused on static structures rather than emerging actions of hybrid organisations, and the analysis that is needed here is therefore very different (Gilsing et al. 2009).

Within innovation, the high level of uncertainty tied to both the technical development and the market makes alliances of complementary skills necessary, but also vulnerable, as contracts and decisions have to be changed, when conditions within the technical project is changing. The smooth plan for radical innovation is still to be seen, as radical innovation means that totally new aspects arise, and we cannot foresee these features. Uncertainty is an embedded part of such innovation, and uncertainty in terms of technology and market is much more difficult to handle if there is uncertainty about the partners involved. In order to handle high level of uncertainty on the other dimensions the partners will try to build up trust and alliances, as an investment in the relations to cope with the uncertainty (Moensted 2006).

The weakness of managing and building trust in large networks, may result in a structure, where sub-projects take responsibility, and thus create the engagement and trust for sub-projects rather than for the large and maybe distant group. The mutual engagement and joint responsibility is easier to develop in smaller groups of partners, and the authority of management has to be stressed as our respondents stressed that the large EU projects demand management, but do not give authority to limit payments to non-performers.

Trust is favoured by homogeneous stable predictable conditions, whereas the high need for trust is in innovative contexts, when the level of uncertainty and diversity is high.

6. Stretching management

We have tried to illustrate the dilemmas in the dimensions for organising collaborations. There is no easy model for solving the dilemmas. In collaborations the negotiations become more difficult every time a new dimension is added.

The manager is the go-between to secure that the different interests are not destroying the whole network or the whole collaboration and the overall needs. The risk of fragmentation is high, and the manager has to keep the joint perspective clear for all of the partners, and sometimes negotiate on the adaptation for specific needs. The manager has to be a good communicator in order to motivate partners and catch these types of tensions that may arise. The manager could be from a leading firm or employed in a special management unit, but in any case she is forced to create a platform of understanding to make sure the synergy of the whole network is supported, and not fragmented to individual interests.

One of the dilemmas is that resources are mostly tied to the individual partners and not the joint management unit. Management is stretched by having to manage synergy at the joint collaboration level, but based on resources outside her control at the partner level.

Trust is a very important management role of finding gatekeepers and translators between different cultures, who can be understood and trusted. Managers would usually know the reputation of the researchers within their own field, but when forming large collaborations, new institutions and firms are involved, and if they also have another disciplinary profile, it is difficult to assess whether they are trustworthy. The role of managers would be to find intermediaries who can evaluate the other expertise and their ability to deliver, as well as finding network contacts to check on the personal trustworthiness. This takes time to build trust, transparency, and legitimacy of new relations.

All of the dilemmas create a high level of complexity of management, as these issues are not just easy to structure, but are part of a constant flow of communication, negotiations and decisions. The managers have to have a strong ability to persuade, to listen and to create networks. Persuasion of partners is an absolute necessity as the partners are usually part of other organisations and under other managers as well.

The EU framework programme collaborations which many of the partners in the survey are involved in show how difficult it is to get proper integration, and how difficult it is to manage, even if most have elected or employed a manager (Hansson et al. 2009). There is a need for a very powerful and resourceful manager, who is an excellent facilitator to make the different needs meet and to create synergy. The good management may create synergy by motivating and energizing participants and the poor manager in such complex networks are likely to create noise, fragmentation, disciplinary misunderstandings, and isolated results. This implies that synergy of the diversity is not exploited. It is not made easier, as in EU type of collaboration, most of the managers would not have full authority beyond their own organisation, and often would depend on resources from the partners.

In terms of theory the new challenges are interesting as they are complex and basically undermine some of the usual theories of management as position and the power and authority of managers in an organization. The dilemmas raise questions on a necessity for Management innovation (Birkinshaw et al.2008). The collaborations as whole networks create conditions of uncertainty, chaos, divergent interests, complexity, and the unknowable that managers have to handle. At the same time many of the EU-projects have part-time managers who are researchers within a technical field, often without management training. They do not necessarily address and conceptualise the many challenges, which may derail the project. Within management theory some of these problems are not new, the Tom Peter's book on "Thriving on Chaos" (1987), or Ralph Stacey's book on "Managing the unknowable - strategic boundaries between order and chaos in organisations (1992) address some of these management challenges in turbulent environments and in knowledge organisations. But the complexity in this type of cross-organisational collaborations and networks increases, and demand not only reactions by managers, but also by management researchers, and create a fascinating research theme.

Because of the many new aspects of collaborations in innovation beyond the normal authority of management, we see that the traditional management role is challenged. We use the term "stretching management" to describe these new features of the management role in a network, due to the fact that the managerial role is stretched beyond the limits and authority of the traditional organisation.

The ability to be a good networker with good persuasive and brokering skills is necessary for overcoming the inter-organisational structure. Both internally in local eco-systems and externally across national boundaries the capability to create integration and motivation is important, as partners and members have competing assignments, and have to be kept active in the cross-organisational collaboration. It is a kind of unstable balance, as passivity is dangerous for collaborations.

Management in this kind of organising is not just a position in a structure. The manager is "creating" the structure and handles the moving and ever changing structure, as well as building up the trust relations that binds the partners together. It is a dynamic social construction of management between organisations. The projects are emerging structures, and a number of management and leadership functions have to help create the structure and the activities for making synergy. The managers of networks are only managers if they behave as managers and are recognised by the participants of the network as managers (Moensted 2003). This is a challenge as it is tied not to position, but to the actual activity, persuasion, and functions of the manager in mobilising resources beyond the organisation.

The main idea is that the entrepreneur or the collaboration manager has to work on the boundary, and needs to control beyond the usual authority, and her formal control of resources. This is the way we perceive management to be stretched in relation to other forms of management, such as those described by, e.g., Mintzberg (2009), Yukl (1989), Van de Ven (1986), Pfeffer & Salancik (1978).

The complexity and challenges are much higher than the "management as position"- literature suggests. Here, the manager is basically asked to manage without having the authority. Authority and power have to be created in the relations with the partners. These kinds of demands require rethinking of management to adapt to these new challenges, and it demands more research to develop new theoretical models on this.

The management effort in such collaboration is usually underestimated. This can be seen clearly, for example, in the managers of EU projects who are often researchers doing the management on a part-time basis as coordinators only. Resources and effort have to be invested into this role to create more than just fragmented results, which would have been done anyway. New managers have to be trained to work with stretched management, and these aspects of management have to be developed both theoretically but also as teaching models in business schools.

7. Conclusion

The aim of the article is to illustrate the complexity and how many dilemmas or even paradoxes of managing innovation collaboration affect management. Not only do the organisations and relationships change in the different stages, but the complexity of the external resources are not uniform for all organisations in a collaboration or for all types of collaborations. The adaptation of a simple model is difficult, if not impossible. The managers would have to have excellent leadership and persuasion skills to mobilise people to do the tasks beyond their organisation, and make them feel engaged in doing so, even if competing with other local assignments.

The theoretical reflections on dilemmas concerning the: a) different motivations and challenges to joint synergy b) size of the network as both rich and impossible to manage, c) diversity of network as resourceful and difficult to manage, d) trust which is easier in stable homogeneous contexts. All of these provide challenges stressing and stretching management of innovation collaborations.

The extreme conditions for managers of innovation collaborations, where the uncertainties explode both on the technical innovation issues and the cross-organisational collaborations strains are used to illustrate new conditions, and the need for further reflection on how to create better management and creation of engagement in distributed systems, collaboration, and mergers. There is a serious need for improvement on these issues.

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