Virtualising the utility industry
through interorganisational learning

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Abstract

Due to changing circumstances, organisations start to co-operate with their competitors or with firms from other industries that can complement their range of products. This development of independent partners sharing their resources and equipment with each other can also be seen in the Swedish utility industry and will soon happen to other utility businesses after the European utility deregulation has become a fact. This co-operation can be seen as a virtual organisation and research is performed on how virtual organisations operate and how partners establish and maintain such an organisation. For this reason the R&D virtual organisation called ISES formed around the utility related joint venture EnerSearch AB. When comparing a virtual organisation with traditional organisations, five boundaries are presented that can both create and inhibit learning and communication. Since learning can be viewed as a major objective of a virtual organisation, the five boundaries are discussed in more detail and are related to empirical results in the project ISES. These boundaries are time, space, diversity, structure and distribution and are characteristics of a virtual organisation. By observing this organisation, opportunities and obstacles of a virtual organisation are presented that could help organisations who initiate to establish a virtual organisation. One example is the difference in decision styles or personality of the members of a virtual organisation, which influences information distribution, communication and co-operation.

Keywords: Virtual organisations and their problems, co-operations, R&D, communication and information distribution, decision styles, interorganisational learning.

Deregulation opportunity

The utility industry within most European countries will be deregulated within a couple of years, or has been deregulated recently. In Sweden, the deregulation of the utility market has already started and lately, competition has begun to arise between the utility providers. In Sweden, utility providers are buying competitors or are being bought and mergers take place, in order to create a better market position in the northern countries. However, not only take-overs are performed, also other organisation structures are tried out. Several utility providers now try to bind their resources with competitors and other lines of businesses in order to produce and offer a more complete product or service that fulfils the customer's wishes (e.g. a computer system steering the electricity use in a household). These co-operations can take place in several areas. In Sweden, Sydkraft AB and IBM Utility have formed a joint venture. Not only Sydkraft is using this strategy to improve its market position, also other utility providers plan to co-operate with competitors and companies that could complement their range of products. Especially, when the European utility market is deregulating, industries and utility providers from several countries could benefit from a co-operation where research and development is combined and where partners can use each other's resources. The advantage with this kind of co-operation is that partners are still independent and only share resources to the point where they agree. This co-operation can also be seen as a virtual organisation and has only recently been introduced in the European utility industry.

Empirical research

In this article results of an empirical investigation performed in the virtual project ISES (part of EnerSearch AB) in Sweden are presented. The research focuses on how the organisation operates and how it develops over time. Several important opportunities and difficulties arise in a virtual organisation, that were not foreseen and that are hardly addressed in existing literature. The found results are presented in the article and could be of help to utility providers who consider to establish a virtual organisation or to those who already participate in a virtual organisation. However, in order to understand the investigated situation, the organisation EnerSearch is discussed in more detail.

The organisation EnerSearch AB, is a joint venture focusing on research and development. EnerSearch AB is owned by the utility provider Sydkraft AB and the IT company IBM Utility. EnerSearch established several projects who are financed partly by her owners and by several sponsors. EnerSearch AB started a large research project called ISES, Information Society Energy System, which consists of nine sub-projects. Being part of one of the nine sub-projects in ISES and this research is concerned with investigating the project ISES as a virtual organisation. The nine sub-projects in ISES co-operate in order to produce a common denominator in two-way communication on the electricity network to the customers (private, municipality, company) from the utility provider. All sub-projects have a specific part that should be developed and these are divided between three parts. First there are technical projects, who investigate the technology of two-way communication over the electricity network. Secondly, there are organisational issues, like how the organisation is functioning and how customers react to this two-way communication. Thirdly, in order to be able to implement the technical and organisational issues, also enabling technology is applied and several sub-projects are working on e.g. the interface and the control mechanisms. An important aspect that should be mentioned, which often is characteristic for virtual organisations, is that the participants of the organisation are geographically dispersed. This distribution is not only within Sweden, but also concerns other countries, e.g. the Netherlands, France, Germany and USA. Furthermore, participants come from different disciplines (technical and organisational disciplines) and have different jargons.

The article is organised as follows. First the notion of virtual organisation and strategic alliance are discussed in more detail in order to understand the type of organisation we are dealing with. Several learning boundaries are described that occur in virtual organisations. Secondly, these boundaries are partly related to the empirical results of the virtual organisation ISES. Obstacles and opportunities of a virtual organisation are presented and are supported by empirical material.

Virtual organisation

When discussing the notion of virtual organisation, often strategic alliances are compared with this form. The strategic alliance can be viewed as the predecessor of a new term in organisational theory, the "virtual organisation". The virtual organisation is a co-operation between several independent partners (companies or individuals), who share their resources, skills and knowledge in order to

produce a "best" customer solution [4]. The extensive use of information technology is one of the characteristics of the virtual organisation. With help of new developments in communication technology, e.g. e-mail, internet, www and video-links, partners from several countries or places can combine their strengths to produce a service or product. Furthermore, the virtual organisation is often characterised by the fact that its members are distributed geographically and communicate with each other via information technology. This aspect causes members to have less personal contact compared to a traditional organisation, where members are situated on the same location. Depending on the tasks performed in the organisation and the members participating, the organisation form can be a short term project, but could also stretch over several years.

Learning across boundaries

A strategic alliance is a combination structure consisting of new and disbanded boundaries, co-operation and competition at the same time. The forming of a strategic alliance can be viewed as a renewal process for the partners involved, where new rules are developed between the partners, in interaction with each other. This means that an involved organisation's stated boundaries and hierarchical structure between partners is no longer valid. Partners have to define new management philosophies, organisation structures and patterns of interaction and co-operation between the partners. An alliance may not only be a means for trading access to each other's skills (quasi-internalisation), but also a mechanism for actually acquiring a partner's skills (de facto internalisation) [7]. Here organisational learning plays an important role in internalising each others knowledge. Since, in a virtual organisation several partners can learn from each other in the organisation, the term interorganisational learning is used to describe learning occurring within the virtual organisation and between the members participating. These participants could be the independent companies who finance the work, but could also be the members who perform the tasks within the organisation. Global competition highlights asymmetries in the skills endowments of organisations. However, collaboration might provide an opportunity for one partner to internalise the skills of the other, and thus improve its position on the market both within and without the alliance. Parkhe defines the strategic alliance as voluntary interfirm co-operative agreements, often characterised by inherent instability arising from uncertainty regarding a partner's future behaviour and the absence of a higher authority to ensure compliance. This self government complicates the aforementioned relationships, since mutual co-operation is not automatic [13].

Most co-operation is based on economical or social exchanges in order to increase each other's results. The relationship between partners continues as long as all partners can benefit from the co-operation [1,7,8]. Some of the structural changes in the co-operation are a radical decentralisation of tasks, power and responsibility. Especially, the employees gain more responsibility in order to make their own decisions and increased interdependency arises. To form a virtual organisation with other organisations and in order to co-operate, organisations have to cross boundaries. These boundaries are not only physical boundaries, but also personal, hierarchical, cultural and practical boundaries. In the co-operation, people with different backgrounds, cultures and nations are combined and are

supposed to work together. In order to co-operate members have to learn across the boundaries within the virtual organisation. One could state that the aim of combining strengths and resources in a virtual organisation, is to learn from each other's knowledge and expertise. However, learning in a virtual organisation is complicated by the boundaries of space, diversity, time, structure and distribution. The five boundaries are derived from literature, logic and empirical research and are discussed in more detail below.

- **Boundary of space**: participants working within a virtual organisation, often work geographically distributed. People from different locations are combined in one organisation and try to co-operate. This co-operation is often performed via information technology, since participants can also work on different times. In order to perform research within a project so that a final product can be made, people have to communicate. This communication is decreased because of the geographical distribution in space and this can have consequences for the learning abilities within a virtual organisation.

- **Boundary of diversity**: often participants in a virtual organisation come from different disciplines, since together they can perform and learn from each other's experiences. Within the ISES project, technological and organisational science people are combined and this can cause several problems in communicating. Within a discipline one often uses a special jargon to address the work in their line of business. Another aspect that should be taken into account when discussing diversity is the fact that people have different personalities. Every person has a unique combination of nation, skills, education and culture and this influences one's decisions and way to work. Not being part of the same organisation means that the participants have not been recruited on the same way as in traditional organisations. In traditional organisations one recruites people in order to fit the company's social life, culture and often nation. However, in a virtual organisation this is not the case, since people are located at different places in different countries.

- **Boundary of time**: the opportunity of working with IT is that members of the virtual organisation can work whenever they want to and where ever they want to, irrespective of different time zones (e.g. members working in the USA and Sweden). This means that members can work irrespective of time and space, and this could complicate personal contact and communication in the organisation and interorganisational learning.

- **Boundary of structure**: participants in virtual organisations often come from different organisation structures. For some members conflicts can arise due to working in an organisation structure not familiar to the member. Within the flexible and dynamic research project ISES, some members come from bureaucratic organisation structures which can give differences in perception, rules and definition of the work procedures. When combining members from different organisations, one also combines different perspectives of how an organisation should perform. Some might see the organisation as bureaucratic with rules, forms and routines, while others view

the virtual organisation as flexible and where members have a lot of empowerment. This difference could influence interorganisational learning.

- **Boundary of distribution of information**: the fact that participants of a virtual organisation often are geographically distributed, does not only complicate personal contact and communication, but also affects the distribution of information. A lot of literature is written about information distribution, but unexplored is how units possess information and units that need this information can find each other quickly and with a high likelihood [10]. Within a virtual organisation, all information should be available, e.g. stored within a database, to all members participating. However, unclear is how the distribution of information should take place in order to increase knowledge with the members of a virtual organisation. This aspect can also be derived from literature [12], which states that knowledge is created by individuals through a continuous dialogue between tacit and explicit knowledge. The tacit knowledge consists partly of technical elements that contain know-how, skills and crafts applied to specific contexts. However, this tacit knowledge is often unconscious and deeply rooted in a person, it contains a person's image of the world. Therefore it is very difficult to transfer this tacit knowledge, so that more persons can learn from the knowledge of an individual. Nonaka claims that in order to obtain the tacit and explicit knowledge, an informal community of social interaction is important. This means that close communication and personal contact are important to transfer knowledge in a virtual organisation.

One can state that virtual organisations have become increasingly popular, partly due to changing circumstances in the environment of organisations and developments in IT. However, besides the positive aspects of combining strengths between organisations, like cost saving, efficiency, sharing resources and possible learning from each other's expertise, also a number of negative aspects can be seen. Especially the fact that members from different backgrounds, cultures and countries try to co-operate and learn from each other's experience, can cause communication and collaboration problems in the organisation. The reason why organisations combine their strengths is, that together, they can produce something that they could not do on their own.

Learning opportunities and obstacles

A possible future scenario for economies consists of co-operations with autonomous partners and competitors, where partners hire expertise in order to fulfil their stated desires. This means that more and more virtual organisations will arise. This increase in virtual organisations will also be seen in the utility industry, especially when competition strengthens because of the deregulation in Europe. Therefore it might be interesting for companies to know if a virtual organisation will increase their market position and if partners gain a synergetic effect of the co-operation. Furthermore, it could be interesting to know how one should deal with such a partnership and how one can manage it. In order to state if a virtual organisation is successful, obstacles and opportunities of a virtual organisation should be taken into account. With help of these, organisations can understand what kind of aspects could be important guidelines in order to establish their own virtual organisation. The

opportunities and obstacles mentioned below are based on the empirical work within ISES and consider the five boundaries of time, space, diversity, structure and distribution. These boundaries can inhibit personal communication and interorganisational learning, but within ISES one tries to counter effect these boundaries with team building meetings, empowerment of the participants, an internal information systems and management style. These aspects are discussed in more detail below, where not only the opportunities of the virtual organisation are presented, but also obstacles that are found during the development process. Although most of the results are based on the case study ISES, we believe the aspects found are also applicable to other virtual organisations.

1. **Space**

   The difference in space in a virtual organisation is an important matter, especially when participants are dependent on the expertise of others. For this reason it might be more suitable that participants are located in the same place, but due to circumstances (e.g. to long distance, other responsibilities, short term project) members prefer to communicate via IT over a distance. Within ISES, some information technology tools are tested in order to decrease the learning boundary of space between the participants, e.g. a brainstorming tool and a file sharing tool.

   Having long and complex discussions on novel ideas might be difficult to accomplish, but a part of the communication within the organisation could be done via an internal information system. For example reports, results and questions can be dealt with via a so called intranet (internal network for the participants, which is not affected by the geographical distribution) within the organisation, where members are subscribed to the network.

2. **Diversity**

   Within EnerSearch the participants working in the ISES project come from different disciplines (technical and organisational science), different countries (thus different language and culture) and different companies. A difference in discipline can make it difficult for people to co-operate, since members have another way of thinking about a certain problem and define it in another way. Furthermore in ISES organisational science members had difficulty in understanding the way of thinking and argumentation used by technical people and the other way around. On the other hand the difference in discipline and culture can also work positive, since people get a different insight in problems and aspects, due to different backgrounds. Within the ISES project, the differences in discipline, culture and nation are decreased through team-building meetings and informal meetings between several members. Participants who are in need of expertise and/or results of other members, arrange informal meetings (where one gets together on a single location) where they discuss the development process of their research. In these meetings one has the possibility to explain in more detail the results, jargon, and other differences that could influence interorganisational learning and co-operation.

Furthermore, one should count with a diversity in personality of the members. This diversity can be both an obstacle and a positive factor. However, in the ISES project the diversity in personality is seen as very positive, since members can add different qualities to the project. Within the ISES project the Dynamic Decision Style of Driver, Brouseau and Hunsaker [5] is used to analyse the different decision styles participants have. The authors have defined five decision styles that describe people's behaviour in certain situations, depending on the load of work and amount of information needed to make decisions. This can be used to increase the team spirit and can help co-operation. Due to differences in personality or decision style, people also view the organisation and their research tasks in another way. This means that some members would like to have a rather specified job description where rules and routines are defined clearly and where the responsibility of management and the members is clear. However, on the other hand there are members who rather work individually and who feel empowered to make their own decisions and they define their own way of working. It is not very easy for management to address all of these different requirements and therefore a middle way has to be found. On one hand members should be empowered to make a large amount of the decisions concerning their own task, one the other hand, certain rules and annual reports might be necessary for management in order to justify financial aids in the project.

3. Management style

The members in a virtual organisation are often distributed geographically and perform their work individually, but their work is combined with the work of other participants so that the stated goal can be reached. For this co-operation of research results, methods and ideas, management is important. Within ISES, management has developed to a supporting role, where the CEO stands for the stimulation of the participants inside and outside the organisation and where co-ordinators are appointed out of the members. The CEO has the overall responsibility of arranging finances, final reports and discussions with the board of directors. The co-ordinators have a more personal contact towards the research participants in order to solve practical problems and increase team spirit. In general one could state that management's role is to stimulate the co-operation between the participants, so that the final product is reached. Furthermore, management has to make sure that participants work towards a similar organisational goal. Besides this stimulating role, it is important that someone deals with the general communication towards participants, this means communication about routines, rules, final reports and about finances. Also in a virtual organisation, certain routines and rules are necessary in order to have some sort of standard.

Management does not only have an internal role, but management is also the messenger towards the member companies or the sponsors of the project and in this sense the manager becomes more a controller in the traditional way. The management has to see to it that the

participants in the virtual organisation live up to their expectations. Participants in the organisation are often chosen because of their expertise and if they do not fulfil the task stated for them, the organisation suffers from this. Within the virtual organisation ISES there is a strict time-limit and this should not be delayed by mis-management or delay of participants, therefore it is important that management performs a controlling function. Management should have a clear role in focusing on the assignment and the target that should be reached.

Furthermore management should build trust in the company and stimulate co-operation in the project. Trust is an important aspect in a virtual organisation, where members hardly meet in person and are geographically distributed. Members have to share valid information and expertise together and therefore members have to be able to trust each other on using the obtained information in a proper way. In order to make a virtual organisation successful, members should be willing to share their knowledge and skills with others in order to learn from each other's experience. This could be a problem when companies co-operate with their competitors, since they might be afraid of disclosing important material that could be used against them and that could decrease their market position. Furthermore, in order to build trust, people have to learn to get to know each other, not only formally but also socially. This means that people have to meet each other regularly in person so that social and informal contact can arise. Within the project ISES, the participants who are chosen to work in the virtual organisation are often chosen out of a personal network of the member companies or out of the network of the management of ISES. This is done, because in a virtual organisation, one has to be able to relay on each other for doing the work one is supposed to do, therefore, participants whose work is known to the organisation are chosen, so that one has a certain guarantee that these participants perform as they are known for. Furthermore, management within the project ISES has arranged for team-building meetings, where with help of prof. M. Driver the Decision Styles of the participants is analysed. With help of this analysis members learn when and how to address the other members in the project [5].

4.   Benefits for participants involved

Since most participants have to divide their time between the virtual organisation and other commitments (within ISES, most members have another position elsewhere), the virtual organisation has to offer certain benefits to the participants so that they are still prioritising their work in the organisation. The benefits for participants could be various, ranging from money to social status. It is important that management discusses what kind of benefits could be suitable for the participants. It will be difficult to state a general beneficial for all participants, since participants bring in different kinds of expertise and work different periods of time in the organisation. For the participants it is also important to gain some sort of advantage from the organisation or management. Most participants work geographically distributed and hardly meet management in person. Since it is difficult to get feedback on

one's work, it is important that members get some kind of appreciation for their work. This appreciation can be from a compliment to financial benefits. Important is that participants know in what way their work is validated.

5. Communication via information technology

Within the virtual organisation, communication often exclusively occurs via information technology and this is often not sufficient for a close co-operation and synergistic effect of combining several strengths together. Intense communication between people is important in order to reach the stated common goals or strategy. For this communication, direct relationships and information sharing between individuals, irrespective of their role, status, level, function, culture or location should be achieved.

Within the project ISES, people do research on unexplored fields and have to communicate in order to reach the stated common goal. Most sub-projects are dependent on the results of the other sub-projects and therefore it is important that during the whole development process, participants communicate about the choices they make and the results they find. One can state that the product of ISES is research and that it is non-routine, non-standardised, personal and often very complex for outsiders. According to the information richness theory of Daft & Lengel [3], research should be communicated personally. Complex and personal communication is best received via a rich medium, this means that face-to-face communication and the telephone are appropriate means for this. However, since participants are distributed geographically and do not meet regularly, it is difficult to make use of rich media in order to communicate. For routine communication like reports, a less rich medium is required, like e-mail or fax. Within today's business, e-mail is used more often and people have to learn to deal with the different way of communicating with each other. Some people have more difficulty than other changing behaviour and therefore it is important that within the virtual organisation participants make clear how they want to communicate with each other. Therefore, in a virtual organisation it is recommendable that people meet regularly in order to learn to get to know each other, to discuss the common goal and the way how to get there, to start co-operation and learn from each other's expertise. For participants who have problems in meeting is person regularly because of the geographical distance, video conferencing could be a solution. Emphasis should be put on the fact that if people want to co-operate and work on complex and new matters, close co-operation between members with different expertise is important in order to gain the stated goals.

6. Information distribution

Within the virtual organisation ISES it is important that all information concerning the research is available for the participants, so that they together can work towards a common denominator. For this reason not only the hard information (e.g. reports, notes) is important, but also the soft data, e.g. knowledge, should be stored somewhere. Organisations often have

rather weak systems in order to find where a certain item of information is known to the organisation. Hard information is often stored quite well, while soft data is difficult to collect and store. What will happen with the expertise available in the organisation, when the project is finished, will all expertise be gone and so the new learned research results? Especially in a world where more and more short term projects arise, consisting of co-operations of several partners, it is important that the learned aspects, the expertise is maintained so that the partners involved can make use of it afterwards. Unfortunately, hardly any concrete ideas about how this should be done are made.

From the case ISES, it became clear that when participants are geographically distributed and have large decision making power over their own tasks, the participants should also be able to gain all the information necessary for their work. This means in ISES, (detailed) information from the other (sub-) projects about e.g. ideas, research results and methods. The information that is stored should be available for every participant at any time and place, it should be flexible and updated regularly. Furthermore, participants should be able to find the information, this means that a search system and structure have to be defined suitable for the organisation. Since participants in a virtual organisation are very dependent on the information system for communication and information distribution, it is important that the organisation pays attention to the aforementioned aspects, e.g. updates, flexibility, adaptability. Unfortunately, there are not many information systems that fulfil the requirements a virtual organisation has on an information system. The current information systems are often not flexible enough to be updated within a short period of time. Furthermore, most systems do not fulfil the availability and adaptability requirements that are so important in a virtual organisation. Also the soft data, e.g. expertise and knowledge, can hardly be stored in an information system. The virtual organisation is changing constantly, not only its structure, but also its members are changing. For this reason it is important that the participants working in the organisation have access over all the changes occurring in the organisation, so that they still feel part of organisation and are able to create a team feeling and co-operate and the expertise that comes and goes with participants should maintain in the organisation.

A possible solution to this problem of updates and soft data being stored could be an idea described by Bosch-Sijtsema & Bosch [2], where an information system is described that functions as a mirror of the organisation. Nowadays the information system is often an enabling system, that enables certain tasks in the organisation. However, the information system mentioned by the authors is a complete reflection of the organisation, this means that when the organisation changes also the information system has to change. Furthermore, all entities available in the organisation are also available in the information system.

Conclusion

Concluding one can state that there is much research left on the subject of the virtual organisation. Especially the distribution of information and the communication within a virtual organisation is important to investigate further, since the virtual organisation is almost completely dependent on the distribution of information and communication in order to function.

Another future research track is investigating the Decision Styles of participants in a virtual organisation in more detail. The members of the virtual organisation all have their unique personality and this should be taken into account when forming a virtual organisation. Therefore, the theory of Decision Styles of Driver, Brouseau and Hunsaker is investigated in more detail in order to answer several questions. Interesting is how the decision style theory can solve some of the personal heterogeneity within a virtual organisation, so that close co-operation and team work can be increased. It is also interesting to know if the decision styles can give different answers to the question of how the virtual organisation is perceived and organised. Some members would like to see an organised organisation with rules and routines clearly defined, while others do not need these definitions and rather work in a flexible and dynamic surrounding. The decision styles do not only have consequences for the way the organisation is viewed, but also in what way information is distributed and handled. For example, some members would like to have extensive information, while others only need summaries or little information.

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