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Changes of Business Models in Electricity Distribution

P. Trygg*[1], J. Toivonen[+], and P. Järventausta*

Abstract – *Electricity distribution is, in most countries, monopoly business and regulated by local authority. Entry of international companies and regulatory demands for higher cost efficiency and better distribution quality demand continuous development in business models of electricity companies. Outsourcing and service providing are possible solutions for improving the cost efficiency of energy companies. The aim of this study is to give both theoretical and practical aspects on the development of electricity utilities' business models in Scandinavia.*

Keywords – Business models, distribution business, outsourcing, service providing.

1. INTRODUCTION

Electricity distribution is a traditional business. The first electrical light in northern Europe was lit here in Tampere in late 19th century at Finlayson cotton factory. Since those days a lot has changed in electricity distribution.

The electricity distribution infrastructure is one of the most valuable assets in every nation *e.g.* in Finland around 10 billion Euros. This means that the business is very capital intensive. After the infrastructure has been built the development has focused on the increasing efficiency, reliability and quality of distribution and reinvestments. Electricity distribution is in most countries monopoly business and regulated by local authority. In 1995 electricity sales was liberated for competition in Finland and after that there has been significant changes in the industry which had been static for many decades.

2. STUDY DESCRIPTION

Tampere University of Technology and Lappeenranta University of Technology have jointly organized a research project concerning the development of electricity distribution business. In this project, future business scenarios have been created and according to studies and questionnaires networked business models seem to be the future [1]. Also new kind of services are needed to meet the business needs of distribution companies. Not just technological research and development is enough, but more understanding on business models is needed in order to fully benefit from the potential of new possibilities.

Besides that electricity distribution is typically monopoly business it is also one of the basic infrastructures of modern society. Electricity transmission and distribution utilities have been active to apply computer systems and communication technology since 60´s. For example distribution companies have databases covering all citizens and interaction with them. The changes in electricity distribution business models can have significant impacts in future. Customer relationship with large amount of people provides possibilities in developing new business models.

3. BUSINESS MODEL DESCRIPTION

Traditional business model of the distribution companies is that most of the tasks have been carried out “in-house”. From own cars to information systems everything has been centralized inside one organization. One driving force behind the change from in-house operations to outsourcing has been the call for better efficiency. There has also happened the entry of international electricity companies to the Finnish markets.

The shift from capital intensive to information intensive business has started. Nowadays outsourcing and networking challenge organizations. Present information systems do not necessarily support this change. Also, the aging organization has its own challenges in coping with new business environment. Service providing model is increasingly affecting the current business model. Network construction and maintenance have already been developed as competitive markets and more processes are following the current trend. Measurement, planning and information system services are also gaining market shares. All the change described can be illustrated as in Figures 1 and 2. Traditional distribution utility is in the Figure 1 and the new networked business model in the Figure 2.

The shift towards networked business model requires changes in distribution companies. The changes involve the whole business. Information systems must be able to deliver information to separate partners reliably. Organizations should gain new type of know how related to purchasing and selling services [2]. Also due to age structure of most distribution companies retiring in near future will increase the need for external services.

Figure 3 describes the flow of changes in different areas.

* Tampere University of Technology, Institute of Power Engineering, P.O. Box 692, 33101 Tampere, Finland.

+ PowerQ Oy (Ltd.), Hermiankatu 8 D, 33720 Tampere, Finland.

1 Corresponding author;
Tel: +358-3-3115-4533; Fax: +358-3-3115-3646.
E-mail: petri.trygg@tut.fi

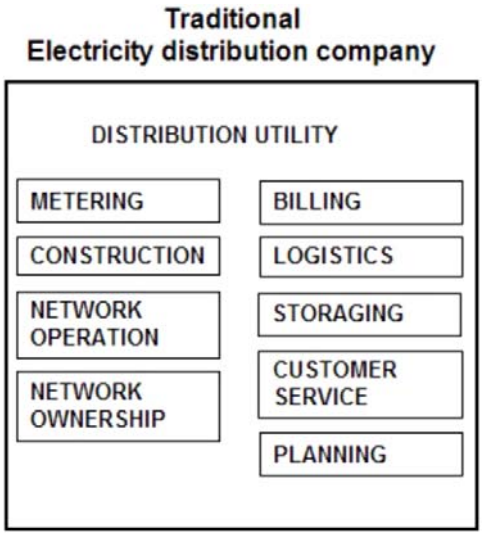

Fig. 1. Business model of a traditional distribution company. In-house operations define the organizational structure

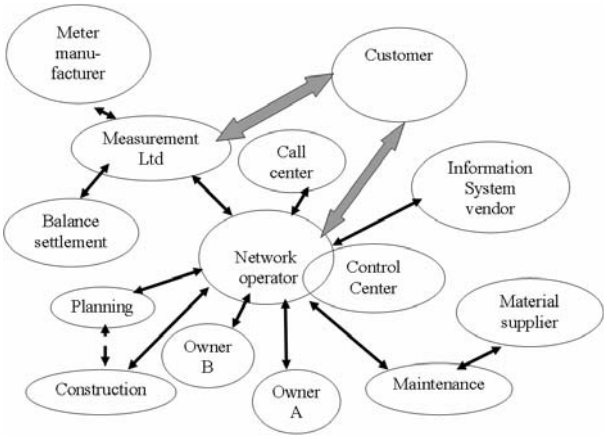

Fig. 2. Networked business model with outsourced services [1]

Fig. 3. Interaction behind business model change

What is also interesting in the business model change is the evident change in the cost structures of participating organizations. When evaluating the profitability of operations for each of the partners in the networked business model, it is important to notice that the overall cost to the end customer should be lower than in the traditional model. If it is not, the network participants must be capable to deliver improved service or to return to the in-house operations. Figure 4 illustrates the theoretical possibility of services role and effect in to the business model of electricity distribution. A new method for this cost structure analysis regarding the comparison between in-house operations and outsourced services was developed in the research project [3].

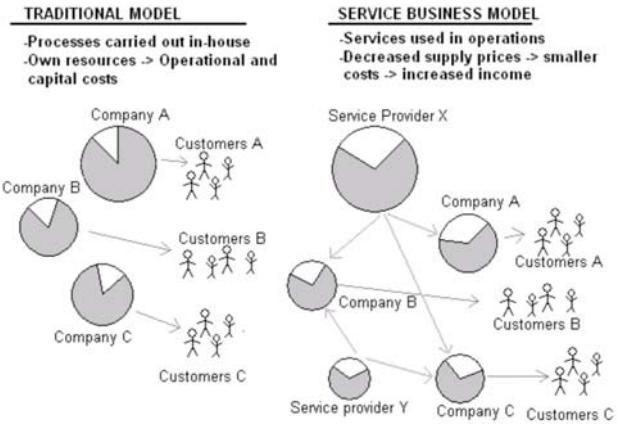

Fig. 4. Interaction behind business model change

Organizations' challenges

Outsourcing or service needs derive, as often said, from the need to cut operational costs. If services fit to the strategy and if regulation supports operational cost cutting, the trend in operations can be towards purchasing services. The ideal theory is that work that is seen secondary or not so important can be given to service partner and own personnel can be directed to more useful tasks [4]. People close to the tasks that change from in-house to outsourced service have strong resistance to the change.

Also, the possibility to lose significant tacit knowledge is a threat when business processes and persons are outsourced. This threat can cause difficulties even after a long period of the new model.

The Role of Information Systems

When considering existing model several information systems are needed for efficient management of the electricity distribution business operations. Separate applications communicate with each other. Same databases are also used in various operations. Network data, for example, is used in operations such as network planning, construction, maintenance and operation. Data management is becoming even more challenging since the electricity distribution business is changing towards competitive service markets where business operations are separated (see Figure 5). Information systems have to make this kind of wide-ranging information sharing possible and open standards are needed for application integration. Furthermore, identifiers such as identification codes for electricity supply point and meter point should be standardized because different coding schemes and terms in applications complicate the integration.

New technologies and standards (*e.g.* IEC 61968 and IEC 61970) may need to be adopted to manage the new environment. XML (eXtensible Markup Language) technology, for example, is suitable for data transfer between applications and business parties. Also more applications will most likely be used over the Internet in the future.

When considering information delivery in

networked business model the role of information systems is essential. Traditional information systems require lot of manual work in forwarding information to each partner. Application service provisioning (ASP) model can be implemented to improve information flow in business network. Each partner can access same system through web browser. The whole system can be bought as a service which allows partners to focus on utilizing the information. ASP model has so far being implemented *e.g.* in energy metering and in power quality monitoring in electricity distribution. With ASP multiple partners can access the same information and more straight forwarded solutions for problems can be achieved. More about the ASP model is discussed in [6].

Business Service Provisioning (BSP) is also a type of outsourced service. In addition to ASP the process includes usage of information storages and the use the information in certain specific business task. More about actual examples of BSP is discussed in Chapters 5 and 6.

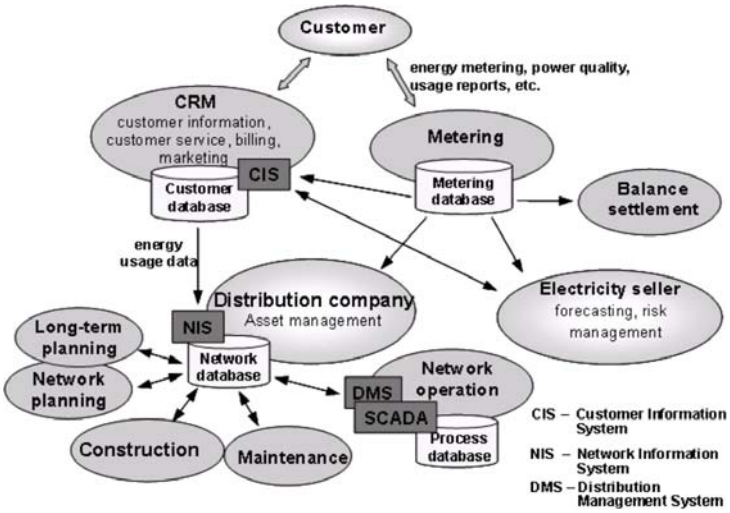

Fig. 5. Data management in the future's business environment

The Effect of Regulation

Regulatory aspects can have significant effect on the way of organizing business processes. In Finland, current model opposes service purchasing. This is due to fact that the capital costs of the in-house operations can be seen as investments while purchased service is reported as total operational cost in the profit and loss account. There is a need for a change and for coming regulation model regulator has set levels on operational costs and depreciations. The goal is to improve service markets in order to increase efficiency of the distribution companies. More regulatory related discussion can be found in [5].

In addition to giving guidelines to yearly economical performance in the form of regulation the authority can also make other kind of decisions in order to make electricity distribution more efficient or to increase the transparency of the business itself. In Finland the regulator set law that in largest companies serving more than 100 000 customers the separation of electricity sales and distribution should be more accurate due to the Directive 2003/54/EC of the European Parliament and of the Council of 26 June 2003 concerning common rules for the internal market in electricity and repealing. So far, only book keeping has been separate. Now also persons involved and information changed is regulated and this has lead to rather large re-organizations in the industry.

Most of the largest companies have established their own construction company that takes part into the free markets with existing service providers. In practice, this development is hoped to increase market efficiency but history sometimes might lead to a contract like in "good old times".

Figure 6 illustrates the development of distribution prices in Finland from 1997. The scale is relative but the main idea is that distribution prices are at the moment on lower level than in the beginning of 1997. The decrease in the prices are said to be on the long enthusiasm of increasing efficiency. Some companies have complained that prices are insufficient for covering the operational costs [7]. This kind of situations may be ahead also in future when regulation further develops. For some extent minor adjustments in the companies can be sufficient but in some cases it is time to search more radical actions based on ideas like presented in this paper.

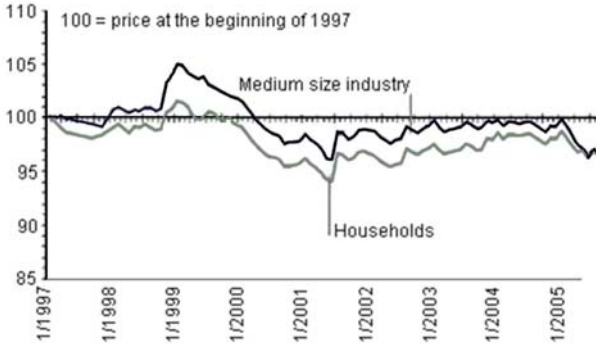

Fig. 6. Distribution price development in Finland. Trend is proportioned with Consumer Price Index (CPI) and is exclusive of taxes. [7]

4. IDENTIFYING THE COST SAVING

The primary aim of re-organizing the wide variety of electricity companies' operations is to reduce operational costs. Depending on the managerial capabilities and understanding of the effects of outsourcing, this re-

organization can lead to higher cost efficiency in new business model. In earlier outsourcing studies it has been shown that understanding the unit cost behaviour is the key element in making the decision between in-house and service operations [2].

For understanding the cause-effect chains of costs, activity based costing (ABC) provides good results. The electricity companies' knowledge of the total cost can be insufficient and the costs of outsourced service operations may seem unfairly high. This discovery is based on discussions when cost structure analysis are carried out in some electricity companies. For example, in traditional energy meter 15-year life-cycle, only about 40 % of the total costs were caused by the direct labour [3]. If indirect costs are not taken into account, in-house operations may seem more cost efficient than they are. Example lifecycle costs are presented in Figure 7.

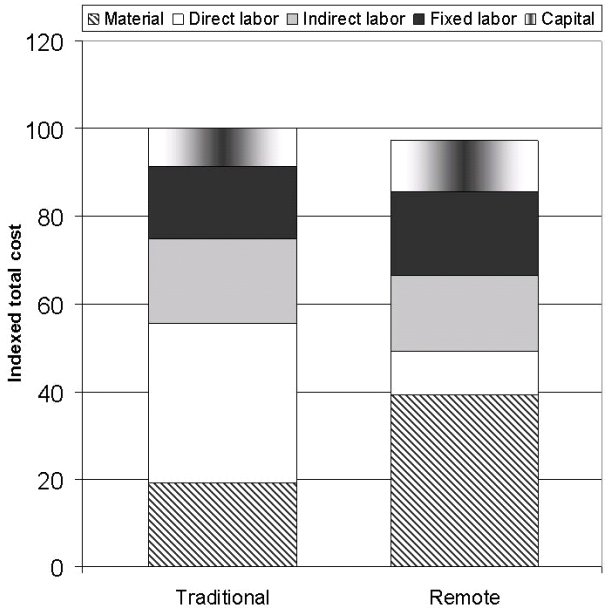

Fig. 7. Life-cycle cost of traditional energy metering and AMR meter

According to Roodhooft and Warlop [8], there are situations, where the most cost efficient decision would be to discontinue in-house process. However, in many situations the managers display a striking conservatism. They tend to attach excessive importance to asset specificity or they are even more conservative than they should be in incorporating sunk costs into the calculations. In the selection of two or more alternative ways to organize service processes, most include both common costs (these cannot be increased or reduced in any alternative) and separate costs (these are independent in all alternatives). If sunk costs are taken excessively into account, no changes can ever be made in the service process structure. On the other hand, if sunk costs are not taken into account at all, the life-cycle cost of service production may be exceptionally high because of constantly changing the process structure [2].

This means, in terms of ABC, that the changes in activity structure should be defined through the whole buyer-supplier service production chain. Currently, it seems that electricity companies in Finland are just learning how to calculate the unit costs of different cost-objects. In metering service, for example, part of the business and one cost-object is "annual meter reading". In the in-house service production, all the ordinary annual metering costs including planning, purchasing, administration, customer support etc. should be assigned or allocated to meters read. In the outsourced service, the costs of managing outsourced service should be added to the outsourced "meter reading" price given by a supplier. This approach would reveal both the activity structure change and the cost effects of outsourcing to the electricity company. While this kind of analysis has long traditions in manufacturing industry [9], it seems amazing how late electricity distribution business has noticed the need for such an analysis.

5. NEW BUSINESS MODEL EXAMPLE

One description in practice supporting the theory of the change taking place in distribution business is the first large scale automated meter reading (AMR) investment in Finland. Vattenfall Co. released it's investment for all of its 360 000 customers in autumn 2004 [10]. The change from traditional to networked business model can be found in many parts of this deal. Vattenfall selected TeliaSonera, a telecommunication company, as the partner to provide AMR services. TeliaSonera is responsible for installing and ordering the meters and later for providing energy measurement readings for Vattenfall´s information systems. TeliaSonera selected contractor Eltel Networks to install the meters. The whole deal for next 15 years is worth 100 million Euros. The investment is estimated profitable because of the new possibilities that it provides to electricity grid operation and ancillary services for customers. The whole activity of energy measurement is in future divided into separate companies acting in close partner relationship. Vattenfall outsourced many secondary activities to companies whose core business they are related into.

This new business model's effects can be studied also from Figure 7. Vattenfall outsourced the meter ownership and installation and just focused on using the information. The benefits for mobile operator are not publicly known, but it is not just owning the meter but perhaps having access to customer.

This example also provides in some extent idea of BSP. Information storages are outsourced to the mobile operator and Vattenfall is concentrating only on using the provided information correctly.

6. NEW BUSINESS MODEL, EXAMPLE 2

Another example of the developing business models is power quality information system service. Network companies need to concentrate their limited resources to their core activities. For this reason, in Finland power quality has been carried out in many companies as service from core companies. The role of the network company is to analyze the information to customer and if necessary start network planning and construction to improve quality of supply. From the beginning of year 2008 network business regulation further demands reducing operational costs and increasing quality of supply. Against these demands good service can be more cost efficient than own

work.

In Finland company PowerQ is providing power quality system additional to traditional systems delivery also as service. For service customers PQNet System has website for each customer which in this case means distribution companies and some of their largest customers. From the system they can use the systems tools to analyze measurements from their own network. PowerQ takes care of meter reading, information storing and providing access to customers in Internet. Analyzing the data and providing the excellence is a key element in successful service [11].

Concept of PQNet is serving also industrial customers when they have problems on power quality. Service is more scalable to few measurements than own system delivery. In addition to information system PQNet concept allows access to measurement information also for specialists/consultants and company management [12].

This type of service will decrease the time to implement power quality monitoring and allow network companies to target their limited resources on using the information.

7. CONCLUSION

Electricity distribution business is currently experiencing changes in business models. Traditional in-house type of structure for activities is changing towards networked business model. Driving forces towards this change are international players on the markets, future mass retiring and new possibilities provided by technology. In new model multiple partners participate to the whole process with their own core activities. This change has its impact also on companies organization where new kind of know how is needed. Outsourcing and service purchasing and management will be activities increasing in network companies. Information systems must better support new business model. Essential feature is the information delivery to each party as efficiently as possible. Application Service Provisioning (ASP) can be utilized. In future, more studies on cost analysis are needed. Also value network theory can be implemented to better understand the whole picture of the future activities.

Understanding the factors causing the change and conducting systematic analysis improves the possibilities to succeed in implementing new business models and gaining their full benefits.

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