

Operations & Maintenance Business Model Transformation—Multiple Case Studies

Harri Hyvönen

Faculty of Information Technology, University of Jyväskylä, Jyväskylä, Finland

Email: harri.a.hyvonen@ju.fi

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Abstract

Capital goods companies' service offering has been mainly to provide spare parts and maintenance work. In search of growth, these companies have expanded to new areas, such as Operations & Maintenance. Instead of operating and maintaining e.g. production processes itself, a customer can outsource a wide variety of managed services based on agreed service levels. There has been a special focus on global information management know-how, governance, process know-how, physical assets, and spare and wear parts. In order to get a good coverage of case studies, we selected five large global suppliers and two customer companies in telecommunication, energy, mining, and pulp and paper business. By implementing the right capabilities in information management and human resources, by managing contract through governance models and by offering right products, a traditional company can transform to the Operations & Maintenance business model.

Keywords

Governance, Service, Information Management, Outsourcing, Innovation

1. Introduction

Different outsourcing cases have been widely researched during the last 20 years, especially in IT business [1]. Outsourced activities are normally routines; they are well delineated, can be measured and managed at arm's length and are readily provided by established suppliers in a competitive environment [2]. One widely referred definition is: ... "a company by outsourcing its processes is targeting to focus on core competences and to increase company's competitiveness." [3] The decision to outsource is largely a consequence of a shift in business strategy. Strategic outsourcing has also been carried out by many companies who have recently abandoned their diversification strategies to focus on core competencies [4]. In trade between companies, there are costs due to

add-on goods or cost incurred by searching, monitoring and negotiating services, among other things. However, markets are efficient by nature, and often it is cheaper to contract out than hire [5].

The concept of value chain [6] embraces primary activities focusing on demand-supply chain management and secondary activities such as infrastructure, human resources and technology development. However, large traditional companies have made a strategic move from product-based sales to expanded service offering. Operations & Maintenance (O & M) is a typical example of these expanded services and raises up a new challenge of how to build up these capabilities. The secondary activities defined earlier have a mandatory role in the new business model.

2. Background

From the viewpoint of a customer, sourcing operations and maintenance follow the logic of strategic outsourcing [7]. “Maintenance” means the control of the process operations and consists of proactively planned actions to keep and potentially replace production equipment and machines before they fail [8]. “Operations” includes those activities which are needed to plan, implement and run production and related services. Before signing contracts on O & M, business risks have to be evaluated, key measurements defined, and governance has to be agreed upon. Suppliers’ earning logic is mainly aimed at high-quality maintenance to operate customer assets efficiently and to maximize production and quality with respect to key performance indicators (KPIs) [9]. For both parties, the earning logic depends on what kind of a contract has been signed between them [10].

Large technology companies have developed and augmented the O & M model further by offering continuous remote process and related information analyses and support with the help of the latest information technologies (IT). However, the realization of the outsourced O & M business model has turned out to require a complex combination of technology and human skills, calling for high-quality business processes and governance with well-defined roles and responsibilities [11]-[14].

As a consequence, service-based business has been growing strongly during the last decades, especially in developed countries and in the Business-to-Business sector. For example, in the US, which is the biggest service market, almost all new jobs have been created in the service sector. According to recent statistics, the number of new jobs in the private service sector, compared to those in the private goods production sector, was more than double during the last quarter of 2011, and the service sector also employs more than twice as many people as manufacturing [15].

In the literature, there can be found strategies that companies have been using to create value while leveraging their resources in an outsourced mode. The following motivations to extend the value chain through outsourcing are proposed [3] [16] [17]:

- 1) Maximizing the utilization of internal resources by concentrating investments and activities on what the enterprise does best;
- 2) Building on well-developed competences to create barriers against present and future competitors;
- 3) Utilizing external suppliers’ investments, innovations and specialized professional capabilities that would be expensive or impossible to acquire internally;
- 4) Outsourcing in a changing environment to decrease risks, shorten cycle times, lower investment costs and create better responsiveness to customer needs.

O & M business risks can be financial, geographical, organizational and people-related technological and cultural uncertainties. Outsourcing-related risks [2] are mainly seen as loss of critical skills, as loss of cross-functional communication (the traditional lines of communication being redrawn), as loss of control over a supplier if the supplier gets into a too dominant position or ends up in a position to transfer customers’ accumulated knowledge to competitors. Hence, a company should not outsource anything which might give a competitive advantage to present or potential competitors. It should decrease the above risks by selective outsourcing, which, while meeting customers’ needs, minimizes the risks associated with total outsourcing approaches [18].

Outsourcing contracts are normally for a long term, up to five years or even more [19]. Therefore, it is important to choose a right negotiation strategy aiming to a win-win, or risk-sharing, situation and to avoid typical “cost plus” contracts, especially from the customer’s standpoint. In contract negotiations, there should be clarity of the lowest acceptable conditions and of how to get away from the present contract if the contract is no longer acceptable for one of the parties.

Maintenance contracts are categorized into different types, depending on the nature of the relationship, knowledge and type of service [10]. In case a customer has a deep understanding and knowledge about maintenance, then 1) a *work package*—type model is likely to work. With a sourcing contract based on a work package, the customer is responsible for planning, controlling and monitoring. The supplier acts as a mere provider of maintenance. When the contract stipulates the desired performance (not merely what should be done and when); 2) a *performance-based contract* is applied. The main emphasis is on defining the revenue stream between the customer and the supplier, and the contract is typically a long-term one; finally, in 3) a *facilitator contract*, the customer is only using or utilizing physical assets which are owned, maintained and even operated by the supplier. In this case, the contracts are also typically long-term.

Some behavioural assumptions of governance and contractual processes of O & M can be described in terms of transaction cost theory [20]. In general, when bounded rationality prevails, planning does not work, whereas promises, competition, and governance are viable mechanisms. If opportunistic behaviour is suspected, relying on the counterparty is not wise, and contractual arrangements are called for. In a situation with high asset-specificity, relying on the competition is very difficult. For all existing situations, the only common means to tackle these issues is governance [14] [20] [21]. In O & M-type outsourcing cases, the assumption is that all the behavioural situations can exist simultaneously, and it is important to establish strong governance structures with good relationship management [22] [23].

The following four key dimensions of O & M are important when an organization invests heavily on physical assets in maintenance environment [24]:

1. Service delivery options;
2. Organization and work structuring;
3. Maintenance methodologies;
4. Support systems.

These four key dimensions can be reviewed both from the perspective of the knowledge potential and that of information system flow. The present information system enablers, such as global data networks (internet, WAN's, LAN's) with integrated applications and service providers' processes [25], allow the major part of work to be done remotely and efficient utilization of the common infrastructure and knowledge by many customers. When information technology is used as an enabler to manage enterprise systems, and maintenance plays a key role in it, we can refer to it as "e-maintenance" [24].

3. Research Methodology

Our research methodology is based on dimensions around outsourcing. Oliva & Kallenberg [14], in their research, studied how in the transformation of a product-oriented company to a service-oriented one the importance of capabilities, product management and also contractual topics becomes highlighted. Because these issues are still encountered in outsourced service business, we applied, in our case studies, a framework to study three-dimensional models in more detail, the studied dimensions being capabilities, contract with governance and product offering described in **Figure 1**.

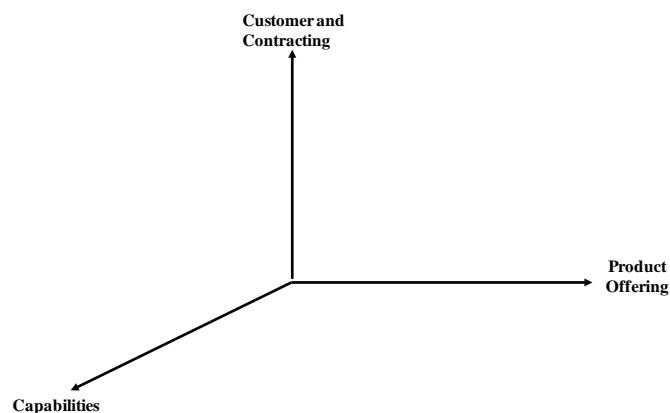


Figure 1. Studied dimensions.

As a starting point of our research, we searched for O & M offering in internet and, based on our findings, investigated 20 large multinational companies' websites which offer O & M services. Most of those companies' O & M offering is for energy business. Also pulp and paper, mining and construction businesses were found frequently. We also met professionals in a mining industry company, which is in the process of building capabilities for outsourcing business. Our aim was to find out, through practical cases, which factors are highlighted most by the selected companies' executives. Therefore, we used case studies instead of survey-based research, and consequently our study is built on multiple case studies [26] [27]. We formulated semi-structured, free-form questions in close cooperation with O & M specialists in the mentioned mining industry company, the focus being on success factors. The questions chosen were based on characteristics which appear mostly in outsourcing-related studies. Those questions dealt with contractual, governance and risk management topics, and the key dimensions were supplemented with human capital issues and especially with the topics related to IT. We reviewed the questions also with people from the global mining industry company referred to, and, based on their guidance, several changes were made before the final set of questions was agreed upon.

The selection criteria for the researched companies consisted of global presence, large size and long-term familiarity with O & M business processes. We wanted to find also companies from different kinds of businesses for our study. Also, potential interviews with O & M professionals with higher and broader views on O & M business were sought. "Supplier" (henceforth one of S1-S5) companies mainly operate in telecommunications, pulp, paper, mining and energy industry. "Customer" (henceforth one of C1-C2) companies operate in pulp and paper industry. The value of O & M contracts for the interviewed companies varied from several 100,000's euros up to 20 million euros, and the contracts' sizes were in the large-size category. The case companies are described in [Table 1](#).

All the interviewees worked for their companies' operations and maintenance activities or very close to them. The interviewees' minimum position in the organisational hierarchy was that of a director; some of them were vice presidents and had gained extensive experience in O & M-related business models for 6 - 20 years, 12.6 years being the average. The customer company interviewees were senior managers of a production site with 25 years experience in pulp and paper industries.

The average duration of the five supplier interviews was 2 hours 14 minutes while the duration of the two customer interviews averaged around 1 hour 40 minutes. Answers to the semi-structured interview were considered together with the interviewees so that they could see the results immediately, during the interview. The written interview reports were re-checked after the interview by the researcher, and the final interview document was sent to the interviewees for comments. In three cases, the researcher got comments back, and minor changes were done to the documents.

Once all the interviews had been completed, the results were collected in a table to find out the key success factors raised up and documented by the interviewees. As the interviews were semi-structured and the questions to the interviewees were the same, the biggest deviations and commonalities could be analysed. The results were

Table 1. The chosen case companies

Company	Turnover 2011 (b€)	Case Companies Description		
		Number of Personnel	Industry	Global Presence (Operations at Least on Two Continents)
S1	38	74,000	Telecommunications	Yes
S2	6	17,000	Pulp and Paper	Yes
S3	10	50,000	Mining Industry	Yes
S4	7	30,000	Metal Industry	Yes
S5	12	18,000	Energy	Yes
C1	10	18,000	Pulp and Paper	Yes
C2	1	1000	Pulp	Yes

also reviewed and discussed with the O & M people from the mining industry company, and they helped in structuring the questions.

4. Interview Findings

All interviewed supplier companies were focusing on strategic long-term solutions/change. Operations & Maintenance business was generally regarded by several of them as a “low profit” business where the suppliers want to make long-term contracts and this way get to a position where they can invest on cost-efficient delivery service. In telecom business, there are competitive and regulatory issues, but agreements on the scope and operating model of the service with the customer can be made in a number of flexible ways. Transactional costs are quite high: for example, contracting and basic infrastructure build-up before launching into operations normally takes almost a year. Customers had two key reasons for O & M, and these also came up in the interview: cost-efficiency to prevent product margins from shrinking and the need to ensure technological leadership and operations’ reliability.

4.1. Capabilities

4.1.1. Information Management

Customer Relationship Management (CRM) seemed to be problematic in all the interviewed companies. CRM systems had not been implemented properly, and as a consequence, relevant information in these companies was not shared further with relevant stakeholders, for example about meetings with customer representatives. Also, keeping history records intact did not seem to be a common practice. Poor “one company” culture came up in several interviewees’ comments. For example, S4 stated: “...*other parts of the company are not willing to share memos and information with the rest of the organisation*”. As this was brought up in customer interviews as well, there is a need for improvement. CRM roles are often local or regional, and some of the companies have an “account director” for coordinating large customers’ needs.

“*Word remote is not allowed*”, stated one interviewed supplier (S2) representative. That statement demonstrates a need to be close to the process and not be “remote” mentally. However, all the companies had some remote services available for their customers. Some were monitoring and some were even running customer processes with the help of global IT systems and networks. Today’s integrated and distributed systems allow that. When the number of contracts is growing, remote processes are perceived as more valuable. In one case company with over 400 contracts to operate, an on-site O & M was no longer a realistic option. When there are just a small number of contracts, operating only locally is possible with the help of global process professionals who have access to customer processes. The most usual arrangement is a combination of remote access and support by global professionals, with the key roles present on-site. Well-functioning inter-operable IT systems are a must for O & M business. Two interviewed companies, both of them in pulp and paper industry, had moved from centralized remote IT centres to virtual facilities. The rest of the companies had remote IT centres in place, and they believed it to be the right way to run and grow the business.

All the interviewed supplier companies (S1-S5) have, within their service business, dedicated IT professionals. Some of those individuals strongly emphasized that they were not willing to let the corporate IT to be the only provider in IT issues. The important thing is that the IT professionals understood the business model well and were able to provide a fast service in a responsible way. Integrating supplier systems to customer databases was the biggest IT challenge within O & M. However, the interviewed customers regarded all the key IT solutions in the production as the customer’s property which should be built or maintained by their own experts. If case partnerships changed, all the information would still stay in the customer’s ownership. A supplier with its own systems was regarded as a big risk: information could be lost and continuity could be disturbed. Based on the topics above, the importance of well-functioning interfaces between the supplier’s and customer’s systems is considered next.

Three suppliers (S1, S2, and S4) calculate O & M offers by using their home-made information systems based on MS-Excel spreadsheets. Two of the companies apply their service/spare part sales software. For cost and price estimation, there does not seem to be any unified toolset in the Operations & Maintenance business. Risks are managed very thoroughly in all the researched businesses, but only half of the companies clearly calculate risks when pricing their offers.

One O & M supplier has specified in the contract that they need to have daily access to customer site informa-

tion. The customer's database is consolidated to include information from many suppliers. Based on long experience in the business, access to customer process data is a must to the supplier. However, the customer representative's opinion is that process data, mostly, is only for the customer's use. All the data is available for the supplier on-site, only if mutually agreed.

There are big differences between companies in how openly data can be shared. In three of the cases (S2, S3, S5), information from the customer site is packed and sent to databases frequently, e.g. once per minute or less frequently. In one business, already in the manufacturing phase, there is an in-built standard interface in delivered machines and equipment for data collection. In the telecommunication business, interfaces to ticketing systems (S2) are available right from the beginning. Information from several customer sites is extremely valuable for suppliers and can also be transferred to R & D, where the collected data can be used for industry benchmarking information to help a wider set of customers. Generally, it can be gauged from the suppliers' opinions that too little IT development has taken place in this area. Customer representatives understand that IT has a very important role in the customer's business today (C1). The interviewed sites are using company-wide IT architectures, and process automation systems are implemented locally.

4.1.2. Human Resources

Recruitment support is considered very important, and one of the interviewees stated that human capital is one of the most important business enablers (S5), thus emphasizing the important role of human resources. The customer interviewees expect the most-skilled persons (might be expatriates) launch activities and processes, especially in the beginning of the relationship. Thereafter, trained local people could take over to assume major roles after the ramp-up (C1).

All supplier companies prefer to have an employed, local manager for O & M because expatriates are expensive and most often temporary. The rest of the personnel can well be "externals", *i.e.* (sub-) contracted employees. Customer knowledge is crucial and can be obtained by training or moving company people temporarily to the customer site and transfer that knowledge from the field to the organization. Service mindset is very important, too. One company had special training for changing project-oriented personnel's mindset towards a more service-oriented way of thinking.

4.2. Contract Management and Common Key Performance Indicators

Capital expenditure (CAPEX) delivery means project delivery, which can be to a totally new (referred to as "greenfield" by the interviewees) or already existing (referred to as "brownfield" by the interviewees) production site. Once CAPEX delivery is completed, the next step is to deliver the contract based on the operational expenditure (OPEX) phase, including long-term services delivery between the supplier and the customer. There can be combinations, containing both CAPEX and OPEX parts, in the same contract. There is a big variation among industries, companies and governance cultures. In the telecommunication and energy industries, targeting to a combined model is a very natural part of the whole contracting procedure. In the pulp and paper as well as in the mining industries, cooperation between CAPEX business teams and OPEX business teams has improved during the last 10 years, but, according to the responses, the situation is still not satisfactory (S3, S4). Service with O & M proposals in customer negotiations come clearly after CAPEX sales, if at all. The customer and industry culture must be considered here (S4, C1, C2). Some customers want to buy project delivery and operations service as separate entities, with separate contracts and deliverables. One interviewed customer (C1) wanted to keep these as separate items to get better terms and contract conditions, but the other interviewees highlighted the importance of bundling CAPEX and O & M type offerings in order to ensure maximum value for their investment.

Greenfield projects are, however, seen as the best "*platforms to success*" both by suppliers and customers. A supplier delivering CAPEX with maintenance that covers production processes and technology management from the start-up phase onwards, has the means to better influence the agreed warranties and commonly agreed key performance indicators. Key performance indicators are implemented as part of O & M contracts to form a basic element of governance in all companies (S1-S5). Most of the interviewed companies (S1, S3, S4, S5) had the same key performance indicators for all their customers. The usual indicators are availability, production per day and response times to recorded issues. The typical ways to control and follow-up the contracts are weekly meetings with on-site managers, a monthly meeting with contract managers and an annual meeting where penalties and the longer-term development is reviewed, including determination of bonuses or penalties. In the annual

steering meeting, participants are normally account directors or employees in comparable positions. KPIs, which are defined in contract, are typically mill- or site-based (bonus metrics); they are linked to process availability, quality metrics and savings in energy and chemical consumption (S4, C2). A leading principle from the interviews (C2) was: “Our interest is not to pay for work; our interest is pay for the result”.

4.3. Product Offering

Supplier (S#) companies handle their product portfolios in very different ways, too. The pulp and paper technology company (S4) had focused on creating good practices in service product information management in workgroups, the energy technology company (S5) approached their products from the standpoint of contract management and standardization, and the mining technology company (S3) concentrated on service products categorized according to different customers. The fourth company stated that “there are many non-standard products desired by customers” (S1). In energy business, production process output was clearly in focus, whereas, in pulp and paper, physical service products such as spare parts after CAPEX deliveries seemed to be more central. All these products had to do with greenfield deliveries. Brownfield delivery in O & M is much more challenging, especially if the customer has many supplier technologies and solutions in use. In telecommunication business, it is quite normal that the customer has strong legacy ties when O & M contract starts. In other businesses, maintenance could be arranged for brownfield sites, but operating was not desired by the supplier in the contract as it was considered to contain too many risks related to personnel, product management and contracting.

5. Conclusions

“Maintenance” business model belongs to every company’s offering, but there is a remarkable difference between companies in the way “Operations” is considered as part of outsourced service offering. The key success factors are shown in the three-dimensional, better-detailed (product, capabilities and customer and contracting details) model below. We analysed how often they got highlighted as key factors (both “Supplier” and “Customer”) in the interviews. This allowed us to arrange the studied cases according to the most notable similarities between them, as shown in **Figure 2**. In each category, the commonalities are listed in a descending order.

O & M contracts are very strategic and valuable, and their duration is long [28]. This kind of a business model requires, from both parties, strategic level engagement. The customer relies on the supplier’s capability and does not invest on own skills, and the supplier invests on building the needed infrastructure and governance. Therefore, the duration of the contracts’ governance is normally very long.

The key selling argument seems to be technology leadership and good references. In the researched companies, mainly O & M contracts were signed in greenfield sites. A sale of a CAPEX delivery typically starts a long cooperation. From the customer’s side, decrease in costs was regarded as a key driver for O & M. This was

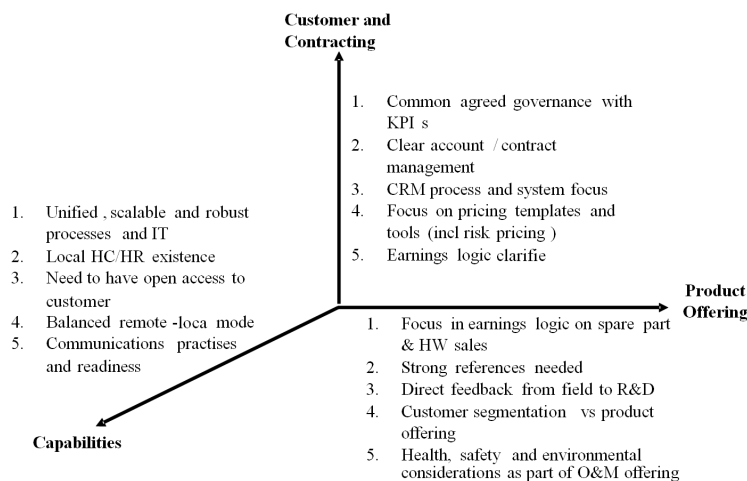


Figure 2. Three-dimensional models for O & M-focused success factors.

achieved mainly by removing present legacy systems and replacing them with the supplier’s infrastructure and modern technology. The “Investment Characteristics” theory [20] is not applicable as such here, but a transformation can be detected during the contract lifecycle. At the beginning, following the project delivery, investment is rather particular and occasional, but gradually it will transform towards a more mixed and recurrent form.

Most of the interviewed companies admitted that they could better utilise the information related to their customer relationship management (CRM). This was also the customers’ view. If the supplier has interfaces to the customer and they do not know each other well, that will create mistrust and misunderstandings on the customer side.

Behavioural assumptions related to asset specificity, bounded rationality and opportunism have strong influence on how well the contract will succeed [20]. Based on the O & M case interviews, in most of the companies, proper governance is mandatory if these behavioural patterns are detected during a contract.

Proper governance in the decision making of an inexperienced customer was seen as an even stronger determinant than technology leadership. Common key performance indicators are one of the key enablers to get a contract implemented. The following model **Figure 3** proposes a governance practice. It is proposed for the commonly agreed contract and relationship management scheme.

Still the hard facts such as cost decreases, efficiency and performance, instead of environmental and health and safety topics, were the key drivers for customers. Sales of concrete items, especially those of spare and wear parts, were the most important topic in suppliers’ earning logic. In the sales phase, several customer companies highlighted the need for good references.

A contradiction in the existing O & M business model was found. Suppliers (S1-S5) are aiming to utilize economics of scale by building, e.g. remotely-managed processes and functions, while customers (C1-C2) want to ensure undisturbed operations and highlight the supplier presence on the site. The most workable solution seems to be an agreement to interface the supplier’s IT systems to customer operations management systems and ensure that the supplier has access to on-line information for analysis. Well-functioning IT is a mandatory part of a wider business model and its transformation [29]. However, some customers (C1-C2) did not want to allow the suppliers to use the data gathered from the customers’ processes. Those customers wanted to keep their operations data in their own databases to be able to change the supplier in the contract renewal phase. Changes are much easier to execute, if the ownership of the data is on the customer’s side. This is a complex and contradictory issue because process data is naturally one of the key factors in process-based industry.

Both human and technology factors need to be well addressed, and all the interviewed companies pointed this out [4]. One of the critical success factors is how well global HR systems are able to recruit locally for O & M site positions and how suitable the people recruited are. Use of expatriates is not a very popular way of resourcing. Instead, companies want to find local people educated as their site’s key personnel as soon as possible. Also, we found out that the companies with the longest experience in O & M business had invested on training programs or packages for their own and their customers’ personnel.

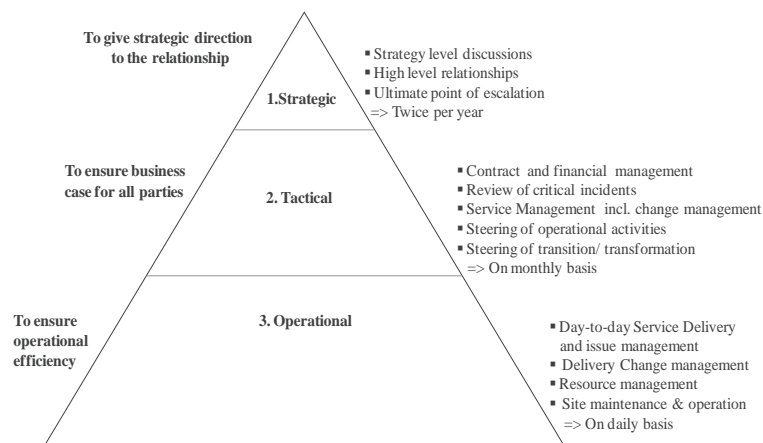


Figure 3. Proposed governance model in O & M contract and relationship management.

6. Summary and Further Research

This paper discussed the key O & M capabilities on the basis of interviews with senior management responsible for O & M in five supplier and two customer companies. In this study, we had a special and valuable opportunity to run interviews and analyze O & M top level professionals from both customers' and suppliers' point of view, allowing us to propose the most common factors for transforming the product-based business model to a service-based one. Our view is that the secondary activities defined in widely used competitive advantage theory [6] have to be prioritized. The data in our study indicates that secondary capabilities in O & M type business are mandatory. We did not try to change nor challenge any general theories but to deepen our understanding about how large global companies see the service business and, especially, the capabilities, such as IT, that are required. Operating and maintaining the customer's process is clearly a complex combination of several influencing factors, see **Figure 1** and has to be managed well. The biggest variations in the findings concern management of product data, centralized way of working and, particularly, use of CRM and customer cultures in adapting to new ways to deliver services. The common areas of importance were found to be human capital, need for governance, and focus on IT solution. Special emphasis was placed on governance and reliability to build and maintain IT systems which enable the O & M business model.

Suppliers benefit from arranging remote operations globally, but customers want services locally. Suppliers are willing to collect data and produce information for a wider use, but customers are hesitant to let suppliers to use their data. A true win-win situation requires deep trust between parties. However, well-functioning and proven relationships are needed before trust can be achieved and, before that, mutually agreed governance structures must be in place. New business models create challenges also for companies' IT and business infrastructure functions and for their ambitions to global reach. Again, there are huge differences in IT tools in-use, in service delivery processes and in focusing on greenfield or brownfield deliveries.

Several large companies are moving in value chain from a traditional goods and project delivery model towards the O & M business model. Some of the traditional global companies are enhancing their offering by extending their activities to customer processes operations. As a consequence, the services and their implementation worldwide form a key growth business area also in capital goods industry. There is a growing body of research especially around IT outsourcing, and there is more room for O & M-contracted activities. Ample opportunities exist for further research not only in organizational, IT and business fields but also in strategy and management.

Further research is needed, especially on life-cycle costing and funding mechanisms and also on how to govern long and large outsourcing services contracts. The number of interviews in this study was limited. To be able to generalise these kinds of results, the amount of data and the number of interviewed companies should probably be larger. The use of mathematical modelling and simulation and development of practical methods for industries' use would also be required. In the interviews, it came up several times that better governance equals better cooperation, and that can lead to targeted win-win situations. Therefore, it would be necessary to study how the relationships between customers and suppliers are longitudinally developed during contract lifecycles.

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