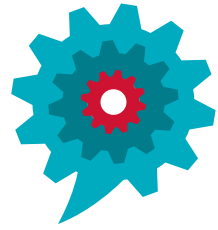
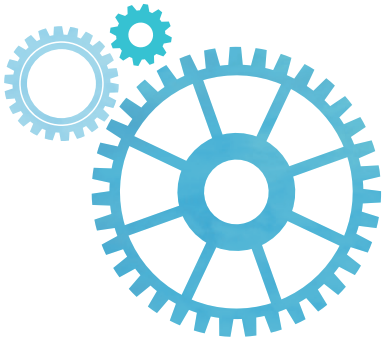


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# Creating an open-books -supported implementation framework for inter-organizational decision-making models in the industrial maintenance context

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**Abstract**—Rapid globalization has forced companies to outsource their intra-organizational activities and collaborate otherwise with previously unrelated partners. As the importance of networking and forming inter-organizational relationships is increasingly emphasized in industrial environments, there is also a need for inter-organizational methods, models and tools to manage network interdependencies. Especially in the industrial maintenance context, the interplay between a customer, a service provider and an equipment provider requires triadic and transparent collaboration.

An open-book accounting -supported implementation framework for inter-organizational decision-making models, featuring a relational dimension and a process dimension is created in the study. The theoretical framework is established through a literature review. Furthermore, the prerequisites and potential pitfalls of increasing real-life inter-organizational openness are studied framework-wise. The empirical data has been gathered in workshop events with companies acting in the field of industrial maintenance.

Firstly, the study reveals that the companies are not yet prepared to disclose intra-organizational information network-wide, rather a willingness to promote dyadic transparency and focal company -coordinated disclosure is highlighted. Secondly, the present state of companies' cost accounting systems seems to be relatively poor, which hinders the adoption of inter-organizational models. Thirdly, a lack of systematic network infrastructure appears as well.

**Keywords**—inter-organizational relationships, networks, open-book accounting, industrial maintenance, model implementation, implementation framework.

## I. INTRODUCTION

The modern-day world is highly globalized. This fairly rapid phenomenon has had direct and indirect effects on companies of very different sizes in the most traditional industries. Therefore, companies and other organizations are increasingly forced to concentrate on their core competencies to be able to thrive in worldwide competition. As a consequence, inter-organizational linkages between firms have multiplied, and networking has truly become a vital part in doing business. In industrial environments, companies' focus on their core competencies has resulted in outsourcing of equipment maintenance to external service providers, either completely or partially [1]-[9]. Outsourcing is an excellent

example of vertical inter-organizational collaboration, i.e. networking, which conceptually takes place in a value chain between a company and its suppliers and/or customers [10]. Even though vertical collaboration is often reckoned as transactional by nature, maintenance networks that are in principle comprised of a maintenance customer, a maintenance service provider and an equipment provider [9], offer a fruitful platform for more partnership-like arrangements. Either way, the above-mentioned "maintenance triad" creates multiple interesting challenges for successful collaboration, such as how to implement, generally and as a process, a network model.

The benefits of establishing an inter-organizational infrastructure, e.g. network methods, models and tools, and developing suppliers' cost accounting systems in particular have been recognized in several research papers to promote better management and control of firm networks [11]-[17]. Despite their usefulness and a plausible demand, the current literature does not really take a stand on which matters should be considered when implementing collaborative models. As technological aspects in such implementation are, if not easier but in a way more straightforward to tackle, the challenges originating from inter-organizational interdependencies are definitely tricky to manage. Therefore, open-book accounting, which is probably the most predominant inter-organizational concept to date, has been chosen as the approach for the present study. So far, research papers in the area of open-book accounting have dealt for example with its successes and failures [15], [17] and [18], the variety of decision-making situations where disclosed data can be employed [19] and [20], profit-sharing incentives forwarding open-books utilization [21] and [22] and trust, as well as other relational factors in relation to the open-books phenomenon [23]-[25]. Nevertheless, the issues in implementing a network model is altogether a novel topic in the present literature.

The main objective of the study is to create a theoretical implementation framework for inter-organizational decision-making models from the open-book accounting perspective. The purpose of the framework is to help understand the relational dimensions and factors that have an influence on the model implementation process. Further, the supportive objective is to map the existing information disclosure potential in real-life maintenance networks from companies acting in this field. The chosen approach, studying the subject by creating a theoretical framework, has been adopted because the

current understanding about inter-organizational model implementation is still rather scarce. Thus, some kind of theoretical basis is a very good starting point for further research, such as an extensive case study where the presented theories are comprehensively tested.

The research questions are as follows:

- *Which open-book accounting theories, presented currently in the cost management literature, are essential from a model implementation standpoint?*
- *What do companies themselves in the field of industrial maintenance think about disclosing confidential information in practice?*
- *How could the implementation of an inter-organizational decision-making model be theoretically illustrated from the open-books perspective?*

The empirical data has been gathered in four workshop events arranged in Finland in February 2014. The participants, twelve individuals in total, came from eight Finnish companies, acting in the field of industrial maintenance, and were selected for collaboration because of their current linkage to an ongoing research project on maintenance services management. Thus, these companies and their representatives were already somewhat aware of inter-organizational matters and issues in relation to this specific industry. Moreover, the so-called maintenance network roles of the participating organizations are the following; three of them represent a maintenance customer, two firms are maintenance service providers and the remaining three are equipment providers. However, all these companies do not cooperate with each other directly, but form two separate networks, one acting in the mining industry and the other in the energy industry.

The overall structure of the paper is as follows. First, the concept of open-book accounting, together with its main content is studied in section II. Further in section III, the prerequisites and potential pitfalls for increasing inter-organizational transparency are observed from the empirical point of view. The empirical data gathered in the workshops is analyzed in this particular section. The open-books -supported model implementation framework is presented and discussed in detail in section IV. Lastly, the paper is concluded in section V, where the main aspects are brought up once more. The potential need for further research is also acknowledged in the conclusions.

## II. OPEN-BOOK ACCOUNTING AS AN INTER-ORGANIZATIONAL PHENOMENON

As cost data is probably the most sensitive piece of intra-organizational information, it has been traditionally kept hidden from firms' suppliers and customers. However, in the wake of network formation, in outsourcing in particular, disclosure of sensitive data has become a topical issue in management and control in industrial contexts. Conceptually, the practice of disclosing intra-organizational information inter-organizationally has been called open-book accounting, also known as OBA, see e.g. [11] and [15]. Alternatively, open-book costing, see e.g. [24] and [26], open-books policy, e.g. [19] and [20], open-book negotiations, e.g. [27] and [28], and open-books, e.g. [13] and [16], have also been employed in

multiple references to the phenomenon. Moreover, cost transparency is sometimes understood as a synonym as well. However, for instance McIvor [26] distinguishes open-book costing and cost transparency from each other. By his standards, open-book costing, i.e. open-book accounting, is rather a negotiation method in contrast to cost transparency, which is, as a matter of fact, a technique of sharing cost information. In this paper, open-book accounting, open-books, as well as the abbreviation OBA are used. The phenomenon is also understood widely from preliminary negotiations as factual and realized disclosure of cost and other intra-organizational information between legally detached and independent companies.

Despite the obviously challenging nature of OBA terminology, its fundamental principle and potential benefits that directly ensue its purposes are fairly unambiguous. On the one hand, as Kajüter and Kulmala [15] state, open-book accounting is a means for revealing cost reduction opportunities through collaborative efforts, but on the other hand, a serious trust-building tool as well. Axelsson et al. [13] for example recognize the establishment of mutual trust as a key issue in utilizing the open-books technique. Kajüter and Kulmala [15] also mention that trust can be seen either as a prerequisite for opening the books or as an end result of the practice itself. In the end, however, the success of OBA is highly dependent on the existing motives, whether cooperative or opportunistic, of the participating organizations [29].

Inter-organizational cost management is very closely related to open-book accounting both in theory and in practice. As Cooper and Slagmulder [30] highlight, the objective of inter-organizational cost management (IOCM) is to identify opportunities for joint cost reductions through coordination of activities. Therefore, companies should be able to achieve lower total costs than acting independently. Agndal and Nilsson [16] underline specifically that IOCM practice focuses on costs that originate from overlapping inter-organizational activities, in other words reciprocal business transactions. Moreover, joint development of cost accounting systems can also occasionally take place in the context of inter-organizational cost management [15]. Before anything, IOCM is an umbrella category that encompasses a variety of practices, such as performance measurement, target costing, activity-based costing and open-book accounting [31]. Evidently, these methods are similar to intra-organizational circumstances and thus IOCM and "regular" cost management should be understood analogically, as the only difference between them is really the organizational context. Open-book accounting, however, is a purely inter-organizational method and, in a sense, a platform that enables IOCM through proper cost accounting tools, such as target costing.

In order to get better understanding of the open-books phenomenon as a whole, its main content and features should be highlighted in closer detail. Windolph and Möller [18] have recognized three open-book accounting dimensions, which are *the direction of information exchange, the degree and the quality of disclosure, and the existing boundaries to information openness*. Also Angdal and Nilsson [32] have listed three open-books dimensions, but not entirely similarly. Their dimensions are *the nature of data and the accounting data disclosure practices, the uses of disclosed accounting*



*data, and the conditions of open-book accounting.* As can be seen, the categorization of Angdal and Nilsson [32] is clearly more extensive, as it takes into account the decision-making situations where disclosed data is used, as well as the organizational attitudes towards information transparency in general. However, the above-mentioned definition of Windolph and Möller [18] is favored in this paper. For example, the uses of disclosed data are irrelevant because the preliminary decision-making situation, implementation of an inter-organizational decision-making model is already known. Moreover, also the open-book conditions, including the firms' past experiences and mutual trust between them are both entirely out of the researcher's hands.

*The direction of information exchange* can be either unilateral or bilateral in a dyadic, inter-organizational relationship. Unilateral, also known as one-way disclosure means that only one of the two collaborating companies "opens its books" to the other one in the relationship. Extremely often, the more powerful customer is tempted to demand one-way disclosure from its suppliers, which may ultimately lead to opportunistic behavior. In bilateral, a.k.a. two-way disclosure, both parties are willing to share information with joint goals and mutual benefits in mind. Occasionally, a third direction of information exchange, multilateral disclosure is also identified. Information is disclosed multilaterally when it is transparent to a third party outside a dyad as well. However, it is arguable whether such alternative even exists, according to this three-dimensional view at least, because the boundaries to information openness conceptually encompass also multilateral disclosure.

*The degree and the quality of disclosure* comprises the type of transparent information and its level of detail. The type of information can be generally divided to actual cost data and other supporting information. Although the discussion in this context is naturally biased towards cost management, open-books can also be seen as a method for disclosing cost-relevant information, such as budgets and forecasts. For example in the case "Leantech" of Mouritsen et al. [11] the focal company's sales forecasts were disclosed to its suppliers in exchange to actual cost accounting data. Furthermore, the level of detail can significantly differ case by case, ranging from inaccurate information to highly detailed and accurate internal cost accounting data. *The boundaries to information openness* can be drawn between dyadic and network-wide disclosure. When certain restrictions in transparency, whether natural or agreement-based, exist in a relationship between two companies, the disclosed data is never given to third parties. In proportion, information flow can be nothing short of unlimited in the network-wide disclosure, which of course is a situation in an ideal world. Therefore, the conditions to network-wide disclosure are realized always when the setting at hand is more extensive than dyadic.

Further, there are particular factors that have an effect on the implementation of open-book accounting in inter-organizational settings, as Kajüter and Kulmala [15] have presented based on multiple case studies. Their framework consists of three factor categories, which are *exogenous environmental factors*, *endogenous firm-specific factors* and *network-specific factors*. According to Kajüter and Kulmala [15], the degree of competition and current economic trend are

included in *the exogenous environmental factors*. Naturally, intense competition in any given industry puts pressure towards cost reductions, and thus more extensive transparency is expected from suppliers across the value chain. Moreover, the economic trend can also be seen as an important factor. In times of recession, suppliers are probably reluctant to "open their books". Customers may also be inclined to benchmark suppliers against each other and perform supplier selection while recession takes its toll on the focal firm.

*The endogenous firm-specific factors* comprise firm size, the state of cost accounting systems, and long-term inter-organizational commitment. Kajüter and Kulmala [15] also list a firm's competitive policy, but depending on the perspective, it could also be seen as a part of the above-mentioned commitment. Angdal and Nilsson [32] refer to the same phenomenon as a company's purchasing strategy, which can be either transactional or relational by nature. If the volume of mutual business between organizations is high, a company probably wants to practice relational purchasing and is, for that reason, fully collaborating and perfectly committed to the network in a long term. Further, firm size influences open-books implementation a lot, as the resources to adopt new accounting methods, models and tools is superior in bigger companies. The state of cost accounting systems is related to the firm size as well. In large companies, cost accounting systems are typically more advanced, and highly accurate accounting data is generally available. For instance Suomala et al. [17] have done an interventionist research in two Finnish manufacturing networks where the development of the supplier's cost management practices and cost accounting systems, i.e. achieving an IOCM structure, were an initial step before implementing open-book accounting.

Last, according to Kajüter and Kulmala [15], *the network-specific factors* feature the network type, the selection of products and/or services produced, the supporting network infrastructure and inter-firm relations, which is basically a synonym for adequate mutual trust. Usually collaboration has a better opportunity for success if inter-organizational relationships are already well established, i.e. the network maturity is high. For example in the paper of Romano and Formentini [22], a case company called "A" had had an over 20-year-long fruitful relationship with one of its customers. Thus the disclosure of information in joint product development was seen positively, and the gained benefits were also shared between the two organizations. In addition, open-books are more advantageous in hierarchical networks than in short-term project-based cooperation. Further, products and services affect open-books practice, as possibilities for cost savings are easier to identify for functional products than for innovative service offerings. The OBA literature clearly supports this point of view, as case studies have been carried out mainly in manufacturing networks. Furthermore, the network infrastructure, composed of inter-organizational methods, models and tools, has a key role in supporting OBA implementation. However, the network infrastructure does not necessarily have to be extremely complex and sophisticated. Straightforward hand-on assistance offered by the customer in developing its suppliers' cost accounting systems that are often a major obstacle for open-books implementation belong to the infrastructure as well. Social relationships are the last but not

least factor in this category, as they are very important for inter-organizational activities. Mutual trust cannot be highlighted enough. Also the balance of power in the network, whether symmetrical or asymmetrical, has a considerable effect on the open-books practice as well.

### III. EMPIRICAL FINDINGS OF PREREQUISITES FOR AND POTENTIAL PITFALLS IN INCREASING TRANSPARENCY

In order to understand how companies perceive inter-organizational openness and information disclosure in practice, collaborating companies acting in the field of industrial maintenance were asked ten questions related to open-book accounting. These questions are presented in **table I** below. As can be perceived, the questions cover the presented OBA dimensions as well as the enabling factors of open-books implementation. In addition, the companies were asked about the present state of inter-organizational openness and the premises for increasing openness in the future.

**TABLE I.** COMPANIES' REPLIES TO QUESTIONS ABOUT OPEN-BOOKS.

N	Question	1	2	3	R
1	How ideal is the present state of inter-organizational information openness in the network?	3	4	2	9
2	How good are the premises for increasing information openness in the network?	1	6	4	11
3	Could the potential information disclosure be network-wide in the maintenance context?	7	X	4	11
4	Should information disclosure be bilateral so that both parties "open their books" to each other?	0	X	11	11
5	How extensively should actual cost data be shared for the sake of inter-firm openness?	1	10	0	11
6	How extensively should supporting data be shared for the sake of inter-firm openness?	0	10	1	11
7	How easily is sufficiently detailed maintenance data available in your cost accounting systems?	9	X	3	12
8	How strategically important do you find your relationships to the other players in the network?	3	5	1	9
9	Do you have any inter-firm methods, models or tools in use in maintenance?	6	X	2	8
10	How significant is mutual trust for inter-organizational openness in the maintenance context?	0	3	8	11

**Legend:** N = question number, 1 = Negative or No (in X-questions), 2 = Neutral, 3 = Positive or Yes (in X-questions), R = the number of respondents for each question.

Questions 1 and 2 in the table are, in a sense, preliminary questions, the purpose of which was to map the present state of inter-organizational information openness and to reveal whether there was room for improvement. As can be seen, only

two out of nine individuals were entirely satisfied with the way information currently flowed from one organization to another. Even though the responses were scattered, it seems obvious that the level of communication was far from ideal. As an interesting fact, two respondents from an equipment provider chose a bit astonishingly the two opposite extremes in the question. This only shows how differently inter-organizational matters can be experienced even inside the same company. Promisingly, the underlying potential was clearly seen more positively amongst the respondents than the present state of inter-organizational openness. As many as four individuals saw the potential as very good and six as fairly good. These results are altogether encouraging from the researcher's perspective, as there seems to be both a need as well as some potential for improving. Therefore, the replies to these questions really encourage developing tangible solutions to unleash the information openness potential in networked environments.

#### A. How is the relational side of inter-organizational information disclosure experienced?

The questions from 3 to 6 are connected to the open-book accounting dimensions. Basically the respondents were requested in question 3 to set a boundary to inter-organizational information openness. As can be noticed, the majority of the respondents were of the opinion that information should not be disclosed network-wide, which indicates that they preferred dyadic transparency. However, it was slightly surprising that these replies did not have clear and unambiguous correspondence with the companies' predominant network roles. Based on this rather sparse empirical evidence, equipment providers seem to be the most skeptical ones towards network-wide disclosure. In addition, the OBA boundaries came up in the workshop discussions. The companies' outlook seemed to be that if collaboration were ever deepened, the focal company of the network, i.e. the maintenance customer should control the practice. Effectively, the two providers, the service provider and the equipment provider, would disclose information in a dyadic fashion to the maintenance customer, who would communicate with them separately. However, this kind of an arrangement could lead to opportunistic behavior from the customer side. Instead of pursuing mutual benefits and in-depth collaboration, the customer could make the providers compete with each other price-wise, especially if they had similar service offerings.

The respondents were asked about their opinions of the direction of information exchange in question 4. As can be seen, they were remarkably unanimous, as all of them thought that information should always be disclosed bilaterally in a relationship. As the literature-based preconception was that customers often demand unilateral disclosure from their smaller suppliers with a weaker negotiation status, this finding is extremely promising OBA-wise. However, it has to be acknowledged that there were no significant size differences between the organizations in question. Nevertheless, bilateral disclosure is certainly "fair play" for all the parties involved in information sharing processes, and thus the current attitudes are very adequate in this respect.

Last, questions 5 and 6 cover the third open-book accounting dimension, which is the degree and the quality of disclosure. However, it should be understood that the degree

side, in other words the type of disclosed information, is mostly considered in this context. Since quality is an abstract concept that substantially depends on the situation at hand, it would require some kind of a reference point. Hence, the purpose of these questions was to find out whether there are mindset-related differences about information transparency. Rather expectedly, the respondents were of the opinion that the degree of disclosure should always be determined case-specifically. However, the consensus amongst the respondents is interesting, as the type of information, whether disclosed data is actual cost data or other supporting information, did not have an effect on the responses. All things considered, the companies are evidently open-minded about inter-firm transparency as they did not automatically turn down disclosure of a specific type of information beforehand. In practice, information transparency is not only case-specific but also heavily dependent on the made agreements as well.

#### *B. What is the current state of the networks in relation to the factors of open-book accounting implementation?*

The remaining four questions in the table are related to the factors of open-books implementation. It should be noted, however, that exogenous factors are not included, as they are unforeseen and uncontrollable from the model implementation perspective. In addition, the firm size of the endogenous firm-specific factors, and the type of network of the network-specific factors, have been intentionally left out of the questions. The endogenous firm-specific factors are concerned in questions 7 and 8. The present state of companies' cost accounting systems is asked about in question 7, where the vast majority of the respondents reckoned that accurate and sufficiently detailed maintenance data was not readily available. Only three individuals were confident that their systems were elaborate enough to provide such data. As the accessibility of information and its details are altogether very important, the respondents were also given a chance to specify their replies. One of them mentioned that their factory-level maintenance data was currently quite accurate but on the other hand, item-level information did not even exist. Another respondent revealed that the level of detail might vary between specific and non-specific, depending on organizational unit. These findings are not surprising, because the state of cost accounting systems and the accuracy of data in particular have been many times recognized in cost management literature as one of the most troublesome factors in inter-organizational collaboration. It should also be highlighted that before a collaborative model can be implemented in a network, this factor should be considered.

In question 8 the respondents were inquired in maintenance-wise about the predominant purchasing strategy of their organization. As can be seen, only one respondent thought that a relational approach was distinctively favored. On the contrary and somewhat unexpectedly, as many as three individuals stated freely that their company operated from a purely transactional basis. As the ultimate goal is achieving an OBA practice in maintenance networks, these findings are more or less worrying because of the risk for opportunistic behavior. Therefore, the companies' mindsets should be

directed towards the relational approach in order to ever promote implementation of network models. Nevertheless, this is mainly a question about choosing the right partners and agreeing on the conditions of cooperation, at least from the customer's viewpoint. It may sometimes be entirely impossible to have any influence on the deeply rooted organizational culture and thus selecting the partners can be far easier.

Last, the effect of the firm size factor should be considered briefly, although it was not directly inquired from the respondents. As the companies in question, apart from one firm that provides maintenance services to a specific customer, are equally sized, this factor has very little weight in this context. Hence, size-related matters, such as the state of cost accounting systems should largely be on a par with each other. However, if collaborative models are implemented, the smaller service provider should be given extra attention, assuming that its customer would wish to acquire the relevant data. The respondent representing the above-mentioned service provider revealed that the planning and follow-up of maintenance operations was currently based purely on accumulated experimental knowledge.

The network-specific factors are covered in questions 9 and 10. The existence of network infrastructure was asked about in question 9, as the respondents were inquired whether their companies had inter-organizational methods, models or tools in use or not. Not very astonishingly, the majority of the respondents admitted that no explicit network infrastructure existed currently. Even though two individuals claimed that their organizations had such practices, these infrastructures were not very elaborate. While the first respondent said that they had cooperative planning meetings for annual stoppages, the other one stated that they had certain key performance indicators (KPIs) for the follow-up of maintenance operations together with their customers. It is easy to comprehend that the role of network infrastructure is very important in inter-organizational collaboration, as it supports information disclosure by creating a common ground that everybody is able to agree on. Thus infrastructure does not always have to be immensely complex but suitable for the case. The cooperative meeting above is an example of an inter-organizational method, and the KPIs an illustration of an actual tool. The significance of building a fully functioning network infrastructure should be emphasized more and more when collaboration is deepened.

Mutual trust, the importance of which for inter-firm openness was asked about in question 10, is a very significant factor in network environments. As can be perceived, a clear majority of the respondents found trust very important, and none of them saw mutual trust as totally meaningless. Disclosure-wise, these replies, and especially the attitudes they reflect, are naturally encouraging. On the other hand, some of the replies to the previous questions, such as the reluctance in network-wide disclosure, may indicate that there are trust issues among these organizations, even though they see the prerequisites for increasing openness rather positively. However, trust is a very hard factor to measure.



Finally, the type of network is the last network-specific factor to be discussed. It was not inquired directly of the participating organizations, but it can be stated that their cooperation had not yet been long-term. Moreover, one indicator of low maturity is the lack of network infrastructure, which is the case here as well. However, this can also be seen positively. When there is not established infrastructure, neither functional nor a bit flimsy, the companies have a great chance to build inter-organizational factors, e.g. infrastructure and trust, from scratch. Altogether, high maturity undeniably helps in the implementation process, but even more important is the fact that the organizations work together for a common goal.

#### IV. THE INTER-ORGANIZATIONAL IMPLEMENTATION FRAMEWORK SUPPORTED BY OPEN-BOOK ACCOUNTING

The created model implementation framework is comprised of two separate parts. The first part is a relational illustration of inter-organizational relationships completed with the three open-book accounting dimensions of Windolph and Möller [18]. Therefore, it presents all the different possibilities to arrange inter-organizational information disclosure in a maintenance network, and the general interplay taking place in the context. The second part of the framework is a chronological illustration of a generalized model implementation process, added with the enabling factors of open-books implementation recognized by Kajüter and Kulmala [15]. Furthermore, the open-books factors have been connected to the different phases of a generalized model implementation process. This process view is based on a framework called *enterprise system experience cycle* originally presented by Markus and Tanis [33] and slightly modified later by Nah et al. [34]. It consists of four cognate process stages; *the chartering phase, the project phase, the shakedown phase, and the onward and upward phase*. All things considered, it has to be noted that the following bipartite model implementation framework is presented in a universal form. Therefore, the empirical findings that have been made earlier based on the workshops are discussed in relation to both parts of the framework but not illustrated separately in the figures. In addition, the open-book accounting -supported implementation framework is referred to as the OBAIF from now on.

##### A. First part of the framework: the relational triangle

The first part of the OBAIF, the so-called *relational triangle* is illustrated in **figure 1**. As can be seen, the maintenance network triad formed by a maintenance customer, a maintenance service provider and an equipment provider forms the body of the figure. Moreover, the open-book accounting dimensions are seamlessly integrated to the above-mentioned setting. Firstly, the three arrow-headed lines, separating always two network actors from each other, picture the potential directions of information exchange. It can also be noticed that there are two dashed lines with an arrow head only at one end, and one continuous line with arrow heads at both ends. As the direction of information exchange in open-book accounting can be either unilateral or bilateral within a single dyadic relationship, there are the above-mentioned three possibilities. Unilateral, one-way disclosure is marked with the dashed lines in the figure, whereas the continuous line symbolizes bilateral, two-way disclosure, which should be seen

as “the target state” in sound inter-organizational collaboration. This is also the reason why a continuous, solid line represents the bilateral alternative rather than a dashed, fragile line in this context.

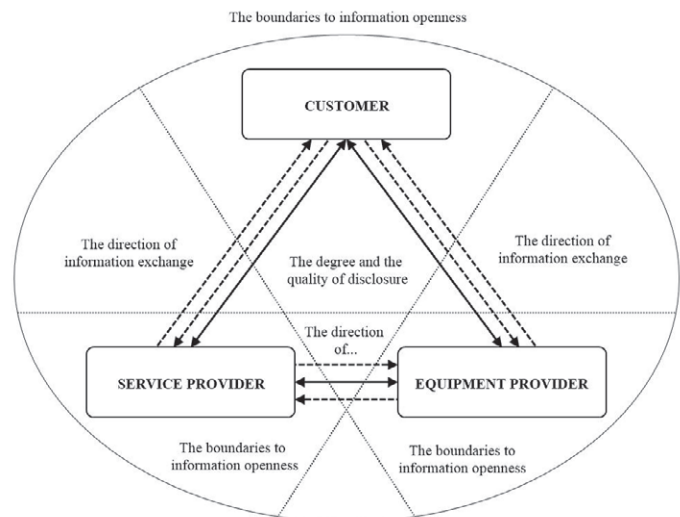


Fig. 1. Relational triangle: part 1/2 of the OBAIF.

The degree and the quality of disclosure are positioned in the middle of the OBAIF by design. Placement like this highlights the importance of this specific open-books dimension. If the disclosed information is either flawed in general or unsuitable for the situation at hand, it might obliterate inter-organizational transparency once and for all. Therefore, it is a very important dimension, as it can make the other dimensions more or less insignificant. Additionally, both degree and quality are extremely case-specific concepts and thus simply impossible to present visually in a framework, such as the OBAIF.

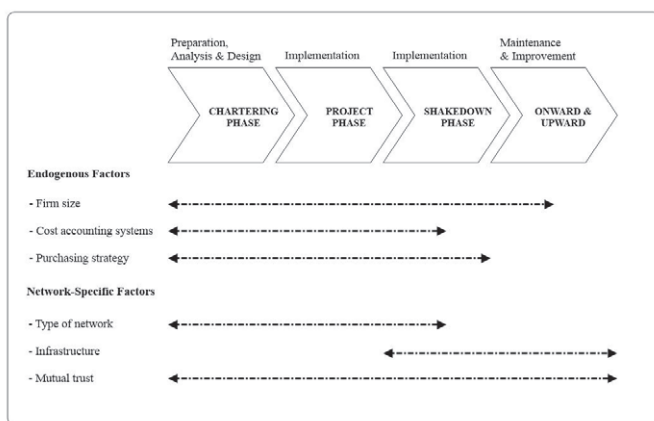
The third open-books dimension is the boundaries to information openness, which four potential boundaries are underlined with the four limiting lines in the figure. The first boundary is the round-shaped exterior border that separates the maintenance network from “the outside world”. Naturally, this boundary to openness, especially if confidential intra-organizational information is disclosed, exists basically in every network. Moreover, there are three thin dotted lines breaking the figure up to three recognizable segments in such a way that each segment is comprised of two network actors. These boundaries limit disclosure inside the network. For instance, both diagonal dotted lines separate a dyadic relationship, formed between a maintenance customer and one of the two providers, from the third player in the network. Hence, open-books are practiced only within this specific relationship. In proportion, the straight dotted line disassociates the relationship between the providers from the customer. As can be seen, the open-books dimensions create a noteworthy amount of options for collaboration. The first part of the OBAIF can, and should, be case-specifically adapted by removing the overlapping alternatives.

The “theoretical consequences” of the empirical findings should also be addressed briefly at this point. According to the

workshop participants, the boundaries to information openness should be withdrawn as follows. Because there would not be a dialogical connection or direct transparency between the service provider and the equipment provider, all three arrow-headed dashed lines between the two should be completely removed from the figure. Consequently, the horizontally placed thin dotted line, otherwise a boundary to openness would also disappear, as there is full transparency towards the customer. Naturally, the exterior border would still exist. Despite of setting the above-mentioned boundaries, the respondents were unanimously of the opinion that bilateral disclosure should be favored. This would mean that the dashed lines with a single arrow head would be useless. This would not affect the situation between the two providers, however, as the customer would control the OBA in a concentrated fashion.

**B. Second part of the framework: the process timeline**

The second part of the OBAIF, also known as *the process timeline* is illustrated in **figure 2**. As mentioned above, the foundation of the figure is the enterprise system experience cycle. The enabling factors of open-books implementation, including the endogenous firm-specific factors, and the network-specific factors in particular, complete the OBAIF. The exogenous factors are also recognized in the OBAIF, but a real stand cannot be taken on how much and in which ways they might actually influence the implementation process for the reasons mentioned above. Therefore, they are separated from the other factors with the exterior border. In addition, it should be noted that the dashed lines in the figure, representing the duration of each factor in an implementation process, are highly preliminary as they are not based on actual empirical findings at this stage.



**Fig. 2.** Process timeline: part 2/2 of the OBAIF.

Before analyzing the figure more profoundly, the phases of the enterprise system experience cycle and their content should be addressed. Firstly, the chartering phase features initial and necessary actions, such as preparation, analysis and design, prior to actual model implementation. Therefore, general project planning, budgeting and scheduling take place in this phase, and the outcome can either be a decision to proceed with or alternatively abort the project for good. Moreover, “hands-on” implementation starts in the project phase, where the key

activities are software configuration, system integration testing, data conversion, rollout, and training. In the project phase, it is crucial that everybody works closely and well together with others. The implemented model will be utilized for a first time in the shakedown phase, but routine use is not yet achieved. For example, bug fixing and system performance tuning are important tasks in this phase. Additionally, all accumulated system knowledge should be passed on from the project team to operational personnel at this point. Finally, the model has been successfully implemented and normal operation achieved in the onward and upward. This phase extends from the start of routine use all the way to eventual replacement in the future. Thus, it is characterized by on-going maintenance and system enhancement. Personnel skill building takes also place.

First, the endogenous firm-specific factors are discussed. As can be perceived, firm size is marked to have an impact on the implementation process of a model from the beginning of the chartering phase to the middle of the onward and upward phase. When an inter-organizational model is implemented in practice, there are usually a lot of very differently sized companies involved in the process. In the beginning of the process, notable size differences will most likely affect especially inter-organizational collaboration. There can be significant amounts of unwanted bureaucracy, general uncertainty about respective responsibilities, day-to-day breaks in communication, and so forth. Even though a huge size difference does not automatically create problems, the odds are higher because of the rather dissimilar organizational structure and policies. Nevertheless, all size-related challenges should be overcome in the onward and upward stage at the latest, where implemented model is utilized on a daily basis. Networks cannot bear these difficulties for long, as there will be far more important issues to tackle in the onward and upward phase.

Cost accounting systems is the second endogenous factor influencing OBA implementation, and an important one, as these systems are in charge of registering, storing and transferring cost accounting data, as well as creating divergent management reports. From the information disclosure perspective, the problem is often that the requisite data in companies’ present systems is inaccurate and unavailable, as it can be scattered in parallel systems and storages. This issue was also seen in the companies’ replies, as the majority of the respondents stated that sufficiently accurate maintenance data was not available. Therefore, improving the state of these systems is of high importance in the beginning of a model implementation process. In the OBAIF, the system upgrade stage has been marked to end in the middle of the shakedown phase, where the implemented model will be run at full scale for the first time. All in all, the focal company of the network, i.e. the customer, should assist the smaller companies, i.e. its suppliers, in improving their cost accounting systems when necessary in order to receive suitable information for inter-organizational decision-making in years to come.

The remaining endogenous firm-specific factor is the company’s purchasing strategy, as the purchasing strategy basically stands for the intra-organizational strategies and perceptions about inter-organizational relationships, e.g. how a firm deals with its relations and responds to them case by case. When the company’s purchasing strategy is strongly based on the transactional alternative, they do not see extra benefits or



additional value in investing in network relations. This kind of an attitude or intentionally chosen strategy is extremely difficult collaboration-wise. For a model implementation process to be successful, the transactional approach should definitely be backtracked more and more towards relational purchasing. Moreover, companies' purchasing strategies will have an effect on the process from the beginning to the end of the shakedown phase. The idea is that purely transactional views should be overcome before the implemented model is operated normally and inter-organizationally. However, there should not be any problems in this regard if each participant cooperates from a relational basis, as that approach already promotes potential success. Hands-on experience that accumulates throughout the implementation process should be an eye-opener for remaining critics about the mutual benefits. According to the empirical findings, the companies in question are currently not yet really poised to implement an inter-organizational model.

Before discussing the network-specific factors in detail, it should be noted that one of the factors, the selection of products and services is not included in the framework. Even though this factor is undoubtedly an essential one from the perspective of open-book accounting, it really does not play any role in a model implementation process. However, the type of network, its maturity in particular, has a great influence on the process as well-established networks usually function better than new-found ones. Thus in the OBAIF, the type of network has an influence especially in the beginning of the process, where initially higher network maturity certainly helps. Once organizational learning takes place along the process in lower maturity networks, the difference tapers significantly, granted that maturity does not have boundaries in practice. In other words, the steepness of "the learning curve" is higher in the beginning, where the most sensitive steps, such as preparative measures and system design, are located.

The need for network infrastructure that is comprised of inter-organizational methods, models and tools does not become concrete until the shakedown phase. As the day-to-day operating of the implemented model starts at this point, mutually agreed network practices and other common protocols are certainly required. In addition, it has to be mentioned that the network infrastructure can, and should, be seen very broadly. The model in question is also in a way part of the infrastructure as it systematizes inter-organizational interactions. To consider the empirical findings briefly once more, it seems that networks today have clearly not properly invested in the network infrastructure. The importance of this factor should not be overlooked. Together with the state of companies' cost accounting systems, the network infrastructure is something tangible and thus easier to develop intentionally.

Finally, mutual trust has been perceived in OBAIF to have an influence on model implementation throughout the process. On one hand, there has to be a certain amount of prerequisite trust in the beginning, and on the other hand, the implementation process itself is an excellent trust-builder. Therefore, trust is always there but its nature will change from the prerequisite one in the chartering and the project phases to relationship-reinforcing trust in the shakedown phase, and especially in the onward and upward phase. Mutual trust was also seen important by the companies participating to the

workshop events, although it should be improved in order to deepen inter-organizational collaboration in the future.

## V. CONCLUSIONS

Despite of the recent proliferation of organizational interdependencies, i.e. networking, companies are struggling to capitalize on, or sometimes even understand, the opportunities that collaboration with other organizations can offer. The implementation of inter-organizational models, and in order to employ them, the disclosure of information are potential instruments that promote such cooperation. Even though companies are often reluctant to disclose sensitive information outside, lots of positive signals were received in this study from the participating companies acting in the field of industrial maintenance. It was revealed that extensive network-wide disclosure seemed to be a distant dream, but a customer-led and dyadic transparency would still be an excellent initial step towards more complex arrangements in the future. At least, the companies, or their representatives to be exact, were able to agree that the exchange process should be bilateral.

The present state of firms' cost accounting systems was found relatively poor, and thus certain coordinated actions should be taken in order to generate accurate and adequately detailed maintenance data for an inter-organizational model. As the state of cost accounting systems is very essential from the perspective of successful model implementation, the data requirements and common standards should be mutually agreed on early in the process. Moreover, the establishment of a sound network infrastructure, e.g. collaborative methods, models and tools, is highly important for managing and controlling inter-organizational content. As was noted above, companies are lacking in this respect as well. To begin with, the implemented model can be sufficient, but supporting methods, such as network meetings or joint budgeting may become relevant in the long term, along with increasing network maturity.

Of course, even the most exclusive and comprehensive network infrastructure combined with state-of-the-art cost accounting systems is worthless if willingness to cooperate is missing. Any given organization that is still internally entangled to transactional purchasing strategy endangers the collaboration from the start. Based on the findings, the current way of thinking among these organizations evidently induces a serious risk for collaboration. However, pursuing relational purchasing is not by any means all about disclosing information companies are uncomfortable with. It is only important to work together for a common goal and keep the promises made. All things considered, mutual trust is the deciding factor in the end, which means that all existing trust issues should really be solved before commencing deeper relationships and agreements with other companies. As hard as relational matters, e.g. mutual trust, are to measure, they actually pose the biggest imaginable threat for a successful open-book accounting set-up in practice.

Finally, and regarding the bipartite framework OBAIF, especially the latter part of it, i.e. the process timeline, needs empirical testing in the future. Currently the illustrations of duration and location of each model implementation-affecting open-books factor are only the researcher's own advance

impressions. However, the responses of the workshop participants left room for further speculation, as a real-life situation might significantly alter the opinions on the direction of information exchange, experienced surprisingly unanimously as bilateral by the organizations, for instance. Therefore, the next logical step would obviously be to conduct an extensive empirical study where an inter-organizational model is actually implemented. In addition, this kind of research setting might very well raise other important perspectives in regard to decision-making model implementation outside the OBA dimensions and factors.

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