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Ecosystem of outcome-based contracts: A complex of economic outcomes, availability and performance

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Abstract

The number of studies concerning outcome-based contracts (OBCs) has gradually increased over the past decade, with a focus on servitizing companies. The mutually beneficial baseline logic behind such contracting provides a fascinating area for research because, for instance, it facilitates overcoming the service paradox through network-driven value co-creation. In addition to contractual techniques, the digitization of services in product-service systems (PSS) has gained attention as the enabler of the given business models. We set out to research OBCs that are based on economic value (eOBCs) in the energy technology sector. We mapped the ecosystem surrounding IPP-provider contract relationships and found that the outcomes sold ultimately consist of value propositions made to serve economic outcomes that subsume availability guarantees, which subsequently subsume performance. The depiction of the value system serves as a basis on which to develop future findings concerning practices comprising the outcomes.

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Keywords: Digital servitization; Performance-based contracts; Outcome-based contracts; Product-service systems (PSS)

1. Introduction

During the past decade, research concerning performance- or outcome-based contracts (PBCs or OBCs) has rapidly increased in number [1, 2, 3]. Despite the academic abundance, the terminology used to describe the phenomenon lacks cohesion [4, 5]. Some authors refer to the overarching phenomenon as OBCs [6, 7], while others use the term PBCs [8, 9, 10].

Despite the variation in the terminology used, scholars agree that the conjunctive factor of outcome-based contracting is the payment, which, in this context, refers to the revenue generation logic. By definition, OBCs represent a means for contracting wherein a customer is obliged to pay only when the provider has delivered the outcome agreed upon [11].

Recently, the OBC concept has been challenged in a way that questions the existence of OBCs that are established to provide economic results (eOBCs [12]). Grubic and Jennions [4] argue that most OBCs are bound to outcome attributes that relate to availability (aOBCs). The authors conclude that the only case plausibly matching their definition of eOBC is the renowned 'Power by the Hour®' contracts of Rolls-Royce. However, the authors argue that, from the remote monitoring technology (RMT) perspective, eOBCs are not feasible, even in the case of 'Power by the Hour®'.

We set out to investigate the validity of the claim of the inexistence of eOBCs. In the energy technology sector, the societal and environmental issues and economic potential of flexible power generation have caused alternative power generation methods to emerge concurrently with new agents in the value chain [13]. These so-called independent power producers (IPPs) usually invest in renewable energy production, such as wind or solar power [14]. In cooperation with public utilities and industrial solution providers, IPPs theoretically form a triadic hub for cleaner energy production networks.

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To investigate the assumption of the existence of eOBCs in the given network context, we interviewed managers from the industry, building upon the framework presented by Kohtamäki et al. [15] depicting the interplay of macro/micro environments of practices in the value system of a servitized ecosystem. As the concept of IPP is fundamentally connected to economic value, it thus provides a relevant setting for mapping the ecosystem of eOBCs in practice.

Furthermore, the value chain of the interconnected network regarding the mentioned triad most likely necessitates the presence of multiple OBC-related, service-intensive phenomena, such as advanced services [16, 17], result-oriented product-service systems [18], performance-based logistics [19] and PBCs [8]. In total, the value chain thus creates interorganizational value through reliable performance, availability, and, ultimately, economic results. The given aspects are addressed through our research question: Why and how should the servitizing providers in the energy technology sector utilize eOBCs?

To ensure the focal scrutinization and the depth of analysis, we chose to conduct a single case study in an international manufacturing company (Company Alpha) operating in the energy technology industry. Additionally, the case company has had an accomplished history in intensive service operations, such as operation and maintenance agreements (O&Ms). We researched a dataset constituting 30 managerial interviews related to the company's service business. The interviewees held various positions, ranging from project managers to vice presidents and general managers. The dataset used contained 1754 minutes of recorded interviews, which were transcribed into almost 450 pages of text (Times New Roman 12, single space, 2.54 margins all around). Accordingly, the case evidence provided valid and consistent evidence for our conclusions. The lens through which we set out to investigate the data was established through a literature review focusing on outcome-based business models (OBMs) and contracts and the risks and value drivers associated with them. Additionally, the concept of IPPs was reviewed.

2. Literature review

The literature concerning OBCs strongly relies on case studies describing the nature of the contracts among their constituents [16, 17, 20]. According to Ng, Ding and Yip [2], the connecting factor of the given contracts is the mutual mission towards achieving an outcome. The vessel through which the given outcome value is created and delivered is embodied by the OBM. Thus, the literature review assessed the challenges of OBMs (i.e., risks), the incentives of OBMs (value drivers) and the concept of IPPs, and how they fit into the concept of an OBM triad in the energy technology industry.

2.1. Risks

Essentially, OBMs are executed through a risk transfer. The asymmetry of the risks between constituents allows the provider side to enjoy marginal gains [21], but on the other hand, it also simultaneously exposes the providers to the risk of not achieving the outcome or performance agreed upon. Conclusively, the payment methods must address performance with regard to both penalties and rewards [17, 2].

Furthermore, the risks associated with OBCs are linked to both context-related and stakeholder-related issues, with some issues more closely connected to economic risks, while others are more closely connected to operational risks [5]. The context-related risk factors are, in an overarching manner, categorized as complexity and dynamism, while the stakeholder-related risk factors constitute capability, alignment and dependency themes [5]. The interplay of the context and stakeholder-related risks necessitates the investigation of social exchange in the OBM context, as Kleeman and Essig proposed [8]. Additionally, the identified risk factors call for further cross-referential research.

2.2. Value drivers

The reconfiguration of the risk structure in OBMs will allow new value drivers to emerge. Value drivers are defined as variables with a positive impact on the overall value creation connected to a business model [22]. First, as the focus shifts from individual actions to the outcome attributes, the customer companies engaged in the network may enjoy the benefit of using multiple services concurrently through the provider's vertical and/or horizontal integration of activities in the value system, causing a relative complementarity of services [23]. In effect, the mentioned shift would apply to power generation through the providers' increased operational responsibilities, such as in O&Ms.

Second, customer lock-in is regarded as a value driver for OBMs in the sense that long-term contracts result in warranted and predictable value for investment and recurring revenues [23] for both providers and investors. Additionally, the long-termism allows providers to pursue cost optimization activities, driving marginal gains [21]. Therefore, the lock-in, as a value driver, is directly linked to efficiency as the third value driver associated with OBMs. Expanded access to the product-service systems [18] and the broader mandate of the outcome provider reduces conflicts and delays caused by disunity [23].

Accompanying the expanded mandate is the asymmetry of accountability, which is the fourth value driver of OBMs. The outcome provider therefore accepts that new operational risks and liabilities, which previously belonged to the customer, are assigned to their account. However, the shift on the risk scale acts as a vessel, making it in the provider's best interest to assess and act upon metrics that alert them about errors [23, 21].

While transitioning to an OBM, service companies also engage in open business models in the sense that their reliance on partner/supplier ability to create new activities out of their own scope of competences increases [7]. Hence, novelty, as a value driver, concerns the possible Schumpeterian rents to be achieved through the creation of entirely new means of value creation, which may decimate the preceding means [24]. Visnjic et al. recognized three reasons why novelty may act as a value driver related to the long-termism of OBCs: it facilitates procedural and mutual strategic learning and

enables the use of case-relevant lifecycle data. Additionally, the reallocated accountability allows trial and error to be more flexible in comparison to traditional product business models [23].

2.3. Independent Power Producers

Due to the reliable power grid's crucially positive effects on economic development [25, 26], many economies, especially developing economies, have turned to the private sector to ensure financial and operational support for their public utilities. The reason for the reform, for instance, in sub-Saharan African countries or India [27, 28], is that many of these economies are excessively in debt, and thus, their abilities to source capital funds may be restricted. The private investment here refers to IPPs. The IPPs represent a model that originally emerged in the 1970s in the industrialized world [14] and currently grows, for instance, in the United States. The IPP model is advanced by policies allowing the functional unbundling of transmission operations that enable drastic increases in renewable energy capacity through IPPs' access to transmission grids that were previously governed by vertically integrated utilities [29], which emphasizes the importance of policies and their effect on IPP incentives.

Green et al. [21] argued that a servitization model of offering outcomes through integrated solutions is applicable in closed systems with low variety and objective measures. However, to pursue OBCs in higher variety, open systems, the development of capabilities related to customer autonomy management has been regarded as imperative [11]. As power generation assuredly is a high variety, open system, although with relatively objective measures, it forms an interesting setting in which to investigate the value system nuances and their meaning for the interplay of micro/ macro environments.

3. Empirical results and discussion

3.1. Company Alpha and IPPs

Company Alpha's interviewees held positions ranging from lower level managerial positions to vice presidents and general managers who were connected to the service offerings of their company. The interview questions concerned business models, value propositions and customer expectations regarding the scope of service offerings. When asked about the value propositions for different customer segments, the concept of IPPs was clearly demonstrated by the interviewees, as is presented in Table 1, in addition to the mutual value drivers and the logic behind operating such a business model.

3.2. The balance of risks and value drivers

The interview data presented in Table 2 rather elaborately demonstrate the context-related risks of complexity and dynamicity, which is in alignment with the results presented by Hou and Neely [5]. However, stakeholder-related risks, on the other hand, can be considered effectively mitigated in the case of the IPP-provider relationship. Accordingly, stakeholder-related risks include capability issues, such as providers' lack of capabilities to contract or deliver, the internal incoherence and/or resistance of the provider, and customers' inability to fulfill their part of the contract [5]. In the Alpha-IPP relationship, these dimensions of stakeholder-related risks can be considered relatively well mitigated based on the case evidence.

Table 1. Company Alpha & IPPs

	Representative Quotations
IPPs	"Some customers do not want to do anything else other than cover the financial side and leave the operation of the plant to us."
	"The group that is the most interested in our O&M services are these kinds of new players in the energy markets who we call IPPs, independent power producer customers. So, they can be investment firms that may not have the knowhow of the details of energy markets but regard it as a good investment that could pay itself back in, well, a couple of years."
	"In the energy segment there is the fact that you don't always need to acquire it, there are these so-called IPPs, which stands for independent power producers. That means that someone invests in that facility and establishes a power purchase agreement with utilities. In addition, they sell electricity for them for fifteen years, but they outsource the operations to Alpha."
	"And, of course, we have a lot of these arrangements where we have the operation and maintenance agreement with the customer, meaning that we run that system. So, there, it is in our own interest to perform these assignments and actions so that the performance remains on the desired level."

Table 2. Context-related risks from Alpha's perspective

	Representative Quotations
Complexity	"Because the problem with these is always how do we measure and how to agree about the measures and how undisputed are the indicators, things like this. So, it's not easy."
	"And you need to remember that, when you are talking about power plant business, the deals are not closed in days or weeks. Instead, we are talking about, well, from the first contact, if it goes quickly, it's a year. Sometimes it can take three, four or five years. You need to find the money-men; you must consider different permissions, environmental permissions especially. You need to think about power purchasing agreements; does the end-customer even have the authorization to dispatch the electricity and at what cost."
Dynamicity	"And then, there are these IPPs, independent power producers, that are investors looking for investees here. So, our value proposition is an outcome of a massive calculative function. If you think about that, the prices in the market change every five minutes; we have then taken all the prices for the last five years. That's 104,000 prices per year. And then, there are the service prices, like frequency control or these kinds of grid support services, so their prices. So that's well over half a million input cells counting in excel. And that is then optimized every five minutes, that's what should be done with facility. So, it's historical data-based calculations."
	"So, based on the forecasts that you can input for gas prices and such, you can estimate how much profit he will generate. Then, with these, these calculations are the essential building blocks for creating our value proposition, through which we can say, hey look, by doing this and this, you would earn this much."

However, other stakeholder-related risk schemes also seem to apply in the case of Alpha-IPP relationships. For instance, stakeholder alignment remains uneven in a sense, although it is driven by the same performance incentives, reducing discrepancies in terms of goals and visions (i.e., value drivers). Therefore, the IPPs and their lenders retain greater financial power, supporting their bargaining power, as demonstrated by an Alpha interviewee quote in Table 3. Furthermore, while the providers may have the capabilities to operate such a model themselves, the operational logic of not doing so is rooted in their resources, for instance, an efficient capital structure.

Table 3. Bargaining power of the financers due to the provider's reliance on the financial integrator

Representative Quotations
"When it comes to third-world countries, the developing countries, there the requirements for financers have increased significantly. So, it does not depend on the country that much, but rather on the financer facet."
"But, we, we do not want to own it (the power plant) because there will be… The owners don't want this on the balance sheet. Because it is an awful burden if Alpha placed a hundred power plants on their balance sheet."

On the other hand, regarding practices and understandings, the discrepancy favors the providers. In that respect, the bargaining power [5] of the provider increases. In the given context, practices and understandings refer to the investor's lack of knowhow, resulting in a reliance on the providers. Nevertheless, the risk dimension of dependency [5], in the form of reliance, is not only a risk but also an asset. Due to the recognition of Alpha as a provider, the IPP's undertaking may enjoy increased credibility in the eyes of their lenders, as the interview quotes in Table 4 demonstrate.

Table 4. Customer's reliance on provider's capabilities

Representative Quotations
"Then, you should have a low-risk type of investment because you have a power plant price guaranteed by Alpha, and you will be guaranteed an operation contract, and that's why this kind of business were started in the 90s, to guarantee the operation cost to these investors. And you had also a financer normally involved, a bank which is financing this thing, and then you have owners which bought the shares in this special purpose company."
"And this very same calculation should be in the hands of the lender at that point when they ponder whether they should grant a loan to that fellow; is he going to generate earnings with his facility. So yeah, these are the kinds of models that turn engineering techniques into economics."

3.3. The logical relation of eOBCs and aOBCs

The misalignment regarding the definition of eOBCs also transpires in our research. Grubic and Jennions [4] use the functionality of a product as the purchased attribute, whereas Böhm et al. define eOBCs as agreements constituting direct economic outcomes [12]. In the case of the IPP-provider relationship, both terms seem to apply. First, providers such as Alpha bill the customer by kWh; they thus sell the functionality of the power plant. However, although the contract is closely associated with the functional value of electricity, the outcome bought by the dispatching agent, in other words, the IPP, is the guaranteed value of their investment, as demonstrated in both Tables 1 and 2. Thus, the return on investment is to be ensured through servitization, i.e., the optimization of production based on dynamic market prices. Furthermore, in addition to the added servitization fees that allow the provider to capture additional value, the provider is also exposed to availability-related sanctions, which demonstrates the increased accountability. This issue is summarized below in Table 5. Thus, the deduction of an eOBC subsuming aOBCs, as presented by Grubic and Jennions [4], is verified in our case. Moreover, we argue that performance is, subsequently, subordinate to availability. The logic behind this reasoning was elaborately explicated by Alpha interviewees when asked about what kind of value their customer buys.

Table 5. Economic value, availability and performance

Representative Quotations
"In a sense it is kind of "as-a-service". So that there, from the power plant there will be this much coming out and if not, then it is on us."
"Well, of course there is certain a fixed monthly price, but in principal it depends on how much is produced. And there we have then bonuses and sanctions in place, so like availability and production penalties and else."
"In principle, you can summarize it to one word or two words, your choice. Availability. And then, the other one is performance. But the availability is the most important, without it, it does not work. It has no significance, what the performance without it is, or would be. So, you could say that's the most important."

3.4. Discussion

While the O&M agreements associated with the IPP contracts are extremely appealing to the providers due to their extensive scope (e.g., the customer is willing to outsource all the related operations), the asymmetry of the bargaining power fundamentally remains tilted in the direction of the IPPs. This result is despite the synergic effects of the provider's recognition of the uses of sourcing. The reason for the given skewness gained support from both the literature and the interview data. The value driver of novelty in OBMs enables mutual strategic learning and the ability to develop competences outside the scope of one's own activities during the long-term contract periods for stakeholders [7, 23]. Furthermore, and more pressingly, the lifecycle data that is gathered for utilization purposes thus becomes an issue with regard to rights and ownership. This is due to the learning activity of the customer, as elicited in Table 6.

Table 6. The role of learning and data

Representative Quotation
Then, there is also this group who want to learn, and it means that the investor knows that they will be able to cut costs when they, at some point, start operating themselves. They basically want to gain access to the core. And there, we have a lot of examples, where the owner locates their own group on the site, and of course, it's their property. You cannot restrict them there, they can monitor. They can watch and follow what we are doing, so they have this kind of five-year university, after which our prospects of continuing the operation agreement are fairly limited. But these are recognized issues in a sense, when the owner says they want their own office on the site, then we know it's this kind of shorter operation project. This is one group."

One apparent means for responding to the mentioned learning-enabled internalization is that the providers can develop capabilities to invest in the IPP to become capital shareholders. This finding conclusively verifies the existence of eOBCs in practice in accordance with the definition and example, where the outcome provider *de facto* condones incremental revenues based on the economic outcome [12]. The option is expounded upon by an Alpha interviewee in the table 7.

Table 7. A gateway to shared incremental revenues

Representative Quotation
"We have a rule that we can own X percent of an IPP. But no more than that."

4. Conclusions

4.1. Theoretical contribution

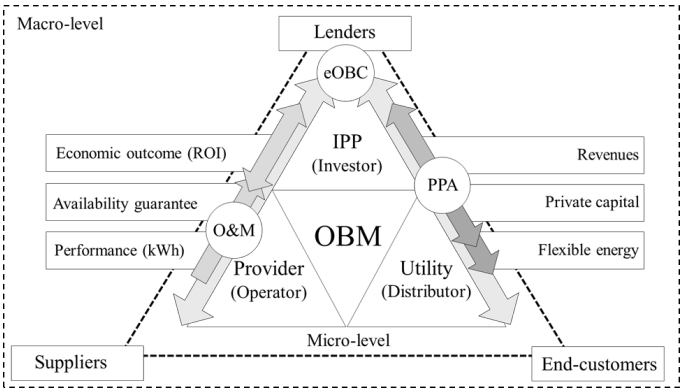
Although seamless regarding the chosen RMT perspective, Grubic and Jennions [4] refer to Selviadris and Wynstra [3] to define outcomes as 'the value derived by the customer from a given service or product.' However, Grubic and Jennions use the definition of eOBC in a manner in which 'the customer purchases the functional result of the product.' Therefore, they diverge from the original eOBC definition provided by Böhm et al. [12] who define eOBCs as follows: 'In contrast, when customers pay for economic results, the performance indicator is a monetary outcome variable, such as incremental revenues or profits.' Thus, the term 'functional result' could, in this context, refer to any singular actions performed that lead to an outcome such as performed maintenance activities.

In the context of the IPP-supplier relationship, the IPP ideally does not have to be concerned with such functional activities for two reasons. First, the IPP's economic outcome (i.e., return on investment) is accounted for by the provider penalties compensating for the losses in case of production or availability failures. Second, the O&M agreement is based on output (i.e., kWh), while the fixed operational fees in a certain sense amount to a guarantee of a service-level agreement. Finally, the power purchasing agreement with the utilities ensures the continuous revenues, accounting for the return on investment.

Conclusively, and in practice, the provider of the power plant or generation unit agrees to ensure the IPP the return for their investment at the risk of availability-related penalties. Furthermore, as suppliers have the option of owning a share of the IPP, thus making them a capital shareholder, which is justified by the incremental revenues, the given arrangement assuredly meets the definition of eOBC, as presented by Böhm et al. [12] while subsuming aOBCs that, together with performance values, ensure the fulfillment of the economic outcomes.

Therefore, the value system at hand forms a triadic hub that shares interconnections with the provider, financial integrator and distributor, as presented in Figure 1. The given setting combines the intraorganizational microenvironments, thus making the figure an exciting area for the further examination of practices and other societal meanings. Furthermore, along with the shared goal of outcome achievement and an expanded microenvironment, the role of digital servitization, from the RMT perspective, for instance, becomes even more important and, thus, should be further studied.

Figure 1. The ecosystem of an economic outcome-based contract



4.2. Managerial implications

The reason why the providers cannot sell the electricity themselves, although they retain the capabilities to do so, is simply that it would substantially burden their balance sheets. However, the given business model allows the providers to enjoy long-term O&M contracts, which furthermore enables cost optimization and thus marginal gains [30]. Additionally, and importantly, the providers have the option to invest in the IPPs, at least to some extent. The mentioned option allows for even greater alignment between the interests of the IPP and the supplier. Furthermore, IPPs can benefit from having the support of the provider while negotiating the PPAs and loans with utilities and financial institutions. Thus, formulating value propositions, with a focus beyond value chain micro-level borders, is highly recommended for servitizing solution providers.

In this paper, we found that eOBCs related to IPPs enable customers to create new competences that may eliminate the need for an outsourced operator. Consequently, it is vastly important for providers to develop strategies that enable the defense of the continuity of their advanced services. One plausible solution to the paradox seems to be similarly developing financial capabilities that allow for partnership agreements in the IPP context through capital investment. Some perspectives, on the other hand, emphasize developing customer autonomy-management capabilities [2], but ultimately, this will only mean fighting the inevitable. Therefore, rather than striving to maintain the extensive scope of delivery, we recognize the need to focus on the particular pockets of value creation that will create the dimensions for profit sharing.

We mean that, although the providing company moves beyond products and singular actions in the value chain, the resources and core competences eventually facilitate the development of a competitive advantage for it. For example, although customers may be able to learn the best practices, resulting in optimal economic outcomes, their total cost of ownership is still dependent on the providers' high-quality

spare parts and, more importantly, availability. This kind of knowledge about the installed base and inventories is something very inimitable and thus is a potential value driver for competitive advantage. Importantly, simultaneously using various business model configurations has been proven to hold potential for complementarity, rather than conflicting effects [31]. Therefore, instead of merely applying service-dominant logic towards their servitizing operations [21], the managers in the servitized manufacturing companies engaged in outcome-based contracting, should explore the possibilities emerging from product-dominant logic as well.

4.3. Limitations

Although throughout this paper we criticized the prior assumptions made concerning the existence of eOBCs, we scrutinized the phenomena using entirely different theoretic lenses. The criticism of this article, however, concerned the definitive terminology and its interpretation. Thus, the RMT perspective could be applied in the case of IPPs, to falsify or expand the generalizability of the paper and to investigate its role as a part of digital servitization in the given context. Second, this study focused on the perspective of the providers. Expanding the scope of focality to also cover the perceptions of IPPs and utilities/grids might elicit a prolific area for the further investigation of this extreme case of servitizing ecosystems.

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