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Major Engineering Project Performance

Transaction costs

When we are thinking about managing major projects either as part of a programme or a portfolio, a major issue to consider is transaction costs. Transaction costs describe something other than the price incurred in trading goods or services. Before a mutually beneficial trade of service or good can take place, a lot of work needs to be done. For instance, one part in the relationship needs to identify a potential person or company with which they would like to trade, then explain the opportunity to this person or company, and negotiate the terms of the exchange. These activities are likely to be costly in terms of time, energy, and money if the terms of trade are more complicated than just paying an agreed listed price. Negotiation for such a detailed contract as a major project may be prolonged and very costly in terms of time, travel expenses, lawyers' fees, and so on. After a trade has been agreed upon, there may be also a significant cost involved in monitoring or policing the other party to make sure they are honouring the terms of the agreement. And if they are not, there may be a cost to take appropriate legal or other action to make them do so. There are main sorts of transaction costs then: search and information costs, bargaining and decision costs, policing and enforcement costs.

To help us think about these more clearly, let's consider an everyday example. Imagine you need to buy an item which costs $10 from a local supermarket. You might decide to get in your car, travel to the supermarket, and then return home. That new purchase only costs $10, but if we add on the cost of driving the car in terms of fuel and usage to and from the supermarket, it is easy to see how the actual cost is more than $10. In this case, the expenditure on fuel and usage of the car is the transaction cost. It is the additional cost attached to carrying out an activity. In this case, let's say that [for] a journey of around 20 kilometres in total, the cost of fuel is two dollars. The tricky thing about transaction costs is that they depend a lot on the context. For instance, let's assume now that the person going to the supermarket is a busy plumber, and going to the supermarket took one hour of his schedule. You make a profit of $20 per hour. So we might add on $20 to the transaction cost because he's lost profit in using the time to go to the supermarket. Let's consider now that the person going to the supermarket is someone working eight hours a day with a fixed salary and is going to the supermarket after work. He is probably giving up quality time to spend with his family. How can we

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quantify this? So, as you see, transaction costs are important to consider, but are, in several cases, very hard to quantify. We must use our discretion when quantifying this cost.

So, what does this mean in terms of managing a project? Let's imagine that company X is building a new power plant. It needs to buy a certain component for the new plant. Let's say, a new type of pump. The pump itself has a price attached to it as listed in the invoice. But beside the cost of the pump, there are other costs to consider. For instance, the cost of the engineers to spend time to define the specification of the components they need and the time spent looking at bids from different contractors, the cost for a lawyer to draw up a plan and the documentation that are associated with shipping and installing a new component. Another cost could be the cost of administration staff working on drawing up the paperwork that are associated with the planned projects. As you can see, the hours worked by these people all contribute to the transaction costs.

So the question you might be asking is, can we reduce transaction costs? Well, the answer is yes. For instance, if the transactions involved in the project run smoothly and go well, it might be that both parties are satisfied enough to consider working together again in the future. If a good working relationship is already established between two parties, then this eliminates the need to go through a competitive bidding process again. In this case, the bidding process cost is avoided. In addition, it might be possible to re-use the same contact which also reduces the legal costs associated with the future projects. And it might be that some of the paperwork could be re-used on future project, further reducing the possible transaction cost. Reducing the transaction cost is crucial when we think about programmes and portfolios. Let's consider a programme. What would be the difference between having 10 nearly identical power plants delivered by a single engineering procurement and construction company, or EPC for short, versus 10 plants delivered by 10 different organisations? In these two examples, let's assume that the 10 power plants are being delivered to the same customer. In the first case, where 10 plants are delivered by one EPC company, they will have the usual transaction cost associated with the delivery of the first power plant. Indeed, the company will need to find all the suppliers, make the contacts, supervise them, et cetera. Some of them will perform satisfactorily, let's say, 75 of them, and 25 will provide poor service of product. So, for the second unit, the EPC company will keep the 75 good contracts and suppliers, making new contracts for 25 new ones. After the second power plant, let's imagine, there are 90 good performers and 10 poor

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performers. So, for the third unit, the 90 will have a low transaction cost and only 10 will have a high transaction cost, and so on. Moreover, the suppliers themselves, knowing that they may have the opportunity to secure a series of contracts after the first, will be less likely to behave opportunistically. Let's remember that opportunistic behaviour is often the cause of a project running over budget.

So, keeping the same suppliers could reduce the cost of supervision, and will build a consistent project delivery chain, and contributes to what is known as industrial learning. What we mean by this is that experience shows that the more times a task has been performed, the less time and cost is required in each subsequent case. This concept was probably first understood in 1936 in an Air Force base in the United States, where it was determined that every time total aircraft production doubled, the required labour decreased by 10 to 15 percent. Subsequent studies from other industries have identified a different value ranging from only a couple of percent up to 30 percent. The key here is that keeping the same supplier allowed them to gain experience and in turn, this reduced construction time and cost. Let's consider our second case where 10 plants are delivered by 10 companies with 10 different project delivery chains. There will be a high number of transaction costs paid over all the plants and the industrial learning will be very low. This would increase the overall cost of the programme and is likely to encourage opportunistic behaviour. A great example of how transaction cost and standardisation can contribute to the delivery of a successful programme, is the case of South Korea's nuclear power plant programme. Just a few words about portfolio. Large companies tend to keep a list of suppliers that they will use over the different projects in their portfolio. Again, this reduces the transaction cost and incentives for contractors to behave opportunistically.

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