ASPECTS OF OUTSOURCING STRATEGIES FOR SPACE ORGANIZATIONS

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ABSTRACT

This paper investigates the advantages of outsourcing versus vertical integration in three geographical areas. We demonstrate in our research on space organizations the reasons why Japanese governmental activities in this industry have shifted to private companies, a shift that has also been visible in both Europe and the US in recent years. This development is not congruent with transaction cost theory nor the human resource-based view but rather with principal-agent theory. We conclude in noting that conventional broad based economic theories have only limited application in the case of the space sector.

Keywords: Corporate Governance, Human Resource-based View, Outsourcing, Principal-Agent Theory, Space Organization, Transaction Cost Theory, Vertical Integration

JEL Classification: C72, L22, L25, L93, D23, M55

1 Introduction

In our research we focus on space organizations in three geographic areas: Japan, Europe and the United States. Space organizations were originally set up as governmental entities for exploration and for the commercial use of space, which can include research, development and operation of rockets and satellites, manned missions, etc. We include for Europe the ESA (European Space Agency), for the United States NASA (National Aeronautics and Space Administration) and for Japan JAXA (Japan Aerospace Exploration Agency). Special attention is given to JAXA, as this organization is currently in the privatization process. It has been noted that “The (Japanese) government is now following a policy of privatization of the space industry, for example JAXA is outsourcing some of its maintenance activities to private companies and is trying also to increase revenues through its operations” (Polak & Belmondo, 2006, p. 24).

To understand this move, we need to recall some recent events. The optimistic commercial satellite market environment of the 1990s has presently led to an overcapacity in the launch services industry. The projected future growth convinced many launch service providers to invest in new or upgraded launch vehicles such as the Delta IV, Ariane 5 ECA and the H-IIA (Hague, 2003).

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Some sort of rationalization therefore became necessary in order to stabilize this industry in the current market environment, especially since a break even point in the commercial satellite market is years away (Hague, 2003). This is one of the key aspects why JAXA is in the process of outsourcing its commercial launcher operations. In addition, JAXA is also considering expanding Japan’s role in the commercial launch services world market, following an impressive record of 12 from 13 successful launches into orbit (Asahi Shinbun, 15 September 2007).

For the purpose of our specific investigation, we will narrow the study to commercial launcher markets as shown in Table 1.

<table>
<thead>
<tr>
<th>Life-cycle</th>
<th>Europe</th>
<th>USA</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Research/Concept/Definition</td>
<td>Government (ESA)</td>
<td>Government (NASA)</td>
<td>Government (JAXA)</td>
</tr>
<tr>
<td>Development/Production</td>
<td>Private (EADS)</td>
<td>Private (Boeing)</td>
<td>Private (IHI, MHI)</td>
</tr>
<tr>
<td>Operation</td>
<td>Private (Arianespace)</td>
<td>Private (Boeing Launch Services)</td>
<td>Government (JAXA) currently in process Private (H-IIA Launch Services) since 2007</td>
</tr>
<tr>
<td></td>
<td>since 1980</td>
<td>since 2001</td>
<td>since 2007</td>
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In the next section, we briefly review the research literature of classic organizational theories concerning outsourcing. These theories form the foundation for developing our three hypotheses. To verify the hypotheses we apply them to a case study; due to limited space not described here but available upon request. Section five follows with a discussion that includes the limitations of our study and offers a path for future research. The paper concludes with speculation on the practical value of economic theory in general vis-à-vis space organizations’ outsourcing decisions.

2 Theoretical Approaches for Outsourcing

We employ three theoretical approaches for outsourcing in space organizations, namely transaction cost theory, agency theory and the human resource-based view. We will show what specific trade-off exists between vertical integration and outsourcing and formulate our own hypothesis based on theory prediction for space organization’s activity and finally verify this hypothesis for the space organization case study.

2.1 Transaction Cost Theory

One of the widely accepted concepts for measuring outsourcing is transaction cost theory, based on Coase (1937). According to Coase, transactions should be organized within a company as long as the costs of these transactions are lower than the transaction costs at the market. Transaction costs include searching, contracting, controlling, recontracting and the risk of delays for both sides.

On behalf of transaction cost theory, all parties use their information according to their advantages, which leads to a strategic asymmetry. To make it simple: a seller attempts to hide negative product characteristics and a buyer does not show his upper limit for purchasing a given product. This leads to each party investing in information costs as both are trying to receive more and better information. A seller might be interested in undertaking market
research about their customer behavior. A buyer, on the other hand, might be interested in testing a product before buying it. In the literature, there are several attempts to overcome these contracting difficulties (Akerlof, 1970).

The transaction cost concept is the predominant theoretical explanation in management studies and basically sets out to explain governance choices and ex post contractual costs (Williamson, 1975). This theoretic concept is widely used for its analytical rigor but also criticized for overemphasizing ex post contractual influences and underemphasizing revenue creation (White, 2000).

In sum, transaction cost theory suggests that outsourcing should be considered if activities: (1) do not require investments in specific assets that invite delays; (2) are not subject to a high degree of environmental uncertainty; and (3) are those activities which the firm infrequently relies upon (Aubert, Rivard & Patry, 1996; Masten, 1984). In our case of space organizations, this industry can be characterized by a high level of uncertainty (few satellite customers dictate world market demand), with very specific assets (launchers, launch operation facilities, etc.), and who frequently rely on those assets (main part of revenue and public acceptance comes from successful launches). This leads us to our first hypothesis:

Hypothesis 1: In accordance with transaction cost theory, the outsourcing activities of space organizations would face higher transaction costs than vertical integration activities, especially when there is a high uncertainty of products, very specific assets and a high frequency on using them.

Nevertheless, in our case of space organizations, companies increasingly outsource those activities that are in contradiction to the central tenets of transaction cost theory. This leads to the assumption that transaction cost theory has a minor influence on organizational decisions compared to agency theory, the human resource-based view, and other theories. Another explanation could be that some companies or space organizations might not be able to produce certain products or to use certain technologies on their own. In this case, an outsourcing of its own activities might be unavoidable. A further reason is that reputation and repetition provide a strong incentive to the operator for providing excellent service. For example, a launch failure caused by the operator itself may have irreparable damages on its brand image (i.e. reputation) and may lead to no further orders being placed with him (i.e. repetition).

### 2.2 Principal-Agent Theory

Another dominant conceptual framework is the agency concept. The idea of the agency concept goes back to Jensen and Meckling (1976), who described the relationship between principals and agents. Principals rely on agents who carry out what the principals want them to do. The agent might be a CEO whose own interests are not automatically in line with the interests of the principal (e.g. the shareholder of the company). Worth mentioning are Holmstrom’s various investigations in such models (e.g. Holmstrom, 1999). In order to attain equilibrium, agency theory emphasizes the cost of misalignment between principals and agents (Becht, Bolton & Roell, 2003). Potential misalignment conflicts arise between a principal and an agent thus causing economic costs (Jensen & Meckling, 1976).

In sum, principal-agent theory defines a trade-off between the costs for the principal of monitoring outsourced activities as parts, products and human resources in order to achieve the main goal of the principal (i.e. a cost increase) and the risks of these activities transferred to the agent (i.e. a cost reduction). Space organizations consist in our case as the principal and companies to whom activities are outsourced are the agents. Due to relatively high failure rates, the operation of launchers is very risky, thus outsourcing would be an advantage for the space organization. As there are effective quality standards and processes existing in the
aerospace sector, monitoring costs caused by outsourcing would be moderate. This leads us to our second hypothesis:

Hypothesis 2: According to agency theory, outsourcing activities for space organizations would be preferable over vertical integration when the costs of misalignment conflicts caused by outsourcing are lower than the costs of risk caused by vertical integration.

This hypothesis is in correlation with our case of space organizations. It is relatively little effort to “monitor” a launch operator compared to other services. Risk transferring to the launch operator is high facilitation for space organizations; delays, launch failures and succession bureaucratic failure investigations within the organization can harm a large, clumsy bureaucratic space organization much more than a small and efficiently structured private launch operator. Another factor is that agents in a company have more incentive to work hard than in a government agency because their effort has more influence on their payoffs, e.g. salary, job guarantee, awards, etc (Schmidt, 1996). Also the soft budget constraints theory explains this effect by the fact that governments are sometimes forced to subsidize a government entity when it performs inefficiently, whereas a bankruptcy may not be a credible threat to governmental bureaucrats it is certainly to managers.

2.3 The Human Resource-based View

Another theoretical explanation for outsourcing and vertical integration is the human resource-based view. According to the human resource-based view, organizations differ in their use of human resources (Wernerfelt, 1984). Organizations with superior human resources can establish competitive advantages that enable them to outperform their rivals (Peteraf, 1993).

In sum, the human resource-based view recommends to keep strategic and competitive activities in-house, because the loss of human resource knowledge cannot be compensated by the increase in short-term financial advantages over the long run. This is an important aspect particularly in our case involving space organizations as these companies are more specialized. Therefore, in these organizations human resources are often critical, because they cannot easily be replicated. This leads us to our third hypothesis:

Hypothesis 3: The human resource-based view suggests that advantages accrue to space organizations that efficiently vertically integrate their activities, because outsourcing activities could lead to a loss of human resource knowledge.

Controversially, in all three investigated areas the respective space organizations outsource their strategic and competitive launch activities to a large extent, thus resulting in a major contradiction with the central tenets of the human resource-based view. This leads to the assumption that the human resource-based view has only a minor influence on organizational decisions compared to other theories in these cases. Another explanation might be that if space organizations are not able to provide their own human resources (i.e. specialists for imperative tasks are unavailable), meaning that an outsourcing of certain specific activities might be unavoidable.

3 Discussion

The given case study has thus been examined using the three separate theories in the previous sections, in the following section this paper will attempt to widen our point of view through a discussion centered on the coherences, alternatives and limitations concerning our applied theories.
3.1 Understanding of Coherences

As we stated in our hypothesis 1, the outsourcing activities by the Japanese JAXA is hard to explain using transaction cost theory. Also our human resource-based view, represented by hypothesis 3, carries little support. Only agency theory holds, represented by hypothesis 2, as it can be applied to the privatization of the operational part of the JAXA space organization.

As we stated in hypothesis 3, outsourcing is normally connected to a loss of knowledge, which is problematic in the area of human resources. What can be seen in space organizations is that several space organizations outsource specific production assets. However, the research part is normally covered by the space organizations themselves. Therefore, space organizations seem to benefit from outsourcing certain activities, while others are kept within the organization. Another factor is that vertical integration of activities is mainly in basic research sectors where it is not profitable to outsource activities.

The aim of JAXA is to increase the competitiveness of Japanese commercial launch services. To do this, JAXA needs to reduce costs, increase reliability and customer service. In sum, we argue that under the current organizational architecture (i.e. basic research, production and operation divisions being vertical integrated), the ability of this organization to increase its commercial competitiveness is significantly limited. The reason for this is that an efficient organizational architecture is different for a basic research division and an operation division: while for example in a basic research division the reward system needs to be optimized to elicit innovations from scientists, the reward system in an operation division needs to be optimized to motivate managers to create lean processes and high quality standards.

3.2 Alternative Theories

We selected three theories out of a pool of alternative ones, because we expect that they are best suited for our investigation centered on outsourcing strategies, while providing us with some significant results within the respective frameworks of transaction cost theory, agency theory and the human resource-based view.

We are aware that there are other theories or approaches as well, e.g. the property rights theory which posits that outsourcing stimulates efficient bargaining power (see Grossman & Hart, 1986). Also rent-seeking theory as a concept can be discussed in this area. According to rent-seeking theory, vertical integration can stop socially destructive haggling over appropriate quasi-rents (see Williamson, 1985). But vertical integration does not completely avoid contracting problems (Klein, Crawford & Alchian, 1978). For instance, influence activities (giving someone authority means that this person will be lobbied) subsequently results in high costs (Milgrom & Roberts, 1988). Finally there is also adaptation theory which stipulates that owning an asset allows the owner to determine how this asset is consequently used (see Williamson, 1975).

3.3 Limitations

Generally, the weakness of these theories is that they make speculative assumptions about human cognition and managerial discretion (Mahnke, 2001). Managers who need to decide on whether to vertically integrate or to outsource tasks, are usually faced with a general lack of relevant information. This fact is called bounded rationality, which means that human actors involved in complex problem solving are limited in knowledge, skills and time (Cyert & March, 1963). Instead managers are driven by means of an experimental search to discover possibilities for improving efficiency of the organization.

Another weakness of these theories is the limitations of scope. Essentially, transaction cost theory is restricted to the issue of the costs of writing complete contracts, while principal-
agent theory narrowed focuses on the issue of moral hazard, and the human resource-based view is limited to the simple issue of linking resources to property.

The space sector has many unique features such as massive entry costs, very high quality standards, dynamically increasing returns, large unit size of production, very low production rates and imperfect competition.

Finally, it should be noted that outsourcing done by companies and done by governments has similar but not completely identical objectives. Typically, the company’s motivation is mainly based on economical aspects, while the government’s motivation might also be based on political aspects. Furthermore, our definition of outsourcing is always connected to switching from governmental activities to private companies. Overall, this kind of outsourcing is much stronger than from one private to another private company.

4 Conclusion
In this paper, we explored a number of reasons why Japan’s governmental space organization JAXA has recently intensified its outsourcing activities to private companies. This process has been shown to have occurred several years ago in both other investigated areas, Europe and the US.

The directional trend in outsourcing activities in space organizations therefore, is most congruent with principal-agent theory. In contrast, transaction cost theory and the human resource-based view both fail to provide sufficient reasons to explain why JAXA should more efficiently vertically integrate its activities rather than outsource them to private companies. The weighting of these three theories against each other is a difficult task and a challenge for future research.

We conclude also that economic theories can be used for a wide field of industrial sectors but have limited use in relation to the space sector. One reason for this might be that the characteristics of aerospace organizations, and in particular space organizations, are unique compared to the overall characteristics of other industry sectors.

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