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# Reinterpreting the Demise of Hierarchy: A Case Study in IT, Empowerment, and Incomplete Contracts

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# **REINTERPRETING THE DEMISE OF HIERARCHY: A CASE STUDY IN IT, EMPOWERMENT, AND INCOMPLETE CONTRACTS**

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## **Abstract**

This paper presents a case study of the implementation of a sophisticated internal performance monitoring system by the service division of a value-added reseller of Canon products in Denmark. This new control system could not only aid in controlling cost and productivity, but could also monitor customer service and quality levels. Although the new system was implemented with exceptional technical success, it met a very defensive reception among the technicians. In response, management decided to initiate an empowerment program. In order for this program to have a significant impact, management needed to make the requisite shifts from a strictly hierarchical to a team-based organization form, as well as moving from a hierarchical to an interactive control process. It was only after the company completed this type of “organizational realignment” that the real benefits of the system were harvested.

This case study explores the implications of the dispersed and empowered organization and the consequent lack of direct process control. In order to fulfill this aim, the discussion is based on the Grossman, Hart, and Moore theories of incomplete contracting and the role of “information assets” and incentive misalignment of the newly “empowered” and highly knowledge-based service organization is examined. Although property rights theories have typically been applied in “boundary of the firm” questions, the goal of this case study is to illustrate the potential of incomplete contract theory in explaining internal incentive structures and governance mechanisms in the emerging wave of organizations characterized by a rich knowledge base, geographical dispersion, or even “loose” and virtual organization structures.

**Keywords:** Organization theory, economic theory, hierarchies, incomplete contracts, empowerment, incentive structures, reengineering.

## **1. INTRODUCTION**

Since the early writings of Leavitt and Whisler (1958), practitioners and researchers have been concerned with the extent to which information technology (IT) and information systems (IS) have influenced organizational structure (see, e.g., Attewell and Rule 1984; Bjørn-Andersen et al. 1986; Blau et al. 1976; Kling 1980; Markus and Robey 1988; Scott-Morton 1991; Whisler 1970). However, if the results from this large number of studies are examined, there is no conclusive evidence on this relationship.

In a seminal article, Robey (1995) summarized the most significant literature within the field of IT and organizational structure into four different theoretical approaches: political theory, organizational culture, institutional theory, and organizational learning. Each of these offer unique possibilities for understanding the phenomenon and account for some of the apparent diversity in empirical results.

However, it is characteristic that even though there has been a significant broadening in the range of theories drawn upon, it can be argued that all of the empirical studies, from Hoos (1961) and Bjørn-Andersen et al. (1979), to Yetton et al. (1994), as well as the more theoretical studies from Robey (1977) and Kling (1980), to Scott-Morton (1991), all owe allegiance to the original framework by Leavitt and Whisler, which views the organization as four elements (task, structure, technology, and people). Using the simplistic metaphor of four paper clips connected with rubber bands, one can say that if one is pulled, it will have an impact on the other three. This simple notion of the relationship between IT and organizational structure is now much more sophisticated, especially with the introduction of institutional theory and structuration theory (Orlikowski 1992; Robey 1995).

However, in the last decade, a different set of theoretical approaches has been introduced potentially offering alternative explanations to the current changes in organizational structure observed almost uniformly in all types of organizations. These are the economic theories, especially agency theory (Ross 1973), transaction cost theory (Williamson 1975, 1985), and theory of incomplete contracting (Grossman and Hart 1986; Hart 1995; Hart and Moore 1990).

This paper is firmly rooted in the latter tradition. However, while these economic schools have typically focused upon the questions of vertical and lateral integration (e.g., boundary of the firm), this case will utilize incomplete contracting theory as an explanatory framework exclusively for internal incentive structures. As this type of application is relatively new, the paper begins with a brief overview of economic theories as determinants of organizational structure and discusses the emergence of incomplete contracting as a model of internal governance mechanisms.

## 1.1 Transaction Cost Traditions

The more frequently cited studies examining hierarchies in the IS domain have predominantly focused upon the market or hierarchy question (Gurbaxani and Whang 1991; Malone et al. 1987) and are highly indebted to Williamson's (1975, 1985) work in transaction cost economics (TCE). In general, these studies have suggested that IT will lower the costs of acquiring information about prices and product characteristics in a given market as well as reducing external coordination costs. This will have effects on the "make or buy" or "market or hierarchy" decision.

While the vast majority of transaction cost analyses have focused upon the "boundary of the firm question," some theorists have concentrated upon the role of transaction costs on the internal organizational structure (for an overview, see Swanson 1987). In particular, the ability of information technology to reduce the "costs" of transacting and processing large amounts of information can reduce internal coordination costs. While some have studied absolute firm size (Brynjofsson et al. 1994), others have looked at the effects of IT on the structure of the organization. Ciborra (1985), for example, suggested that a transaction costs framework could be used to analyze decentralization as *the substitution of control mechanisms*, from the traditional hierarchical to market-based incentive and control structures. According to this view, decentralization should not be viewed as a loss of authority on the periphery, but rather the introduction of market- or price-based incentive structures to coordinate and control performance across the organization.

## **1.2 Efficiency's Determinism**

The concept of “coordination cost” has its origin in the work of Coase and his pioneering work in transaction cost economics (Coase 1936). In simple terms, Coase suggested that efficiency alone, in terms of transaction costs, determines organizational structure. Many well known studies exist that question the viability of transaction costs as the only determinant in modeling organizational structure (Fischer 1977; Goshal and Moran 1996) and these problems will be addressed in an analysis of the cases. However, one important perspective from the Coase theorem (Coase 1960) is the use of efficiency and value maximization (via transaction costs) as an explanatory principle in the study of economic organization (Milgrom and Roberts 1992). The paramount factor here is the causal direction: *efficiency determines organization structure*.

This theme has continued to underlie the reengineering movement prevalent in the early to mid-1990s. The central thesis in this literature (Davenport 1993; Hammer and Champy 1993; Hammer 1996; Nolan et al 1995), as well as in recent mainstream IT management literature (Applegate 1995), is that developments in information technology have allowed the automation of registration, coordination, and analysis of data, yielding middle management obsolete. Moreover, distributed data and analysis tools can place information in the hands of operational personnel, empowering them to branch out beyond their tightly defined function based jobs into cross functional, process-based teams with greater freedom and responsibility. Once again, these schools are faithful to the Coasian tradition: efficiency in information transacting and processing costs determines—or at least permits—changes in the organizational structure.

## **1.3 Incomplete Contracting**

More recently, the theory of incomplete contracting has transcended the transaction cost theory for research into vertical and lateral integration, most notably in the realm interorganizational systems (Bakos and Brynjolfsson 1993; Bakos and Nault 1997). The theory of incomplete contracting, with origins in transaction cost economics, was pioneered by Grossman, Hart, and Moore (Grossman and Hart 1986; Hart 1995; Hart and Moore 1990). Like TCE, incomplete contract theory views the transaction as the fundamental unit of analysis.<sup>1</sup> However, a critical difference is the assumption of bounded rationality; that is, the assumption that economic actors can not, and do not, foresee and contract for every contingency. In other terms, all “real-world” contracts will somehow be incomplete in that it is either impossible, or too expensive, to foresee, define, enumerate, and contract upon all circumstances and contingencies which may occur in the future. Accordingly, all rights not expressly defined in the contract accrue to the owner of the “asset” as “residual rights” of ownership. The allocation of these residual rights will have a pivotal effect on the bargaining position of the parties after investing in the contract/relationship. Based upon these roughly described principles, Grossman, Hart, and Moore have developed a theory of vertical-lateral integration and market structures.

It is important to note that the Grossman, Hart, and Moore framework is largely based upon physical capital, although they don't explicitly exclude non-physical assets. An asset is important in incomplete contracting, insofar as the marginal value of an agent's actions are increased via access to an asset. This paramount qualification allows us to access organizations via the perspective of residual rights of ownership of the “information asset.” While most applications of incomplete contracting have also focused on the traditional boundary of the firm question, recent work has applied property rights and knowledge base assets to explicate internal governance mechanisms (Brynjolfsson 1994).

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<sup>1</sup>Kreps (1990) notes, “Besides providing an interesting analysis, Grossman and Hart point us in what I believe is the right direction to pursue. Williamson, following Coase, wishes to make the transaction the unit of analysis; Grossman and Hart do so with a vengeance.”

An appealing characteristic of incomplete contracting theory is that, given contractual incompleteness, governance structures based upon softer, unverifiable information and implicit self-enforcing mechanisms become critical. When contingencies occur that are not explicitly contracted for, other mechanisms, such as corporate image, reputation, trust, and social norms as determinant factors in corporate and organizational behavior (Gietzmann 1996) should be considered. Accordingly, the key in understanding who maintains the final, definitive control of an economic relationship lies in the residual ownership rights of the “assets.” However, this picture can become convoluted when we delineate between physical and “information” based assets, as disparate ownership of physical and knowledge base assets is becoming a common reality for many emerging organization forms.

The paper proceeds by presenting the case of Bruhn A/S. The case is followed by an interpretative analysis, where the value of incomplete contracting as a framework of internal organizational governance is illustrated. Specifically, the separation of physical and information assets and the consequent incentive misalignment in explaining the internal organizational governance are examined. A discussion of compensating measures that were needed in order to reduce the risk of opportunistic behavior as well as the corresponding benefits in information coordination follows.

## **2. BRUHN A/S**

### **2.1 Data Collection**

This case study was completed in the spring of 1996 in semi-structured interviews with the company’s senior and functional management, as well as line employees (technicians) and technician team leaders. In addition, verification and follow-up interviews were completed in the spring of 1997. In total, 15 interviews were completed. The data was gathered and organized according to the principles of the CEBUSNET consolidation framework,<sup>2</sup> which focuses upon the analysis of business best practice as a function of institutional and market environments as well as a combination of enabling factors such as information technology, organization forms and human resource principles.

### **2.2 Background**

Bruhn A/S has achieved an exceptional track record as a value-added reseller and distributor of Canon products in Denmark. The company, privately owned by the Bruhn family, has specialized in providing a very high level of service and operating security across the complete range of Canon printers and photocopiers. Through an exclusive agreement with Canon, headquartered in Japan, Bruhn has focused on two main strategic areas: sales and long term service contracts. An average annual revenue of approximately 800 million DKK (approximately 105 million ECU) is split evenly between sales and service activities. Of the 550 plus employees in Bruhn, over 150 service technicians continually provide service throughout the country.

Bruhn’s managerial policies are to a significant degree a response to the competitive demands of its marketplace. First of all, the market’s feverish price pressure on new products places constant demands for productivity improvements. As a working rule, the management states that “productivity increases in year one are profit in year two.” A second focal point for the management is “adaptability.” Due to the turbulence in their market, management believes that the only thing they can be certain about in the coming years is the need to adapt and change. Therefore, increasing the general adaptability of its workforce is a constant objective for Bruhn.

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<sup>2</sup>This case was prepared through the support of CEBUSNET. CEBUSNET is the Community of European Management Schools Business Best Practice Network, sponsored by domain 7.8 of the EC’s ESPRIT program. Participants include the University of Cologne, Stockholm School of Economics, the Copenhagen Business School, Erasmus University, Rotterdam, Bocconi University, Milan, and The Norwegian School of Economics and Business Administration. Additional information can be obtained on the web site: <http://www.wi-im.uni-koeln.de/CEBUSNET>.

## **2.3 Market Characteristics**

In the Danish market for document reproduction, Bruhn shares leadership with Xerox at roughly 22% of the market. In recent years, however, the company has been forced to realize that technical excellence in products is becoming less and less potent as a competitive enabler and differentiator. This ensuing commoditization, combined with excess capacity in both professional and retail sales channels, has resulted in acute price pressure and falling contribution levels in recent years. Consequently, value-adding service contracts have overtaken sales as the primary source of the company's operating profits.

## **2.4 The Service Process**

The service level, or variety of specific services the customer receives, is dependent upon the particular profile specified in the customer's contractual agreement. Examples of services include:

- *Rapid Dispatch*: a service technician is on-site within four hours notice for major machines and six hours notice for peripheral products.
- *Quick Response*: a technician contacts the customer within one hour of original communication to either help the customer via telephone or agree upon a specific time for the service call.
- *Ambulance Service*: a special express service where the technician is on site within two hours.
- *Stand-by Service Watch*: For extremely large production runs, a technician can be reserved for stand-by status.
- *Help Desk*: a telephone hot-line for immediate advice on technical problems.
- *Systems Support*: Consulting services for computer networks and printers.

When the day begins, only 50% of the jobs are known. During the day, customers call the service department where the operator logs the customer's information into the planning system. The system prioritizes and delegates the assignments to the individual technician. Once the technician has completed the job, all details are reported back to central dispatch concerning parts usage and inventory, services completed, as well as key figures of the specific machine and customer.

The IT system is centered around a DEC Alpha mainframe running a RDB/Oracle relational database. Operations of the central system are outsourced to an IBM division specializing in facility management. The service department's main system, designed to support operations and planning, is supplied by a Danish software developer. The system supports job dispatching/planning, spare part logistics, and the overall optimization of the service function. Particularly noteworthy is that the job planning system utilizes optimization algorithms to model both hard financial parameters such as geographical distance, time, and contractual profiles, as well as soft "customer service" factors. Due to the fact that all service contracts specify a maximum time for technician response, the system attempts to answer the question "what is the relative cost of coming one hour later than promised?" All analytical applications are based in SAS. The SAS system is a front end analysis tool which is based on de-central data warehouses which are updated daily.

## 2.5 Business Performance Monitoring

To support the service function, as well as facilitate the productivity improvements necessitated by the marketplace, Bruhn decided that a focused system was needed to increase the visibility of both efficiency and customer service levels. In January 1994, Bruhn established a performance monitoring system which monitors both typical productivity as well as service efficiency measures. A brief definition of the measures follows:

- **Time productivity** is a simple ratio of the total time the technician has registered on the clock divided by the net time registered, either on service calls or in transport. The purpose of this statistic is to measure the amount of time the technician spends in direct, productive activities.
- **Job productivity** measures the average amount of time used for an assignment in a given period. Is the technician faster or slower on average in completing a service call, when compared with the norm?
- **Service efficiency** registers the average amount of time from the point where the technician has made a service call to the time when he/she has been called back to the specific machine again. The intent here is to begin to assess the quality of the work completed by the technician. Time productivity measurements are quickly deemed superfluous, both in financial costs and customer satisfaction, if the technician does not adequately service the machine and must return.
- **Spare parts** indicates the number of jobs the technician has completed on site without having to attain additional spare parts. The measurement is designed to support the monitoring of the physical logistics system, as well as customer satisfaction.
- **Recall percentage** registers the number of jobs recalled within three days of the original visit. This is also an attempt to monitor the quality of the service provided by the technician. If the customer reports that the problem occurs within three days of the first visit, it is an indication that the original problem has not been adequately solved, or that the technician has not thoroughly checked the machine for other potential problems.
- **Jobs below max time** reports the number of jobs completed below the maximum allowed norm time, which is specified in the service contract. This is an attempt to measure the productivity of the service function. It also provides an indirect indication of customer satisfaction.
- **Average response time** measures the average time it takes for the technician to arrive on site after the customer has reported the job to Bruhn. This statistic is a moderate measure of productivity and a direct indicator of customer satisfaction.

## 2.6 Organization: Barriers and Challenges

Preliminary deployment of the business performance monitoring (BPM) system met a cold and defensive reception among the service technicians. Not only did the technicians have problems understanding the BPM's language, the organizational context within which management chose to launch the project was structurally unripe for the initiative. This can be explained by the fact that the nature of the service technician's job requires that they are in the field servicing customers the vast majority of the time. The technicians don't even have to visit Bruhn to replenish spare parts, as inventory management is subcontracted to a third party, who replenishes the individual inventories in the service vans at the home of the technician. Frustrating matters was the previously mentioned central planning system, which denied the technicians the opportunity to plan how they could service their own customers. While entirely logical from an accounting and logistics viewpoint, the unfortunate effect of this geographical dispersion is that many technicians develop a higher degree of loyalty toward their customers, whom they see on a regular basis,

| Initials                     | Name                  | Group                      | Period                |                      |                    |                           |
|------------------------------|-----------------------|----------------------------|-----------------------|----------------------|--------------------|---------------------------|
| SS                           | Steven Service        | S056                       | 96/04/01 - 96/06/30   |                      |                    |                           |
| <b>Time productivity</b>     |                       |                            |                       |                      |                    |                           |
| Monthly report               | Standard time<br>471  | Overtime<br>2,7            | Payed Time<br>473,7   | Absence<br>23,5      | Over Time<br>15    | Available Time<br>465,2   |
| Job reports                  | Work time<br>360      | Travel time<br>65          | Double req. time<br>5 |                      |                    | Time/job reports<br>420,0 |
|                              |                       |                            |                       |                      |                    | Index<br>90,3             |
| <b>Job Productivity</b>      |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Work time<br>335           | Travel time<br>45     | Norm<br>355          | Job reports<br>355 | Index<br>94,4             |
|                              |                       | Total<br>380               |                       |                      | 420                | 69,2                      |
|                              |                       |                            |                       |                      |                    | 90,5                      |
| <b>Service Efficiency</b>    |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Sum of index<br>11592      |                       | Avg index<br>90,6    |                    | Index<br>90,6             |
| Copy                         |                       |                            |                       |                      |                    |                           |
| Other                        | 0                     | 0                          |                       | 0                    |                    |                           |
| <b>Spare parts</b>           |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Jobs without lack<br>115   |                       |                      |                    | Index<br>89,8             |
| <b>Recall Percentage</b>     |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Recalls<br>11              | Norm<br>7,6           | Actual recalls<br>9% | Norm recalls<br>6% | Index<br>69,1             |
| <b>Jobs Below Max Time</b>   |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Jobs< max time<br>94       |                       |                      |                    | Index<br>73,4             |
| <b>Average Response Time</b> |                       |                            |                       |                      |                    |                           |
|                              | Number of jobs<br>128 | Average norm time<br>06:00 |                       | Avg. time<br>09:03   |                    | Index<br>66,3             |

Figure 1. Business Performance Monitoring

than they do toward the company, where they only meet twice a month. A natural human reaction, but one having markedly adverse effects on key areas of employee performance and satisfaction.

These unfavorable circumstances compounded the frustrations the technicians felt with the BPM system. Tensions with the system tended to group around several problematic areas:

- First, providing uniform, easily understood interpretations of the measures proved to be a greater challenge than originally anticipated. Despite management’s efforts to coach the technicians through the system, uncertainty about the measurements remained a constant impediment.
- Second, the position of service technician demands people who are detail oriented by nature. It was therefore natural for the technicians to become highly focused upon less significant details, at the expense of a more holistic understanding of the larger patterns.
- Finally, the question of how to use the measurements in a constructive manner remained largely unanswered. The system provided an excellent mechanism for telling the technicians how, where, and when they were performing inadequately. However, a pedagogic medium for coaching the technicians into improved performance using BPM had not been provided by Bruhn management, which had failed to realize the obstructive, “big brother” effect of the system. In direct confrontation with management, the technicians would assume a very defensive posture, rather than a learning one.



Management was forced to conclude that most of the technicians objected strongly to the intrusion into their autonomy and seriously questioned the validity of the measurements.

## 2.7 Human Resources: The Empowered Response

As a consequence of the unsuccessful introduction of the BPM system, induced by the resistance and highly defensive attitudes among the technicians, Bruhn decided that a drastic shift in the organizational structure was necessary. Inspired by their large competitors, Bruhn decided to embark upon an empowerment program. While the lofty rhetoric of empowerment literature often promises celestial results (Simons, 1995), Bruhn's reasoning was tempered with the common sense demanded by its marketplace.

*We want to be more effective than our competitors. Motivated employees will be more productive, thus making us more cost effective.* [Service Director]

However, returning to the company's strategic aim of employee adaptability, the logic becomes more subtle.

*You cannot achieve the adaptability levels we need without satisfied employees. If employees are to become satisfied, they must be involved and consulted. This also works to resolve the tensions and frustrations associated with change.* [Service Director]

Experience with TQM had matured management's understanding of how challenging the task of motivating employees can be. Telling them they are empowered is simply insufficient. Management soon became convinced that the service division needed to be transformed from 150 individual technicians into 20 well synchronized teams. Thus the traditional structure, which contained five levels in the chain of command, was delayed to a three tiered team-based structure:

- management team
- four spokesperson teams
- 20 technician teams

Each technician team consists of between five and eight technicians including one spokesperson. The key to understanding the function of the team is that the spokesperson is a technician, not chosen by management, but chosen by the team to represent its interests. The spokesperson maintains his/her role as an ordinary technician and fulfills the responsibilities of a spokesperson in addition to normal duties. The technician team thereby becomes the primary operating unit of the service division. Planning, goal setting, and performance evaluation are conducted at the team level. It is the spokesperson's responsibility to coordinate the activities of the team in an effort to fulfill performance goals. The team structure continues up the hierarchy, such that between five and eight spokespersons form a spokesperson team. Each spokesperson team nominates a member of the management team, which maintains collective responsibility for the entire region.

The major goals of this organizational structure are to

- Increase the overall responsiveness of the service team by shortening the chain of command,
- Improve the overall coordination and synergy effects resulting from team structures, and
- Increase the degree of "experience sharing," learning, and lateral information flows within and between teams.

The project commenced with a business psychologist who conducted two-day courses in team building. Frequent team meetings were initiated to increase the experience sharing and interaction among the members.

## **2.8 Results**

Quantifying the effects of IT investment or management initiatives such as empowerment is always extremely problematic. However, management has made the following estimation: in 1993, the service function worked a total 156,000 hours in the field. The budget (under the same assumptions with no change in productivity programs), for 1996 totaled 222,300 hours. This represents a growth of 42% over a three year period. With the combined effect of the BPM, the budget for 1996 equaled 181,000 hours, a 16% growth over three years. This represents a total productivity savings of 26%, or an annual cost reduction of approximately 8%.

Evaluating the other goals of the empowerment initiatives is even more difficult in financial terms. As mentioned, Bruhn had the direct challenge of returning the technicians' loyalty to the company. Improved employee loyalty and satisfaction are defined as key enablers to long term adaptability and competitiveness. Quantifying and qualifying the attainment of these goals is challenging, but the measurement task has been supported through biannual surveys of employee satisfaction. While definitive causal relationships are difficult to establish, management truly feels the programs have been successful and supports this opinion through continued allocation of financial and management resources to the project.

## **3. ANALYSIS**

### **3.1 Hierarchies Revisited**

Re-examining the Bruhn case raises a question: Does the introduction of information technology cause the categorical elimination of formal hierarchies? The answer is obviously no. As has been seen, the system was introduced with the old organizational structure and is now functioning under the new, team-based organization. The decision to change the organization was entirely a matter of management discretion. However, a strong argument can be made that the IT system "enabled" the organizational transformation. Or rather, the BPM system did not contribute to better performance on its own, but combined with a dramatic change in the organization, far more effective results were achieved.

It is noteworthy that the Bruhn case is consistent with other studies of organizational adaptation to new IT systems (Walton 1989). Specifically, the predominant practice within IT implementation is a "reactive-adaptive" development, where the organization is reconfigured to the system after technology is in place. Walton's studies, for example, recommend the simultaneous development of technology and organizations to shift the pathos of the underlying change process from "compliance to commitment," yet further acknowledge a broad spectrum of barriers which may prevent such a strategy. In contrast to Walton, it is not solely the intent of this analysis to emphasize normative recommendations of organizational and technological alignment, but, as shall be argued, to focus on the ability of a theoretical framework to explain the underlying dynamics of the realignment.

### **3.2 Knowledge Dispersion and Incomplete Contracts**

If one accepts the postulate that employees confronting customers have the most relevant knowledge of local business dynamics, then the challenge is to bring the perspectives of management and line employees closer together (Applegate 1995). This is achieved if

- information ownership becomes collective—both management and line employees have equal ownership rights to business information, and
- planning and analysis functions are transferred to those who have direct contact with operations and customers.

These ideas form the framework for the interactive control mechanism established in Bruhn. The fundamental issue is that ownership of the planning and analysis functions is shifted from management to the line employees. In the case of Bruhn, it is the task of each technician team to define areas which need attention, and thereafter develop an operational plan for the resolution of the problems, e.g., in response to a negative trend in the BPM system. Planning and goal setting become the property of each technician team. Conversely, it is the challenge of management to listen to the technician teams and to provide and coordinate resources in support of the teams. On a more strategic level, management's task is to define long term strategic goals of the firm as well as to establish the outer boundary system within which the empowered employees can operate (Simons 1995).

Interpreted through a Grossman, Hart, and Moore framework, the argument is made that the geographical dispersion of the technician's activity, combined with the market expectation that the service function should accommodate all problems "on-site," routine as well as unforeseen, stipulates a high level of uncontractual actions in the position. In other terms, *the proportion of activities residing in the realm of contractual incompleteness is high*. This portrays a marked contrast to the traditional Taylorist recipe of industrial activity, where job responsibilities are specific and narrow, and uncontractual actions are minimized (Brynjolfsson 1994). To restate this logic in other terms, the argument is that market pressures demand rapid response, on site, with the accommodation of all contingencies and uncertainties in service tasks. This can only be fulfilled through an organization with a high level of contractual incompleteness.

### 3.3 Incentive Misalignment and Resolution

One important consequence of Brynjolfsson's application of the Grossman, Hart, and Moore framework is that optimal incentive structure exists where informed agents are in ownership of the physical assets. This is the formal result of the Grossman, Hart, and Moore framework, which states that incentive structures will be optimized when complimentary assets are owned by the same agent. Bruhn's management has in fact made the acknowledgment that the technicians have become the "informed agents," through experience, and possess "knowledge of the particular circumstances of time and place" (Hayek 1945). However, this vast experience base, or knowledge of operations, has the particular characteristic that the knowledge is highly inalienable, e.g., difficult to transfer from one agent to another, or from agent to principle. Although physical assets are alienable, ownership of physical assets by the informed agents is in fact infeasible, insofar as the technicians are not permitted to acquire legal ownership of the company. On the other hand, information and knowledge base assets are highly inalienable. This suggests a unique set of incentive problems, which not only pertain to Bruhn, but to a growing regiment of loosely organized, knowledge- and service-based organizations.

Where the misalignment of incentive structures cannot be resolved through complete contracting, the potential for opportunistic behavior increases. Critical to the interpretation of this case is understanding the organizational transformation as a set of *compensating measures* to offset the tendency for self-interested conduct. Particular mechanisms for assuaging opportunist behavior could include cultural norms and "company spirit," as well as religious and patriotic beliefs. In the case of Bruhn, consider the application of Kreps' concept of the "firm as a bearer of reputation" (Kreps 1990). Kreps utilizes game theoretic modeling to argue that reputation and reputation among firms functions as its own governance mechanism in the arena of contractual incompleteness. This argument

could be applied to the technician teams, claiming that the team structure serves as a prolific venue for repetition, reputation, and peer review, thereby replacing formal governance mechanisms with an implicit, yet powerful, control structure.

Another lever of “goal realignment” can be found in the transfer of the analysis and planning functions from management to the technician teams. The reengineering literature typically claims that the decomposition of hierarchical, function-based organizations implicitly offers some kind of incentive alignment, in that both management and employees are focused upon a “customer-based” outcome, as opposed to a previous industrial paradigms, where management was focused upon outcomes, and employees were governed by procedure-based controls. In Bruhn, it can be seen that the initial independent introduction of a registration system to monitor customer outcomes had a negative effect on goal realignment. To make it effective, a complete shift was undertaken to provide the teams with ownership of the control and planning functions. Although this did not eliminate the misalignment, the transition did, in the organization’s context, formally align technicians’ and management’s incentives.

### **3.4 An Assessment of the Incomplete Contracts Perspective**

It can be fairly argued that a major weakness of modern economic theories of the firm, such as agency theory, transaction cost theory, and incomplete contracts theory, is their overwhelming tendency to reduce all aspects of economic and often social organization to the alignment of incentives.<sup>3</sup> This perspective assumes that productive knowledge simply exists—as in a production function—implying no problems in the differentiation and coordination of productive knowledge. Consequently, the sole purpose of management is the use of incentives, monitoring, and sanctions to assuage opportunism and maximize productivity (Foss 1997). However, while attention has been focused on the mis- and re-alignment of incentives in this case, the issue of the dispersion and redistribution of productive knowledge is also central in the interpretation. Furthermore, it is argued that the major contribution of the “information assets” derivative of the Grossman, Hart, and Moore theories as an interpretive framework is the acknowledgment that the coordination of productive knowledge is, in fact, imperfect.<sup>4</sup> That is, knowledge can be bounded, inalienable, dispersed, idiosyncratic, or “sticky.” In addition, the framework implicitly highlights the fact that linking sources of productive knowledge within the firm is a problematic combination of incentives, embedded knowledge, and information asymmetries.

This point can be illustrated in the analysis of Bruhn, where it is explicitly argued that the issue of incentive misalignment is a problem of information asymmetries caused by the idiosyncratic nature of the “information assets.” It may be asked, does contractual incompleteness matter? As the future unveils itself, contracts can be revised and renegotiated. Hart suggests that, as information asymmetries increase, contracting and negotiation costs rise and the potential of reaching an efficient agreement falls. Moreover, Hart argues that a major benefit of internal integration is that information is exchanged more readily and that the parties are more willing to cooperate. While some have claimed that *the* defining property of integration is the elimination of informational asymmetries (Arrow 1975), a softer form of the argument suggests that reducing informational asymmetries can help align incentives, as well as improving the probability for which contractually incomplete behavior will be efficient for both parties (Hart 1995).

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<sup>3</sup>This has even been acknowledged by proponents of contractual theory. “The incentive based transaction cost theory has been made to carry too much of the weight of explanation in the theory of organizations. We expect competing and complimentary theories to emerge—theories that are founded on economizing on bounded rationality and that pay more attention to changing technology and to evolutionary considerations” (Milgrom and Roberts 1988, p. 450).

<sup>4</sup>Paradoxically, as the property rights approach is so thoroughly rooted in the transaction theory tradition.

In the case of Bruhn, the placement of planning and analysis functions in the hands of the technician teams is a clear attempt at reducing information asymmetries. Both management and employees are directly focused on process results and have equal ownership rights to this information. Furthermore, by making the team the fundamental operating unit of the organization, as opposed to the individual, the technicians' incentives are more equally balanced between rivalry and cooperation. As a catalyst to improving their own performance as a team (hence their value to the company and wage level), they now have the direct incentive to reveal additional information laterally within teams, increasing cooperation. This should result in a "learning" effect which would consequently improve the overall performance of the division, while maintaining an adequate level of rivalry, via tournaments, among the individual teams. The increase in lateral information flows further reduces information asymmetries and, hence, will help realign the incentives.<sup>5</sup>

Finally, it must be noted that critics of transaction-based perspectives have denounced the pessimism of the Williamsonian traditions. That is, first order efficiency maximization (from the Coase theorem) deems firms as nothing more than second best alternatives to the market. And while a theory that acknowledges the firm as an entity with its own logic and purpose has long been desired, even TCE's harshest critics have few suggestions to fulfill this need (Goshal and Moran 1996). However, it is maintained here that the "information asset" derivative of incomplete contracting theories, in acknowledging that organization is more than a question of aligning incentives, but also a challenge of coordinating and managing an idiosyncratic, shared knowledge base, takes an important step in closing the gap between transaction-based theories and competing theories of organizational learning and resource-based economics, as well as offering a fundamentally new perspective on information systems design within organizations.

#### 4. CONCLUSION

Bruhn's deployment of a sophisticated internal performance monitoring system met a defensive response among the service technicians. Vast amounts of operating data delivered on individual performance proved to be ineffective, both for management as well as the technicians, when used in a traditional hierarchical control context. Only by reengineering the organizational structure and human resource policies was Bruhn able to leverage the value of the IT system. Specifically, by forming a team-based organization, combined with an effective empowerment program, the company was able to tap the vast amount of knowledge found in its line employees and nurture the organizational learning. By rerouting this knowledge flow directly to those on the operating lines, management was able to transform its function from a "policer" of data to a supportive role in an interactive control context.

In interpreting this case, an attempt has been made to highlight the governance problems inherent in geographically dispersed, knowledge-based service organizations. In doing so, a derivative of the Grossman, Hart, and Moore theory of incomplete contracting was utilized to delineate the incentive misalignments resulting from separation of informed agents (technicians) and principles of the physical assets. It is argued that the success of the organizational change is due, in part, to the realignment of incentive structures among owners and informed agents, alleviating the opportunistic behavior which can increase in contractually incomplete settings. It is further argued that the restructuring of the organization not only mitigated incentive misalignment, but also had fundamental consequences on the redistribution and coordination of productive knowledge within the firm.

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<sup>5</sup>Some parallels can be drawn between Bruhn and the well cited "Otisline" case (Stoddard and McFarlan 1986). The fundamental difference lies in the formation of the team-based structures and the empowerment. In acknowledging that the technicians are informed agents in a contractually incomplete setting, the case presents the organizational shifts as "levers" to reduce the risk of self-interested behavior.

This case is unique in that it demonstrates the potential of incomplete contracting to model the internal governance structure of a single organization. By accommodating for the separation of physical and information-based assets, we are allowed to model the incentive problems which arise from the dispersion of productive knowledge, as well as issues concerning the coordination and management of productive knowledge. This particular dimension brings a theory firmly rooted in transaction theory one step closer to competing theories such as organizational learning and resource-based theories.

In the future, we should expect a high degree of mutation in the traditional industrial, hierarchical organizations with which we are familiar today. Among other factors, the information age and its knowledge base will cater in a new breed of loosely structured, diffuse, or virtual organization forms. These hybrids will offer new dimensions to the standing conflict between decentralization, flexibility, and coordination and control. Incomplete contracting theories offer a potent framework in the analysis of the interaction of physical and information assets, the alignment and misalignment of incentives, and the coordination of knowledge as it emerges in the gray zone of contractual incompleteness.

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