

Coordination of Internal Transactions at Hoogovens Steel

Struggling with the tension between Performance-Oriented Business Units and the Concept of an Integrated Company

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SOM-theme A Primary processes

ABSTRACT

Hoogovens Steel (HS) is a vertically integrated steel company, which until 1995 was functionally structured. During the eighties the steel market became saturated and more heterogeneous. In order to remain a flexible, market-oriented company, HS changed its organizational structure, by introducing business units responsible for their own financial results. Nevertheless, it remained a vertically integrated steel producer.

With the functional structure HS had used cost-based transfer prices. But following the introduction of the business units the question was raised as to whether the transfer pricing system should be changed. A business unit structure implies a decentralization of authority and the delegation of certain activities to the units, but vertically integrated production requires close relations between the various stages.

This paper discusses the extent to which the tensions between decentralization and integration can be resolved through the coordination of internal transactions. After introducing the relevant theoretical concepts, the issues which emerged in discussions about the coordination of internal transactions at HS are discussed. Some possible solutions are evaluated on the basis of criteria derived from the theoretical concepts, and the choice made within HS is described. Finally, some conclusions are drawn regarding the significance of the theoretical concepts.

1 Introduction¹

The coordination of internal transactions can be a major issue in divisionalised companies. The delegation of authority for the operational management of business units can provide space for central management to concentrate on strategic issues, while giving general direction to, and assessing the performance of, the individual business units. But the possibility of interdependencies between business units in the form of internal transactions means that there have to be agreed procedures for managing those transactions, including the allocation of the associated revenues and costs. Numerous companies struggle with the question of how to manage internal transactions, and this paper describes the struggles of one such company, Hoogovens Steel, and explores how it addressed this question. The question encompasses not only the way in which revenues and costs are allocated, but also who is permitted to take decisions regarding internal transactions. The way in which this question is resolved influences various aspects of divisionalised activities:

- the distribution of authority and responsibility;
- the allocation of risks relating to internal transactions;
- the degree of autonomy perceived by business unit managers;
- the way in which business units managers deal with each other; and
- the behaviour of business unit managers more generally.

The pricing of internal transactions (transfer pricing) is the aspect of the coordination of internal transactions which has probably received most attention in the academic accounting literature. Initially, researchers were interested in optimal transfer prices, based first, on the neoclassical economic model (such as in the writings of Hirshleifer, 1956, 1957) and later, on such mathematical techniques as the decomposition method of linear programming (derived from the work of Dantzig and Wolfe, 1960), both of which

¹The authors are indebted to the controllers of Hoogovens Steel for their participation in the research project. Helpful comments on an earlier draft of the paper, which was presented at the 20th Annual Congress of the European Accounting Association (Graz, April 1997) were received from Wim Kiewiet (Hoogovens).

received considerable attention from accounting researchers in the 1970s (see Abdel-Khalik and Lusk, 1974). Subsequently, attention shifted to behavioural and organisational issues (see Watson and Baumler, 1975; Swieringa and Waterhouse, 1982) and recently there has been an interest in the implications of transaction cost economics (see Van der Meer-Kooistra, 1994 and Colbert and Spicer, 1995).

In the research described in this paper ideas from the transfer pricing literature were used to assist managers in a large Dutch steel company, Hoogovens Steel, to come to an agreement about the most appropriate way of coordinating their internal transactions. Controllers from the company approached two of the authors for advice concerning the factors which should be considered. Drawing on their knowledge of the existing literature (and their previous studies of transfer pricing), these authors provided an input into the discussions which were taking place within the company, but they carefully distanced themselves from the company's decision making processes and avoided making any specific recommendations. Thus, although knowledge from the research literature entered the process, the transfer pricing system eventually selected was a decision of the controllers and managers of the company.

In 1995 Hoogovens Steel changed its organisational structure and this raised questions concerning whether its existing way of coordinating internal transactions remained appropriate. Hoogovens Steel is a vertically integrated steel manufacturer which processes raw materials into finished products through various production stages. The most important aspect of the change in organisational structure was the transition from a functional structure to a product-based structure, with five separate business units each responsible for its own financial results. The motivation for this organisational change will not be explored in detail in this paper, but the explanation given by the managers was that it furthers a market orientation within the company and promotes a flexible organisation which can quickly respond to market changes.

The authors were approached when it was decided within the company that there should be

an investigation into whether the existing transfer pricing system, which used full cost, for the mostly mandated internal transactions, was appropriate for the new governance and organisational structure. In essence Hoogovens Steel had a major problem in achieving a satisfactory trade-off between what Lawrence and Lorsch (1967) described as differentiation and integration. What the company needed was a means of integrating its activities, while at the same time delegating authority to business units in a way which gives at least some autonomy to business unit managers. Thus, it needed a method of coordinating internal transactions which would realize the required degree of both integration and differentiation. In contacting the authors Hoogovens' controllers were seeking to ensure that the discussion which was taking place within their company examined all the relevant issues in a way which would lead to the successful implementation of any change to the existing transfer pricing system.

Thus, the research described in this paper addresses two questions:

- how can the coordination of internal transactions be organised so as to resolve (or at least reduce) the inherent tensions between the autonomy of business units and the needs of managing an integrated business?
- how can the process of change be organised in order to facilitate the successful implementation of the emerging new system?

The first question concerns the way in which decisions affecting internal transactions are taken; including the form of transfer pricing which is appropriate to the particular context and governance structure of the business. Here the existing literature is of some help. For example, the work of Spicer (1988) and Colbert and Spicer (1995) identify the conditions under which particular forms of transfer pricing are appropriate, and these can be used to predict the transfer pricing systems which might be expected in specific situations.

The second question, however, concerns the processes by which a particular transfer pricing systems emerges. Here the existing transfer pricing literature is of rather less help, although Van der Meer-Kooistra (1993) does provide some pointers. Thus, this paper will

explore the processes through which a new transfer pricing system emerged in Hoogovens Steel. It takes as given the decision to change the governance and organisational structure of the company. Furthermore, it will not focus on the existing transfer pricing system, but instead will concentrate on the processes of change. Hoogovens Steel was at the time of the research, and continues to be, in a period of extensive change. This change involves not only the structures and systems, but also the practices of management, and as a result the position and interests of individual managers are at issue. The paper describes the processes which led to the emergence of a new coordination system for internal transactions and investigates the implications for decision processes, information supply and management control, and their consequences for the autonomy of business units and the behaviour of business unit managers.

The paper is structured as follows. First, in section 2, there is an explanation of the theoretical concepts which were used to inform the discussions about the coordination of internal transactions at Hoogovens Steel. In section 3 the organisation structure of Hoogovens Steel is described, together with an outline of the activities of the various business units. Section 4 is devoted to the research process, and describes the various stages, the persons involved at each stage, and the information collected. Section 5 contains an extract of a discussion which illustrates the main problems involved in the coordination of internal transactions at Hoogovens Steel. Some alternative solutions to these problems are identified in section 6, and evaluated against criteria derived from the theoretical literature. While section 7 describes the choices made by the company, the conclusions of the case research and the significance of the theoretical concepts are discussed in section 8.

2 Theoretical concepts on coordination of internal transactions

Research has shown that the coordination of internal transactions is influenced by numerous factors, including the environment of the organisation and its organisational context, and in turn that transfer pricing influences the behaviour of managers². Furthermore, extensive case research (eg., Eccles, 1985; Van der Meer-Kooistra, 1993, 1994; and Colbert and Spicer, 1995), which has investigated the roles of central management and the managers of business units, has indicated the importance of understanding all the dimensions of the transactions. For example, both Eccles and Van der Meer-Kooistra stress that the coordination of internal transactions involves much more than setting transfer prices. It also concerns the delegation of authority to business units, the setting of transaction conditions (e.g. terms of delivery, product specifications, quality requirements, and so on), the form of contracting, the way conflicts are resolved and by whom, how information about the internal transactions is processed, when and how changes in the transfer pricing system take place, and in general how the internal parties interact with each other.

Much of the case research in this area has adopted an essentially static approach, although Eccles and Van der Meer-Kooistra did explore the dynamics of changing transfer pricing systems and the resolution of conflicts, and has drawn largely on theoretical concepts from earlier transfer pricing research. Van der Meer-Kooistra and also Colbert and Spicer used transaction cost theory, and in particular the hypotheses formulated by Spicer (1988), to explore how authority is divided between the parties to internal transactions. The findings of such research is briefly summarised below to provide a framework for the research conducted at Hoogovens Steel.

Eccles (1985, p. 79) argued that transfer pricing policy is determined by corporate strategy

² The following papers are illustrative of this research: Watson and Baumler (1975), Swieringa and Waterhouse (1982), Grabski (1985), Eccles (1985), Spicer (1988), McAulay and Tomkins (1992), Emmanuel and Mehafdi (1994), Van der Meer-Kooistra (1993, 1994), and Colbert and Spicer (1995).

and he linked strategy to the degree of (a) vertical integration, and (b) diversification, which in turn, he argued, influence whether internal transactions are mandated, whether transfer prices are prescribed by top management, and the way in which transfer prices are set. Using the dimensions of vertical integration and diversification Eccles distinguished four models of organisation: (1) collective; (2) cooperative; (3) competitive; and (4) collaborative. He set out the characteristics of each model and its consequences for the coordination of internal transactions. He discussed *inter alia* why specific transfer pricing policies are used, what they mean for the autonomy for the internal parties, where conflict can be expected and how to cope with it, and when the parties can access the external market. As a result Eccles broadened what had previously been seen simply as an issue of setting transfer prices.

Van der Meer-Kooistra (1993) and Colbert and Spicer (1995) went further, however. In contrast to Eccles, they did not take corporate strategy as given. Instead, they used transaction cost theory to explore issues of vertical integration and diversification, as well as transfer pricing policy. They argued that transfer pricing policies are determined not only by the boundaries of the business units and the distribution of authority and responsibility, but that the production capabilities and the decision-making and information management processes are also important; as are behavioural characteristics within the company, and the nature of external markets, such as customers, suppliers and competitors.

Transaction cost theory (Williamson, 1975, 1985, 1986) explores how transactions are coordinated and the factors which determine the form of that coordination or (in the terminology of transaction cost theory) *the governance structure*. There are two extremes of governance structure: the market and the hierarchy. Between these extremes are various other forms; so-called mixed governance structures. Some mixed structures are more market-oriented, such as supply agreements between independent parties with long-term links, while others are more hierarchical, such as joint ventures.

Although the coordination of internal transactions implies a hierarchy, various forms of coordination are possible. For example, the business units concerned may have more or

less authority. On the one hand, hierarchical arrangements might mandate internal transactions at prescribed transfer prices. But on the other hand, a more market-oriented arrangement would allow the internal supplier and buyer to determine the transfer price, and might even permit them to access external markets if internal arrangements are unsatisfactory.

According to transaction cost theory, governance structure depends on the following characteristics of transactions: (1) the degree of uncertainty in the transaction environment, (2) the degree of asset specificity, and (3) the frequency and volume of transactions. In an uncertain transaction environment the parties cannot anticipate the changes which will take place or their consequences for the transactions. As a result new agreements may be necessary on each occasion. If the transactions also require specific investments, finding alternatives may be very costly, and consequently the parties are at each other's mercy. In such cases, it is important that *ex ante* and *ex post* safeguards against opportunistic behaviour are in place.

A high degree of asset specificity makes the seller and buyer dependent on each other, and necessitates transaction conditions which can be easily monitored and do not cause unilateral disadvantages. The hierarchy is usually more suitable for such transactions than the market, especially when the volume of transactions is high and they take place frequently. Central management can mandate internal transactions and prescribe the transaction conditions. In a hierarchy opportunistic behaviour can be mitigated through control systems which encourage cooperative behaviour and ensure that business unit managers are aware of the consequences of their actions.

However, as well as the degree of asset specificity, the form of asset specificity is also important. Governance structures are shaped by rules, control mechanisms, personnel positions, information systems, etc., and these depend in part on the form of asset specificity. Williamson distinguishes six forms of asset specificity: (1) site specificity; (2) physical asset specificity; (3) human asset specificity; (4) dedicated assets; (5) brand name capital; and (6) temporal specificity (see 1985, 1986, 1991). Research (eg., Armour and

Teece, 1980; Monteverde and Teece, 1982a, 1982b; Palay, 1984) has shown that, for instance, with high physical asset specificity or substantial dedicated assets contractual arrangements can be made to moderate conflict and limit opportunistic behaviour; as when a buying company agrees to reimburse the value of a specific machine or installation in the event of the relationship being terminated unilaterally. Thus, economic interests in a transaction can be protected. In such cases it is the form of asset specificity which influences the nature of the contractual arrangements and consequently, the fine tuning of a governance structure requires insight into the character of any specific investments.

Adapting such arguments to internal transactions led Van der Meer-Kooistra (1993) and Colbert and Spicer (1995) to expect that in case of high asset specificity business unit managers will be constrained in their sourcing and selling decisions. For example, a requirement that transactions have to take place internally will guarantee the continuity of the transactions and protect the value of specialized investments. Whereas, when asset specificity is low business unit managers will be allowed to make their own decisions with regard to selling or buying internally or externally. However, their research identified cases in which such relations were not found: as when even though asset specificity was low, internal transactions were prescribed. Colbert and Spicer explained these findings by referring to the intended strategy of the company; such as where a division is set-up to serve internal needs and an exclusively internal focus is retained. But Van der Meer-Kooistra concluded that history matters, and as past actions influence the present, decisions are often made in an incremental way. Thus, although circumstances may have changed, it may not be easy to change structural relationships. For instance, a change which would allow internal parties to buy or sell externally could have implications for levels of employment, and such decisions are only likely to be taken when the company's profitability is under considerable pressure.

Van der Meer-Kooistra (1993) also found a company which permitted external transactions even though asset specificity was high. But in this case, although the organizational structure was characterized by a high degree of decentralisation, further investigation revealed that if a business unit wanted to buy or sell externally it had to

discuss the matter in advance with central management. The result was that all transactions took place internally - as suggested by the theory. Van der Meer-Kooistra concluded that as well as being compatible with the organizational structure, the design and functioning of the transfer pricing system has to be in line with performance measurement, evaluation and reward systems. As the coordination of internal transactions is directly linked to the nature and functioning of other control systems, any inconsistencies would increase the risk of undesirable behaviour and could cause frictions in the organization. Furthermore, transfer pricing policy is determined, to an extent, by the quality of information management, as well as by the availability of information.

The various factors described above provide an insight into the framework within which the transfer pricing system functions. The organizational structure and, in particular, the division of authority and responsibility have an impact on the degree of autonomy of business unit managers. Vancil (1979) argued that the financial measurement and assessment systems, which regulate the allocation of profits and costs to business units and apportion financial responsibilities, has an impact on the local managers' perception of their autonomy, and influences their behaviour.

As the methods used to assess financial results influence the behaviour of those assessed, the coordination of internal transactions has to reflect the interdependencies between business units. As discussed above, transaction cost theory identifies three characteristics of transactions, which can be used to explore these interdependencies: namely, (1) the degree of uncertainty of the transaction environment; (2) the degree of asset specificity; and (3) the volume and frequency of transactions. If there are frequent transactions of goods or services between two business units, the interdependence will be greater than if there are only occasional transactions. The interdependence will also increase with the size of the internal transactions *vis à vis* the total transactions of the business units. Furthermore, the greater the uncertainty the more the parties will be dependent on each other. When the interdependence between two business units is high Van der Meer-Kooistra (1992) found that assessment, evaluation and reward systems are linked not to the performance of the individual business, but to the combined performances of both units.

In large complex companies, which operate in various markets and regions, and probably face volatile market conditions, decisions have to be taken by those who possess sufficient knowledge of the circumstances. If all decisions are taken by central management, decision making will be slow, strains will be placed on the information systems and business unit managers will become frustrated. In such cases there is information asymmetry between central management and business unit managers, who themselves possess different amounts of information. Furthermore, certain types of information cannot be easily transmitted. For example, experience-based information is tied to an individual or group and is very difficult to communicate. Such so-called tacit knowledge contributes to information asymmetry and can encourage opportunistic behaviour.

Thus, decisions may be taken in an individual's (or group's) own interest, without taking into account the consequences for other business units or the company as a whole. This creates what Williamson called behavioural uncertainty, which is due to 'strategic non-disclosure, disguise, or distortion of information' (1985, p.57). In such cases it is essential to reduce the information asymmetry and research has demonstrated that direct negotiations and personal contacts between the parties can diminish information asymmetry (Ackelsberg and Yukl, 1979, Chalos and Haka, 1990).

The potential for, and consequences of, information asymmetry have to be recognised in the design and functioning of the transfer pricing system. First, central management is unlikely to possess enough information about specific internal transactions. Van der Meer-Kooistra (1993) found that, even with large specific investments, transfer prices and other transaction conditions were determined by business unit managers. Second, there are various arrangements which can reduce information asymmetry. Use of the open-book principle and permitting the parties concerned to negotiate over the conditions will make everyone better informed, and so discourage opportunistic behaviour. Negotiations are helpful, particularly when high levels of uncertainty in the transaction environment mean that the transaction conditions have to be changed frequently. In order to avoid lengthy negotiations, and even conflicts, central management will usually appoint an arbitration

committee.

Colbert and Spicer (1995) assume that at higher levels of asset specificity internal transactions will be more customized, and consequently it will be very difficult to find prices in external markets which can be used for transfer pricing, and as a result transfer prices will be based on cost. However, Van der Meer-Kooistra (1993) found a close relationship between the availability of information and the transfer price system. Furthermore, when a company's accounting system gathers precise information about product costs (say, because it pursues a strategy of cost leadership) the use of cost-based transfer prices has cost advantages. In other words, using cost-based transfer prices does not depend primarily on the degree of asset specificity, but on the cost of information processing. She also found examples of market-based transfer prices with high asset specificity, and cost-based transfer prices with low asset specificity, which could be explained by information processing cost efficiencies. Furthermore, Colbert and Spicer's assumption that high asset specificity means that external markets are not available is also doubtful, as they do not take account of the various forms of asset specificity.

Finally, differences in the risks associated with internal transactions can influence the behaviour of business unit managers. March and Shapira (1987) demonstrated that, if the anticipated result of a decision is considerably more favourable than the objective, the decision maker will take more risks. But as the anticipated result comes close to realisation risk aversion increases, and it can be very high if the anticipated outcome is below some critical survival level. If a cost-based transfer pricing system with mandatory internal transactions is used the supplying unit will know that all its costs will be recovered, although no profit will be earned on the internal transactions. If the buyer further processes the internally supplied goods and sells them to the market, this unit bears the market risk, with respect to both the volume sold and the price received. But alternatively, if internal transactions are made at market-based prices, both parties bear market risks, and the supplying unit also has to take market conditions into account, even when internal transactions are compulsory.

Based on the above discussion, table 1 summarises the factors which have the potential to influence the coordination of internal transactions - see Van der Meer-Kooistra (1993). Many of these factors were derived from transaction cost theory, but although necessary, they are not sufficient for explaining the coordination of internal transactions. We know from case research that history matters and that major decisions are sometimes difficult to take, so that change is often incremental. Thus, to explore the coordination of internal transactions we need to recognise organisation history as well as context. The framework developed in this section provided the theoretical basis for discussions at Hoogovens Steel.

Table 1 Factors Influencing the Coordination of Internal Transactions

Characteristics of the organizational context:

- a. organizational structure, comprising the division of authority and responsibility and the distribution of the risks involved in internal transactions;
- b. performance measurement, assessment methods and reward systems;
- c. information processing and supply methods;
- d. the organisation's history.

Characteristics of the internal transactions:

- a. uncertainty of the transaction environment;
- b. degree of asset specificity;
- c. volume and frequency of the internal transactions.

Characteristics of the parties involved:

- a. bounded rationality;
- b. potential for opportunistic behaviour;
- c. degree of information asymmetry between central management and business units and the degree of information asymmetry between the business unit managers involved in internal transactions;
- d. attitude to risk.

3 Changes in governance and organizational structure at Hoogovens Steel³

Hoogovens, founded in 1918, is a company which now (in 1997) has approximately 23,000 employees and a turnover of approximately 10 billion Dutch guilders (equivalent to 5 billion US dollars). This paper deals with Hoogovens Steel, which accounts for about 68% of the total turnover, while aluminium which is Hoogovens's next largest product accounts for 29% of turnover. Today, Hoogovens Steel (abbreviated to HS) produces more than 6.6 million tons of steel annually; eighty percent of which is exported. Its main production site, which covers eight hundred hectares, is located at IJmuiden, in the Netherlands (Hoogovens, 1998).

Until 1995 HS had a functionally based organisational structure which was regarded by the company's management as quite appropriate for an integrated mass producer of steel. However, during the eighties, the steel market became more heterogeneous, and a greater variety of steel products, of differing qualities, were produced to customers' specifications. Furthermore, the steel market became saturated, due largely to excess capacity in the world market. For HS this meant a change from being largely a producer of commodity steel to producing more speciality products.

As a consequence of this change in its product-markets and to make it more responsive and flexible to market demands, HS has restructured several times during the past two decades. The most recent restructuring, which took place in 1995, was intended to make the organization more market-oriented by creating business units linked directly to the different product-markets, and each accountable for its own financial performance. This resulted in the following organizational structure (see figure 1):

- HS is divided into five business units, referred to as performance units (PUs);
- two of these five units have primarily an internal function and supply intermediate goods (HS Primary Products) or services (HS Infrastructure and Services) to the

³ This section is based in part on Hoogovens (1996).

other units; the other three units (HS Steel Strip mill Products, HS Packaging and HS Long Products) supply their products to external markets, although internal transactions also occur, as will be clarified below;

- Hoogovens consists of, along with the five steel units, ten other business units, governed by a Board of Directors, with one member (the CEO Steel) responsible for the five Steel units.

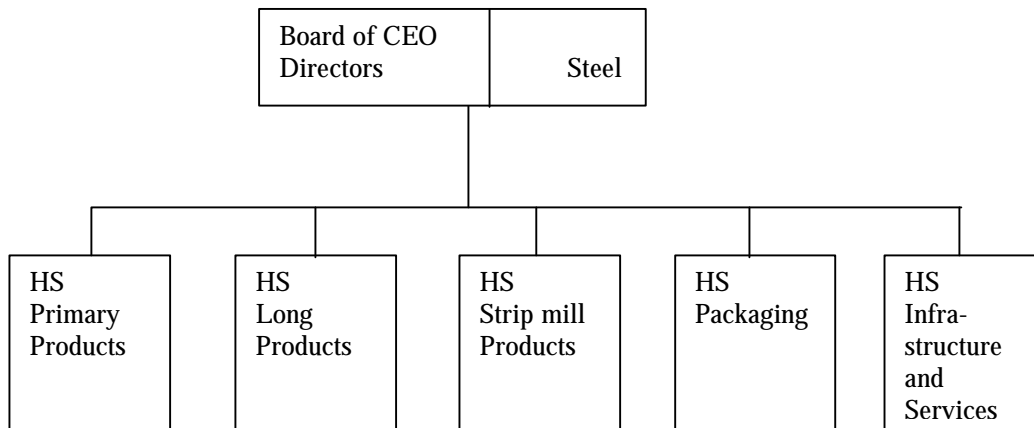
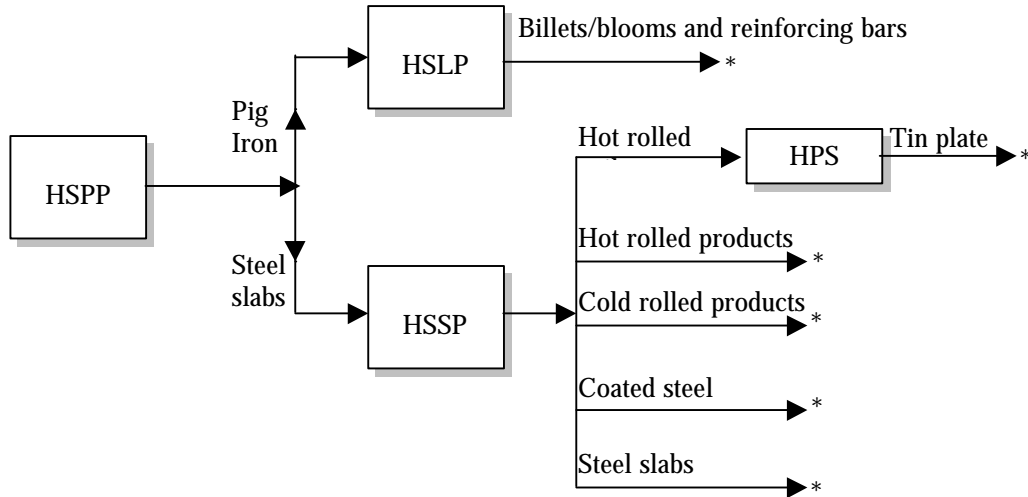


Figure 1 Organizational structure of Hoogovens Steel since 1995

The main features of HS steel process are illustrated in Figure 2 below, which shows the flow of intermediate and final products of the four business units engaged in steel production. The fifth unit, HS Infrastructure and Services, is omitted because it supplies only supporting services.

HS Primary Products (HSPP) purchases raw materials, iron ore and coal, and processes them to produce pig iron, which is supplied to HS Long Products. In addition, steel slabs are produced and supplied to HS Strip mill Products. *HS Strip mill Products (HSSP)* processes these steel slabs into various rolled products, for internal as well as external customers. It sells slabs, hot-rolled coils, uncoated and coated cold-reduced steel (e.g. for construction and piping purposes). *HS Packaging Steel (HPS)* processes the hot-rolled coils into various types of tin plate which are used to produce tin cans for foodstuffs,

aerosols, and for other packaging purposes. *HS Long Products (HSLP)* produces continuously poured steel billets and blooms, and reinforcing bars, which are used in, for example, the automobile and construction industries. *HS Infrastructure and Services* provides all kinds of services to other HS business units, such as engineering, building, computer and library services.



* = supply to market or to fully or partly owned independent companies

Figure 2 The Steel Process

4 Research process

The research at HS was conducted between May 1995 and February 1997 and can be divided into four stages. Before these stages are explained, the role of the researchers needs to be clarified. Not only did the researchers observe the controllers' discussions about the coordination of internal transactions, but as will be explained below, they also took part in those discussions. However, the researchers' input was restricted to advice on the available alternatives and their respective advantages and disadvantages. Care was taken to ensure that decisions about the new system were made by the controllers and their

managerial colleagues. Thus, although the process can be characterised, in part at least, as action research, the emerging system for the coordination of internal transactions reflects to a considerable extent the needs, beliefs, values and preferences of people within HS.

The *first stage* of the research began when the coordinating controller of HS invited two of the authors to take part in a change process at his company.⁴ The 1995 reorganization had created business units which were responsible for their own financial results and had prompted a reconsideration of the ways in which internal transactions were coordinated. In the new structure transactions across the boundaries of the business units not only had implications for their individual activities, but also had a direct impact on their financial results. The existing cost-based transfer prices meant that business units which primarily sell internally cannot show any profits, because their selling price equals their total production cost. It is only the business units which sell to the external market that show a profit.

Traditionally, cost-based transfer prices had been used for nearly all internal transactions within HS, and their continued usefulness was questioned, in view of the new organizational structure and the associated management philosophy which made business units responsible for their own financial results. At this stage in the research process there was an initial meeting with all HS controllers (including the corporate controller) at which the authors presented some ideas on the coordination of internal transactions. They outlined, in general terms, the ideas set out in section 2 above, and emphasised the interrelationships between the various factors involved. During this presentation the multidimensional nature of the control process was discussed and the authors argued that the coordination of internal transactions should not be considered solely in terms of the transfer pricing system because the allocation of responsibilities, the system of performance measurement, the assessment and reward of (business unit) managers and the

⁴ Each of the HS business units has a controller. In addition, there is a *coordinating controller* who has functional responsibility for the business unit controllers, and also a *corporate controller* who supports the Board of Directors.

associated administrative procedures also have to be taken in account.

During the *second stage* of the research the individual controllers provided information about the internal transactions in which their business units are involved⁵, focusing primarily on the characteristics of the internal transactions outlined in table 1 - i.e.,

- a. uncertainty of the transactions environment - expressed in the following terms:
 - * the availability of an external market;
 - * the stability and predictability of the external market;
 - * the competitive power of HS, particularly, in terms of price setting;
 - * the degree of interdependence of suppliers and customers with regard to product characteristics;
- b. the degree of specificity - subdivided into site, physical, human asset and dedicated asset specificity; and
- c. the volume and frequency of transactions - in physical and money terms.

The controllers also described the availability of information concerning:

- * suppliers and their prices, and the extent to which surrogate price indicators could be specified, if no market information is available; and
- * benchmarks for the cost levels at the various stages of the steel production process.

In addition, they indicated the cost of providing this information and the extent of "information asymmetry" between the parties. They also described the existing methods of

⁵ In this process the business unit controllers were representing their individual business units and their business unit managers. In general, the business unit controllers in HS are accountable to their own business unit manager; although some of their activities, such as the application of accounting standards, are centrally coordinated.

managing internal transactions, in particular:

- * the systems of order processing;
- * the way in which volume and quality are controlled;
- * the way in which complaints are settled;
- * the availability of standard terms and conditions for both volume and price;

Finally, they gave their opinions on two alternative forms of transfer pricing: market-based and cost-based. Each alternative was evaluated according to the following criteria:

- * does it induce desirable incentives for both suppliers and customers?
- * is it compatible with the new management philosophy?
- * is it compatible with the present system of performance evaluation?
- * does it discourage suboptimizing behaviour?

In the *third stage* of the research the information collected during the second stage was discussed with all the HS controllers. A major dilemma emerged during this discussion:

how should HS cope with the tension between the autonomy and the interdependence of its business units?

On the one hand, the new management philosophy called for autonomous business units with responsibility for their own financial results, while on the other hand, as HS is an integrated steel producer, there was a strong desire not to damage the inherent interdependence of the business units. Section 5 provides an illustration of issues which arose in this debate.

As the discussion of principles which inform the selection of a system for coordinating internal transactions did not lead to a consensus amongst the HS controllers, the authors were asked to prepare a report to clarify differences of opinion and to identify possible solutions. During the *fourth stage* the authors' report was discussed with the controllers. The content of this report and the outcome of the subsequent discussions are detailed in

section 6 below. Although these (and all the other) discussions took place with HS controllers (including the coordinating controller), the business unit controllers reported to their business unit managers, and the coordinating controller kept the CEO Steel informed.

After these four stages the coordinating controller drew up a proposal for a revised system for the coordination of internal transactions in HS. This proposal was discussed in a management meeting attended by the CEO Steel and the business unit managers, as well as the coordinating and corporate controllers. The principal features of this revised system and the underlying arguments are described in section 7.

5 Debate on coordinating internal transactions

As indicated above the tension between the autonomy and interdependence of business units within HS became an important issue of debate in the controllers' discussions. The following extract from these discussions illustrates the arguments put forward during this debate. To simplify matters, we shall introduce only three discussants. Bob van Delden is the controller of HS Primary Products, which mainly supplies internal customers, while Marian Brandsma is the controller of HS Packaging Steel, a unit that supplies the external market. Dick Holland is the coordinating controller of HS who advises the CEO Steel.

Bob van Delden: *I know my unit does not supply the market directly, but our people should be more exposed to market pressures. If the products of HS have to be sold at low market prices, this should be an incentive for us to produce more cheaply.*

Marian Brandsma: *I could not agree more. Our unit does sell to the market and if we get high prices, we make huge profits. We hardly realize that a considerable part of these profits is the result of good work done during earlier stages of the steel production process, for instance by your unit, Bob. Because your unit supplies other*

units of our company at full cost, our unit can boast too easily: "just look at our profit, how well we did." These feelings of pride are unwarranted and may also lead people to believe that they "can sit back and relax."

Bob van Delden: *So what does this mean for the transfer prices that are used by HS?*

Marian Brandsma: *I think that we ought to start using a system of market-based transfer prices. So we should abolish the current system of cost-based transfer prices. Look, if there is a decline in demand in the external market, and we have to accept low prices, transfer prices ought to be affected as well. In that case, Bob, your unit will be motivated to produce more cheaply and effectively. If HS as a whole makes a loss, your unit and mine will probably also make a loss.*

Bob van Delden: *And what will happen when the steel economy is booming?*

Marian Brandsma: *Well, a market-based price system will also be a success in those circumstances. If we manage to get high prices for our products in the external market, this will benefit you too. That does not happen with a cost-based transfer pricing system. You will break even, while we make all the profit.*

Bob van Delden: *Precisely! And you know, such a change in policy is also very much in line with the new management philosophy introduced by the senior management. They want to control and assess all business units within HS on the basis of results. This will only be possible if certain units, like ours are no longer regarded as cost centres.*

Marian Brandsma: *This would mean, of course, that, if we thought your prices were too high, our unit would be allowed to purchase from other steel producers.*

Dick Holland: *Ah, there we have it. As a coordinating controller, I want to take exception to over-simplified opinions of this kind. We are a vertically integrated company. For good reasons: we are ideally located by the North Sea, and we have invested in the production of steel with a view to processing steel in our company. So we are interlinked. Surely, Marian, it would be unthinkable for your unit to buy steel from a competitor in the future. Our system of compulsory internal transactions is not a handicap at all, but a strength. And another thing. I think your stories about market-based transfer prices are nonsense. Bob, is there an external market for steel, in particular for pig iron? I don't think so. All our competitors produce steel to process in their own companies. Only after the steel has been processed, is it sold in external markets.*

Bob van Delden: *You've got a point there, but how is the idea of 'our being inter-linked' to be reconciled with the new management philosophy? How can we be completely interdependent and still be assessed on the basis of our results?*

Dick Holland: *Well, I must admit that is a moot point.*

What can we learn from this discussion? First of all, business units which sell their intermediates internally have no incentive to look outside or to react to external market conditions. Only the business units which sell externally have to be aware of outside competition and changes in market conditions. But business units selling externally are

dependent, in some cases to a large extent, on the internally oriented business units, as the volume and quality of their final products are determined by the volume and quality of the intermediates. Thus, the profits made by the business units at the end of the production process are, in part, dependent on the efficiency of the earlier stages of production.

As the steel market is now highly competitive and subject to large cyclical fluctuations, it is important for HS to react quickly to changes in market conditions. Furthermore, due to the integrated nature of HS's production process, it is not only the business units which sell externally which have to react to the market, it is essential for business units at earlier stages of production to be responsive to the needs of the market. For example, they have to recognise the quality required by the market and look for efficiencies in the production of those products which are under significant competitive pressure. The latter is particularly important as a major part of production costs is incurred at the earlier stages of production. Thus, if cost efficiencies are to be found there is often greatest scope in these earlier stages.

Furthermore, the controller of the internally oriented business unit wanted to make managers in his unit more sensitive to market conditions by subjecting them to market risks. Although business units at the end of the production process were bearing all the market risk, they could not directly control all the characteristics of the products (including costs and quality). It was thought to be fairer to give the business units which bear the market risk greater control over their activities; for example, by allowing them to buy intermediates from outside suppliers if they are not satisfied with the internal transactions. However, as the controllers were aware, the production process is highly integrated and the profitability of HS as a whole depends on how the interconnections are exploited. If business units were to buy intermediates from the external market, it could have a damaging effect on HS's financial results. In addition, as some intermediates have no external market, there is no alternative to internal transactions. But nevertheless, interdependencies between the business units create major problems in assessing the financial results of the individual business units.

6 From opposing views to possible solutions

This section will first explore, in general terms, the tensions in HS created by a system of compulsory internal transactions in the context of business units responsible for their own financial performance. We then set out alternative transfer pricing systems and outline criteria to assist in choosing between them, based on the report which the authors prepared for HS controllers. Finally, we will describe the results of the discussions with the HS controllers which were based around those criteria.

Incompatible principles?

The economic advantages of a vertically integrated steel company, such as HS, are derived principally through the exchange of knowledge and expertise between the successive stages of production, through specific investments which benefit more than one stage of the production process, and through the availability of dedicated productive capacity. HS's competitors are also vertically integrated, but being situated by the sea, HS has a particular advantage due to the easy transport of raw materials. However, the integration of the production process means that much decision-making is centralized, especially major decisions, such as investment decisions, which affect more than one business unit. As a result, decisions about reinvesting cash flow and the prioritizing of specific projects are usually taken centrally, although some small investment decisions are delegated.

Because of the interdependencies between business units, the profitability of individual products is determined by the efficiency and quality achieved at all stages of the steel making process. Furthermore, due to the highly competitive nature of the world steel market, HS has relatively little control over the prices it receives for its products, as they are largely market determined, and subject to considerable uncertainty. Thus, HS has to focus on the costs and efficiency of its production process in order to improve its profitability. This means that the acquisition of raw materials and the efficiency achieved in the production of intermediate products can be of vital importance for the profitability of HS as a whole.

In his description of short-term capacity utilization decisions at HS, Wouters (1996) illustrated the complexities involved, with many different factors having to be taken into account, including variable costs, certain elements of fixed costs, market conditions, obligations towards particular customers, and long-run expectations about the profitability of alternative uses of productive capacity. Simple pricing rules, such as full cost or even market-based pricing are unlikely to provide a suitable basis for such decisions or for the coordination of the resulting internal transactions. Wouters described how the planning of capacity utilisation at HS emerges from intensive consultations between the various people involved at each stage of steel making process. Short-term production plans are drawn up every three months, setting out the volumes of both the intermediate and final products. These plans specify the quantities of the individual products to be produced at the successive stages of production and thereby imply the volumes of intermediates to be transferred from one process to the next.

As a result of the 1995 reorganisation, the various business units, now called performance units (*PU*s), became accountable for their own *financial results*, especially their profitability.⁶ In general terms, it might be argued that accountability should, in principle at least, be matched by authority. For example, someone not authorized to take a particular decision should not be held accountable for the consequences when that decision is taken by others. Thus, as the PUs are accountable for their financial results, their managers could be expected to want to be in control of the decisions which impact on those results, even though this might expose them to certain risks, such as the risks inherent in the purchase of raw materials, the recruitment and training of staff, the acquisition and operating of machines, and especially the selling of products.

Although the unit(s) at the early stages of the production process do not sell to the external market, their managers seemed willing to be subject to market risks. According to HS

⁶ The terms PU and business unit will be used interchangeably throughout the remainder of this paper.

controllers, this would enable them to respond to the demands of the external market, so that the subsequent units would be able to operate more successfully in that market.

Thus, there is a tension between the policy of compulsory internal transactions within a vertically integrated steel company, and the management philosophy of making PUs accountable for their financial results. The former emphasises the *interdependence* of the business units and implies a centralization of authority, while the latter underlines the relative *independence* of business units and a decentralization of authority. The question which was faced by the controllers of HS (and two of the authors who were advising them) was how to reconcile these two apparently contradictory policies.

Addressing this question requires a consideration of how internal transactions are coordinated, including the system of transfer pricing in operation. But in view of the interdependencies between the various stages of production, HS's policy of compulsory internal transactions was not open for debate. Nevertheless, the PUs could be given more freedom in determining the conditions on which internal transactions take place and/or in relating such transactions to market-based information. The following summarises the advice contained in the report the authors prepared for the HS controllers.

Possible solutions

Traditionally, HS had used a system of cost-based transfer prices which were quite suitable for a vertically integrated steel company, but some people in the company seemed to think that market-based transfer prices were an inevitable result of the introduction of PUs. However, these two types of transfer prices represent extreme positions, and it was doubtful that either would be feasible in a situation where the benefits of vertical integration had to be reconciled with the philosophy of holding business units responsible for their financial results. Therefore, in advising the HS controllers the authors looked for compromises, bearing in mind that internal transactions had to remain compulsory, and two broad alternatives were suggested.

Alternative 1: let the parties involved determine both the transfer prices and the other terms

of the transactions through *negotiation*. In this way, the parties would have to agree what they each contribute to any particular transaction. Through such discussions of the terms and conditions of internal transactions the parties will be exchanging information about their circumstances and possibilities. They could also discuss the nature of the final market and inform each other about contracts and other dealings outside HS, and thereby they can take into account the market demands and pressures on them (and on HS as a whole).

Alternative 2: use a modified form of *cost plus pricing* for internal transactions. Two types of modification were distinguished.

Alternative 2a: the mark-up at each stage of the production process being determined by *transferring part of the budgeted profits of the business units supplying the external market, to those business units which supply the intermediate products*. The profits transferred could be calculated, for example, on the basis of the budgeted costs at the various stages of production.

Alternative 2b: the mark-up at each stage of the production process being determined by *the extent to which each business unit meets relevant assessment criteria*; for example, efficiency and capacity utilisation targets. The total company profits would thereby be allocated to the units which achieve their targets.

The mark-ups calculated under alternatives 2a and 2b are intended to reflect the contributions which each unit makes to HS as a whole. If HS makes a loss, the mark-up under alternative 2a will become a mark-down.

Criteria to evaluate the alternatives

In advising the HS controllers, the authors avoided making explicit recommendations. The choice of a preferred method for the coordination of internal transactions had to come from within HS. However, to assist the controllers in evaluating the alternatives described above, various criteria were suggested. These were designed to provide insights into the

advantages and disadvantages of each alternative in the particular context of HS. Criteria a. to e. listed below were derived from the theoretical ideas discussed in Section 2 and summarised in table 1. In addition, in view of the implications of cyclical movements in the steel market for a company such as HS, criterion f. was added.

- a. *allocation of authority, and financial or other responsibilities:* does the transfer pricing system help to match the responsibilities of the business units with the authority given to them?
- b. *market incentives:* does the transfer pricing system encourage the various business units to take account of developments in the market?
- c. *management information:* does the transfer pricing system produce the information required to take decisions about internal transactions?
- d. *conflicts of interests:* will the transfer pricing system create conflicts of interests, and can steps be taken to minimise them?
- e. *feasibility in terms of accounting:* is the transfer pricing system practicable as far as accounting is concerned?
- f. *boom or recession:* how will the transfer pricing system function during periods of boom or recession?

Results of the evaluation

The HS controllers were invited to use these criteria to evaluate the alternatives outlined above and the remainder of this section describes the outcome of their discussions. The two cost-plus alternatives will be considered together, although some specific remarks will be made about each separately; but first the negotiation alternative will be considered.

Alternative 1: negotiation

This alternative gives the individual business units some control over the conditions of their internal transactions. However, as business units are not allowed to buy or sell intermediate products externally, their authority is limited, even though they are responsible for their financial results. Consequently, there is some imbalance between authority and responsibility. In order to cope with this imbalance, performance measurement (and also reward) systems should not be restricted to the financial results of the individual business units, but should also incorporate measures linked to the performance of the company as a whole.

Available information about markets, competition, competitors etc., can be fully exploited in negotiations over internal transactions; as also can information about technology, costs etc. Thus, as the negotiations enable business unit managers to become informed about market and cost conditions, information asymmetry between negotiating parties will be relatively low, although the central management will not have as much information as the business unit managers (but this could be avoided by applying an open-book principle).

But conflicts of interest between negotiating parties can pose a serious threat. Negotiations could take considerable time and agreement may never be reached. Consequently, central management needs to have the power to intervene, possibly through arbitration procedures. Furthermore, there is the problem that the outcome of the negotiations may depend on the negotiating skills of the parties, rather than the strengths of their respective arguments. Negotiations over the terms and conditions of internal transactions are unlikely to cause particular accounting problems.

Finally, negotiations should work reasonably well during a boom or a slump. Of course, the parties may be more inclined to shift the risks of negative consequences during a slump to other parties, but this possibility could be diminished by the threat of central management interference and also by a performance measurement (and possibly reward) system which combines both business unit and company results.

Alternative 2: cost-plus pricing

With a cost-plus transfer pricing system central management specify the conditions for internal transactions, thereby limiting the authority of individual business units, although business unit managers could be involved to some extent in setting these conditions (e.g., through consultation). Consequently, a system of performance measurement (and possibly reward) based on both business unit and company performance is needed.

Under a cost-plus transfer pricing system, business units are only indirectly confronted by the market. A specific disadvantage of apportioning budgeted profits on the basis of the costs of individual business units (alternative 2a) is that the units have no incentive for cost reduction: the higher their costs, the greater the profit apportioned to them. But this may not be a serious disadvantage if benchmarking is used to set targets.

As a result of calculating profits on all the products for purposes of apportioning the total profits to the individual business units (alternative 2a), all parties (business unit managers and central management) will be informed about market and cost conditions. Consequently, information asymmetry problems are unlikely. However, in relation to alternative 2b, where the mark-up is determined by performance against relevant assessment criteria, there is no objective way of selecting the basis of allocation or the amount to be allocated. In this case, and possibly also in the case of alternative 2a, conflicts of interest could occur over the allocation of profits and central management will have to play a key role in setting fair criteria for profit allocation.

There are also potential accounting problems with this alternative(s). First, actual sales, costs and profits may differ from the budget. However, the use of a relatively short planning period might resolve this problem. Second, physical performance criteria need to be well-defined and easily measurable.

In a period of a slump, when market prices are very low, there may be an incentives for business units supplying internally to pass on costs. In a boom period, however, there may be a 'sit back and relax attitude'. The use of physical targets (alternative 2b) in a slump could lead to the strange situation whereby a supplying unit could make a profit at the

expense of the unit selling to the market which is incurring a loss. But in a slump, alternative 2a would use a cost-minus (rather than a cost-plus) and would thereby avoid this problem.

Table 2 uses the following scale to summarise how HS controllers evaluated the two alternatives against each criterion:

- ++ very well
- + fairly well
- 0 neither well nor badly
- rather badly
- very badly.

But it was recognised that in many instances specific negative evaluations could be avoided (or minimised) by adding further controls. For example, a system of arbitration by central management could prevent conflicts or lengthy negotiations. Moreover, systems of performance measurement and reward based on both business unit and company performance could encourage business unit managers to recognise the effects of their decisions on the company as a whole, and not to be solely interested in their own financial results. Furthermore, in the case of the cost-plus alternative(s), the balance between business unit authority and responsibility could be improved by involving business unit managers in decisions concerning the terms and conditions of the internal transactions.

Table 2 Evaluation of transfer pricing alternatives

transfer pricing alternatives	<i>allocation of authority and financial or other responsibilities</i>	<i>market incentives</i>	<i>management information</i>	<i>conflicts of interests</i>	<i>feasibility in terms of accounting</i>	<i>boom or recession</i>
negotiated	+	+	++	-	+	+
cost plus	0	0	++	0	0	+

7 Decisions made by the HS management

The process described in this paper was driven by a perception within HS that its system for coordinating internal transactions needed to change. Although it was the controllers who were intensively engaged in the discussions, they were in general representing the views of their managerial colleagues. The discussions described in the previous section inspired the coordinating controller to draw up a proposal which was then accepted by HS managers with little further discussion. However, the evaluations of transfer pricing alternatives reported in the previous section only implicitly influenced the coordinating controllers proposal, which was based on two principles. First, business units which were not already directly involved in external transactions, must be encouraged to behave in a more market-oriented way, and second, the new system had to be both transparent and simple.

The new system agreed by HS managers comprises a profit allocation scheme in which the budgeted profits of each product are divided between the business units which are involved in its processing. This allocation is based on the budgeted "added costs" of each business unit; defined as the total product costs of the unit, less costs of raw and auxiliary materials,

and plus revenues from by-products (all measured at standard cost). This profit allocation scheme is to apply only to the business units directly engaged in steel processing. Hence, HS Infrastructure and Services, being a supporting business unit, will not receive a profit allocation.

This new system has three important characteristics. First, the profit allocation is specific to each individual product, both because there can be different business units involved in the individual products, and because their respective contributions to the production process can differ. Second, the profit allocation is calculated using budgeted standard costs and forecast revenues; with no account taken of differences between actual and budgeted profits. However, flexible budget variances and efficiency variances are attributed to the business units where they occur. Third, transfer prices continue to be based on full standard costs. Thus, the profit allocation scheme is not used for transfer pricing.

Table 3 Illustrations of profit sharing between business units involved in making a product

	product 1	product 2
Budgeted revenues	4,000	8,000
Budgeted total costs	3,800	7,200
Budgeted profit margin	200	800
Budgeted costs HSPP	2,000	1,500
Less material costs HSPP	800	1,000
Budgeted added costs HSPP	1,200	500
Budgeted costs HSLP	1,800	-
Less material costs HSLP	1,000	-
Budgeted added costs HSLP	800	-
Budgeted costs HSSP	-	2,500
Less material costs HSSP	-	1,500
Budgeted added costs HSSP	-	1,000
Budgeted costs HSP	-	3,200
Less material costs HSP	-	1,700
Budgeted added costs HSP	-	1,500
Profit allocation based on added costs	<p>HSPP: $[1200/(1200 + 800)] \times 200 = 120$</p> <p>HSLP: $[800/(1200 + 800)] \times 200 = 80$</p>	<p>HSPP: $[500/(500 + 1000 + 1500)] \times 800 = 133$</p> <p>HSSP: $[1000/(500 + 1000 + 1500)] \times 800 = 267$</p> <p>HPS: $[1500/(500 + 1000 + 1500)] \times 800 = 400$</p>

Table 3 shows two illustrations of the new system, but for reasons of confidentiality, hypothetical figures have been used. Moreover, the illustrations are simplified in another way; as the effects of revenues from by-products, and both flexible budget and material price variances have been ignored.

The system is designed to ensure that business units, which are not directly exposed to external markets, share at least some of the market risks. If market conditions are poor, leading to low profits or even losses, these business units (as well as the business units which sell directly to these market) will be encouraged to operate more efficiently. While, if market conditions are favourable, business units which do not directly supply the external market will also benefit from high profit margins. There are similarities between the new system and alternative 2a in the previous section, although there are also some differences. First, there are differences in the way profits are divided between the business units: alternative 2a used total budgeted costs as the basis of allocation, while the new system uses the budgeted "added costs". Second, the new system is *only* a profit allocation scheme, and it is not used for transfer pricing.

According to their coordinating controller, the business unit managers claimed that the new system is preferable to negotiated transfer prices (alternative 1 in the previous section) as it avoids costly and time consuming negotiations. Costs and revenues can be estimated reasonably accurately in the short run (on a three-monthly basis). Finally, it should be emphasized that although the outcomes of the profit allocation scheme are not used for the compensation of PU managers, they will affect the evaluation of their PU's performance. Thus, the system provides information primarily to support decision making and, as will be discussed in more detail in the next section, the business unit managers can use this information as an input for the decisions which affect the use of productive capacity and by implication the coordination of internal transactions. Thus, although the new system is not used for transfer pricing, it is nevertheless an essential part of the system of coordinating internal transactions.

8 Discussion

In the 1995 restructuring HS introduced business units (PUs) in an attempt to make all parts of the business more aware of, and responsive to, the demands and pressures of the increasingly competitive market. The cyclical nature of the demand for HS's products and the excess capacity in world steel markets during the eighties led senior managers to adopt the philosophy that all PUs should be accountable for their financial results. However, as HS is an integrated steel company, the profits of individual PUs depend to a great extent on the transfer prices and other mechanisms used for the coordination of internal transactions.

In the company's previous functional structure, all internal transactions had been mandated and centrally organized. In addition, cost based transfer prices had been used for most internal transactions, and revenues recognised only when the output was sold to external customers. Operating managers were responsible for costs of their processes, and as production moved from process to process these costs went with it. Consequently, there was little incentive for operating managers to be responsive to what in the 1990s had become increasingly competitive and uncertain market conditions.

The reorganization was intended to create a structure in which all managers have to recognise the implications of prevailing market conditions. However, as HS remains a highly integrated steel producer the coordination of internal transactions continued to be an important issue. Consequently it was decided to reconsider the transfer pricing system and it was at this point that two of the authors became involved. They offered advice on the general principles to be considered and suggested a framework for discussing alternative methods of transfer pricing. It became clear very quickly that market-based transfer prices would not be suitable and thus the choice was between negotiated transfer prices and various forms of cost-based prices.

The system eventually selected was cost-based, but with the budgeted profits on individual product lines allocated to the PUs which contributed to their production in

proportion to their "added-costs" - measured in terms of standard costs. Although the implied transfer prices could be computed, these prices are not actually used, as all products continue to be transferred at standard cost. Although, the profit allocations are not used for compensation of the PU managers, they play a role in the evaluation of the results for their PUs.

So what has this extensive exercise in reviewing the transfer pricing system achieved for HS? Previously cost-based transfer prices were used - and with the new system transfers are still priced at their standard costs. But now the managers of the PUs can see in their budgets their share of the profits earned on the various products they process. Although this information is intended as an input to their decision making, the managers cannot act autonomously. The complexities of managing an integrated steel company are such that HS is unable to allow PUs to operate independently. Thus, their primary task remains to undertake steel making operations as cost-effectively as possible. Nevertheless, there is a role for the PUs in the decision making process.

As mentioned earlier, steel making in HS is coordinated through short-term plans which indicate the volumes of the various intermediate and final products to be produced during the planning period. These plans emerge from a process of intensive consultation and negotiation with everyone involved in the processing and supply of both the intermediate and the final products. Prior to 1995, these negotiations were primarily concerned with functional responsibilities, but as a result of the reorganisation attention has shifted to the product markets in which HS operates. Thus, although the short-term planning process remains the same, the concerns and information which the managers bring to the negotiations have changed. The information provided to the PUs through the allocations of the budgeted profits add to the information which they bring to the short term planning process, and thereby it has the potential to influence decisions taken about the use of the available production capacity. For instance, if certain products are facing downward pressure on prices, due to say excess capacity in the world markets, the profits allocated to the PUs in respect of those products will be falling. Consequently, PUs producing both the intermediate and final products will be

encouraged to look for cost-reductions and efficiencies in the production of those products, or to seek more profitable product lines.

Thus, although the formal transfer pricing system used in HS has not changed, and intermediate products continue to be transferred at standard costs, the coordination of internal transactions has changed. Whereas before 1995 the company was organised on a functional basis and all internal transactions were centrally directed, there is now a system which could be termed *constrained negotiation* in which the PUs are actively involved and which is informed by the allocation of budgeted profits on the individual products to the various stages of production. Although internal transactions are still compulsory and transfers continue to be recorded at standard cost, there is room within the short term planning system for negotiations about various aspects of the internal transactions, such as volumes, timing, qualities, technical specifications, terms of delivery, and so on. Consequently, apart from the price, there are many other conditions relating to the coordination of internal transactions which are settled between the parties involved and their negotiations are likely to be influenced by the profit allocation scheme.

It is important to recognise that the coordination of internal transactions is not simply a matter of selecting a transfer pricing policy. Within HS transfers of intermediate products continue to be mandated and priced at standard cost, but aspects of the governance structure used in relation to such transfers have changed. As argued in section 2, transfer pricing cannot be studied in isolation from its organisational context or the other aspects of the governance structure (cf. Van der Meer-Kooistra, 1993). Bearing in mind this broader understanding of the nature of the coordination of internal transactions, we can now examine in more detail the changes which have taken place in HS.

The changes in the world market for steel have altered the transacting environment in which HS operates, and this in turn has affected the characteristics of the internal transactions within HS. As discussed earlier, transaction cost theory suggests that

governance structures are influenced by the following characteristics of transactions: (a) uncertainty; (b) asset specificity; and (c) volume and frequency (Williamson 1985; Van der Meer-Kooistra, 1993). The excess capacity in world steel markets during the eighties, and the greater competitiveness which it has induced, have greatly increased the uncertainty of the transacting environment for HS products. Furthermore, HS's increasing emphasis on speciality products, in place of commodity steel, has implications for both the volume and frequency of transactions (as a wider range of products and markets are involved) and the degree of asset specificity (required for the production of speciality products). Thus, transaction cost theory would predict a change in governance structure.

Within HS we do indeed see a change in governance structure. The increasing uncertainty in the market requires greater differentiation within HS, leading to the creation of PUs, which can identify and respond to the volatile market conditions. By reorganising the company into PUs, HS now has business units which can focus on particular markets, and which are thereby in a better position (than central management) to collect information about the markets, to assess the nature of market risks, and to take informed decisions. However, this reorganisation brings other problems; in particular, it increases information asymmetry and the possibilities of opportunistic behaviour, and it adds to the difficulties of managing the integrated steel operations.

The individual PUs are now the carriers of organisational knowledge, both about their own productive operations and the related market conditions. This makes it difficult for central management to evaluate their performance and to ensure that they are not acting opportunistically. Thus, the information system which makes the operations of the PUs visible to central management has become an important means of reducing information asymmetry. For example, the new system of allocating profits on internal transactions indicates the profits attributable to the individual PUs and thereby supplements the financial reporting system which seeks to show the financial results of each PU. This provides an important element of management control and motivates the PUs to improve their profitability. However, the risks of opportunistic behaviour are high and

consequently the new allocation system is not used for the assessment of PU performance or to reward PU managers. Rather, it provides information for decision making, and at the same time makes the operations of the PUs visible to others within HS, especially central management. The effect within HS has been to make managers more aware of the importance of understanding the profitability of their operations and of the need to respond to the changing market conditions. But as indicated above, the PU managers are not able to operate autonomously and, in particular, they do not have freedom to select their own production plans.

The integration of steel making processes within HS is both a strength and a potential weakness. There are both technical and transactional efficiencies which have led to the evolution of HS as a large integrated steel company. For example, economies of scale and benefits of location are important for the (technical) efficiency of HS's operations, and the transmission of technical information is much easier in an integrated company. Furthermore, transactional efficiencies favour the hierarchical (rather than market) form of organisation. There is considerable asset specificity, in terms of both physical and human assets, site specificity, and dedicated assets (Williamson, 1985), which would offer the possibility for opportunistic behaviour in market-based arrangements. Furthermore, given the frequency and volume of transactions, hierarchical arrangements have considerable cost advantages. Finally, the levels of market uncertainty also favour hierarchical arrangements. Although, as discussed above, market uncertainty was a primary reason for the reorganisation of the governance structure within HS, according to transaction cost theory market uncertainties mean that parties to market-based arrangements cannot anticipate the changes which may take place and therefore hierarchical arrangements are likely to be more appropriate than market-based arrangements (Spicer, 1988, pp. 444-445).

The potential weakness of HS's integrated steel making can be seen in the difficulties of delegating decisions to the PUs. In a large and complex company, such as HS, all decisions cannot be taken by central management and some element of decentralisation is necessary, but the coordination of internal transactions then becomes a problem.

Prior to 1995, HS used a hierarchical arrangement in which internal transactions were mandated, intermediates were transferred at standard costs, and short-term production decisions were taken by a functionally-based management team. However, as discussed above, market uncertainties made decision making by central management increasingly difficult and the system of PUs was introduced. But the characteristics of the internal transactions (especially asset specificity, and the volume and frequency of transactions) do not favour market-based arrangements. Thus, the possibility of allowing PU managers to buy and sell their intermediate production on the external market was ruled out, as was the use of market-based transfer prices.

The system for coordinating internal transactions which eventually emerged, and which we described above as *constrained negotiation*, could be considered a hybrid. Although the individual PU managers cannot act autonomously, they are actively involved in the process of short-term production planning which effectively determines the internal transactions. Whilst there is an element of central direction in this process, the PU managers are able to negotiate over various (non-price) conditions of the internal transfers. As pointed out earlier HS as a whole has little control over the prices it receives for its products - these are largely determined in the world steel market. Consequently, internal negotiations over prices are unlikely to focus attention on the characteristics of the products over which HS can exercise control. Thus, a system for coordinating internal transactions which permits negotiations over the non-price conditions of internal transfers should focus attention on the factors which can be controlled.

It might be argued that whilst such a system may be appropriate for the PUs which sell their output to the external market, it is unnecessary for HS Primary Products which sells only internally. It could be argued, for instance, that HS Primary Products should be seeking to produce all products in the production plan as cost effectively as possible, and the particular market conditions for the individual products should not matter as far as the intermediate products are concerned. Alternatively, it could be argued that given

bounded rationality the management of HS Primary Products will not be able to focus their cost saving efforts on *all* products, *all* the time. But by identifying those products which are facing particular market pressures, the management of HS Primary Products will be motivated to look for efficiencies in the production of those products, and consequently they will be responsive to the needs of the market. Furthermore, they will need to be aware of the diverse quality requirements of the final products.

Furthermore, the coordinating controller wanted a simple system which could be applied to all the PUs, and which would avoid undue complexity and economise on information processing costs. He also wanted to learn about the operation and use of the new system before introducing further changes. As such, the change in the coordination of internal transactions at HS is an ongoing incremental process.

As mentioned in section 2, *history matters* (Van der Meer-Kooistra, 1993). The past experience of an organisation influences its current decision making and change processes. Much organisational change is incremental (or evolutionary - see Burns and Scapens, 1998). Specific external factors can impinge on an organisation and create the conditions for change; as with the increasingly uncertain market for HS's products. However, where such change takes place, it will impact on other organisational processes, and on the positions, roles, security, etc., of existing members of the organisation.

Thus, changes in systems of coordinating internal transactions cannot be separated from the systems of planning, measuring, evaluating and rewarding performance. Within HS the new system for the coordination of internal transactions had to be compatible with other aspects of the governance structure. Furthermore, changing the ways in which certain accounting routines are enacted, such as the pricing of internal transactions, can have an impact on the way organisational activities are understood (Scapens, 1994). Consequently, such changes can be both costly and time consuming. In HS the controllers, especially the coordinating controller and the corporate controller, were cautious about the processes of change; not because they objected to the change, but

because they were aware of the complexities involved, and wanted to understand the organisational and personal implications of each step. Thus, we expect the process of change in HS to continue.

Whereas transaction cost theory is helpful in providing a general understanding of the factors which can shape governance structures and the coordination of internal transactions, it is somewhat limited for understanding the processes of change in a specific organisation; such as Hoogovens Steel. As indicated earlier, there are often specific reasons relating to the history of a particular organisation and its specific organisational characteristics which can lead to organisational arrangements which are not explained by a simple transaction cost model. The coordination of internal transactions is a complex and dynamic process which requires managers to balance a wide range of organisational considerations. Furthermore, change in such organisational arrangements is evolutionary and needs to be studied as an ongoing process, whereas transaction cost theory focuses on equilibrium positions (Hodgson, 1993; Burns and Scapens, 1998).

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