DIVISIONAL PERFORMANCE MEASUREMENT

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Abstract

Our purpose in this paper is to examine divisional performance measurement methods and related aspects of the rules of the game that govern the behavior of managers. Performance measurement is one of the critical factors that determine how individuals in an organization behave. It is one aspect of what we call the organizational rules of the game, which consist of (1) the performance measurement and evaluation system, (2) the reward and punishment system, and (3) the system for partitioning decision rights among individuals in an organization.

Performance measurement includes the objective and subjective assessments of the performance of both individuals and subunits of an organization such as divisions or departments. Performance evaluation is the process of attaching value weights to various measures of performance to represent the importance of achievement on each dimension.

The reward and punishment system relates the rewards granted to individuals to results measured by the performance measurement system. Rewards and punishments include nonmonetary factors such as honor, attention, and rank, as well as monetary factors such as salary changes and bonuses.

We analyze the peculiar characteristics of common divisional performance measures associated with what are often called cost centers, revenue centers, profit centers, investment centers and EVA and expense centers. We analyze the counterproductive incentives induced by these various performance measures and the conditions under which each of them could be sensibly used in an organization.

Keywords: Performance measurement, decision rights, evaluation system(s), reward and punishment system, allocation of decision rights, specific knowledge, general knowledge, agency costs, transfer of knowledge, cost centers, revenue centers, profit centers, investment centers, EVA (Economic Value Added), expense centers, chargeback system.

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1. Introduction

Our purpose in this paper is to examine divisional performance measurement methods and related aspects of the rules of the game that govern the behavior of managers. Performance measurement is one of the critical factors that determine how individuals in an organization behave. It is one aspect of what we call the organizational rules of the game, which consist of (1) the performance measurement and evaluation system, (2) the reward and punishment system, and (3) the system for partitioning decision rights among individuals in an organization.

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The reward and punishment system relates the rewards granted to individuals to results measured by the performance measurement system. Rewards and punishments include nonmonetary factors such as honor, attention, and rank, as well as monetary factors such as salary changes and bonuses.

A manager is said to have a decision right if the enforcement and disciplinary powers of the top-level executive office will be used to enforce his ability to take an action. In large organizations, decision rights are more complex than the simple phrase suggests. For example, it is common in such organizations for no single individual to have all the decision rights necessary to undertake a major project. Instead, there is a complex process that brings many people into the decision-making function, a process that breaks the simple notion of a decision right into many components that are allocated to various decision agents. The following is a common breakdown:

1. Initiation right—the right to initiate resource allocation proposals.
2. Notification right—the right to be notified of the actions or proposed actions of others in the organization and the right to provide information or recommendations to the decision process regarding those proposals.
3. Ratification right—the right to review and ratify or veto the resource allocation recommendations of others.
4. Implementation right—the right to implement the ratified resource allocation proposals.
5. Monitoring right—the right to monitor the implementation of ratified proposals, including the rights to measure and evaluate performance and to determine rewards and punishments.[1]

[1] Fama and Jensen (1983) discuss initiation, ratification, implementation, and monitoring rights, and how their assignment can reduce agency costs.

Notification rights differ from ratification rights because the individual does not have veto power over the decisions at issue. Coordination of the individuals who have input into a decision is accomplished through a set of procedures that makes up a large part of what is generally thought of as the management process in an organization. Committees play an important role in coordinating and focusing the input of information into the decision making process and provide an appeal process to resolve differences of opinion regarding aspects of any decision or project. This process takes on many of the characteristics of an internal court system with its own rules and procedures. Further consideration of the complexity of decision rights and the decision process is left to future work to concentrate here on analysis of performance measures.

The three dimensions of the rules of the game are obviously related. The reward and punishment system must coordinate rewards with performance if the performance measures are to have desirable effects on the behavior of an organization's members. Furthermore, the performance measures are related to the ways in which decision rights are partitioned in an organization. For example, it is less important to measure the way a manager utilizes plant and equipment (for example the measurement of return on assets rather than total dollars of profits) if the manager does not influence plant and equipment decisions.

2. Specific and General Knowledge

The cost of acquiring and transferring knowledge among decision agents is important to the analysis of performance measurement systems. We define specific knowledge as that knowledge which is costly to transfer among agents and is not easily observable by other agents (in our discussion this means from higher levels in the organization's hierarchy). General knowledge is knowledge that is transferable among agents at low cost or is easily observable by other agents. The terms specific and general

knowledge are used to characterize the two ends of a continuum that measures the cost of transferring knowledge between agents.[2]

Idiosyncratic knowledge of people, machines, organizations, customers, and suppliers, as well as knowledge of time and place, are examples of specific knowledge. This knowledge is difficult or impossible to aggregate; time and place by their very nature are destroyed by aggregation. Specific knowledge is also often obtained at low cost by individuals in an organization as a byproduct of other activities, for example, the idiosyncratic knowledge about a machine that its operator gains over time. Prices and quantities are examples of general knowledge that are easily aggregated and are inexpensive to transmit among agents.

Achieving effective utilization of information in decision-making is a major problem in organizations. The literature in computers and information systems views the problem as one of finding ways to transfer knowledge relevant to a decision to the agents involved in the decision. This makes sense when the knowledge is general or when the problem is one of discovering new technology that will convert specific to general knowledge. When the relevant knowledge, however, is specific, and when the technology (for example, in computing and communications) is unable to lower the cost of transfer substantially, this approach will fail.

The alternative to moving the knowledge is to move the decision rights to those agents who possess the relevant specific knowledge. The cost incurred in this approach to the problem is the cost engendered by the fact that people are self-interested. Therefore,

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[2] The importance of the costs of transferring knowledge was suggested by our reading of Hayek's (1945) article "The Use of Scientific Knowledge in Society." Although he used the terms scientific and particular knowledge, we believe specific and general knowledge defined in terms of cost of transferring knowledge between agents captures the important dimensions of Hayek's discussion of the role of knowledge. Williamson (1975) uses the term "information impactedness" to characterize a similar phenomenon. That term, however, does not suggest a continuum in which the costs of information transfer can vary, and this seriously constrains the effectiveness of the analysis. The notion of "asymmetric information" widely used in the principle/agent literature (see, for example, Harris, Kriebel, and Raviv (1982)) deals with the same issue and has the same problem.

as the decision rights are partitioned out among agents in the organization, self-interested agents will use the decision rights in ways that benefit themselves at the expense of the performance of the organization. This makes it necessary to expend resources to control the costs associated with the inconsistent objectives of agents in the organization—what have come to be called agency costs.

Agency costs include the costs of devising and enforcing contracts with agents, the costs of monitoring the agents' behavior, the bonding costs incurred by the agent to help assure the principal that he or she will not engage in opportunistic behavior and finally, the residual loss, the costs incurred because it is uneconomic to define and enforce contracts perfectly. The residual loss arises because it pays to incur additional monitoring, bonding and contracting costs only to the point where the improvements in the decision process just pay for themselves. This means not all counterproductive behavior is eliminated.

3. Alternative Divisional Performance Measures

The major categories of performance measurement systems are:

- cost centers
- revenue centers
- profit centers
- investment centers
- expense centers

We shall discuss each of these measurement systems briefly and then turn to an analysis of the conditions under which each one will tend to be an efficient system.

4. Cost Centers

There are three alternative forms for a cost center performance measurement and evaluation system:

1) Minimize costs for given output.

2) Maximize output for given total cost.

3) Minimize average costs (with no quantity constraint).

Rules 1 and 2 are logically equivalent, and, conditional on the correct choice of the output or cost constraint, they are consistent with maximizing the value of the firm. Rule 3 is logically inconsistent with maximizing the value of the firm because it motivates the cost center manager to achieve the output that minimizes average cost even though it is different from the value maximizing level. Figure 1 illustrates the point for a manufacturing division with a U-shaped average cost function, that is evaluated as a cost center. The figure portrays two alternative optimal output levels, Q^*_o, and Q^*_1, for two alternative sets of demand conditions. Since minimum average cost occurs at output level Q, that is where the divisional manager will choose to operate, and the company as a whole will sacrifice the profits that could have been earned from operating at the optimal level of output.

If the division manager does not have the rights to set the output level unilaterally but has input into the decision, he will tend, other things being equal, to provide a constant source of pressure to move the planned output level closer to Q, the minimum average cost output level. In the situation where optimal output is higher than the minimum average cost point, the manager will tend to take actions that reduce output unexpectedly, for example, claiming machine breakdowns or labor or material shortages (which could have been avoided with better planning). Moreover, if it is difficult for those at higher levels in the hierarchy to distinguish the reasons for these events (because the information required to do so is specific and located in the manufacturing division), it will be difficult to eliminate these counterproductive effects from the system as long as the manufacturing division is a cost center.

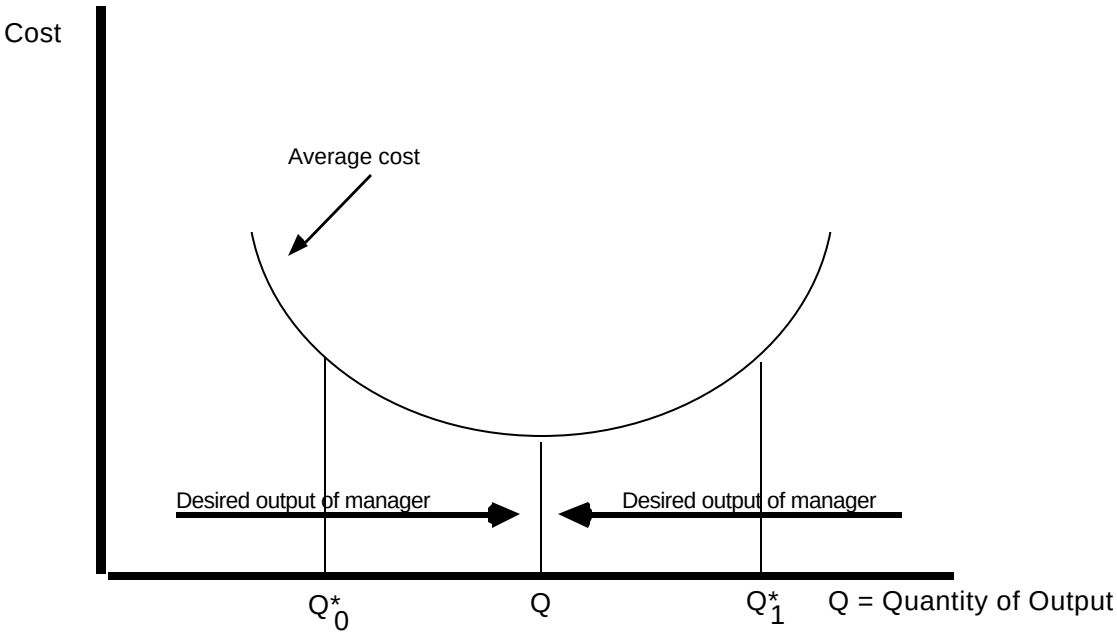

Figure 1. Desired output of manager evaluated as a cost center with no quantity constraint. Q^*_0 and Q^*_1 are two alternative optimal outputs.

Good knowledge of the minimum obtainable cost functions would allow the evaluation mechanism to adjust for differences in quantity of output and therefore to eliminate the problems associated with incentives to game the system on the quantity dimension. The evaluation system would measure performance as deviations from the minimum obtainable cost function. Such knowledge of the cost functions will in general be unavailable or very costly. Standard cost systems are a crude attempt to control for the effects of quantity changes. But they make the correct adjustments only when marginal cost is constant.

Because it reduces measured cost, the cost center manager has incentives to reduce quality below the optimal level as well. This means cost centers will tend to work better when it is inexpensive to measure both quantity, quality and the cost functions. For some functions the measurement of quantity is as difficult as the measurement of quality. Consider, for example, the measurement of the quantity of computer services supplied by

a centralized service bureau in a firm. There is no simple, unique way to measure quantity in such a multidimensional environment.

If a division produces different products, the product mix decision will also pose serious difficulties in this structure because the relative amounts of each product to be produced must be decided outside of the division and given to the cost center divisional manager as a constraint that must be met. This is another example of the necessity to control the quantity decision for a cost center manager.

The general principle in assigning decision rights is to co-locate the decision rights and the relevant specific knowledge. The cost center manager is given decision rights over the factor input decisions, operating procedures, technology, and so on, all of which generally require a great deal of knowledge that is specific to the local situation. The advantages of this system, when it can be implemented, come from the specialization it induces. The cost center manager can focus on increasing the efficiency of the production process without distractions caused by changes in demand conditions that would affect him if revenues were included in the performance measure.

Our earlier discussion illustrates the interrelation between the choice of performance measure and the allocation of decision rights. The discussion indicates that cost centers will tend to work better when the optimal quantity and product mix decisions are made outside the division. When it is expensive to measure quantity and quality and when the knowledge required to make the optimal quantity and product mix decisions is specific and inaccessible to those higher in the hierarchy, it will be difficult to operate the division as a cost center. This situation is addressed below.

5. Revenue Centers

Revenue centers are the logical complement to a cost center. The performance measure in such centers is total revenue and they have many of the same problems and advantages as cost centers. They can take one of three logical forms:

1. Maximize total revenues for a given price.
2. Maximize total revenues for a given quantity of unit sales.
3. Maximize total revenues (with no quality constraint).

Again, the first two of these options are logically the same, and for the correct choice of price or quantity, are consistent with maximizing the value of the firm. The revenue center manager cannot be allowed to determine the quantity or he will simply go to the quantity where revenue is maximized (the point where marginal revenue is zero). As long as marginal costs are positive this will exceed the profit maximizing quantity.

The product mix decision is a particular problem in revenue centers because the additivity of revenues from different product lines increases the probability that the measurement will evolve to total revenues from all products. If so, other things equal, the manager will substitute sales efforts from lower priced to higher priced products at the expense of overall profits. In this situation, a better performance measure is gross margin defined as the difference between total revenues and total variable costs.

The advantage of the revenue center is that the manager can specialize on the marketing and sales effort without concern for the factors that influence production cost. To do so the manager will generally be given decision rights over those issues involving marketing and sales which require considerable knowledge that is specific to the local level but not the rights to decide on quantity or product mix. This means that if the knowledge required to make the quantity and product mix decision is available at low cost at higher levels in the hierarchy the revenue center structure will tend to work better.

6. Profit Centers

A divisional profit center is evaluated on the difference between its revenues and costs as defined by the measurement system. “Profit center” is a term that strictly describes the performance measurement system, but it is also widely used to describe a divisional structure in which the profit center manager is given a broader set of decision

rights. Profits can be (and are) used as a measure of performance in divisions in which the manager is given a limited set of decision rights as well as in divisions in which managers are given a broad set of decision rights. We use the term here to describe a system in which a division's performance is measured by its profits.

If the knowledge required to make the product mix, quantity and quality decisions is specific to the division and therefore costly or impossible for managers at higher levels in the hierarchy to obtain, the profit center can be an effective performance measurement system. In these cases it is desirable to use profits as a performance measure in conjunction with an assignment of decision rights over factors such as the product mix, quantity and quality.

The profit center structure, however, has its own serious problems. It is well known that maximization of profits for each division does not lead to maximum profits for the firm as a whole, except in the special circumstance in which there are no interdependencies between divisions. These interdependencies can take the form of: interdependencies introduced when one or more divisions buys the product of another, and therefore the price paid by the buying division affects its costs and pricing decisions (the transfer pricing problem),[3]

- interdependent demands (e.g., Pontiac and Oldsmobile, or film and cameras) where demand for one or more of the firm's products depends on the policies for the other products (e.g., pricing, quality or technology), or
- interdependent supply or cost functions where the cost of producing a product depends on the production decisions for other products (e.g., gasoline and kerosene, since more gasoline production means less kerosene obtained from a barrel of crude oil).

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3 See Hirshleifer (1964).

To the extent that interdependencies between centers are major, profit center performance measurement can induce serious suboptimal behavior on the part of divisional managers. One solution to the interdependencies induced by the transfer pricing problem is for corporate headquarters to set a transfer price equal to the marginal cost of the producing division at the optimal quantity of output. This requires top management to know both the revenue and cost functions in detail (in order to determine the optimal output level in each period and the marginal cost at the optimal output level). If the information required to know both revenue and cost functions is specific to the operating divisions, it will be difficult for top management to set the optimal transfer price. When close substitutes for the good being traded internally are traded in outside competitive markets, the optimal transfer price is the outside market price.

There is no simple solution to the problems caused by interdependencies in demand or cost functions.[4] If these interdependencies are serious and there is no simple way to coordinate the actions of the two divisions, one solution is to merge them into one division, where the profit measure is applied only to the sum of the two divisions rather than to either separately.

7. Investment Centers and EVA

Investment centers are a variation on the profit center structure in which the manager is evaluated on the relation between profits and the assets used to generate them. They tend to be desirable when the profit center manager is given decision control over the amount of assets used in the activity and when the costs associated with asset utilization are important.

As such, investment centers are performance measurement systems which take into account the efficiency of asset utilization. They are important when managers of the

4 See Hirshleifer (1964).

division have the specific knowledge required to decide on the optimal level of investment, and are given or acquire decision rights over investment and asset levels, and when the costs of asset utilization are important. It has historically been common for organizations to take asset utilization into account by using rate of return measures such as return on assets (ROA) or return on equity (ROE). Both of these measures are highly susceptible to gaming and tend to provide counterproductive incentives when managers have decision rights over the level of investment or assets. Again, as is true for cost centers and revenue centers, the objective function in an investment center can take one of three forms:

1. Maximize the percentage return on assets for given total assets.
2. Maximize total assets for given total percentage return.
3. Maximize total percentage return on assets (with no constraint on total assets).

Forms 1 and 2 can be consistent with maximizing the value of the firm if the constraints on total assets or total percentage return are chosen correctly, and this can work if top management has the relevant specific knowledge to set the correct constraints. However, a common form for this objective function to take is the unconstrained version, 3, and this is inconsistent with maximizing the value of the firm. A manager evaluated on maximizing the total percentage return on assets has incentive to reduce assets to the point where the firm owns no assets other than the single asset whose returns are the greatest. This, of course, is not consistent with maximizing value or wealth. A 100% return on $1,000 of assets is $1,000, while a 30% return on $100,000 of assets is $30,000. EVA (Economic Value Added)[5] is an alternative performance measure that does not have this critical fault.

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[5] EVA is a registered trademark of Stern Stewart & Co. See Stewart (1991) for a detailed description of EVA and its uses.

EVA is defined as net cash flow in a period less a capital charge which is the cost of capital times the dollar value of the assets employed in the business. This "residual income," as it used to be known in the accounting literature, has none of the disadvantages mentioned above concerning return on asset or equity measures. It is total dollars of net cash inflow less the total dollar charges for capital used in the business and is an appropriate number to maximize. EVA also has the advantage of revealing to managers the real cost of capital used in a business. Accounting statements reflect the cost of debt capital used in a business in the accounting reports, but not the equity capital. This causes managers regularly to think that equity has no cost. EVA accounting statements show a loss when net cash flows are not sufficient to cover the full cost of an organization's capital.

Because EVA is a flow measure, it does not solve the capital value problem. This means that if future annual EVA of a project is sufficiently large, it will pay a company to take a project whose early years' EVA is negative. Market value, the discounted present value of net cash flows less the investment required to generate them, is the appropriate value to maximize. Thus, while EVA is the best flow measure of performance currently known, it is not the universal answer to the search for the perfect performance measure. Perfect measures of capitalized value will never be found because value is never something that can be known perfectly until *after* a project has run its course to completion and shutdown.

8. Expense Centers

A division organized as an expense center is the private equivalent of the classic public bureaucracy.[6] The division generally produces services for the rest of the organization and the consuming units are not charged for the services they consume. The

6 See Niskanen (1968).

provision of internal administrative services such as human resources, patent and public relations services are commonly organized as expense centers.

Consider a division which negotiates a budget allocation from a central budget office at the beginning of each year and simultaneously makes a commitment on the quantity of services that will be provided. Figure 2 portrays the demand for the division's services from the rest of the organization. This curve plots the marginal value to the

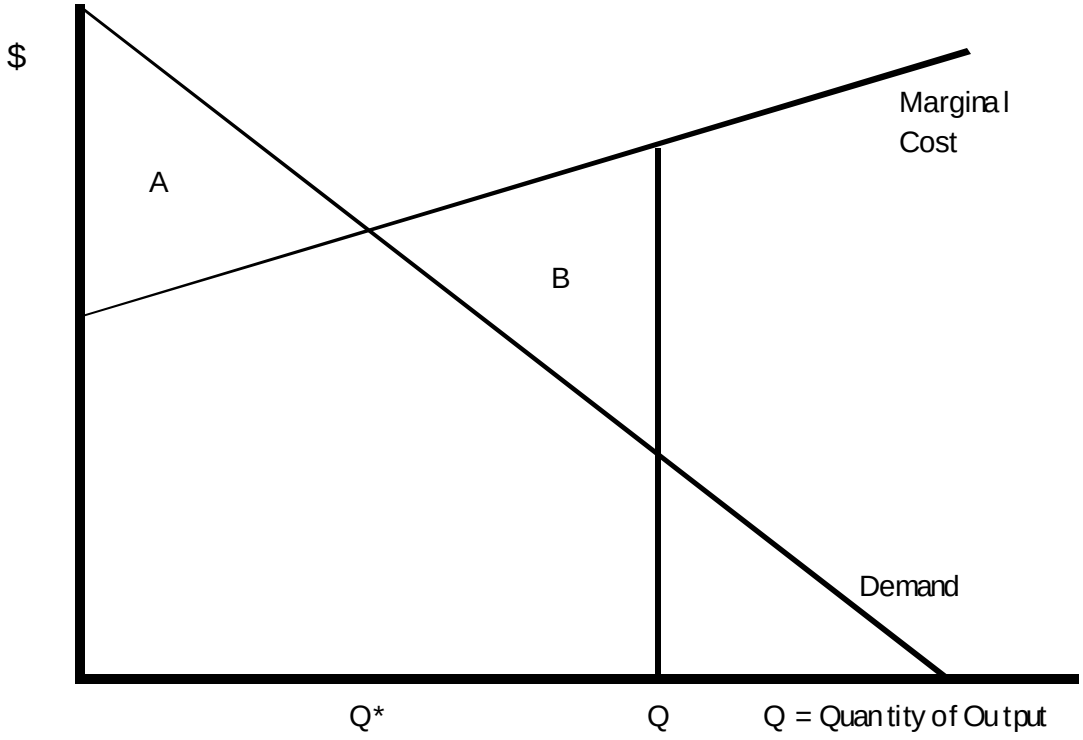

Figure 2. The firm value maximizing level of output, Q*, for an internal service center organized as an expense center and the center's optimal output level, Q.

organization as a whole of the division's output at various levels. For simplicity, we assume the service is produced with no fixed costs and marginal costs given by the schedule in Figure 2. The profit maximizing output level, Q*, is the point where the

marginal production cost of the service equals the demand price (which is the marginal benefit to the organization of an additional unit of the good or service.)

If the manager of the expense center in Figure 2 is motivated to maximize the size of the division (perhaps because compensation is determined by a system such as the Hay system in which compensation schedules reward jobs with larger budgets and more people), the equilibrium output level will be Q in Figure 2. For simplicity the figure assumes that the relevant measure of size in the objective function of the divisional manager is the quantity of output. The point Q is determined under the assumption that the budget office can estimate reasonably well the value to the organization of the division's total output but has poor knowledge of the costs and benefits of individual units of output. This means the budget office will never authorize a budget for the division which exceeds the division's total value to the organization. Q then is the maximum quantity that can be produced by the division subject to the constraints that (1) its total budget does not exceed the total value of its output to the organization (the area under the demand curve) and (2) its total cost of producing the output (the area under the MC curve) does not exceed its budget. Graphically, this is the quantity at which area A equals area B. The manager of the center wants to produce as much as possible, and the total value of the center to the organization rises as the promised output rises. Therefore the budget increases with increases in the promised level of output. The manager cannot produce more than Q, however, with the maximum total budget the budget office is willing to give him at that level of output. Thus such expense centers will tend to be too large since Q is greater than Q*, the output level that maximizes the value of the organization as a whole.

The tendency of an expense center to overproduce is exacerbated by the fact that the consumers of the center's product are not charged for the services they consume. Therefore, consumers have no incentives to compare the cost of the services they consume with the value of the services to them. In addition, if the budget office attempts

to cut the center's budget the center will be able to obtain support from the consumers of its output to oppose such cuts. The center director reacts to budget cuts by threatening cuts in the most highly valued rather than the marginal services and this also motivates the center's users to lobby against such cuts. The fact that the users of the service do not pay for the output they consume also means they will tend to demand services of too high a quality.

9. Internal Chargeback Systems and Decentralization of Part of the Control Function

Consider a situation where the knowledge required to evaluate the performance of a division that provides services or product to other units of an organization is

- not easily observable from higher levels in the hierarchy,
- specific (that is, costly to transfer among agents), and
- located among users of the division's output.

In this situation it can be desirable to transfer some of the control function to the users of the division. This can be done by instituting a charge system in which the users pay for the output of the producing division. When consumers must pay for a good or service rather than receiving it at no cost, they have incentives to compare the benefits of the goods with the prices they must pay for them. This will cause them to consume less of the goods or services than when they are supplied at no cost, thereby reducing the overconsumption problem engendered by the expense center structure.

If a chargeback system is to be effective as a decentralized control mechanism, the users must also have decision rights that give them effective choices: for example, the right to purchase the good outside, to produce it themselves, or to buy it from another division that has gone into competition to produce and supply the good internally. Given these decision rights, a buying division also has incentives to compare the quality and prices of the goods offered by the supplying division to that which they can obtain from

other suppliers or by making it themselves. This constant evaluation will then be reflected in the buyer's decision to purchase or not to purchase from the supplying division. This right to choose to buy elsewhere provides great incentive for the buying division to monitor the hard-to-asses qualities of the product of the supplying division, and it will be able to use its specific knowledge of those qualities in its monitoring. In such a system the higher levels in the hierarchy have decentralized much of the monitoring of the supplying division to its customers. The overall divisional monitoring function can then be accomplished at higher levels in the hierarchy by measuring the profits of the producing division, thus freeing the monitor from many of the details associated with measuring and evaluating dimensions such as the quality and quantity of output.

Divisions that deal with the ultimate consumer are dealing with the most effective chargeback system, namely, markets. Internal chargeback systems can be used with any of the performance measures thus far described. In each case there are benefits to be obtained by soliciting the help of the buyers of the division's output in the monitoring function.

Chargeback systems work better the smaller are the agency costs with the managers of the buying divisions—that is, the easier it is to evaluate and motivate the buying managers to act in a way that closely reflects the organization's objective function, and the smaller are the internal monopoly powers of the supplying division. Unfortunately, there are strong forces that tend to exacerbate the monopoly problem while at the same time substantially reducing incentives for users to make effective use of their specific knowledge regarding the quality and quantity of the output of the producing division. One source of such pressure is what we have labeled the "locus of uncertainty" problem.

10. The Locus of Uncertainty Problem

Organizations that institute chargeback systems as part of a decentralized control mechanism commonly inhibit the functioning of those systems by disabling an important part of the choice set faced by managers buying the services of the selling division. They do so by constraining the choices of the customers of the internal seller through such devices as line budgets or "funny money" allocations that cannot be spent on anything other than the good or service in question. Computer services are a good example. It is common for computer funds in the budgets of buyers of a centralized internal computer supplier to be constrained for use in purchases from the central facility only. Since the funds allocated in such line budgets have zero opportunity cost to the managers, the managers' purchase decisions do not reflect their assessment of the value of the service relative to other uses of the funds. This means the purchasing decisions of users do not reflect their evaluation of the quality and quantity of the services supplied by the central facility in comparison to that available from alternative suppliers or from their own production of the service. Thus, one of the major benefits from introduction of a chargeback system, the revelation of such specific knowledge possessed by users, is lost to the organization.

In every organizational situation in which a chargeback system is used there is an individual who must bear a great deal of uncertainty in order for the organization to receive the benefits of the chargeback system. This is the person responsible for the budgets of both the selling and buying divisions. The problem surrounds the fact that at the beginning of the year the same monies allocated to the selling division for use in the production of the service must also be allocated to the buying divisions. If the buying divisions choose to spend the resources on goods and services other than those forecast by the selling division for its product, the budget officer will experience a deficit. The deficit arises because the monies for production of the good have been committed (if they

can be undone easily the problem goes away) and therefore have in effect been spent twice if the users choose to spend them on producing the good themselves or to purchase other goods and services. If the evaluation mechanism faced by the budget officer is not flexible enough to allow for these deficits, the budget officer has incentives to collaborate with the pleadings of the supplying division to make it a monopoly by forbidding the expenditure of funds allocated for its product on anything else. This is accomplished by line budget allocations. Such constraints destroy much of the benefits of the chargeback system.[7]

Centralized restriction of choices through line budgets makes sense when problems of measuring the performance of users make it difficult to ensure that users are generally reflecting the value of the good to the entire organization in their decisions. Such restrictions, unfortunately, are also widely used when there is no benefit to the organization and when they generate considerable costs. In these cases, the perversion of incentives reflects the "locus of uncertainty problem."

11. Choice of Performance Measure

The choice of a performance measure requires a theory that predicts when one performance measure will dominate another. Our goal is the construction of a theory of the determinants of performance measurement that enables one to predict when a division will be organized as a profit center, cost center, investment center, revenue center, or expense center.

The choice between an expense center and the other options is essentially the choice over whether to monitor the division directly from higher in the hierarchy. This option will be more attractive when it is easier to evaluate the performance of the division from higher levels of the hierarchy, and when it is difficult to decentralize the monitoring

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7 See Baker and Monsler (1995) for a case dealing with the Locus of Uncertainty problem.

function to users of the output of the division. It is, for example, sometimes difficult to identify a set of users who could be charged for the output of the unit. Such users must be individuals whose valuation of the center's output is equal to the value to the organization as a whole. The output of the patent services group in a large organization is an example where this condition is unlikely to be satisfied. If the scientists in the lab are given the decision rights on patent services and charged for them, it is likely the organization will consume too little of the service. On the other hand, since the lag between the decision on the patent and disclosure issues (a substitute for patent acquisition) is so long, it is difficult to give the decision rights to the manufacturing or marketing divisions, who are unlikely to have the scientific expertise to keep up with the multitude of developments in the lab and to foresee the commercial applicability of that subset which should be protected with patents or disclosure. They will tend to focus their attention instead on the struggle to contain the usual day-to-day emergencies in the firm's current markets. In short, it will be difficult in many organizations to decentralize the monitoring of such services. In these situations the major alternative is to organize the supply of such services as an expense center and monitor its performance directly. It will tend to have all the problems of expense centers, but the costs of these problems might nevertheless be the lowest attainable among all alternative organizational structures.

In general, a cost center will be more desirable the lower is the cost of obtaining good information on:

- quantity
- quality
- correct output mix
- cost functions

Profit centers will tend to be more desirable the higher are the above costs and:

- the easier it is to identify the correct revenues for the division,

- the smaller are interdependencies in cost and demand functions between divisions, and
- the smaller are internal monopoly problems

Profit centers will tend to work best when they are combined with a rights assignment that decentralizes part of the monitoring function of the center to its customers through a chargeback system that gives those customers effective alternatives and thereby provides potential or actual competition for the profit center.

Investment centers and EVA will tend to be more desirable the more capital-intensive is an activity and the harder it is to identify optimal divisional asset investments from higher in the hierarchy.

References

Baker, G. P. and K. B. Monsler. San Francisco Bay Consulting. Case no. 9-195-196: Harvard Business School Publishing, 1995.

Fama, E. F. and M. C. Jensen. "Separation of Ownership and Control." *Journal of Law and Economics* 26 (June 1983), 301-325.

Harris, M. K., C.H. and Raviv, A. "Asymmetric Information, Incentives and Intrafirm Resource Allocation." *Management Science* 28, no. 6 (June 1982), 604-620.

Hayek, F. A. "The Use of Scientific Knowledge in Society." *American Economic Review* 35, no. 4 (September 1945).

Hirschleifer, J. "Internal Pricing and Decentralized Decisions." *Management Controls: New Directions in Basic Research*. R. K. J. Charles P. Bonini, Harvey M. Wagner. New York: McGraw-Hill, 1964.

Niskanen, W. A., Jr. "The Peculiar Economics of Bureaucracy." *American Economic Review* 58 (May 1968), 293-305.

Stewart, G. B. *The Quest for Value: A Guide for Senior Managers*. New York: Harper Business, 1991.

Williamson, O. E. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press, 1975.