

**A Report for
The Government of Tunisia
on Pay-Productivity Systems**

Prepared by

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I. BACKGROUND

A. INTRODUCTION

The Hay Group, the world's largest consulting firm specializing in compensation and human resources management, with support from AMEX International, was initially commissioned by the U.S. Agency for International Development (AID) through the Center for Privatization to work with the Government of Tunisia (GOT) to evaluate its progress in the implementation of a government-wide pay and productivity program.

The AID approved a request by the GOT to use the limited funding for the initial phase of consulting work to compare the Tunisia Productivity Measurement System (PMS) with other systems and determine what, if any, changes are needed to improved its application and use. Upon completion of this work, the GOT plans to commission additional work that will:

- Determine the data and format requirements for PMS accounting information.
- Present organizational arrangements for a governmental pay and productivity program.
- Establish a system for the distribution of the productivity surpluses to employees.

B. PROJECT ASSUMPTIONS

This is a pay for productivity study, which at the moment is only concerned with a comparative evaluation of the GOTs Productivity Measurement System (PMS).

If we are to review the linkage between pay and productivity, it is essential that we examine both the measurement of productivity and the sharing of the rewards from productivity improvements. Thus, for purposes of this study the PMS is understood to be comprised of two working components, as follows:

- (1) A method for defining, estimating, measuring and reporting on productivity changes and the factors that contribute it; and
- (2) A method(s) that links supplemental wage increases (bonus) for employees contributing to productivity improvements.

Hay believes this definitional framework is consistent with the Prime Minister's directive of September 1987 entitled: "Design of a Performance Measurement System to Support Salary Increases in Public Enterprises." Moreover, this definition of a productivity measurement system reflects the analytical and decisional framework found in pay and productivity systems worldwide.

Other assumptions employed in the conduct of this analysis include:

- As part of the Seventh Development Plan, GOT is committed to increasing the productivity and quality of products and services of all public enterprises in order to contain costs and to improve the price, quality and competitiveness of goods and services produced in Tunisia.
- GOT has mandated that all future pay increases should be linked to productivity improvements.
- GOT has announced its plans and has begun to implement a government-wide pay and productivity program, which will be fully operational by 1990.

The key objective of the GOT pay-productivity program is to motivate managers and employees to participate in the definition of measures of performance improvement and productivity goals and accept periodic wage adjustments (bonuses) based upon the overall performance achievement of the organization.

C. APPROACH

The initial terms of reference for this project called for a general evaluation of the ongoing pay and productivity program sponsored by the Government of Tunisia. It was expected that this evaluation would be used to identify and prioritize problem areas and recommend appropriate changes.

A key phase of the planned work for Hay involved a one-week, fact-finding trip to Tunisia, which took place on Sept. 25-30, 1988. At that time, the Director General of Public Enterprises formally requested a redirection of the work. In early December 1988, AID approved an amendment to the Hay contract calling for a comparative evaluation of the Tunisian Productivity Measurement System with other approaches in the United States and elsewhere.

Under the amended terms of reference, approximately 30 professional days of consulting time has been used to perform the following work:

- Meet with a representative of the French C.E.R.C., Center d'Etude des Revenu et des Coûts to discuss the origins and practical application of pay and productivity approaches in France, including the use of a productivity measurement approaches.
- In-depth evaluation of the Tunisia PMS in terms of: conceptual framework; operational definitions; relationship between inputs and outputs; the mathematical formulas used to calculate productivity changes; and the characteristics of supplemental wage system that can be linked to productivity improvements.

- Review of literature and case studies and numerous interviews with business and government officials experienced in the design and administration of pay and productivity programs.
- Preparation of a concise analysis comparing the Tunisia productivity measurement system with approaches used in the administration of pay and productivity programs in the United States and other countries.
- Travel to Tunisia to conduct a 1-2 day briefing and discussion session(s) with government officials.

This report has been organized and formatted to meet several objectives specified by the Government of Tunisia and the AID Mission in Tunisia:

- Prepare a report, with complete translation, which can be transmitted by telefax on or about January 5, 1989 in order to expedite the review by Director Jebali and to permit a presentation in Tunisia by Hay on or about January 16, 1989.
- Prepare a report that is concise, easily referencable, and most importantly is technically complete and comprehensible.

The report is presented in 34 pages. In order to minimize the verbiage, it relies heavily on the presentation of condensed key points, charts, and other techniques to summarize the analysis, findings, and recommendations.

The first chapter provides background information, followed by a chapter describing the characteristics of major pay and productivity systems being used in the United States and other countries. Chapter III examines the Tunisian productivity measurement system. Chapter IV, the concluding chapter, contains findings and recommendations, including proposed steps to place the Tunisian PMS on a more operational footing.

II. REVIEW OF PAY-PRODUCTIVITY PLANS IN THE U.S.

A. INTRODUCTION

Throughout the world there is a traditional differentiation between wage earner (paid by the hour), salary earners (paid by the year) and executives (paid by annual salary and bonuses).

This is now changing in many parts of the world as manufacturing and service companies are implementing new pay systems in an effort to increase productivity and quality performance.

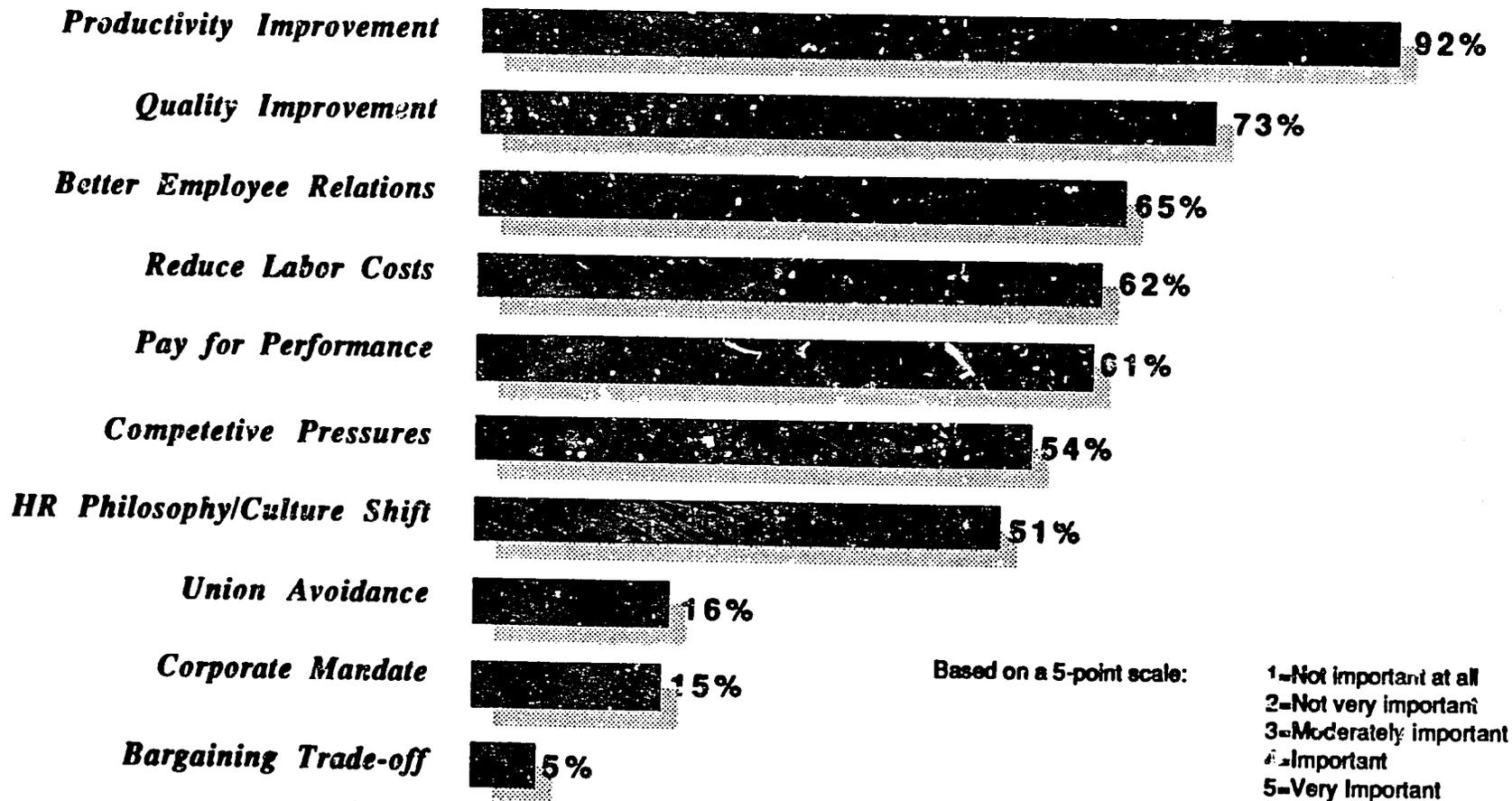
In the United States pay for productivity is sweeping the country. The American Productivity and Quality Center reports that 75 percent of U.S. companies are using at least one form of non-traditional pay, most of which have been adopted in the past 5 years. Examples of these non-traditional pay plans include:

- Profit Sharing - Employees receive a varying annual bonus based on corporate profits, with payments made in cash or deferred retirement payments.
- Gain Sharing - Eligible employees receive a periodic bonus when a work unit exceeds predetermined performance targets.
- Individual Incentive - A bonus based upon an individual's performance, which is predetermined and which may not be related to overall organizational performance.

Why are these pay plans gaining such widespread support in the U.S. and other countries? In a word: competitiveness. Fortune magazine reports that not only does "incentive pay induce workers to produce more, it also holds down wages and wage-related benefits and lets compensation costs rise and fall with the company's fortunes."

Table II-1 *

Reasons for Adopting Gain Sharing Percent Reporting "Important" or "Very Important"



II-2

* American Productivity and Quality Center and Carla O'Dell, 1987

Other reasons for the growing use of pay for productivity plans are contained in a survey by the American Productivity & Quality Center for the White House Conference on Productivity (See Table II-1).

It must be pointed out that non-traditional pay has its share of problems. It has been the Hay experience that almost fifty percent (50%) of pay-productivity plans fail because of poor design and administration, which result from:

- Lack of continuous and visible top management support.
- Ill-defined productivity measures.
- Failure to clearly show the relationship between productivity gains and the bonus pool.
- Inadequate workload to absorb productivity increases.
- Lack of employee involvement in the design and administration of the program.

What follows is a more detailed analysis of pay-productivity.

B. THE RATIONALE FOR PAY-PRODUCTIVITY PLANS

It is a well-known postulate of economic theory that in a free market system the factors of production will be rewarded according to their contribution to the value of output. But in actual practice this rule has been difficult to define or implement. There are in fact any number of approaches for rewarding labor that have been devised in different ways to meet the needs of different situations. A comparison of the most important "models" that link pay to productivity can be useful before such a system or systems is designed in detail and implemented in practice for the public enterprises in Tunisia.

The single most important rationale for using any method of linking the employee rewards to increases in productivity in an enterprise is to increase the efficiency of the enterprise and make its output more competitive. There is overwhelming evidence that employee reward systems based on productivity gains within an enterprise are quite likely to provide many benefits to both an organization and its employees. For the enterprise the result of introducing pay-productivity plans has been to increase profitability and to generate a spirit of cooperation among employees and between employees and management. The employees themselves have reaped higher wages in the form of bonuses and greater job satisfaction from their work. In many cases, the introduction of such incentive plans has brought about significant cost saving.

But success of pay productivity schemes has not always been assured. Nor can such plans be considered as a panacea for all the problems facing inefficient enterprises. They are not a substitute for good management. When properly designed and implemented the pay-productivity plans have been successful in enhancing the productivity of the firm by stimulating better performance by the employees. The plans, however, need to be adapted according the size of the firm, the type of products and processes used, and the "corporate culture" in which the plans are to be administered.

Because of the wide variety of approaches that fall within the category called "incentive pay plans", it is necessary to classify them according to their most important characteristics. These plans could be arrayed on a spectrum that ranges from the sub-micro level where individual reward is emphasized to the most global orientation on the bases of a "common fate" of the enterprise or the industry. But between the two extremes are a host of well-known schemes that can be classified into five groups: Standard Hour Plans, Physical Productivity Plan; Gross

Product-Wage Cost Plan, Value Added-Wage Cost Plan, and Profit Sharing Plan.

Some of these plans are known in the United States by the name of the principal author. For example, the gross product - wage cost plan has been called the Scanlon Plan and encompasses a philosophy of corporate management that goes beyond the specifics of the formula to calculate the bonus to share the gain from higher productivity. These plans are described in Tables II-2 through II-6 at the end of this section.

While these five groups represent the middle ground, each is sufficiently differentiated so that the models could be analyzed comparatively and with the proposed plans for Tunisia. The Hay study has also shown that, associated with any particular pay-productivity plan one is likely to find a great number of interesting innovative schemes that reinforce employee motivation to improve productivity through a combination of shared rewards from productivity gains with participative systems like Quality Control Circles (Japan), Work Teams (Western Europe), Job Enrichment and Quality of Worklife groups (U.S.).

In addition to a resurgence of interest in innovative management styles that are changing the culture of the enterprise, there is also a fast growing interest in the non-traditional pay plans that come under the umbrella known in the United States as "gain sharing" or "productivity gain sharing". The latter approaches, modified to suit firms both large and small and in different industries in the manufacturing and service sectors, are essentially a response to such considerations as cost containment, effective control of quality, and incentives to increase individual or group productivity.

The Hay Group, which recently acquired IMPROSHARE (a registered trademark that stands for Improved PROductivity through SHARing), has successfully modified and introduced pay-productivity models as compensation schemes for enterprises around the world. These are known as "customized contingent compensation" plans and are tailored to particular situation after performing a diagnostic and a readiness audit of the client's organization. The present report offers information on the different productivity measurement and incentive pay systems currently in practice in the United States and many other countries. A comparative analysis of these models is expected to form a basis for the pay-productivity system being considered for public enterprises in Tunisia.

C. GENERAL OBSERVATIONS

All pay-productivity plans have one common feature: they offer a yardstick for measuring and compensating the performance of employees in an enterprise. At the simplest and most disaggregated level the plans correspond to payment based on piece rate. These plans offer individual incentives using standard work time for specific tasks. In case of interrelated and complex tasks the incentives are extended to the group and gains measured against engineered or historical standards are shared among the members of the group. The measurement of gain could be in terms of physical productivity (as in IMPROSHARE) or through a valuation of the product (as in Scalon or Rucker plans). Finally, plans for incremental compensation, or bonuses, can be based on financial considerations of the enterprise, namely profit, where a formula is agreed for the employee share in profits earned by the enterprise.

Based on the survey of pay-productivity models and practices there are several additional observations that are relevant to the productivity measurement concept.

First, there is no easy, mechanistic approaches or totally objective criteria to measure, monitor, and motivate a workforce. Many organizations with pay and productivity plans avoid the complete adoption of the standard plans, such as Scanlon, and take a more customized and eclectic approach. This reinforces the notion that there is no single, best way to link pay to productivity. The customized approach puts greater emphasis on the primary objectives of the pay-productivity program (e.g. increase worker output; cost containment etc.), product and operational characteristics of the enterprise, and the composition of the workforce.

Second, the most successful pay-productivity practices are those in which managers, supervisors and employees are given an opportunity to participate in the establishment and administration of productivity standards and goals.

Third, the management style and the organization structure of an enterprise is an important governing factor in the design of a pay-productivity plan. The best candidates for pay-productivity plans are those enterprises that have a high motivation to improve productivity, and management is willing to accept the prospect of change. The worst candidates are those enterprises that have a history of lay offs and wage reductions and that discourage employee participation in the decisionmaking process.

PAY GROUP: DIFFERENT APPROACHES TO INCENTIVE PAY PLANS

Standard Hours

BACKGROUND

Standard hours plans have evolved from the traditional piece rate.

PRIMARY OBJECTIVE

Increase the physical output by producing more units of a finished product in standard time.

FORMULA

"Employee efficiency coefficient", E

$$E = H_e/H_c$$

where:

H_e is standard hours earned

H_c is clock hours (actual hours) worked.

$$H_e = [X/100] \cdot Sh$$

X is actual physical production

Sh is standard time expressed in hours per 100.

USE IN THE UNITED STATES AND ELSEWHERE

U.S. Army Materiel Command

U.S. Navy Supply Systems Command

U.S. Internal Revenue Service

Numerous manufacturing establishments worldwide

ASSUMPTIONS

Engineered standards exist that can be applied to individual tasks or small group tasks.

REQUIREMENTS

Simple measurable tasks in which engineering norms are acceptable and can be readily applied. Operations must be highly standardized.

ADVANTAGES

- Useful in measuring a simple function or production
- Simple and understandable to individual worker.
- Direct relationship between performance and bonus.

DISADVANTAGES

- Not suitable for complex and interrelated tasks found in large manufacturing activities.
- Relevant only to simple operations of production workers and clerical tasks.
- May not engender team spirit and cooperative environment.
- Lacks incentives for collective or corporate-wide productivity/quality improvements.

HAY GROUP: DIFFERENT APPROACHES TO DECEPTIVE PAY PLANS

Gross Product Related To Wage Costs

ORIGIN

So called "Scanlon standard" after Joseph Scanlon, a labor leader, who died in 1956. First developed in 1937 to reverse plant closings, it has been adopted in a wide variety of organizations.

PRIMARY OBJECTIVE

A participatory system to enhance employee contribution to gross value of output. The central theme is that efficiency is based on plant-wide cooperation among all employees.

FORMULA

"Scanlon standard", S

$$S = W(\text{BAR})t / Y(\text{BAR})t$$

where:

W(BAR)t is average historical wage cost

Y(BAR)t is average historical gross value of production

t is the period for averaging.

$$P = S.Y - W$$

where:

P is the bonus pool

Y is the value of current production

W is the current wage costs.

USE IN THE UNITED STATES AND ELSEWHERE

Scanlon plans have become very popular despite high degree of commitment needed on the part of management and employees. A recent example is the Marine Systems Division of Honeywell, Inc. that recently (1987) adopted such a plan after careful study and experimentation since 1981.

ASSUMPTIONS

Special assumptions are made with regard to management and reward systems. Management is required to demonstrate a high degree of openness and understanding while the employees are expected to be highly cooperative. The monthly bonus pool (less 10-30% reserve to offset negative months) is often divided 25% to company and 75% to employees.

REQUIREMENTS

Organizations with less than 1,000 employees are most suitable.

The product line ought to be relatively stable and price changes not too great.

Great level of trust between employees and management.

Accurate and timely labor cost information ought to be available.

No layoffs are imminent.

ADVANTAGES

- Scanlon plans are likely to be more lasting since the assumption is that certain fundamental management styles be adopted.
- High involvement of everyone in the company has beneficial results on individual performance.

DISADVANTAGES

- While the formula may be simple and uncomplicated, it can be highly sensitive to output price changes.
- Employee benefits are not sheltered when company encounters major losses.
- The formula is often not very flexible and the standards require redetermination if wages are to increase substantially.

TABLE II-4

HAY GROUP: DIFFERENT APPROACHES TO INCENTIVE PAY PLANS

Physical Productivity

BACKGROUND

Patented incentive plan developed by Mitchell Fein and recently acquired by the Hay Group, This plan is designed to alleviate the problems of individual incentive plans.

PRIMARY OBJECTIVE

Reward higher labor productivity, as measured by quantity of output, through engineered standards applicable to larger units and group tasks. Designed to produce more finished goods per hour of personal input.

FORMULA

"Base Productivity Factor", B

$$B = H_a/H_s$$

where:

H_a is total hours (number of employees x work week)

H_s is standard value hours

(H_a = H_d + H_i, i.e., direct and indirect labor hours)

Applied to each product line and combined by the current produce mix.

USE IN THE UNITED STATES AND ELSEWHERE

Started in 1974, IMPROSHARE has gained popularity among a large number of different business activities. Until 1980 it covered hourly employees and occasionally plant supervisors and salaried employees. But more recently these plans have included all employees except those covered by management bonus systems. Example: Carrier, a subsidiary of United Technologies, with six manufacturing plants in Syracuse, N.Y., producing heating and air conditioning equipment.

ASSUMPTIONS

Standards need to be established for group tasks and gains are usually split 50/50 between employees and the enterprise. The base period for the productivity factor calculation must reflect representative operating conditions.

REQUIREMENTS

Measurement of productivity in physical rather than financial terms by comparing actual work to engineered standards for each product, and the bonuses are independent of product pricing or material costs.

ADVANTAGES

- Evolved from standard hour plans and is applied plant-wide, retaining a high degree of simplicity and objectivity.
- Satisfies the need for rewarding labor productivity and reducing labor costs and labor content of product.

DISADVANTAGES

- Heavy reliance on engineering data for each product line and the introduction of new product line calls for additional data.
- Lacks flexibility - once established the standards are rarely altered.

RAY GROUP: DIFFERENT APPROACHES TO INCENTIVE PAY PLANS

Value Added Related to Wage Costs

BACKGROUND

Developed in 1930's by Allen Rucker, the plan operates under a registered trade mark. The plan focuses on improving worker productivity and reducing cost of materials and services used. This plan is similar to Scanlon except that it uses production value instead of sales value.

PRIMARY OBJECTIVE

Under the Rucker Plan performance in the current period of operation is compared to past performance and the increase or gain in the basis for the employee share.

FORMULA

"Rucker standard", R (or "productivity ratio")

$$R = W(\text{BAR})_t / V(\text{BAR})_t$$

where:

$W(\text{BAR})_t$ is the average historical wage cost

$V(\text{BAR})_t$ is average historical value of production less cost of materials and supplies.

LABOR COST

Production Value (sales value minus cost of materials and services)

As with the Scanlon plan, the bonus pool is calculated as actual labor cost times the productivity ratio n (inverse of Rucker standard) to produce the expected production value (EPV). Productivity gain is the positive difference between actual production value and EPV.

USE IN THE UNITED STATES AND ELSEWHERE

Many of the companies in the steel industry, such as Inland Steel, have based their union agreements on a version of the Rucker plan.

The best known application is the Lincoln Electric Company in Cleveland, Ohio, which has manufactured industrial electric motors and welding equipment since 1934. Employee bonuses are said to average 97.6% of regular earnings. Independent study by William Freud and Eugene Epstein concludes that workers at Lincoln are up to three times more productive than their counterparts in similar plants not using such plans.

ASSUMPTIONS

Clear performance targets are related to productivity. Employees can create a production gain through reducing labor costs or material costs, or both.

The distributions of gains, just as in the Scanlon plan, are usually calculated on a weekly or monthly basis with a provision to hold back a part of the employee bonus as a reserve for deficient months.

REQUIREMENTS

The Rucker plans require accurate and timely data on production costs, material cost, and cost of supplies and services used.

Product prices and material costs need to be stable so as not to exaggerate and distort the value-added estimates.

A high degree of cost consciousness is expected of employees.

ADVANTAGES

- Ideally suited for those companies where production is sufficiently removed from sales or end use.
- Suitable in plants where material costs are high and wastage is an important factor to be considered.

DISADVANTAGES

- Burden of maintaining detailed pay and production data may be considered excessive in case of small or new plants.
- Plan is difficult to administer where there is no clear relation historically between labor costs and value added.
- Plan may not be realistic if planned capital improvements are likely to significantly affect productivity.

HAY GROUP: DIFFERENT APPROACHES TO INCENTIVE PAY PLANS

Profit Sharing

BACKGROUND

In the United States this is one of the more popular forms of non-traditional pay or bonus plan. Employees receive a bonus based on corporate profits. According to U.S. Statistical Abstract (1983) profit sharing covered approximately 9% of production workers, 27% of all technical and clerical employees, and 23% of all professional and administrative employees in the U.S.

PRIMARY OBJECTIVE

Only pays a bonus when the corporation is profitable or performance is better than some market average.

FORMULA

A wide variety of specific formulas have been used in the calculation of profit sharing.

In general, "Profit share", J

$$J = \alpha [Pa(\text{star})/Pa]$$

where:

Pa(star) is the annual profit target

Pa is the realized profit

J is bonus, as a function of profit ratio.

Employees receive a varying annual bonus based on company or division profits. Payments can be in cash or deferred income through a retirement fund.

USE IN THE UNITED STATES AND ELSEWHERE

In the 1980s it is estimated that as many as 10 million employees in U.S. firms came under profit sharing plans. The deferred and cash plans (560,000) were almost equally divided. Profit sharing is popular with U.S. automobile manufacturers.

A U.S. steel company recently negotiated profit sharing as part of its 4-year labor agreement. Also DuPont's Fiber Division, with sales of 3.4 billion and 20,000 employees, recently adopted a profit-sharing approach.

ASSUMPTIONS

Profit sharing is viewed as falling outside the group of different productivity gainsharing systems. The principal difference is that profit sharing schemes are not based on variance from a predetermined standard - engineered or historical - but rather on the basis of corporate profitability. Sometimes greater than expected standard gains can be measured in profits instead of productivity, but these fall under the title of "gainsharing" rather than profit sharing. Source: A 1987 survey by the Hay Group of public and private organizations)

REQUIREMENTS

A profit sharing plan to be successful requires a good design and has to be well-administered. There should be a clear and understandable relationship of profit to performance.

The profit-sharing plan it should cover all employees from the CEO to the lowest work, with compensation rising and falling with company fortunes.

ADVANTAGES

- Profit sharing is financially affordable - pay out is made only when company is profitable.
- Profit-incentive formula is often simple and easy to communicate.
- Does not require extensive employee involvement.
- Less likely to create false expectations from employees.
- Less reporting and validation, with corresponding reduction in administrative burden/costs.

DISADVANTAGES

- Factors beyond employee control can influence profit thereby creating disincentives.
- Profit or loss may have no relationship to productivity.
- Annual payments may lead employees to ignore individual or group performance.

III. PAY-PRODUCTIVITY SYSTEM FOR TUNISIA

A. THE CONCEPT

All pay-productivity systems should have two dimensions: there out to be a well-defined measure of productivity or performance; and there ought to be a system for rewarding the performance of those participating in it.

The proposal to set up such a system in Tunisia addresses both these sets of issues. Since the two sides of the problem are interrelated it is important that they be mutually consistent.

Having surveyed the different models of a pay-productivity system in use in the United States, it is now possible to examine the approach proposed in Tunisia to establish a customized "Productivity Management System" (PMS). The examination will be made at three levels of generality:

- The conceptual formulation level;
- The system design level; and
- The operational and administrative level.

First, it will be necessary to evaluate the measure of productivity proposed in Tunisia, in terms of the objectives, stated explicitly or implicitly. Next comes the question of how the rewards are to be shared among the contributors to the gains in productivity and whether the Tunisian proposal meets certain objective criteria of equity and effectiveness.

In this examination we will stress the validity of the concepts proposed for Tunisia and compare certain conceptual issues with such systems elsewhere. This is the very first step

in the development of a PMS. Somewhat less emphasis will be put on the discussion of the system design since this remains to be fully developed and articulated in Tunisia. To do that it is necessary to carry out systematic field work among the enterprises that are likely to be the candidates for the implementation of a full-fledged system. It is not within the scope of this project to cover the operational details of a PMS for Tunisia. Such details must evolve through a participatory mechanism in which all parties affected are involved and are willing to share the responsibility for making the plan a success.

The single most important lesson to be drawn from the U.S. experience in the introduction of a PMS, or related system, is that there be strong motivation to improve productivity or performance within the enterprise and in an environment of mutual trust and with wide acceptance of change in the way things have been done. The initiative taken by the Government in Tunisia provides the proposal with a big clout. But it is equally important that enterprise management, supervisors and all other employees are willing to accept the measures by which the enterprise performance is to be judged so that the rewards may be distributed accordingly.

B. MEASURING PRODUCTIVITY

At the most general level, "productivity" is defined as the relationship between output and inputs. There are a variety of specific formulations of this concept. The Tunisian proposal for PMS covers a broader definition than is usually the case. Inputs are measured both as labor inputs and as capital inputs. Therefore, the concept is considered to cover "total factor productivity" rather than "individual factor productivity". In practice, the concept most often used is that of labor productivity.

The mathematical formulation of the concept of total or multi-factor productivity can be stated precisely. In this respect the work of the Bureau of Labor Statistics of the U.S. Department of Labor is quite appropriate and is able to reflect the underlying assumptions of the approach to measure total factor productivity.

To start with, a dual factor production function may be stated as:

$$Q(t) = A(t) f [K(t), L(t)]$$

where:

$Q(t)$ is the real output (measured at constant prices)

$K(t)$ is real capital input

$L(t)$ is real labor input

$A(t)$ is multi factor productivity (or index of "neutral" technical change). It can be represented as:

$A(t) = Q(t)/I(t)$, where: $I(t)$ is the aggregate index of real inputs.

This general formulation can be used in a single or multi-enterprise situation. It has also been used in analyzing macroeconomic trends.

From the foregoing formulation it is possible to derive the relationships of the contribution of each of the factors to total factor productivity.

$$\hat{Q}/Q = \hat{A}/A + s_k \hat{K}/K + s_l \hat{L}/L$$

the symbol " $\hat{}$ " is used to denote growth or change, so that \hat{Q}/Q is the rate of growth of real output.

where:

s_k and s_l are output elasticities with respect to capital and labor respectively. These represent relative shares of individual factors in total factor costs.

$$s_k + s_l = 1$$

$$s_k = [p_k K(t)] / [p_k K(t) + p_l L(t)], \text{ and}$$

$$s_l = [p_l L(t)] / [p_k K(t) + p_l L(t)].$$

where:

p_k is the price of capital services (rental price)

p_l is the price of labor (hourly compensation).

The measurement of labor productivity can be derived as follows:

$$\text{LAMDA} = (\hat{Q}/Q) - (\hat{L}/L) = \hat{A}/A + s_k [(\hat{K}/K) - (\hat{L}/L)]$$

where:

$(\hat{Q}/Q) - (\hat{L}/L)$ is percent change in labor productivity

\hat{A}/A is the percent change in joint productivity (both capital and labor)

s_k is capital's share, and

$[(\hat{K}/K) - (\hat{L}/L)]$ is percent change in capital input per hour (capital/labor ratio).

Similarly, $\text{KAPPA} = [(\hat{Q}/Q) - (\hat{K}/K)] =$ percent change in capital productivity.

At the aggregate level, the foregoing model has been applied to the total manufacturing sector in the U.S. We take two time periods to illustrate the variations in the parameters.

TABLE III-1

INPUTS AND OUTPUTS IN THE MANUFACTURING SECTOR
(Average annual rate of growth in percent)

	<u>Period</u>	
	<u>1948-1973</u>	<u>1973-1979</u>
Total output (Value added)	3.9	1.9
Inputs:		
Labor hours	1.1	0.5
Capital services	3.7	3.8
Capital's share in value of output	0.308	0.273
Labor's share in value of output	0.692	0.762

The multifactor productivity can be calculated from the above data using the BLS model.

$$(\hat{Q}/Q) - (\hat{L}/L) = (\hat{A}/A) + sk [(\hat{K}/K) - (\hat{L}/L)], \text{ or}$$

$$(\hat{A}/A) = (\hat{Q}/Q) - (\hat{L}/L) - sk [(\hat{K}/K) - (\hat{L}/L)].$$

-21-

For the time period 1948 - 1973 we estimate the multi factor productivity gain to be:

$$(\hat{A}/A) = 3.9 - 1.1 - 0.308 (3.7 - 1.1)$$

$$(\hat{A}/A) 1948-73 = 1.9992$$

Similar calculation for the subsequent period 1973-1979 results in a multifactor productivity gain of:

$$(\hat{A}/A) 1973-79 = 0.4991$$

However the labor productivity increase for the two periods was:

$$(\hat{Q}/Q) - (\hat{L}/L) 1948-73 = 2.8$$

and

$$(\hat{Q}/Q) - (\hat{L}/L) 1973-79 = 1.4$$

The labor productivity increase (increase in output per hours of all employees) includes the effect of increase in total factor productivity and the contribution of change in the capital labor ratio as was shown in the mathematical formulation.

That is, the contribution of increase in capital labor ratio is estimated for the two periods. Thus:

$$sk [(K^{\wedge}/K) - (L^{\wedge}/L)] 1948-73 = 0.8$$

and

$$sk [(K^{\wedge}/K) - (L^{\wedge}/L)] 1973-79 = 0.9$$

. 22'

In order to determine the extent to which wages can be increased, we use the measure of increase in labor productivity. But this would fail to account for changes in capital intensity (contribution of the capital labor ratio) to the increase in labor productivity. Consequently, it is proposed that the increase in labor productivity be considered as an upper bound for the determination of wage increments. Labor productivity increase, when adjusted for changes in capital intensity, would yield multifactor productivity increase. In this case multifactor productivity increases can be used as a lower bound for setting guidelines for industrywide wage increments.

C. SHARING OF GAIN

The concept of gain-sharing is far more difficult problem than the measurement of productivity. The term is a generic description of certain features that are associated with compensation systems that are contingent upon a certain performance standard or improvement in productivity. It is surprising that the Tunisian proposal gives such heavy emphasis on the measurement of productivity at the expense of conceptualizing or designing a contingency compensation system. One reason may be that contingency compensation systems have a great variety and the extensive adoption of such plans is relatively recent, particularly when bonus payments are linked to measures of productivity.

In the Tunisian proposal contingent compensation is not considered as the key issue of managing performance with well-defined objectives. Even though a great amount of evidence needs to be obtained to make a firm judgment about the validity of one or the other form of contingency pay systems in Tunisia, it is possible to establish the conceptual foundations for its introduction on a more solid ground than has been done so far.

There are 10 generic classes of contingency compensation systems that have been defined by the Hay Group in its surveys of such practices among U.S. industry. We list them in terms of their relative popularity based on a sample of firms surveyed by Hay.

Individual incentives - part of the pay of the individual is tied to performance.

Key contributor programs - payments to individuals whose skills, abilities or performance has made a significant impact on company product or performance.

Profit sharing - immediate cash bonuses or deferred retirement plans based on division or company profit performance.

Long term programs - benefits received by corporate officers or key personnel for performance extending over a year or longer.

Lump sum payments - one time bonus to employees.

Group incentives - similar to gain-sharing but based on small groups rather than on the performance of large units.

Pay of knowledge/skills - payment on the basis of knowledge and the number of jobs a person can perform.

Gainsharing - unit wide bonus systems designed to measure and share the results of the improvement in productivity.

Two-tier structure - new entrants receive a lower rate of pay than previously employed persons for similar jobs.

Among these different approaches the preference shown by the Tunisian proposal is clearly for a productivity gain-sharing program. But this does not appear to have been based on a careful examination of the different approaches available for Tunisia when it comes to the question of adopting a contingency compensation system. From a conceptual point of view it appears that an eclectic approach that combines special features of more than one approach may be suited for adoption in Tunisia. This is especially true when a multiple set of objectives are involved in a nation-wide program with a diversity of enterprises in different sectors of the economy.

From a theoretical point of view, gains in productivity are translated into profitability or the "surplus" generated by an enterprise. Higher productivity normally leads to greater profit. A reward system, to be conceptually sound, must be based on a profitability factor superimposed on a productivity factor. In this way profits arising from factors others than gains in productivity cannot be allowed to determine bonus payments. This removes the criticism levelled against the profit sharing plans discussed earlier. Furthermore, the Tunisian proposal should emphasize a profit standard in addition to contribution of labor to productivity improvement as a basis of distributing gains.

In designing a system of bonuses based on both improvements in productivity and sharing of profits Tunisia will be able to incorporate the two dimensions of a productivity pay system that will have a wide applicability as a framework and which will, at the same time, allow individual enterprises to operationally differentiate the application from one enterprise to another, as needed.

The next chapter of this report outlines a proposed conceptual framework for a supplemental wage (bonus) system linked to productivity improvement.

IV. FINDINGS AND RECOMMENDATIONS

A. MAJOR CONCLUSION

The conceptual framework set forth in the Tunisian pay-productivity directive is logical, definitionally sound, and has a productivity measurement formula which can be made to work in Tunisia.

However, as noted throughout this report, there is one other highly interrelated component of a pay-productivity system, namely: A method(s) that links supplemental wage increase (bonus) for employees contributing to productivity improvements. This component remains to be developed in the Tunisian approach. What follows is an incremental pay formula that might be used under the "methode des comptes de surplus."

As Tunisia proceeds with the design and implementation of a pay productivity system of the type and magnitude proposed for its public enterprises, its success would represent a major breakthrough in the development of pay-productivity systems in the Third World. This possibility alone makes it important that the underlying *raison d'etre* of the system be understood and appreciated. The concept is that:

- (1) pay increments, or bonuses, can only be allowed if there are productivity gains in each unit of the enterprise;
- (2) for everyone in an enterprise, from top management to rank and file workers, these increments are directly linked to the profitability of the enterprise; and

- (3) the bonuses, above the basic salary level, will vary with the profitability performance of the unit against predetermined standards.

The basic objective of the system must be to improve the efficiency of the public enterprises. The premise for the design of the system is that efficiency could be improved through a system of incentives that are based on ability of both the employees and management to respond positively to competitive influences by generating profits.

The absence of a competitive, free-market system creates major problems of determining profitable enterprises in the public sector operating under significant levels of subsidy. To circumvent this problem, we propose that in determining productivity and profit-linked bonuses for employees and management it will be necessary to create a simulated competitive situation.

This is hardly a revolutionary idea when one considers that a competitive paradigm is often employed by large multi-plant corporations to determine prices, profits and bonus payment systems based on productivity gain-sharing or simply profit-sharing. Thus, the country as whole is analogous to a large corporation in which the enterprises can be viewed as plants belonging to a single corporate structure represented by the government. In this case, productivity and profit standards are set at the macro-level averages, while enterprise-level changes in these variables are evaluated in comparison with the macro-level average changes to determine the distribution of bonuses.

The way the system may be designed to first set an average salary increase for the public sector or large parts of it. These salary increases must be determined by the total factor productivity model.

Thus, $(\hat{W}/W) > \text{or} = (\hat{A}/A)$

This forms the macro standard for general wage increases for the public sector. It could, however, be modified to include other factors as needed. For example, wage increases can be set equal to or less than the increase in labor productivity:

$$(\hat{W}/W) < \text{or} = (\hat{A}/A) + sk [(K^{\wedge}/K) - (L^{\wedge}/L)]$$

All wage increases would be linked to productivity gains calculated on an annual basis. The upper bound will be set by increases in labor productivity while the lower bound is set by multifactor productivity increase.

Individual enterprises would be allowed to choose a special productivity-pay system based on profitability performance of the enterprise. Each enterprise would set a profit target based on guidelines provided by the government. These guidelines for profit target would reflect the enterprise gain in productivity:

$$Pi(\text{star}) = f (\hat{A}/A) i$$

The functional form of the relationship would have to be negotiated between the government, the enterprise management and the employees. The exact formula can be drawn up after a careful consideration of the organizational structure and culture of the enterprise, the technology available to the enterprise, and the nature of the input and output mixes.

Those enterprises participating in the program would have the wage increases related to the increases in the public sectors wage increases.

Thus: $(W^*/W) i = \text{ALPHA} (W^*/W)$

where: ALPHA = 1.0 iff $P_i = P_i(\text{star})$
ALPHA = .94 iff $P_i = .80 P_i(\text{star})$
ALPHA = 1.2 iff $P_i = 1.20 P_i(\text{star})$

The foregoing is an illustration of the formula that may be used to link enterprise wage increases to profitability performance measured against the target profitability. The targets are themselves set in terms of the relationship of profitability relative to the aggregate profit performance, which in turn is a function of productivity increase.

A further condition for the bonus payments in terms of wage increases will be that these increases will be subject to upper and lower bounds. These bounds will have to be determined in terms of the past changes in productivity.

A number of operational considerations are required for the actual application of any incentive pay system, such as:

- The system will have to be phased in over a period of time - three to five years.
- The pay-productivity system needs to be applied uniformly among similar enterprises - similarity of characteristics may include size, the nature of products, the complexity of technology, and organizational features.
- the locus of decisions in terms of corporate hierarchy, the committee structure, etc., will have to be settled in advance.
- Data and reporting requirements must be assessed and set up in advance.
- Historical experience need to be carefully evaluated in terms of the representative period which will become the basis for the standards.
- The training and orientation requirements will have to be met to develop employee and management understanding of the change and the involvement in its operations.

Initial inducements will have to be developed for enterprises enrolling in the pay-productivity system, if it is to be voluntary.

B. ADDITIONAL RECOMMENDATIONS

Although the Prime Minister's directive provides a useful introduction to the pay-productivity concept, supplemental information appears warranted to help managers and employees understand and accept the pay-productivity program. Therefore, Hay recommends that the GOT develop and issue additional explanatory material describing in clear and explicit terms, with examples, the productivity factors to be measured and how the measures will be used to link supplemental wage increases for employees contributing to productivity improvements.

Most important, the Government of Tunisia should initiate steps to provide for more managerial and employee involvement in the development of pay productivity program. Hay recommends that participating enterprises be encouraged to establish administrative regulations for employee involvement in such areas as identifying work areas for productivity improvement, and participating in the design of methods for monitoring performance and allocating the bonus pool.

Finally, Hay recommends that the data used in the specific formula to measure productivity and establish bonus payments be accurate and reliable. The Government of Tunisia should make a special effort to establish standard definitions and a uniform reporting system to ensure that the quantitative base of the PMS is valid across enterprises.

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