INCENTIVE PLANS FOR MEXICAN CONSTRUCTION WORKERS

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ABSTRACT

Construction is one of the industries that rely heavily on the worker's performance. The construction worker is responsible for the optimal use of resources and equipment, making him an important part of the project and his performance essential to its accomplishment.

The aim of the paper is to propose an incentive scheme for the Mexican construction worker that could assist the firm to achieve its goal in terms of costs, time and quality of its projects. The incentive plan is the direct result of a work study analysis conducted in a firm specialized in the construction and development of low income housing complexes in Mexico. In particular, the study focuses in three types of activities: stucco and plaster application and masonry of concrete block walls. Based on the observations from the methods employed and time spent in each process, with previous identification of the firm's objectives and benchmarks, the monetary incentive schemes are designed to meet the firm's objectives.

Furthermore, the proposed incentive scheme is meant to identify the most trained workers and to build a database that could help to keep track and rehired them in the future. However, the main use of the incentive plan is the effect it has on the worker's motivation that could help him to improve his performance. The paper offers numerical results for the three activities under study in terms of productivity indicators, comparison to theoretical benchmarks and evaluation of field personnel and design of effective economic incentives.

KEY WORDS

Economic incentives, work study, worker's evaluation, performance, productivity.

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INTRODUCTION

During the last twenty five years the construction industry has contributed with approximately 4.42% of the Mexican Gross Domestic Product on average and according to the last National Survey of Urban Employment conducted by INEGI in 2004 it employs 5.9% of the urban population.

Although in terms of contribution to GDP growth construction is ranked in the sixth position out of nine sectors that composed the GDP, economists and policy makers have widely used the evolution of its economic performance as a leading indicator of domestic investment, production and employment, highlighting the importance of the construction sector both at the micro and macroeconomic level.

At the firm level production heavily relies on the construction worker's performance, nevertheless, the application of comprehensive strategies promoting economic and psychological incentives to increase his productivity has received little attention due to the complications caused by high turnover rates and the worker's attitude, highly explained by the profile of the Mexican construction worker. Despite this, at the time when companies implement incentives programs, one of the main issues is to obtain commitment from people in the organization and the necessary involvement whit the new challenge (Alarcon, Seguel 2002) of implement lean practices that will lead them to gain improved competitiveness in theirs markets (Alarcon, Seguel 2002).

The applicability of incentive plans and development strategies in the construction industry is probably most affected by high mobility of workers within projects and firms. High turnover rates reduce any economic incentive for employers to invest in programs aimed to increase workers' overall skills in the medium or long run, notwithstanding the benefits that firms could reach by specializing them in key construction processes or activities that could reduce some of the risks related to quality of work and performance.

Furthermore, the design of an effective incentive scheme has to consider the profile of the average construction worker and customized it to the workers' specific needs. (Rodríguez and Ramírez 1992) characterize the Mexican construction worker as malnourished, with a high propensity to abuse on the consumption of alcoholic beverages or drugs, illiterate or with low educational levels. At the same time has a friendly and cheerful personality and has strong family and religious linkages. In terms of working performance, he lacks discipline and tends to be inefficient and irresponsible. On the other hand he is ingenious and capable to deliver high quality tasks when supervised.

According to the labour quality indicators published by The International Labour Organization (ILO), the Mexican construction worker has low income, does not have access to working benefits beyond his wage and in many cases does not qualify for social security benefits in spite of his long, risky and physically intensive shifts usually performed in difficult conditions; in addition, he faces high income uncertainty, has little opportunities to make a lifetime career within the organization, his opinion is low valued and some occupations have no union representation.

In summary, in order to devise and implement effective incentive strategies that lead to a superior performance of the Mexican construction worker through an increase in his productivity, such an incentive plan should consider the sociologic and psychological elements of his personality. In his seminar work "Theory of Human Motivation" back in 1943, Abraham Maslow proposed his famous hierarchy of needs, often depicted as a pyramid integrated by

five levels: physiological, safety, belonging, esteem and actualization. The first four steps of the pyramid are associated to physiological need while the one on top of the pyramid is related to psychological needs. According to the theory, human needs ranked on higher levels would only be embraced once the lower needs have been totally satisfied.

Taking Maslow's hierarchy needs as theoretical framework and the profile of the Mexican construction worker as the object of study, it is straightforward that given his working conditions a construction worker may only be able to satisfy the most basic physiological needs placed at the button of the pyramid; hereby a successful incentive plan should facilitate his transition to the safety level, which includes security of employment, revenue, health and resources among others.

The aim of this paper is to propose an incentive scheme for the Mexican construction worker that acknowledges the monetary and psychological importance of income and safety benefits on his motivation and attitude towards work, considering the latest trends in payment schemes and institutional constraints.

CASE OF STUDY

In order to develop the worker's incentives program, we performed a work study in a project involving the construction of low income housing in Monterrey, N.L, Mexico. We focused on three specific activities (stucco and plaster application and masonry of concrete block walls) that are representative within the construction industry main activities (structural construction and finishings). The analysis consisted of the following sections:

a) Detailed analysis of the work activities including review of the methods being used and time management practices (Meyers 1999) Reviewing the methods being used allows the identification of the logical sequence of the work and the worker's role within it. Decomposing the time allocated to the job helped us to identify (1) shirking, (2) dead time, (3) effective working time and (4) time devoted to supporting activities that indirectly help the achievement of the main activities. The outcome of this section is a work study form and a graph representing the distribution of time.

b) Computation of workers' productivity and performance. Performance is measured in terms of the advance in the work activities in the time-span being considered. A productivity index is subsequently constructed comparing the worker's performance and the theoretical performance forecasted by the firm. Using a bar graph we show the actual performance and both the firm's forecasted performance and a national index (using BIMSA, 2004 database) as benchmarks.

c) Worker's evaluation. Using criteria standard in the construction industry, the Human Resources department determines the implications of the workers' performance in both the overall cost of the project and the time budgeted for it. The most important elements of such criteria are the work quality and the technical knowledge involved in it, raw materials management and overall reliability. In the lowest part of the scale, the criteria include the worker's rapport with their superiors and colleagues, punctuality, learning skills and hygiene habits.

Once the three stages of the field study are completed the immediate step is to exploit the findings to identify the deficiencies in the working process. The chosen mechanism is to construct an incentive scheme that links good performance with higher rewards. The proposed scheme combines both the collective systems of Merrick, Taylor and Rucker as well as other traditional incentives systems.

RESULTS AND INCENTIVES PROPOSAL

The results corresponding to the first activity, mortar application, show that the firm has already taken some steps in solving some imperfections in the logistical process. The firm has installed in each house project individual deposits in which the mortar is distributed by a truck mixer. Such policy eliminates the participation of the worker in the material preparation saving time and reducing wasted material. Additionally, the firm uses modular scaffoldings matched to the specific size of each housing project making the workers mobility easier and quicker.

The analysis of the time allocated to this activity showed that in spite of the firm's policies already in place, only 50% of the time was devoted to effective work (Figure 5). An important determinant of such outcome is the fact that in a typical day the workers have to wait 1.5 hours for the mortar to be distributed. Such daily idle time has important consequence for weekly aggregates. As shown in Figure 2 and Table 1, the actual worker's performance is higher than both the firm's theoretical performance and the national standard for this specific activity.

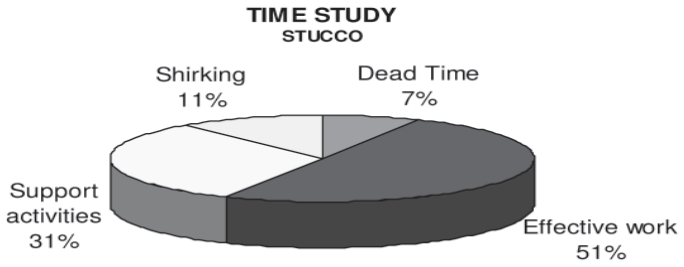

Figure 1: Results of stucco Time Study (Figure 3-5 in Romero. 2005)

Table 1: Productivity Analysis of Stucco (Table 3-1 in Romero. 2005)

Productivity Analysis		
	Date	050218
	Activity:	Stucco
	Unit	m2
	Time Unit	jornal
Performance m^2/jor		
National	Firm	
(BIMSA)	Theoretical	Real
14.93	18	24.93
	Productivity Index	**139%**

In view of the fact that the stucco application technique is not affected by workmanship, the system will look for an scheme that accomplishes higher quality standards in this activity, without interfering with the workers' pace. The system will establish five indicators to evaluate the quality of the workers performance and will determine his productivity bonus according to the criteria in table 2.

Regarding the analysis of plaster application on walls, results exhibit significant inefficiencies in the use of raw materials. Bad workmanship and inherited wastefulness from previous stages lead to unnecessary material disposal. In contrast with the stucco application process, the firm has not implemented corrective measures to improve the plaster application stage.

Table 2: Percentage of bond according to the numbers of quality standards than be done and the Productivity Index reached (Table 3-3 in Romero. 2005)

Accomplished Quality Standards	Productivity Index Reached							Percentage of bonus
	110	115	120	125	130	135	140	
5	22%	25%	31%	36%	40%	43%	45%	
4	17%	20%	26%	31%	35%	38%	40%	
3	12%	15%	21%	26%	30%	33%	35%	
2	7%	10%	16%	21%	25%	28%	30%	
1	4%	7%	13%	18%	22%	25%	27%	
0	2%	5%	11%	16%	20%	23%	25%	

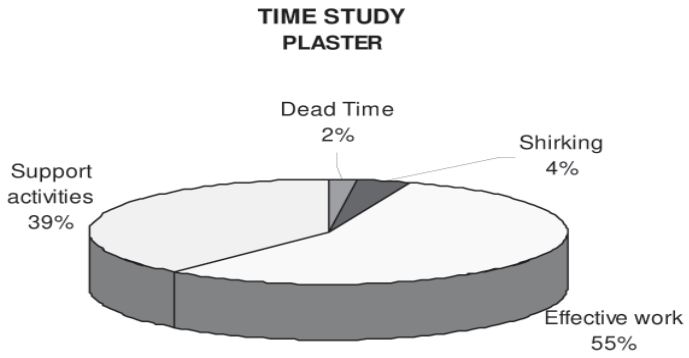

Figure 2: Results of Plaster Time Study (Figure 3-15 in Romero. 2005)

It is important to mention that the observed time decomposition from the worker under study was on supporting activities and effective time, given that he worked without interruptions (Figure 2). Nonetheless his performance was lower than the theoric benchmark yielding a productivity of 93% (Refer to table 3). This result highlights the importance of working conditions on the construction worker's performance, since his low productivity is not the result of shirking or idle time.

Table 3: Productivity Analysis of Plaster (Table 3-5 in Romero. 2005)

Productivity Analysis		
	Date	050218
	Activity:	Clay
	Unit	m2
	Time Unit	jornal
Performance m^2/jor		
National	Firm	
(BIMSA)	Theoretical	Real
24.39	32	29.65
	Productivity Index	**93%**

Alternatively, for the plaster application activity the incentive proposal is based on the Rucker Plan, a group system in which the monetary incentive comes from savings in terms of value of production due to an efficient use of equipment and material reducing unnecessary disposal. The Rucker plan computes incentives on a monthly basis and usually only 50% of the incentive fund is distributed among workers while 25% is reserved for times when workmanship is under the standard and the remaining 25% goes to the firm.

The eligible group of workers for the Rucker incentive plan is composed by all construction workers in the firm specialized on plaster application, independently of their contractual affiliation. Furthermore, it is important to remark that the incentive fund should be based on real monthly expenses rather than expected or budgeted expenses, so savings proceeds are not compromised and could be divided among all eligible workers in the group.

Finally, the last activity under study is the masonry of concrete block walls. In contrast to the plaster application process it was observed that the effective time of the worker under study was low due to constant interruptions in his journey, long breaks and shrinking time. In addition, most of the worker's time was devoted to supporting activities, which only add marginal value to production due to deficiencies on the method of work itself.

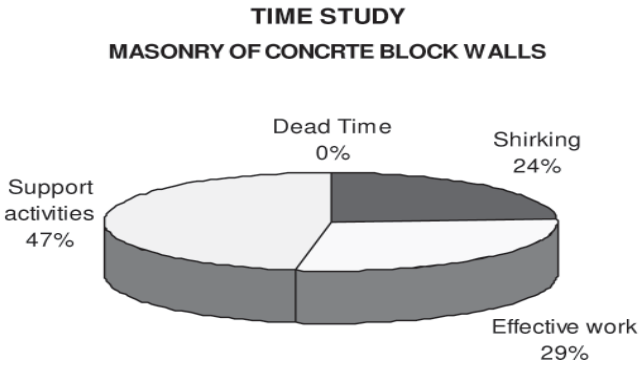

Figure 3: Results of Masonry of concrete block walls Time Study (Figure 3-30 in Romero. 2005)

In terms of the workers' performance evaluation was ranked under the theoretical benchmark and the BIMSA national average (Table 4). It is important to remark that the both the stucco and plaster application evaluations had easily overcome the national indicator unlike the masonry of concrete block walls. The worker under study showed low productivity levels, although the quality of his work was high compared to the one of his co-workers.

Table 4: Productivity Analysis of Plaster (Table 3-5 in Romero).

Productivity Analysis		
	Date	050218
	Activity:	Mansory of concrete block walls
	Unit	m2
	Time Unit	jornal
Performance m^2/jor		
National	Firm	
(BIMSA)	Theoretical	Real
14.12	18	8.68
	Productivity Index	**48%**

The incentive proposal for the masonry of concrete block walls activity for a worker with the characteristics like the one under study should offer him the opportunity to improve his overall performance since the relative quality of his work is good and if he can increase his productivity it would be in the best interest of the firm to keep him. In this context, three types of traditional quantity-based incentives schemes are proposed: by piecework, quality-based piecework (the monetary incentive is related to low, medium or high productivity) and percentage-based piecework (compensation is increased by one percentage point for each percentage point increase in performance).

Considering a peak of 45% of the worker's wage as bonus premium, among the three proposed schemes, the study revealed that the percentage-based piecework offers a more egalitarian distribution of monetary incentives and avoid conflicts among workers, while the quality-based piecework had the lowest implementation costs, but also offers the lowest results increasing the worker's performance. Finally, the combination of the percentage and the quality-based piecework was considered in the analysis, but although this type of scheme would offer a higher premium for the productive worker, it would also propose a harder punishment for the low productive worker, and this may increase conflicts among them.

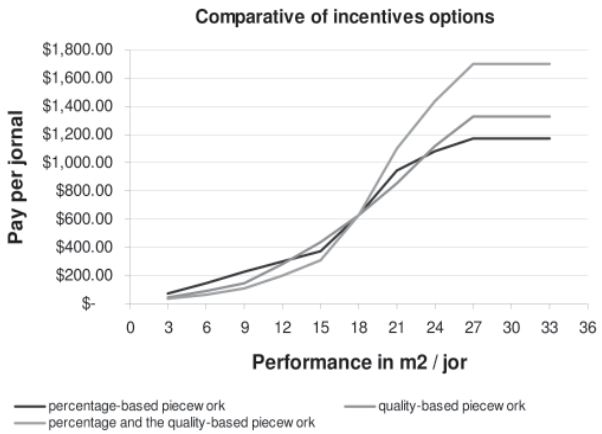

Figure 4: Comparative of incentives options for masonry concrete blocks (Figure 3-42 in Romero. 2005)

CONCLUSIONS

The optimal allocation and use of resources is one of the main concerns in the construction industry, however, firms tend to favour techniques aimed to reduce wasteful disposability of raw materials over programs focused to maximize the productivity of the human capital directly involved in the construction process. This article stresses the importance of such policy implementation as a cost reduction alternative.

Specifically, we propose an incentive plan for the construction worker based on economic compensations directly linked to his effectiveness and productivity. An important characteristic of the incentive scheme is its flexibility and applicability to different activities within the construction process. Work study and time study analysis are used to identify each activity's opportunity areas and challenges so as to adjust the incentive plan accordingly and therefore achieve benefits both for the individual worker and the firm's overall performance.

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