



# “Net Profit Chain” Within an Instrumental Proposal of Management Accounting for Management Control

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## ABSTRACT

This work is aimed at developing an instrumental model of Management Accounting, oriented to Management Control. The current scenarios in which companies operate, globalized, with permanent and vertiginous changes in the environment and technologies, (Digital Age), regulations in the environment establish high competitiveness and short-term operational cycles. Organizations establish strategic plans that must be conducted and directed by managers. Accounting information under standards if they have improved the quality of the information, presents significant limitations for management control. Managers need to have information regarding costs, revenues and results attributable to their areas of responsibility. The proposed "Net Profit Chain" model is based on having a decentralized organizational structure in responsibility centers, the application of internal transfer pricing and Accounting by Responsibility Centers, which generates information for the different responsibility centers. The "Net Profit Chain" will allow to know the results of each segmented for the measurement of the performance and economic efficiency of each center, measuring the contribution of each of them in the generation of the net profit or net margin of the company.

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## 1. The Modern Approach to Business Management Control

The Management Control must be conceived as a process of conducting and directing the strategic plans of the organizations to be executed by the business managers, being necessary to have the techniques and support tools for this objective.

The current economic, financial and social scenario faced by highly competitive companies requires designs of organizational structures based on responsibility centers to achieve the fulfillment of specific objectives and actions established by senior management through decision-making processes and efficient performance.

## 2. The Net Profit Chain Model

In time, and considering the need in the management of companies to apply rigorous controls to management. Various techniques have been developed for this purpose, among which are mentioned, Indicator panels or integrated scorecard. (Balanced Score Card), Management and Cost Accounting, Budgetary Control, Just-in-Time, Total Quality, Activity-Based Cost (ABC Costs) and others.

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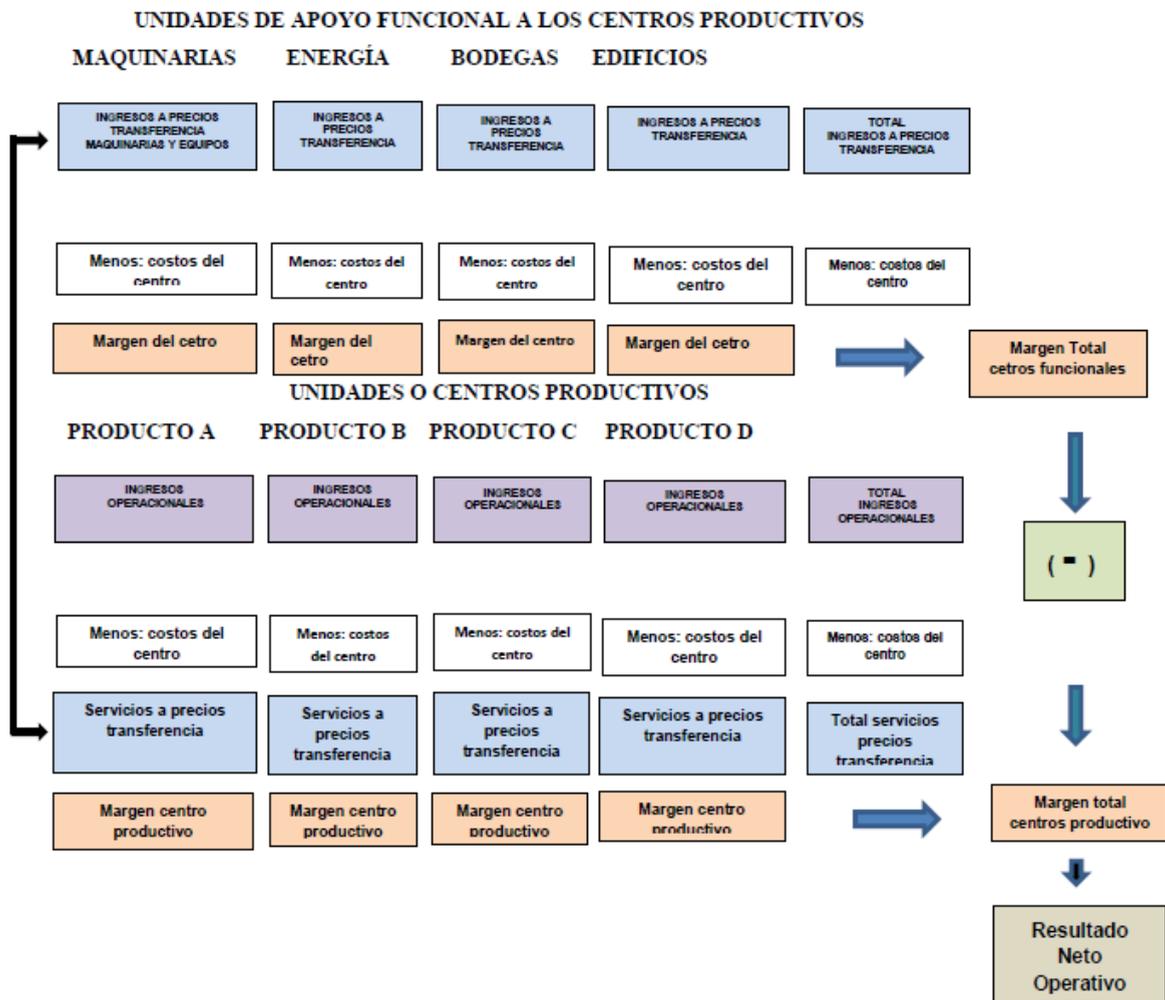
The proposed model is inserted in the extension of Management Accounting focused on generating management reports on the performance, actions and contributions that the centers make in the net operating result of the companies.

It is based on the establishment of centers or areas of responsibility and the application of internal transfer prices to the products or services transferred from one center to another.

The key aspects will be the relevant centers to establish, the transfer pricing policy and an Accounting model (by Responsibility Centers) to identify the income, controllable costs and investment of each unit.

The results obtained in each segment will not have an impact on the corporate net result as the income in a transfer center is neutralized as a cost of the recipient.

A representative graph of the Net Profit Chain is as follows:



As noted, the basic elements of the model are: The centers of responsibility that correspond to a unit within the organization, made up of resources or material and human elements, directed by a manager (manager or head responsible), with delegated authority that carries out activities, operations or actions of the same nature. A responsibility center can take the character of a management, a directorate, a department, a section, or a task force or other small units.

An internal transfer price is conceptualized as the quantity or value to be transferred or charged from a segment or center of an organization to another center of the same organization. The setting of transfer prices can be

resisted by the managers of each center, who are going to be evaluated on their performance and efficiency when they do not represent the economic or alternative value of the opportunity and when there are costs that cannot be controlled by the unit. The available transfer prices are: market prices, replacement prices, cost value plus margin, negotiated prices and arbitrated prices.

For the purposes of the model, the market prices, replacement prices or the opportunity cost, represent the most adequate basis as they are the decisional alternative of using own resources or resorting to outsourcing or outsourcing.

Accounting by centers or areas of responsibility whose basic objective is to channel and classify the accounting information of the different centers or areas of responsibility, especially regarding costs, income, results and investments.

### 3. Illustration of the Application in a Construction Company

The construction company "Vientos del Sur S. A" dedicated to the construction of highways in the nature of Public Works, generally awarded through bids from the Ministry of Public Works of the country and are expressed in US dollars (\$). In the period, the company was awarded two proposals for the construction of two highways in the Metropolitan Region, both consider highways with asphalt layers, considering that alternative concrete layers result in higher costs.

Contract No.1 was awarded at a fixed price of US\$11,494,122

Contract No.2 was awarded at a fixed price of US\$15,648,956

The contracts at the end of the accounting year are fully terminated and the income statement at the end is as follows:

Statement of Income	
Contract income	27,143,078
Operational costs	
Remuneration	2,616,769
Miscellaneous Materials and Supplies	2,174,776
Asphalt Cement	3,750,600
Machinery and Equipment Depreciation	8,670,770
Depreciation of aggregates plant	65,000
Asphalt Plant Depreciation	56,500
Energy Consumption	200,874
Fuel Consumption	954,852
Additive Consumption	15,069
Municipal Rights extraction of aggregates	86,850
Consumption of hydraulic fluids and lubricants	657,847
Maintenance and spare parts Machinery / Equipment	1,274,128
Third party equipment rental	1,578,954
Security articles	150,587
Personal Food Services	140,442
Miscellaneous operating costs	117,130
	22,511,148
Operating Income	4,631,930

As operational policies, the company has production plants for the aggregates necessary to prepare asphalt mixtures and portable asphalt plants to prepare asphalt mixtures on site. Furthermore, for strategic reasons, it has practically all the machinery and equipment required in the construction of these highways and exceptionally resorts to equipment outsourcing.

For management control purposes, the administration has developed an accounting model by responsibility centers, as a definition of relevant responsibility centers, a) construction contracts, b) aggregates plants, c) asphalt plants, and d) the unit machinery and equipment.

Internal transfer prices will be applied based on market prices and on this basis, establish the contributions that each unit adds to the net operating profit.

The transfer prices are:

Machinery and Equipment Services

MACHINERY AND EQUIPMENT	TIME VALUE PRICE DESCRIPTION OF MARKET
Caterpillar D8 T Bulldozer	US\$80
Caterpillar 140K Motor Grader	US\$50
Atlas Coppco Rock Drills	US\$140
Caterpillar 120 CG Motor Grader	US\$38
Front Loader 456 CF 08	US\$65
Front Loaded 456 CF 07	US\$65
Hitachi PC 200 Backhoe Loader	US\$45
Hitachi EX 130-5 Backhoe Loader	US\$45
Mac brand trucks with 20 M3 Hopper	US\$35
Kenworth Asphalt Transport Trucks	US\$70
Ford Asphalt Sprinkler Trucks	US\$40
Pick-up trucks	US\$15
Cat CCS7 Combined Asphalt Compactor	US\$40
Ingerson Rand compressor	US\$80

Production and delivery of aggregate materials to the Asphalt plant.

ARID PRODUCTS	QUANTITY M3 PRODUCTION	PRICE COST US\$M3	PRICE M3 MARKET
SAND	7,986	11.3	US\$30
GRAVEL 1 1/2"	15,440	9.0	US\$24
GRAVEL 3/4"	8,518	9.8	US\$26
ROCK POWDER	21,296	15.0	US\$40

Asphalt mix productions.

PRODUCT DELIVERED ON SITU	CONTRACT 1 M3	CONTRACT 2 M3	PRICE OF MARKET M3
Asphalt Mix	23,426	35,138	US\$90

#### 4. Development of the Net Profit Chain Model

Accounting by responsibility centers designed to generate detailed and analytical information on income and costs of each operational responsibility center (construction contracts and functional or logistics support centers, provides the following information at closing:

**(1) Direct costs generated by each responsibility center**

Concepts of Costs	Plant					Costs Totals
	Arid plant	Asphalt	Machinery	Contract 1	Contract 2	
Remuneration	224,603	117,701	200,600	993,010	1,080,856	2,616,769
Materials and Supplies	29,691	72,680	19,197	902,343	1,150,866	2,174,776
Asphalt cement AC-30	-	3,750,600	-	-	-	3,750,600
Electricity consumption	185,200	3,532	1,298	4,806	6,038	200,874
Municipal material rights	86,850	-	-	-	-	86,850
Machinery/equipment additives	-	-	15,069	-	-	15,069
Depreciation of machinery and equipment	-	-	8,670,770	-	-	8,670,770
Aggregates Plant Depreciation	65,000				65,000	
Asphalt Plant Depreciation		56,500			56,500	
Fuels	-	-	954,852	-	-	954,852
Hydraulic and lubricant fluid consumption	16,563	74,241	567,043	-	-	657,847
Maintenance and spare parts for machinery and equipment	-	-	1,274,128	-	-	1,274,128
Other variable production expenses	1,645	714	3,227	4,695	8,229	18,511
Equipment rentals	3,334	11,771	-	714,013	849,836	1,578,954
Security items	4,771	13,496	9,815	7,428	115,077	150,587
Staff supply	12,702	9,959	13,498	48,153	56,130	140,442
Miscellaneous production costs	2,936	7,008	16,393	29,429	42,853	98,619
Miscellaneous production costs	4,581	7,722	19,620	34,124	51,083	117,130
<b>TOTALS</b>	<b>633,294</b>	<b>4,118,200</b>	<b>11,745,891</b>	<b>2,703,877</b>	<b>3,309,886</b>	<b>22,511,148</b>

**(2) Production report of machinery and equipment and measurement at transfer prices**

Description of Machinery and Equipment	Actual Working Hours				Hour Value Market Price	Transfer Prices to Market Prices			
	Arid Plant	Asphalt Plant	Contract 1	Contract 2		Arid Plant	Asphalt Plant	Contract 1	Contract 2
4 Bulldozer Caterpillar D8 T			6,682	6,582	US\$80			534,560	526,560
4 Caterpillar 140 K Motor Grader			6,750	8,452	US\$50			337,500	422,600
4 Atlas Coppco rock drills			2,560	1,850	US\$140			358,400	259,000
2 Caterpillar 120 CG Motor Grader			2,340	2,560	US\$38			88,920	97,280
4 Front Loader 456 CF 08			14,640	12,150	US\$65			951,600	789,750
4 Front Loaded 456 CF 07	4,250	5,342		5,230	US\$65	276,250	347,230		339,950
1 Hitachi PC 200 Backhoe Loader	3,568				US\$45	160,560			
3 Hitachi EX 130-5 Backhoe Loader			9,545	8,754	US\$45			429,525	393,930
20 Mack Hopper Trucks 20 M3	10,250		22,458	20,650	US\$35	358,750		786,030	722,750
4 Kenworth brand asphalt trucks		11,200		-	US\$70		784,000		
2 Ford Asphalt Sprinkler Trucks	1,250	2,250	US\$40	50,000	90,000				
12 Pick-up trucks	780	642	8,562	12,040	US\$15	31,200	9,630	128,430	180,600
4 Cat CCS7 Combined Compactor	5,058	6,450	US\$40	202,320	258,000				
6 Ingersoll Rand Compressor			450	250	US\$80			36,000	20,000
<b>Total</b>						<b>826,760</b>	<b>1,140,860</b>	<b>3,903,285</b>	<b>4,100,420</b>

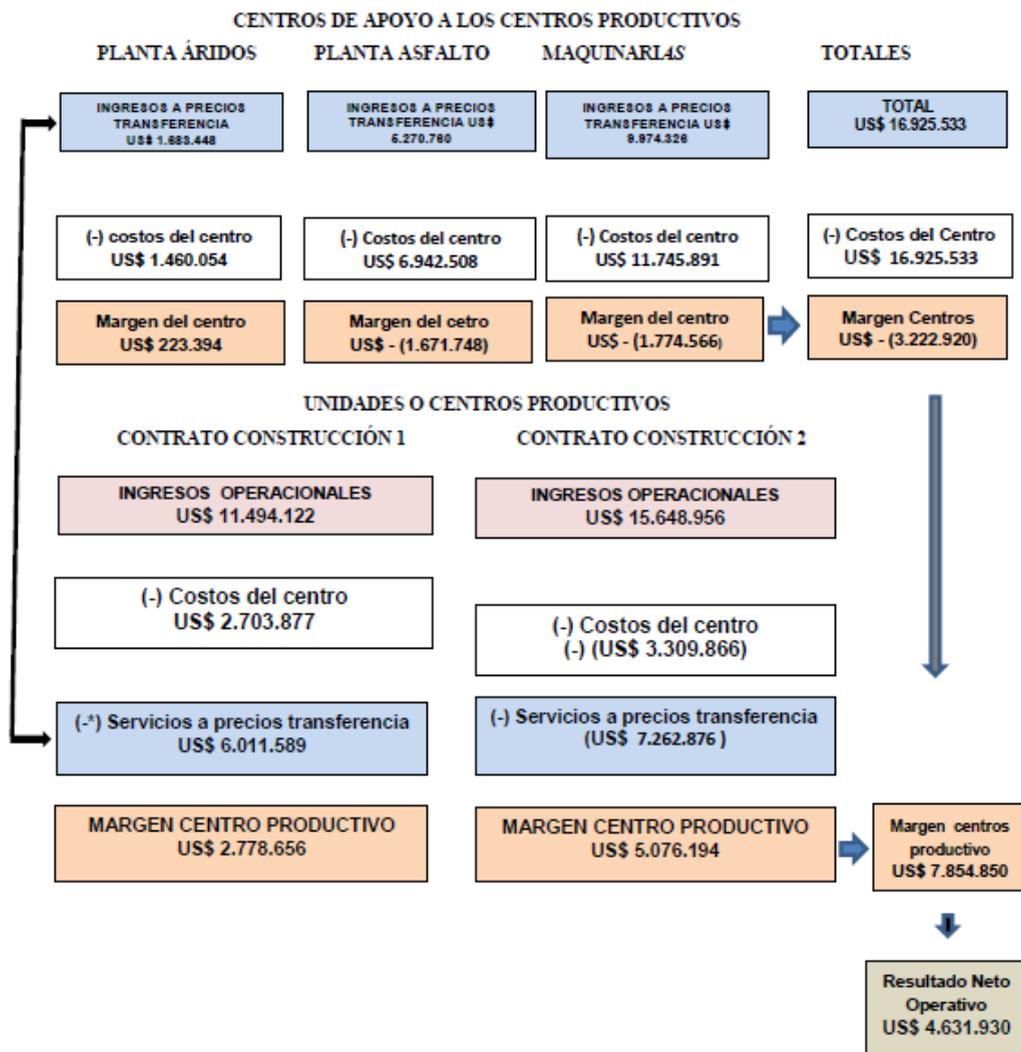
Production and measurement at transfer prices Aggregate plant to Asphalt plant.

Arid Products	Quantity M3 Production	Price Cost US\$M3	Cost Production	Price M3 Market	Price of Transfer
Sand	7,986	11.3	90,127	US\$30	US\$239,580
Gravel 1 1/2"	15,440	9.0	139,397	US\$24	370,550
Gravel 3/4"	8,518	9.8	83,318	US\$26	221,478
Rock dust	21,296	15.0	320,452	US\$40	851,840
Totals	53,240		US\$633,294		US\$1,683,448

Asphalt mix production and measurement at transfer prices.

Product Delivered on SITU	Contract 1 M3	Contract 2 M3	Market Price	Contract 1	Contract 2
Asphalt Mix	23,426	35,138	US\$90	2,108,304	3,162,456

### Presentation of the Company's Net Profit Chain



Statement on the generation of net profit.

Concepts	Plant	Aggregates Plant	Asphalt	Machinery	Contract 1	Contract 2	Costs Totals
<b>INCOME</b>							
Income from External Payment Statements					11,494,122	15,648,956	27,143,078
Income from transfer prices	1,683,448	5,270,760		9,971,325			16,925,533
Total Income	1,683,448	5,270,760		9,971,325	11,494,122	15,648,956	44,068,611
<b>COSTS</b>							
Aggregates Transfer Price			1,683,448				1,683,448
Asphalt Mix Transfer Price					2,108,304	3,162,456	5,270,760
Machinery and Equipment Transfer Price	826,760	1,140,860			3,903,285	4,100,420	9,971,325
Variable remuneration and bonuses	224,603	117,701		200,600	993,010	1,080,856	2,616,769
Materials and Supplies	29,691	72,680		19,197	902,343	1,150,866	2,174,776
Asphalt cement AC-30 (5,784 Ton)	-	3,750,600		-	-	-	3,750,600
Electricity consumption	185,200	3,532		1,298	4,806	6,038	200,874
Municipal material extraction rights	86,850	-		-	-	-	86,850
Consumption of machinery/equipment additives	-	-		15,069	-	-	15,069
Machinery and Equipment Depreciation	-	-		8,670,770	-	-	8,670,770
Aggregates Plant Depreciation	65,000						65,000
Asphalt Plant Depreciation			56,500				56,500
Fuels	-	-		954,852	-	-	954,852
Hydraulic fluids and lubricants	16,563	74,241		567,043	-	-	657,847
Maintenance Machinery and equipment	-	-		1,274,128	-	-	1,274,128
Third party equipment leases	3,334	11,771		-	714,013	849,836	1,578,954
Security items	4,771	13,496		9,815	7,428	115,077	150,587
Staff feeding	12,702	9,959		13,498	48,153	56,130	140,442
Miscellaneous production costs	4,581	7,722		19,620	34,124	51,083	117,130
TotalL	1,460,054	6,942,508		11,745,891	8,715,466	10,572,762	39,436,681
Central Economic Margin	223,394	- (1,671,748)	- (1,774,566)		2,778,656	5,076,194	4,631,930

**Executive report on the net profit chain**

The company was awarded 2 construction contracts with the following agreed lump sum or fixed price values:

Contrato N° 1 US\$11.494.122

Contrato N°2 US\$15.648.956

The contracts together generated a Net Operating Income of US\$4,631,930.

According to the accounting records, the real costs of the different operational responsibility centers defined as such due to their relevance by the administration, total the amount of US\$22,511,148 and their segregation as direct and controllable costs in each unit, is as follows:

Contract Costs 1 US\$2,703,877

Contract costs 2 3,309,886

Cost of Own Machinery and Equipment 11,745,891

Asphalt Plant Costs 4,118,200

Aggregates Plant Cost 633,294

Total US\$22,511,148

The total costs of the two contracts (absorption) are generally obtained by distributing or apportioning the costs of the support units (Machinery and equipment, Asphalt plant and Aggregate plant) using appropriate bases such as cubic meters of asphalt, machine or equipment hours and cubic meters of stone materials.

By proceeding in this way, traditional cost accounting is being transferred to construction contracts, the efficiency or inefficiencies (economic performance) of each support unit (center) without being able to identify how the different centers contribute to the generation of results. or net profit.

To specify the performance and efficiency of each center, internal transfer prices based on market prices were applied for the transfer of the products and services provided to the construction contracts that would represent the decision-making alternative for the contract managers to resort to outsourcing of products or services). Under these conditions, the returns and contributions to the net operating profit of the company, from the different responsibility centers, are as follows:

Construction Contract N ° 1 (Profit) US\$2,778,656

Construction Contract N ° 2 (Profit) 5,076,194

Machinery and Equipment Center (Loss) (1,774,566)

Asphalt Plant Center (Loss) (1,671,748)

Aggregates Plant Center (Profit) 223,394

Net Operating Income US\$4,631,930

With the information recorded in the report, the administration will be able to make relevant decisions both of senior management as well as senior or middle managers, which with generic information from financial statements or traditional costs would be feasible to carry out, such as:

Adopt a policy of using the outsourcing of the services of machinery and the placement of asphalt mixes that theoretically, the decision would imply eliminating a loss in these services of the order of US\$3,446,314.- Additionally, the liquidation of these assets may generate cash flows of cash and improve working capital or make other investments.

Demand from the heads responsible for the referred centers, specific and analytical reports on the causes and effects of the inefficient performance of the unit.

Adopt measures and decisions aimed at improving the performance and performance of all the responsibility centers involved.

Exercise an appropriate Management Control in the conduction and directing of the Strategic Plan of the company

## 5. Conclusions

The current scenarios where the various companies operate impose the requirement of developing strategic plans and conducting and materializing them through adequate management control.

The design of the organic structure must emphasize the necessary decentralization of the actions to be carried out through the establishment of responsibility centers, where the managers of each center, with the corresponding delegation of authority, assume the functions and responsibilities aimed at complying with strategic objectives.

Decisions and control of these centers are built on the basis of having information by areas of responsibility both in terms of costs, income, results and investments. The responsibility center accounting model aims precisely in that direction.

To measure the performance and efficiency of the center, the products and / or services generated in the centers must be measured or valued at economic values represented by internal transfer prices, the most appropriate being those based on market prices, opportunity cost, negotiated and / or arbitrated prices.

The proposed net profit chain model, as a Management Control tool or instrument, has the purpose, in addition to measuring the performance and economic efficiency of each center or segment, will allow knowing the contribution of each one of them in the generation of net profit or net margin and support decision-making processes at the corporate level as well as in each segment.

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