CHAPTER VIII

APPRAISAL OF MARGINAL COSTING
"Well! I have often seen a cat without a grin", thought Alice; "but a grin without a cat! It's the most curious thing I ever saw in all my life!"

Pig and Pepper

"... a controversy has been ringing between the adherents of two widely different concepts of product costing, absorption costing which has long enjoyed general acceptance and direct costing which is seeking recognition. The issue is the treatment of the "non-variable manufacturing costs"\textsuperscript{1}.

The contention of the adherents of absorption costing concept is that all manufacturing costs, variable as well as non-variable,\textsuperscript{*} are product costs, whereas the advocates of marginal costing concept contend that the non-variable costs are not product costs.

The cardinal point of difference between these two concepts is that whereas absorption costing concept accepts both variable and non-variable costs as costs that can be inventoried, the marginal costing concept, treating non-variable costs of production as 'period costs', recognises only the variable costs of production as that which can be inventoried. "Using direct costing to allocate costs, only variable costs of production are assigned to a product,


\textsuperscript{*} The terms "fixed cost" and "non-variable cost" are used synonymously. So also the terms "direct costing" and "marginal costing".
and the fixed costs of production recognised during the accounting period are treated as expenses of the period."1

As a matter of fact, in a hypothetical situation of 'no inventory' -- all products produced are sold during the accounting period itself -- it does not matter whether direct costing or absorption costing is followed. But, when confronted with the problem of inventory, in times of piling up of inventory, profits shown, using marginal costing, will be less than that shown using absorption costing; and in times of inventory disposal the profits shown using marginal costing, will be greater than that shown using absorption costing.

Under absorption costing the inventory quantities influence the profit projected during an accounting period because, depending on the units sold, and the units to be sold (inventory), "...the fixed costs are transferred between accounting periods on production quantities as though fixed costs were in some way dependent on production quantities...."2 In the case of marginal costing, the profit for an accounting period is influenced by sales quantity. "The inventory quantities have no influence because they are valued at the (constant) variable cost of production."3 In this case the fixed costs are not transferred between periods as though fixed costs were in no way dependent on production quantities.


3. Ibid.
Charles T Horngren aptly stated that "...Thus the central question becomes what is the proper timing for release of fixed factory overhead as expense: at the time of incurrence, or at the time that the finished units to which fixed overhead relates are sold?..."\(^1\)

The Marginal Costers' stand is that the fixed factory overhead should be written off in the period incurred. Absorption Costers maintain that the fixed factory overhead relating to the units of products sold alone should be released as expense during the accounting period, and the fixed overhead related to unsold units should be treated as 'unexpired cost' - the cost is inventoried - and released as expense only when the units are sold.

So much about the central issue between the absorption costing and marginal costing concepts. It is an interesting proposition to consider the logic of the marginal costing concept.

'Cost function' is the base on which the edifice of marginal costing is built. Costs are classified into 'variable' and 'non-variable'. Those costs which vary with the volume of output are referred to as 'variable costs', and those costs which do not so vary are referred to as 'non-variable costs'. It is to be noted that such distinction between 'variable' and 'non-variable' costs will

disappear in the longrun because in the longrun all costs are variable. Thus, marginal costers address themselves only to 'shortruns'.

Addressing themselves to 'shortrun' the marginal costers assume that price per unit of output, variable cost per unit of output, and non-variable cost in total remain constant. The marginal cost being defined as the addition to total cost resulting from the production of an additional unit, under the assumptions referred to in respect of variable and non-variable costs, the variable cost is equal to the marginal cost, and variable cost function is linear. So also the marginal revenue (defined as addition to total revenue resulting from the sale of an additional unit) is equal to price, or average revenue, because of the assumption that price per unit remains constant. So, the revenue function is also linear. Cost and revenue functions being linear, the profit function is also linear. Thus, when marginal costers exhibit an analysis of 'cost-volume-profit' they show all the projections as linear.

The concept of shortrun, based on the cost functions referred to in marginal costing, runs contrary to the well established and accepted concept of shortrun: "...for short periods the stocks of appliances of production are practically fixed, but their employment varies with demand...."1 The effect is the working of the well known universal law of "diminishing returns" (or increasing cost). It is evident that the marginal costers ignore the effect of variation in the employment of fixed factors during short period.

During shortrun, as output increases, the intensity of utilisation of fixed factors becomes greater and the result is diminishing returns (or increasing cost). Even assuming that fixed costs are not product costs, the variable cost per output will definitely increase because the output added by the additional 'dose' of variable cost will be less than what a similar 'dose' added previously. Of course, it is true that the variable cost of a unit of output is the same for all units produced at a time. But that does not mean that variable cost per unit would remain constant.

In fact, the principle of diminishing returns is valid as a tendency during short period. "....It is not safe to draw, by means of analytical transformations, other laws from empirical law by interpolations because one may in doing so end up with results completely divergent from reality...."1

To assume, as in the case of marginal costing, that variable cost per unit of output will remain constant is to say that by adding more and more decoction to a fixed quantity of milk the taste of coffee will remain the same.

In this context it will be relevant to note the observation of F H Knight: "When costs begin to increase, the added unit, since the production of each additional unit raises the cost of the earlier units to a level with that of the new unit. It must be observed that the cost of the additional unit is always

the same as the cost per unit of the whole supply produced; much economic
analysis is vitiated by a spurious separation of these two conceptions of
cost".1

Managements are interested in planning and control devices and, therefore, costing should be an aid and guide to management in scheduling proper planning and controlling programmes. Any managerial decision should address itself to the achievement of least-cost or the best-profit output. During short period, as the period is characterised by fixed factors, the only alternative to achieve the 'objective' is the best possible utilisation of the fixed factors. The basic economic proposition is that the best-profit output is at that level of production where Marginal Revenue is equal to Marginal Cost (MR = MC).

But the marginal costing concept tries to assert that more the sales the more will be the profit. As a matter of fact, the price is determined more by market conditions on which the producer has little direct control. Obviously, the management has to direct its attention to the 'cost reduction' techniques to achieve the best profit. Even with less sales more profit is possible if the cost of production is less. The suggestion is not that the sales volume is unimportant, but the cost reduction aspect is more important.

Under marginal costing concept, Marginal Revenue (MR) is equal to Average Revenue (AR), because the assumption is that price per unit remains constant. Similarly, Marginal Cost (MC) is equal to Variable Cost (VC), because the assumption is that VC per unit remains constant. Thus, under marginal costing,

\[ MR = AR = \text{Price}, \]  
\[ MC = VC \]

If it is true that the least cost or the best profit output is at that volume where MR = MC, this position, under marginal costing, is at that point where price = variable cost. This suggests that the management must either bring the price to the level of variable cost or the variable cost to the level of price to achieve their 'objective' of profit maximisation.

Suppose that price and variable cost are equalised (?) to achieve the "equilibrium". The best profit output position turns out to be a position which is in no way a better position than that of 'no production, no sales' position. This is so because, irrespective of the volume of production and volume of sales, the position will show a loss (!!) equal to the amount of fixed cost.

**Proof:**

\[ \text{Sales} - \text{Variable Cost} = \text{Contribution} \]
\[ \text{Contribution} - \text{Fixed Cost} = \text{Profit} \]
When sales price and variable cost are equalised:

\[
\begin{align*}
\text{Sales} & \quad - \quad \text{Variable Cost} \quad = \quad \text{Zero} \\
\text{Zero} & \quad - \quad \text{Fixed Cost} \quad = \quad -\text{Fixed Cost}
\end{align*}
\]

Looking at the 'break-even chart' of marginal costers, it can be seen that the maximum profit is at the 'horizon' of the sales axis. Unless the point at which the least-cost or best profit output can be achieved is known to the management, the decision maker's position will be that of a person searching in the dark without the least idea of what he is searching for.

In substance, the most important equilibrium formula, \( MR = MC \), is completely eclipsed in marginal costing. By projecting a linear total cost function the very basic law of production (law of increasing cost), in the short run, is assumed to be nonoperative in marginal costing. The assumptions in marginal costing are at best arbitrary; at worst misleading. In an attempt to 'out-do' the casuality is an outstanding universal economic law. Those who imagine that they know something about economics will act 'as if motherhood has just been abolished'. (This expression is borrowed from Burton Cranes.\(^1\))

As far as pricing decisions are concerned there are two possible alternatives: (a) If the firm is a 'price fixer' it has to find out its production level where \( MR = MC \) and fix the price accordingly; (b) If the firm is a 'price taker' it has to see whether its \( MC \), in relation to its market share, is equal to price. No matter, whether the firm is a 'price fixer' or 'price taker', its best profit output is at that volume point \( MR = MC \).

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Profit during a period is equal to the sales proceeds from the output sold during the period minus the cost of output sold. (It is assumed that the firm has no selling expenses). If this is accepted, under marginal costing, sales proceeds, from the output sold during the period minus variable cost of the output sold should be the profit because fixed costs are not related to products. But even according to marginal costers sales proceeds minus variable cost is not profit; it is designated as contribution. For them, profit is contribution minus fixed cost.

Marginal costers assert that the "contribution" is the core of marginal costing because the index of 'profitability' is 'profit-volume ratio' (P/V ratio), a ratio of contribution to sales.

\[
\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100
\]

It is to be noted that, as contribution is not profit, P/V ratio is not profit-volume ratio; it is only contribution-volume ratio.

It is relevant to have a closer look at the 'contribution' in marginal costing. Since sales price and variable cost per unit are assumed to be constant, the contribution (difference between sales proceeds and variable cost) per unit is also constant. In other words, total contribution will
increase or decrease proportionate to the increase or decrease in sales volume. Profit being the difference between contribution and fixed cost, to what extent the contribution changes, as a result of change in the sales volume, profit will also change exactly to that extent. "Decision making in the short run is more concerned with this contribution to both overhead and profits than it is to the profit figure alone.... The stress is on the changes in total revenue and changes in total costs as output varies. The fixed cost appear in a subordinate position."¹

'Is contribution the factor contributing to profit?' is a pertinent question that could be raised.

The formula for profit in marginal costing is:

\[
\text{Contribution} - \text{Fixed Cost} = \text{Profit}
\]

(Looking at the increasing gap between a standing man and a running man three on-lookers observed:

Onlooker I: (Pointing at the running man), The gap between the running man and the standing man widens because that man is running.

Onlooker II: (Pointing at the standing man), No. No. The gap widens because that man is standing still.

Onlooker III: (Turning to onlookers I and II), No. No. No. The gap widens because one man is running and the other is standing still.

The Profit being the gap between 'contribution' and fixed cost, the answer to the question, whether the gap is due to 'running' contribution? or 'standing' fixed cost? or 'running' contribution and 'standing' fixed cost?, is obviously 'running' contribution and 'standing' fixed cost.

This brings the enquiry down to the ... question of whether profit measurement is improved and management facilitated by treating all fixed expenses as period costs rather than product costs....

The principal arguments for this procedure seem to be that the benefits of fixed cost expire with the passage of the period to which they relate, and they must therefore be absorbed by the revenues of that period, and that it is simpler and more understandable to treat all fixed expenses as profit reduction items rather than as value creating items....

...charges for insurance, maintenance, and depreciation are commonly treated as relating to such short-term periods as individual months, but this
is largely a matter of convention and convenience. The cost of facilities usage may be as logically apportioned to units of output as to periods of time. Either basis is arbitrary and largely theoretical.

It seems clear, however, that even if the "period" argument is accepted, it is the production of the period rather than the revenue of the period that supplies the test of the benefits obtained. Machine rental may relate to a specific time period, but it is hardly arguable that the company has sustained a loss of the amount of the rental because the product made in that period was not sold in that period. Facilities are utilised to create values, not to reduce profits. The values stored up in manufactured goods are sacrificed when the goods are sold, not lost when the goods are produced.\footnote{Howard Clark Green: ‘Alternative to Direct Costing’. Article 22 in the book "Readings in Cost Accounting, Budgeting and Control". Edited by William E Thomas Jr. (D B Taraporevala Sons and Co. Pvt. Ltd., Bombay. 1970). pp.278-79.}

Cost and profit are, no doubt, related to ‘volume’. Nevertheless, it is to be remembered that the cost of production is a matter related to the \textit{Volume of production} and productivity of the factors, variable as well as fixed, of production. On the other hand, profit is the difference between the sales proceeds and the cost of the \textit{volume sold}. As a matter of fact, cost of production is determined at the stage of production, and the sales volume can in no way influence the cost of production of the goods produced. When the production volume and sales volume differ in an accounting period the cost of the ‘sales volume’ should be based on the cost of the ‘production volume’ to
which the 'sales volume' belongs. The total cost of the accounting period is the
total cost of the 'volume of production' during the period.

"Illustration of supposed improvement in interpretation of results,
under direct costing, are unimpressive. Under certain conditions, the
emphasis on deficient sales revenue might be constructive, but often it could
be merely confusing. A factory which produces in the spring and summer for
sale in the fall and winter would show startling losses for six months and
illusory profits for the next six, contrary to logic and reason. Facilities usage
does not involve a loss if the goods manufactured are worth what they cost,
including fixed charge component. Why tell people it does?"¹

At this point of discussion it will be interesting to discuss as what is
the 'logical' way of calculating cost. In this respect, two propositions can be
put forward for consideration:
(i). For one unit, cost is Re.1; so for 1000 units, cost is Rs.1,000.
(ii) For 1000 units, cost is Rs.1,000; so for one unit, cost is Re.1.

If only one unit is produced, during the period under consideration,
there is no problem. But when a number of units are produced during a
period, it is the total cost for so many units that is relevant. As the units
produced are homogeneous, naturally, 'cost homogeniety' will also be present
in the units produced at a time. It is due to the combined efforts of the so

¹. Ibid. p.280
called ‘fixed’ and ‘variable’ factors that the production takes place and the ‘productivity’, during short period depends upon the utilisation of fixed factors. To be precise, every unit produced during a period does contain an amount of variable as well as fixed costs and the amount of variable and fixed costs contained in an unit is equal to those contained in any other unit. To assume otherwise will lead to spurious conclusions.

(The milk available for a family, for a day, is only one cup. The required number of cups of coffee could be prepared by adding required quantity of decoction to this fixed quantity of one cup of milk. Expecting ten guests, the lady of the family prepared 10 cups of coffee by adding 9 cups of decoction to the one cup of milk. As only 8 guests turned up, two cups of coffee remained unserved. It will be incomprehensible if one tells the lady that the liquid in the remaining two cups is only decoction and not coffee!! Can she be convinced that the ‘fixed’ factor, milk, should not be accounted for the product and hence the left over is only decoction and there is no milk in that? If one tries to convince her so, the lady will be wondering as what the guests consumed was, decoction or coffee, because the contents of all the 10 cups came from the same lot. If the left over is decoction, what the guests consumed was also decoction and there was no coffee at all.)

It will be appropriate to repeat that the production function involves both ‘fixed’ and ‘variable costs’ and the cost of production varies with the ‘productivity’ of factors which in turn depends on the utilisation of ‘fixed’ factors during short run. The fact is that any drop of liquid in the ten cups
referred to in the previous paragraph contains as much as 'variable' decoction and 'fixed' milk as any other drop in the 10 cups. Had the lady prepared less cups of coffee, each drop would have contained more milk (and less quantity of decoction); that is all. To say or assume otherwise will amount to attempting to make the day dark by closing ones eyes. (However, with a fixed cup of milk only certain cups of coffee, say 15 cups, which would taste real good could be prepared. What will be the quantity of decoction and milk such a cup of coffee would contain is the normal 'input' for a cup of coffee. If less than 15 cups of coffee is prepared with all the milk, it is underutilisation of milk, because to prepare less than 15 cups of good coffee, one cup of milk is not required.)

Much of the confusion in respect to marginal cost stems from the attempt to view the cost in relation to the production of an 'extra' or 'additional' unit. A right approach in this matter requires a right perception of marginal cost.

Let it be understood that:

Marginal cost is the amount by which the total cost will rise as a result of raising the level of output by one unit. To put it differently, Marginal cost is the difference between the total cost of producing 'n+1' output and 'n' output.

It is absolutely important to note that 'raising the level of output by one unit' and 'producing an extra or additional unit' are two entirely different
propositions. For a discussion on this point the following hypothetical example is considered.

<table>
<thead>
<tr>
<th>Volume</th>
<th>Fixed cost (Rs.)</th>
<th>variable cost (Rs.)</th>
<th>Total cost (Rs.)</th>
<th>Marginal cost (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>5</td>
<td>105</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>10</td>
<td>110</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>15</td>
<td>115</td>
<td>5</td>
</tr>
</tbody>
</table>

While interpreting the above data it is often concluded that since the total cost of producing 2 units is Rs.110 and that of 3 units is Rs.115 the cost of producing the extra (third) unit is Rs.5, which is the marginal cost. This interpretation and conclusion are fallacious because there is nothing in the data presented to tell what it would cost to produce an extra, or additional unit.

It is imperative that one should be extremely diligent in understanding the cost-volume relationship. In the example considered, the important aspect that should not be lost sight of is that the costs are presented for three different levels of Volume. The data presented are what it would cost if (a) no output is produced (b) if the volume of output is one (c) if the volume of output is two; and (d) if the volume of output is three. It is to
be emphasised that the data do not provide (and for that matter do not disclose) what it would cost to produce an additional, or extra, output.

In associating cost with a given volume, the volume should be taken as a ‘unit’. Accordingly, Rs.110 is the cost of a ‘volume of 2 units of output’ and Rs.115 is the cost of a ‘volume of 3 units of output’. From this it cannot be surmised that the cost of producing a unit additional to the 2 units of output is Rs.5. Such a position would amount to presuming that producing ‘a volume of three units’ means producing two units and then producing an extra unit. (In that case would it not cost Rs.110 for 2 units and Rs.105 for one unit!? Refer the cost of producing 2 units and the cost of producing one unit in the data presented.)

The difference of Rs.5, between the cost for ‘3 output volume’ Rs.115, and the cost for ‘2 output volume’ Rs.110, is the marginal cost. But one has to be clear as to whether it is the cost of (for) the extra third unit or the increase in the cost for raising the output volume level from 2 units to 3 units. If it is perceived as the cost of the extra (third) unit, then it would lead to the conclusion that producing an extra unit will cost only the marginal cost (which is equal to variable cost).

Even according to the definition, addition to total cost by producing an additional unit is the marginal cost of the Marginal product. It is to be noted that it is not the cost of the additional product. Marginal cost of a product and the cost of a product are two different things.
A boat has a capacity to carry a maximum of 500 Kg of weight. The boat with 5 persons weighing 100 Kg each was about to move. A sixth person weighing, say 50 Kg, rushed into the boat. The boat sank. Debating on what caused the boat to sink, three propositions emerged:

(a) The boat sank because of the "extra" 50Kg weight (over the original 500 Kg weight).

(b) (As the boat sank when the sixth person got in) it was the weight of the sixth person that caused the boat to sink; and

(c) The boat sank because the total weight in the boat exceeded 500 Kg.

Therefore what caused the boat to sink was 500+ Kg weight.

If the proposition (a) is accepted, it would amount to the conclusion that 50 Kg of weight would cause the boat to sink because the 'extra' weight added to the boat was 50 Kg. This is not tenable because the boat can carry a maximum of 500 Kg.

The second proposition is also in no way different from the first. If the boat sank because of the weight of the sixth person, then it was his weight of 50 Kg that caused the boat to sink. But, this cannot happen because the boat has the capacity to carry 500 Kg of weight.

Consider the third proposition. Since the boat has the capacity to carry only a maximum of 500 Kg of weight, the moment the boat experiences more than 500 Kg weight, it will sink. Thus it was 500+ Kg of weight that caused the boat to sink.
When the boat sank there were 6 persons in the boat together weighing more than 500 Kg (or 500+ Kg). Would it be possible to state how much of each person's weight put together accounted for '500+ Kg' of weight that sank the boat? As an answer to this question a few of the possible alternatives are given below - For convenience '500+' is taken as 501.

<table>
<thead>
<tr>
<th>Person</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (in Kgs)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>50</td>
</tr>
</tbody>
</table>

- How much of each person's weight: (a) 100 100 100 100 100 1 = 501
- put together: (b) 51 100 100 100 100 50 = 501
- account for 501: (c) 76 100 25 100 100 100 = 501
- (d) 100 80 100 100 100 21 = 501
- (e) 100 100 100 52 49 100 = 501

Obviously, it would be a futile exercise to probe as to how much of each person's weight form part of 501 kg of weight that caused the boat to sink. The only thing that one could say with certainty is that the boat sank because of 500+ Kg weight.
If one were to use the concept of marginal cost - that it is the cost of producing an extra unit- to explain the 'boat tragedy case' referred to above what would be presented is shown below.

<table>
<thead>
<tr>
<th>Number of persons</th>
<th>Weight (Kg)</th>
<th>The situation (that results)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State I 5</td>
<td>500</td>
<td>Boat floats</td>
</tr>
<tr>
<td>State II 6</td>
<td>550</td>
<td>Boat sinks</td>
</tr>
</tbody>
</table>

Marginal person ...... 6th person  
Marginal weight ...... 50 Kg  
Marginal Unit(Product) .... Boat sinks.

Conclusion (Inference):

The Marginal event, the sinking of the boat, was caused by the marginal weight, 50 Kg of the marginal person, 6th person.

The fallacy in this conclusion, based on the marginal cost concept, is because of the misassociation of cause and effect.

As a matter of fact, the boat sank because of overweight (weight more than 500 Kg). Though the overweight was felt at the point when the sixth person got into the boat, it was the weight of 'six persons' and not of the' sixth person' that caused the boat to sink. It was the overweight, (500+ Kg), not the excess weight, (50Kg), that caused the tragedy.
Just as the cause of marginal incident, boat sinking, is not the weight of the marginal person, the cost that causes the marginal unit is not the marginal cost.

Marginal costing does not tell what the product cost is, but tells the profit for the period. This reminds what Alice expressed looking at the watch of March Hare: "What a funny watch!", she remarked, "It tells the day of the month, and doesn't tell what O'clock it is!"¹

Of course, as the 'structure' is illuminated with 'linear functions', the whole edifice of marginal costing, is extremely beautiful, more especially, when the concept is used to project 'cost-volume-profit' analysis. But the question is: will the beauty and light, though fascinating and delightful, serve the purpose? One may be fascinated and delighted by the full moon, but the fascinating moon and its light cannot help him to read his lessons.