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Маржинальный анализ как основа для принятия решений

Аннотация

Маржинальный анализ является важным инструментом для моделирования процесса принятия решений производителями и потребителями. Основная идея заключается в том, что такие решения основываются на целесообразности затрат, связанных с незначительными изменениями в текущих условиях. Если маргинальная выгода таких изменений перевешивает маргинальные затраты, то лицо, принимающее решение, подстраивается под эти изменения и затем снова анализирует ситуацию для дальнейших потенциальных изменений. Маржинальный анализ является важным компонентом для понимания того, как производители принимают решения для достижения максимальной прибыли, и как потребители принимают решения для достижения максимальной целесообразности. Целью данного исследования является оценка различных аспектов маржинального анализа и способы его применения в сфере финансового учета. Таким образом рассматриваются многие вопросы от «как оценить альтернативные издержки?» до вопросов увеличения прибыли, и как эти аспекты могут быть применимы в процессе принятия решений. Вследствие этого в исследовании была предпринята попытка определения и формулировки умозаключения по вопросам возможности надежного применения такой идеи в реальных условиях, и возможности достижения таких результатов, которые помогут предприятиям снизить расходы и увеличить прибыль.

Ключевые слова: предприятия, принятие решений, маржинальный анализ, применение, максимальное увеличение прибыли.

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Marginal Analysis as the Basis for Decision Making

Abstract

Margin analysis is a very powerful tool for modelling how individual producers and consumers make decisions. The basic idea is that decision makers make choices based on the comparative costs and benefits associated with small changes in a given state of the world. If the marginal benefits of a small change outweigh the marginal costs of that change, the decision maker makes that small change and then re-analyses for the next potential additional change. Margin analysis is an important component in modelling how producers make decisions to maximize profits and how consumers make decisions to maximize utility. The purpose of this study is to evaluate the different aspects of marginal analysis and how it may be applied in management accounting, therefore it encompasses a lot of aspects from how to evaluate actual opportunity costs to profit maximization and how these aspects can be applied in decision making, consequently this research will try to determine and infer whether the concept can be reliably applied in real life scenarios and be able to produce reliable results which can benefit firms to reduce costs and maximize their profits.

Keywords: industries, decision making, marginal analysis, application, profit maximization.

Introduction

The process of checking the resulting change when the input is changed (increment in Y caused by increment in X). In non-mathematical cases it is equivalent to calculus. Marginal analysis is about change, not absolute levels or averages.

In the 1860s and 1870s, William Stanley Jevons, Carl Menger, and Marie-Esprit-Léon Walras proposed and developed an economic analysis system based on the total cost and total

utility that change with other small changes. For example: sell quantity Y at price X. If the price drops slightly, what is the marginal effect on the quantity sold (how many or less)? This revolutionized economics [1].

The marginal analysis may have its origin from physics or other non-economic disciplines: if the rope is subjected to a load of 100 kg if the load is increased by another kg, how much will the rope stretch? Therefore, Marginal analysis has become an essential tool economist consider in decision during making

processes. In the marginal analysis, the decision maker does not make decisions based on the average of actions done, but based on the costs and benefits of the next input. Harvard economist Gregory Mankiw pointed out in his «Principles of Economics» that marginal analysis is significant and has stood out among the ten principles of economics [2].

Companies use marginal analysis as a decision-making tool to provide help to increase profits. In addition, marginal analysis is used instinctively to make various daily decisions. Marginal analysis gives managers a deeper understanding of the supply curve in a competitive market and, as a result, a deeper understanding of market outcomes.

In light of these questions and objectives a lot of literature was studied to deduce the correct theoretical explanations of the whole concept of marginal analysis which encompasses this research [3].

And it was logical to conclude that there was no argument found concerning the meaning and interpretation of the basics and fundamental principles of marginal analysis namely:

Marginal revenue, Marginal cost which measures the cost change corresponding to the unit growth of production level. The ultimate goal of any firm when using marginal analysis is to increase profit, [4] Marginal profit measures the change in profit due to the increase in the number of units. The marginal measure of economic function is related to operating volume because if evaluated at different levels of operations it causes major changes. There are multiple calculation techniques that can actually calculate these marginal metrics [5].

The problematic, subject and objects of this course work therefore lie in determining the simplicity, applicability and reliability of the different methods of marginal analysis, in real life circumstances, and to answer these questions the research Structure of course work was framed in such a way that a thorough theoretical exposition of the fundamental principles of marginal analysis were to be studied and understood, and taking into account the knowledge attained, it was intended to examine and apply it in practical situations, and this is non-other the changes of the costs of producing an additional barrel of Oil commodity during the corona virus outbreak of 2020; because recently the oil commodity began selling at negative price, [6] so this sparked questions as to whether marginal analysis is a reliable tool for managers to use when deciding the optimal amount of something that must be produced, if it indeed is reliable and accurate then what transpired in the oil industry?

Alternative methods to marginal analysis were also studied, in order to determine in what cases, they are useful and whether they can be useful to managers using marginal analysis methods of decision making; Therefore, at the end it will be determined and concluded whether these methods should be used simultaneously.

Practical application of marginal analysis

Applying Marginal analysis in Production industries

In this chapter it was set to apply and test the theoretical knowledge attained throughout the research into practical situations, and an example of how Café du Donut the most popular dining venue in New Orleans (USA) on the edge of the French Quarter was used.

The café sales coffee and donuts.

Firstly, it buys fresh donuts daily from large industrial bakeries. This costs the café \$4 per carton (including two dozen donuts) delivered each morning.

All cartons that are not sold at the end of the day will be discarded because they are not fresh enough to meet the standards of the café.

If you sell a box of doughnuts, the total income is \$6.

The marginal profit per donut is as follows:

Table 1

Café du Donut's Probability Distribution [6]

Daily sales (cartons of doughnuts)	Probability (p) that demand will be at this level
4	0.05
5	0.15
6	0.15
7	0.20
8	0.25
9	0.10
10	0.10

MP=Marginal profit=\$6-\$4

The marginal loss is ML=\$4 Because donuts cannot be returned or recycled at the end of the day. Based on past sales, managers of Internet cafes estimate that daily demand will follow the probability distribution shown in Table 1.1

Then, the manager follows the following three steps to find the best quantity of donut cartons to order each day.

Step 1. Determine the value of $\frac{ML}{ML+MP}$ for the decision rule.

$$P \geq \frac{ML}{ML+MP} = \frac{\$4}{\$4+\$2} = \frac{4}{6} = 0,67$$

$P \geq 0,67$

Step 2. Add a new column to the table to reflect the likelihood of donut sales reaching each level or higher. This is shown in the right column of Table 1.2.

For example, the demand will be 4 cartons or greater with a probability of $1.00 = (0.05+0.15+0.15+0.20+0.25+0.10+0.10)$

Similarly, the probability that sales will be 8 cartons or greater is $0.45 = (0.25+0.10+0.10)$ – This is the sum of the sales probabilities of 8, 9 and 10 cartons.

Step 3. Keep ordering additional cartons as long as the probability of selling at least one additional carton is greater than P, which is the indifference probability.

If Café du Donut orders 6 cartons, marginal profits will still be greater than marginal loss, since

P at 6 cartons=0.80>0.67

Overall Observations

From this research it was deduced that indeed marginal analysis is very effective tool and fulfils the core of underlying purpose to study the company's marginal profit after adding an additional unit. Therefore It is essentially a decision-making tool and very easy to use.

This was observed from during the practical application of marginal analysis in a café business; business owners may be curious about whether it is worth producing another unit, and exactly the cost of production of an additional unit will incur, and also the amount of income that will be generated through sales.

Table 2
Café du Donut's Probability Distribution [7]

Daily sales (Cartons of Doughnuts)	Robability(p) that demand will be at this level	Probability (P) that demand will be at this level or greater
4	0.05	$1 \geq 0.66$
5	0.15	$0.95 \geq 0.66$
6	0.15	$0.8 \geq 0.66$
7	0.20	0.65
8	0.25	0.45
9	0.10	0.20
10	0.10	0.10

And Marginal analysis satisfied these particular needs buy the Café Business, and depicted the exact point were the risk of production started getting high.

The concept of contribution analysis also proved to be very effective as well especially in these times, of so many uncertainties; If you can always predict the number of products to be sold next month or even next week, that would be great. However, the current Corona virus pandemic has proven that indeed we do not have this ability, therefore we can only make the best guesses, therefore so it is important to understand your margin of safety. This information is particularly valuable when it is difficult to predict sales. If you know that your business is experiencing large sales fluctuations, it will be very beneficial to know whether these fluctuations will make your company into a loss.

Furthermore, Marginal proved further reliability when it was used to answer exactly the reason why oil prices were said to be negative, and the economics behind this phenomenon, this was a further indication that indeed it lives up to its reputation as one of the major theories of economics.

Apart from the obvious positive aspects that marginal analysis provides which are mentioned above, this research as proven that there is always room for the optimism regarding any economic situation, because they can be used as a basis to evolve and learn about new ways of tackling situations, because one of the initial questions of this research was «why the oil prices became negative», but in the end the question is «how we can modify utilise the available knowledge on marginal analysis to avoid similar future scenarios; this proves that:

The cost excess of marginal cost itself is not bad it is a way for the market to signal a shortage of resources. Managers should constantly work on looking for hidden costs and expose them. As we have seen, marginal analysis can help us do this. However, since costs are generated using element inputs, they need to be optimized rather than minimized.

Its logical to conclude that Marginal analysis also provides a huge advantage when it come to the area of time management, this is due to the fact that Cost, quantity, and profit data can be found in the accounting books, that is, regular financial statements. Otherwise, it should be calculated separately, which will involve extra time, labour and money. However, in the case of the marginal cost method, such data can be easily obtained in conventional accounting statements, thereby saving time and money.

Despite all the positive discoveries mentioned, pure marginalization may become the road to destruction of the enterprise, [8] if the average cost of a unit of output is greater than the average income, that is, the price of the unit sold. As is the case with the oil industries, for centuries they have been using marginal analysis to ascertain the correct amount of oil Production fit for the market demand, however not all aspects of reality where put into consideration for example risk of how consumers may react to disease outbreaks like the current corona virus pandemic are ignored, therefor when the actual outbreak occurred, little was left for them as options to determine the optimal amount of barrels to be produced without making a loss, therefore Marginal analysis has a major pitfall by ignoring major risks when making assumptions of what is right to do. First, you assume that the selling price is constant. This means that large orders do not offer any discounts. Second, you assume that the cost is linear and can be clearly divided into fixed and variable components. Usually, this is easier said than done. Third, suppose that multi-product companies can keep the mix between products constant even when the sales price changes.

Finally, you assume that the manufacturer sells and produces exactly the same number of units. The extent to which these assumptions affect the practicality of technology varies from company to company. For example, if a large portion of your business is discounted to large customers, this technology may not be for you.

The other negative observations of issues which may arises that when using revenue management techniques to generate incremental sales, the contribution margin is a related metric. As long as the increased income exceeds the increased (variable) cost, the profit will increase. But marginal analysis only works on the margin. The price reduction must be limited to a part of the business and in a manner that discourages more and more customers from seeking or expecting price reductions. For example, tickets for Broadway shows are quite expensive. Tickets can often be purchased at a low price in a central location a few hours before the show time. This procedure helps to fill vacancies and thus contribute to profits. But the short delivery time and uncertainty about whether seats (or good seats) can be provided discourage most customers from waiting for the opportunity to reduce prices. In this case, the marginal profit is still important. As revenue management technology becomes the norm for pricing, however, one cannot rely on the company's fixed costs to undertake «other» business. Achieving a positive marginal profit does not guarantee that a price reduction will increase profits. Management must consider costs that exceed variable cost.

It is often said that the most well-known industries that use revenue management (airline and automotive industries) have very poor profit records.

Many airlines operate at a loss, and several have gone bankrupt or forced to merge for economic reasons. Similarly, auto companies, especially the three largest automakers in the United States, have also encountered major financial difficulties in recent years. Since both the aviation industry and the automotive industry face problems other than revenue, especially the inability to adequately manage their fixed costs, they do not represent the advantages of revenue management. A worrying issue is that many of these companies did not initially

have a profitable business foundation. Another problem is that as revenue management technology continues to expand in these industries, the indicators of success may not change with it. American Airlines began revenue management in response to low-cost, low-fare competitors and selected competitive routes. When this effort succeeded, prices continued to decrease to reduce the number of unsold seats. These reductions initially came with restrictions, such as advance purchases and Saturday night accommodation requirements designed to attract only a small percentage of customers. In this case, there is a normal fare business basis, which can cover fixed costs, as long as the special pricing exceeds the variable cost (the lowest cost per flight), special pricing can be successfully carried out. However, as low fares gradually spread to more and more ticket purchases, restrictions have eased. The resulting low-cost fares beyond variable costs no longer generate incremental profits, because fixed costs are not covered by non-discounted business. Car companies have also begun to implement price concessions, such as rebates and low-cost financing, as an occasional price reduction tool to reduce prices. Inventory during slow winter months or model year-end. As long as the company makes enough sales at a price sufficient to cover fixed costs, occasional cuts can work. The discounted price spread again and became the basis for more and more sales in the industry, leading to negative financial results. The experience of these two industries provides important lessons for revenue management. When implementing revenue management strategies, it is important to ensure that the price reductions provided do not cause prices to continue to fall during periods of high demand.

Away from qualitative errors, one notable limitation to managers implementation of marginal analysis is the sheer wrong connotation by society that the sole purpose of management accounting is to collect, convert, and report data, this is far from reality however because its main purpose is first and foremost to affect the behaviour at all levels from the CEO to each employee, and it should do so by supporting decision-making. The second purpose is to stimulate investigation and discovery by signalling relevant information (and thus causing attention) and raising questions. Unfortunately, the gap between the content of accountants' reports and the needs of decision makers continues to widen, involving the transition from descriptive historical information analysis to analytical predictive information, such as budgets and hypothetical scenarios. All decisions obviously only affect the future, because the past is already history. However, many things can be learned and used from historical information but are unfortunately ignored, making it difficult for managers to evaluate such techniques as marginal analysis properly. This is in response to a more comprehensive change in the style of administrative management. This is from a passive command and control focus (For example, carefully check the cost difference analysis between actual results and planned results), in a forward-looking and proactive manner, where organizational changes and adjustments can be made before things happen and small problems become major problems, such as storage levels of raw materials.

Once more the oil commodity industry has proven the drastic negative impact of these assumptions in the year 2020.

Finally, there will always be debates concerning what methods are optimal in the management decision making processes but, in the end, some form of consensus will prevail within the organization. Potential controversy may be due to improper use of standard cost information and potential misconduct that may result. Therefore, the key factor in deciding which costing method to use is how to deal with economic forecasting? Is it possible to classify resource costs as variable, semi-variable, fixed, sunk, or inevitable or avoidable (i.e., allow capacity adjustment decisions)? Can it isolate unused or idle capacity costs? The good news is that organizations are challenging traditional accounting. Therefore, in the end, an accounting method that produces better decisions should be adopted. The coexistence of two or more cost accounting methods may cause confusion that the correct cost is reported, but this is a different issue. The important thing is that organizations are looking for better ways to apply management accounting techniques to make better decisions.

Conclusion

To deal with the inaccuracies presented under the marginal analysis, it would be wise for managers not to restrict themselves to only using marginal analysis but to incorporate newer or advanced methods of analysis whenever appropriate, for example; if we want to know the true cost of producing product X for Y number of customers, and we find that traditional cost accounting methods are not enough.

For instance; Financial analysts simply classify costs as fixed or variable, the so-called «relevant quantity range." In fact, the costs are classified as sunk, fixed, semi-fixed, semi-variable or variable depending on the decision made.

We can use the ABC (Activity-based Costing) method, which was developed specifically to overcome the shortcomings of traditional methods. ABC will not only use costs such as working hours, but will also use many other costs.

Concerning the allocation of overhead costs; Some cost calculations will be based on the numbers used by ABC including the number of machine settings, the materials purchased or used, the number of engineering change orders, the number of machine hours, and so on.

Therefore, will we continue to use the system because it is simple to use and has been used for decades, or do we want to analyse the way we share costs more accurately.

Alternatively, to eliminate the risks of assumptions under marginal analysis discussed above; Throughput accounting [9] could be used, it is rather advanced that the marginal costing methods but its foundation was built on the older accounting methods.

Upon completion of this research work, and establishing the previously mentioned observations, it was discovered that there is still room when it comes to ways in which Marginal analysis may be utilised to solve a lot of questions and provide answers in different spheres of life, and this is a fact that has been proven by the implementation of newer methods of accounting such as ABC and throughput accounting all which are derivatives of Marginal analysis.

Not only can marginal analysis be used to derive newer methods of accounting but also it can be used in its very present form, in different spheres of decision making, because it appears an emphasis has been made, that it can only be efficiently used

in production industries, as the previous definitions highlighted in this research also confirm, however it is logical and factual to ascertain that it may also be implemented in service industries with a little modification to better equip managers make decisions about their services.

But it would be highly recommendable for managers or the bodies responsible for implementing accounting standards to companies on a global scale to make it mandatory for every firm that uses traditional methods of accounting analysis such as marginal analysis to also take into account the newer methods of accounting to combat the shortcomings of the older methods, for example in addition to marginal costing methods or absorption methods ABC and throughput should also be used reduce the risk too many assumptions which marginal analysis may promote.

Regarding the qualitative impact of this study on the individual level, it brought a realization that international management accounting professionals have generally done a good job in asking the reasons and ways of the economy, and continue to do very well, however a problem still remains, to be specific there are very few opportunities given to managers to provide solutions to problematic areas; for instance taking the negative oil price problem discussed earlier as an example, it is evident that the problem could have been avoided if the shortcomings of the marginal analysis methods had been given much attention to; The marginal analysis methods simply explain why the price of each barrel of oil is lower than its cost, instead of giving an in-depth discussion on how to solve this problem; such are issues which could be easily averted, however this research does prove that marginal analysis is a very useful and integral part in management decision-making processes.

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