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# Understanding and Analysing Resource Utilization, Costing Strategies and Pricing Models in Cloud Computing

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**Abstract.** This paper is primarily focused on understanding the basics of cloud computing economics – specific pricing models and general cost structure and compares between basic cost structures. It also examines 15 pricing models dependent on various bases and attempts to consolidate the different pricing methods used to guarantee maximum profitability to both the service provider and consumer. To avail the services of cloud computing from the cloud service provider, the organization has to incur individual costs. There are three types of costs: fixed, variable, and semi-variable costs. Each type is computed and analyzed. There are more than 30 pricing models though the pay-as-you-go model, subscription model, and pay-for-resources models are in demand. To consider and discuss the basics of cloud computing, emphasizing its economics and pricing models considering various aspects and costing components, using and estimating plans from various cloud Registering suppliers. The paper also considers identifying gaps, if any, present in the current pricing models that are highly preferred with other pricing models that are designed but not implemented due to practical conditions and fear of higher percentage of risk and error and to compare the basic prices provided by the cloud service providers.

**Keywords:** Cloud Computing, Pricing, Static, Dynamic, Pay-As-You-Go Model, Subscription Model, Pay for resources model, Fixed/Static, Variable/Dynamic, Semi-variable.

## 1. Introduction

NIST defines cloud computing as follows: "cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., Networks, servers, storage, applications, and services) that can rapidly provision and released with minimal management effort or service provider interaction [1]."

Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on-demand, like the electricity grid. Cloud refers to shared computing resources [2]. Cloud computing is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet [3]. Cloud Computing consists of three primary services, namely, infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). There are a few Cloud Service Providers such as Amazon Web Services, Google Cloud Platform, and Microsoft Azure, all providing various cloud services of varying degrees such as IaaS for the entire infrastructure of the organization



[4], PaaS for Uses of the undertaking, and SaaS as a turn-key arrangement. An in-house server farm at the enterprise is utilized to comprehend what the necessities are of an example association by the specialist co-op and the client [5]. When the requirements of the purchaser are recognized, cost displaying conditions are utilized to make sense of the amount it costs, and different conditions are thought about for the best outcomes, that is, ideal usage of assets with the expansion of benefits. There are two sorts of models: Deployment models, which allude to the area and the executives of the cloud framework [6]. Arrangement models are sorted as Public model, Private model, Hybrid model, and Community model. The second kind of cloud models are the Service Models, which Include IaaS, PaaS, SaaS, and others, for example, Storage as a Service, IdaaS (Identity as a service ), CaaS (Compliance as a service), and

XaaS(Anything as a service) so on [7].

Any consumer has three basic needs: CPU, RAM, and disk. With CPU, it was found that a local data center needs approximately ten times more capacity than is needed 75% of the time. So to accommodate that extra 25% just in case, the cost increases by a factor of 10 [8]. Mean usage for RAM is 43.1%, and Mean utilization for a disk is 50.4%. It is noticed that the graphs for the usage of all three are heavily right-skewed [9]. A cloud solution was devised to handle such issues wherein various providers offer a variety of solutions in a "pay-as-you-go" model. Each provider also provides "reserve servers" needed to add more capacity as quickly as possible [10]. Worked examples were developed for Azure and AWS. In these examples, 336 / 506 servers were counted since, at the in-house data center, this percentage of servers saw the most usage [11]. Total cost was modeled by factoring in CPU, Disk, RAM, support pricing, and IP address pricing [12].

Costing Structure involves three types of costs, fixed cost, Variable costs, and Semi-Variable Costs [13]. The motivation driving providers is to expand income by their value plans, while the principal target of consumers is to have the nature of organizations for an ideal cost [14]. The specialist organization uses distinctive assessing models to choose the expense. However, most good evaluating is a noteworthy test inappropriate figuring that augments income for the provider and builds the nature of administrations for end clients with reasonable valuing charge [15].

The paper's inspiration is to comprehend the essentials of distributed computing financial aspects – specific evaluating models and general cost structure and look at fundamental cost structures for the administrations that are given by the distributed computing specialist co-ops [16]. It additionally looks at 14 valuing models reliant on different bases and endeavors to unite the distinctive evaluating strategies used to ensure the greatest productivity to both the specialist co-op and buyer. To consider and examine the nuts and bolts of distributed computing underscoring its financial matters and valuing models thinking about different viewpoints and costing parts, utilizing and assessing plans from different Cloud Registering providers [17]. It additionally attempts to give an essential comprehension of the Economics of Cloud Computing with its costing parts. The majority of the issues are looked at regarding the choice of the evaluating models and the administration [18]. Even though there are more than 30 estimating models, three models are popular, and a couple of others are being executed in different assistance businesses and, according to the solicitation and necessity of the shopper, joined by the Service Provider [19]. The arrangement may dwell in future exploration in a similar angle and consolidate different models for best outcomes and to fuse semi-variable costing plans and assemble more cost-proficient models that will profit all the gatherings. Since distributed computing is the need of great importance [20], it likewise adds to the innovative financial aspects of the professional workplace, it is critical to comprehend its essentials and the financial aspects included and to break down what the different alternatives accessible to the gatherings of Cloud Computing Services are [21]. This paper is divided into six parts, namely, Literature Review, Methodology, Experiments, Analysis & Findings, and Conclusion.

## 2. Literature review

Cloud Computing was introduced, as it turned into a need to have higher storage capacity and when the associations were hesitant to have all information on-premises. Cloud computing offers different types of assistance and organization models to guarantee that the consumer's needs are fulfilled. Cloud likewise helps in guaranteeing that all the users' can get to it correctly and give total security [22]. Later, the pricing and costing strategies of the cloud were highlighted since it was essential to understand these to be able to ensure that the customers' interests are well protected. Further explained as the basis of various services and deployment and the limitations of cloud computing. Many research authors classify the pricing models and throw light upon static pricing, limiting Service provider's profits. Many authors explain the various circumstances for the usage of the pricing models and believe that the Cloud providers form an "Oligopoly."

In [1] also mention the basic cost structure is followed and the factors that affect the price of cloud resources. It is believed that genetic pricing approaches must be explored and conclude that all static models are implemented. However, only a few dynamic models are implemented though they are fairer and more adequate. It is also mentioned that the service providers may be more benefited from the pricing schemes rather than the consumers. Various services are mentioned with the demand and supply of each in the market. The detailed, comprehensive study of various models is explicitly provided in various research materials. It is believed that the consumer is to choose an apt model as per their requirements and infrastructure and that it is the responsibility of the consumer to do it aptly.

In [2] provides a comparison and discusses several pricing models of Cloud Computing provided by individual service providers. Specific pricing models are explained in short descriptions with their features and area of implementation provided. The fluctuations concerning demand and supply are focused on, presently, for the pricing models. The pricing structure at Sales cloud is laid out. Many authors believe that the change in risk must be shared between service providers and the service consumer and that the models are to be more inclined towards the consumer's requirements. As advancement in cloud computing technologies and virtualization is seen, further research is conducted in the same area to understand and compute its costing.

It was proven that Cloud Computing helps to maximize profits with minimum output. There are explanations as to how the price and pricing affect both parties in the usage of cloud storage systems. Individual researchers analyzed and tried to explain why most approaches are "theoretical and not yet implemented in the real market and maybe favoring Cloud Service Providers." Many costing models to assess the cost of the administration from the specialist organization are proposed. There is a survey of different models and their groupings to comprehend the issues of different actualizing models. Different issues of embracing cloud are additionally distinguished, and different worries of estimating are tended to while recognizing the issues on particular unique evaluating model execution. It is further understood through vigorous analysis and experimentation that "A single efficient model being created or suggested is a herculean task; instead, a comprehensive framework is to be built." "A balance in the budget is suggested to be fair in terms of both the parties. Pricing Strategies are considered to be highly complex buildings since it involves economics. Optimum utilization of resources and allocation is to be ensured by both the parties".

It is at this crossroad that the semi-variable costing technique is reviewed, and "Detailed explanation on cloud computing services with costs, only costs directly related" is derived; there is also a discussion on "Yield Management, promoting demand, better utilization, and reduction in idle capital. The author of the paper explores energy storage capital, power cost fluctuations, and competition to cloud service providers. The author also explains the value of the market and analysis cloud resource prices. In the paper, uniform distribution theory and independent values deriving key insights from such distribution are considered." "A mathematical model is discussed for problems as various factors as ideal QoS and resources being directly proportional to cost and explains various factors directly influencing price and presented with regression models specifically providing data analysis for the same." Many experiments are conducted, concluding that the experimentation model is booming since the model presented results in an improvement in pricing policy transparency,

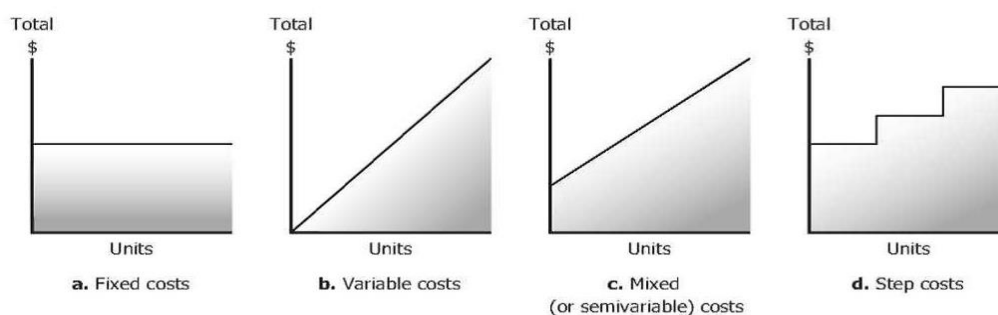
Concluding that the future aspect of dynamic pricing being more in demand and in-use due to financial metrics and advantages it provides. However, individual researchers concluded: "with a preference for fixed pricing concerning cloud service providers with example."

The research in cloud computing continues with technological and cost developments. The "Gartner's Hype cycle is presented for explaining the Total Cost of Ownership (TCO) model for Cloud Computing, The TCO model's approach and representation with reliable decision support." Cost Accounting is co-related to the TCO model by "Cost-benefit analysis." The advantages of the TCO model and future work aspects are discussed by various mathematicians and cloud computing researchers to understand how far the benefit of the TCO approach is. However, the model is not yet implemented, only theoretical. One of the papers' reviews provides the approach and process of development with assumptions required and cost structure with cost types and descriptions. Various service models' pricing schemes are broken down, and a mathematical approach with cost correlation, formulas, and mathematical modeling is provided.

Another researcher "classifies Cloud Computing Models (CCM) into eight types," explaining the Cloud Cube Model and how each model fits into CCM. Each of the eight types is further explained with its advantages and disadvantages. It concludes with a "proposal to Financial Cloud Framework (FCF) and future expansions of CCM into various fields." "An SBIFT (Scope, Base, Influence, Formula, Temporal Right) model is designed, explained in detail, and a correlation to the cloud is conducted, proposing a 7-dimension model". A further breakdown of the cost structure is provided. "An Addition to the SBIFT model is shown as part of the proposal- the Degree of Discrimination and the Dynamic Pricing Strategy." Comparison of the models designed is provided, and patterns of popular models are also analyzed and explained.

There is a comprehensive study ongoing for grid computing and cloud computing pricing models for each organizational goal, and these are compared with one another, with an explanation of grid and its types with an analysis of how it works. Six pricing schemes used in the grid are analyzed for pricing and found the methodology of implementation. Basics of service provided on Cloud Computing and vital technologies are discussed in various forums' of cloud computing wherein a comparison between grid and cloud computing from various aspects are provided.

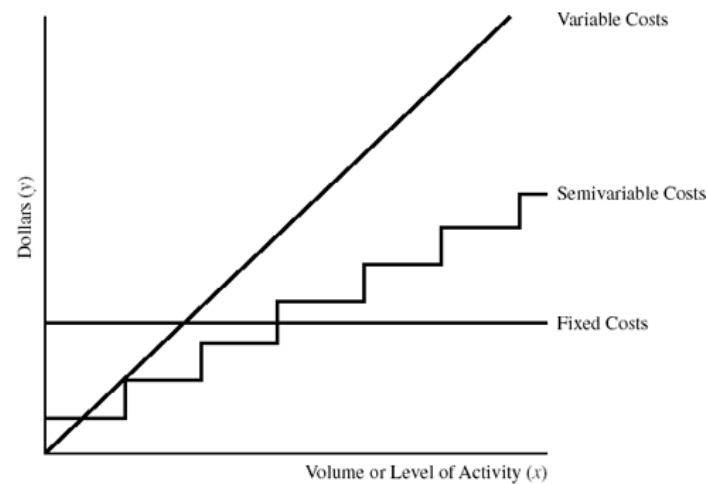
## 2.1 Understanding Dynamic and Static Pricing



**Figure 1:** Types of Costs Representation

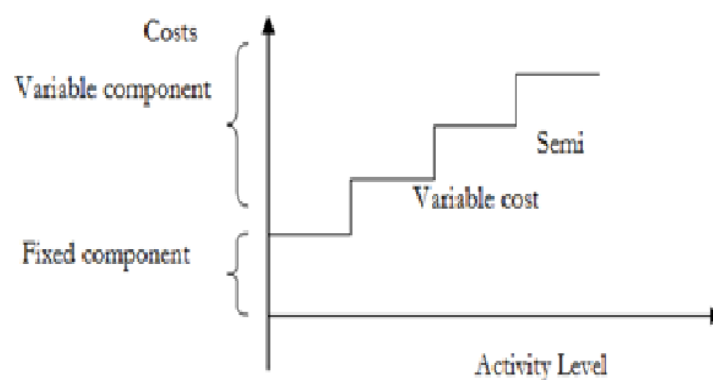
Figure 1 shows the Types of Costs Representation. The procedure of valuing can be ordered into two regular evaluating models, for example, a fixed pricing model and a dynamic pricing model. These are two significant models to choose the expense of inquiry: accessibility when a client requests "something from the cloud, a question is terminated to the cloud and time skyline, i.e., when demand an inquiry." The contrast between fixed and dynamic is that in fixed estimating, every asset type has a predefined value, set by the dealer while utilizing dynamic estimating, processes each solicitation as per the evaluating instrument utilized. Both fixed and dynamic evaluating have the favorable

circumstances that portray them in their utilization. For example, while the fixed cost is all the more straightforward for the client, dynamic estimating is reasonable for it; while static evaluating bolsters protections, dynamic valuing underpins suppliers to amplify benefits with every consumer. Figure 2 shows the Types of Costs.



**Figure 2:** Types of Costs

**Fixed pricing:** It is additionally called static estimating or pricing because it reliably for a more drawn-out timeframe. The asset has a foreordained value set by the supplier. It bolsters more confirmation for clients. Better to implement on buyers proportioning risk. Produce costs that do not fluctuate in the capacity of the customer. More comfortable to comprehend and all the more candid for users. Supports protections, steadier, diminish risks. Makes benefit estimation simple. It prohibits changing the cost as for time and cost. It could not be reasonable for all consumers. Does not permit suppliers to change cost for any reason. Unfair for the supplier (customer may pay not as much as his/her genuine utilization). Consumers may be charged for assets they have not consumed. It could be halted if shoppers come to the maximal limit. Are not founded on ongoing economic situations. Figure 3 shows the Cost Components.

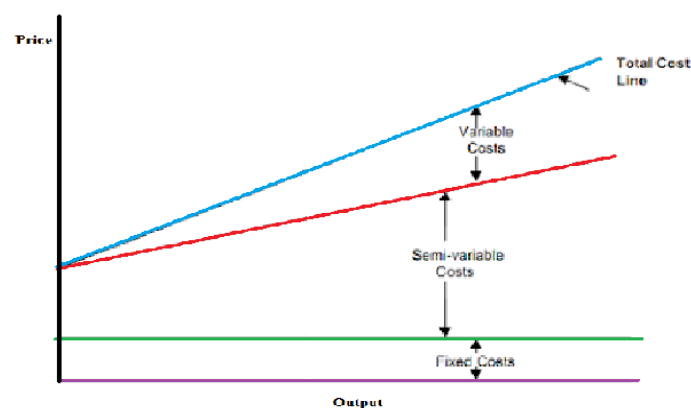


**Figure 3:** Cost Components

**Dynamic pricing:** Setting off the cost of the administrations is truly adaptable because costs are differing concerning time. The asset will mean each solicitation dependent on evaluating components utilized. It modifies the cost from the point of view of cost and time. Reasonable for purchasers. The firm defers its valuing choices until secondary selling uncovered its conditions. Supports suppliers to boost benefits with each consumer. Setting cost depends on the present status of the market. It drives estrangement in the client. It needs more development innovation for altering cost and benefit calculation. Consumers may follow through on more significant expense than can pay. Many firms sometimes fall short of costs to react to advertised conditions. Many clients are not keen on this model. Consumers who address more feel inequality. Enforces a cost chance on shoppers.

Variable costing technique empowers a gauge for the fixed expenses, and variable expenses can be found in a brief time frame, with just fundamental arithmetic and no costly projects to run the estimations, considering the firm to contribute their limited assets somewhere else. This is especially helpful for small and micro firms which do not have budgets or the spending plan to bear the cost of more qualified experts.

It tends to be effortlessly determined and does not need a specialist for estimation. Arranging and Control; Financial arranging expects directors to gauge future prerequisites, which can be determined easily. This thus permits simple dynamics. It likewise makes the valuing more straightforward for Services Providers. The cost can be adequately taken care of by both gatherings. This technique is viable since different expenses do not influence it; it is needed when required. However, the issue with such costing is that it requires the fixed expense to be independently determined. It is likewise not entirely suitable for suppliers to just have variable costing. Specific segments require fixed costing, wherein this strategy will not be advantageous. Sometimes variable costing might be pointlessly given a more extensive centrality than it merits. Figure 4 shows the Types of Costs and Behavioural patterns.



**Figure 4:** Types of Costs and Behavioural patterns

**Semi-Variable Pricing:** In this type of costing and pricing, a part is fixed for a slot or for some time or up to the maximum unit, after which the calculation is conducted for Per Unit or, in this case, Per GB/TB. A semi-variable cost, otherwise called a semi-fixed expense or a mixed expense, is a cost made out of a blend of both fixed and variable segments. Expenses are fixed for a set degree of creation or utilization and become variable after this creation level is surpassed. This empowers a gauge for the fixed expenses, and variable expenses can be found in a brief time frame, with just essential arithmetic and no costly projects to run the figuring, considering the firm to contribute their limited assets somewhere else. This is especially helpful for small and micro firms which may not have the required funds for the same. The disservice of figuring semi-variable expenses through this specific technique is that it would disparage the expense as it does not separate the fixed and variable costs, prompting the expansion in use being disregarded and bringing about off base estimates.



### 3. Methodology Tools and Techniques

The methodology followed in this paper is qualitative study and analysis in terms of basics of Cloud Computing and the economics involved in the same. Similarly, secondary sources were used for collecting data related to the pricing of various service providers to compare them and provide an overview of the pricing strategies involved.

Most of the data collected are secondary data and from research papers and various websites.

The Comparison is based on the introductory pricing for Asia (south- Mumbai). The analysis is less comprehensive since the data is gathered from secondary sources and as only as much is available for conducting research. All the experiments are conducted from the data collected from the respective Service Provider's websites. There may be a varied opinion concerning the experiment since the data collected is General and not considering each organisations' requirements and Service Level Agreements (SLAs). Also, since the experiments were based on calculations understood from that provided on the website of the service providers, it is not a specific mathematical model but just necessary calculations of cost. All these are also carried out without taking into consideration that there may be more models that are being used by the providers.

#### 3.1 Basic Cost computation

The Basic mathematical formula for calculating Total cost for data storage on cloud is:

$$T = c + I + m + s \text{ (Ellman et al., 2018)}$$

Total cost = computing cost + ip address cost + data storage cost + support cost

Wherein,

T = total cost of the entire process

Computing cost is the cost of the principal components IP address cost is for the IP address, especially if it is a reserved IP address which also is not used to 100%. Support costs are the extra cost which is provided for various services that the cloud providers provide, such as development, business strategy. Data storage cost is the cost per GB which could either be calculated on an hourly basis or monthly basis. The Real-time examples considered of GCP, AWS and Azure as per their general pricing models are considered every month.

The Various Cost components are Hardware, Software, People, Accommodation, External Services, Transfer / Migration, Initial cost / Investment, Lease period/contract time, Quality of service, Rate of depreciation, Age of resources, Cost of maintenance. Other factors that affect the costing and pricing structure in cloud storage are provider's reputation, Capital cost of data centres, User review, Monitoring services, Social category of customers, Service level agreement (SLA), type of co-cloud user.

The basic pricing strategies used in the three providers are considered, and the experiment is conducted, wherein different costing methods are used according to the costing, and the most cost-efficient model for the consumers are highlighted. The calculations and experiments are conducted by understanding the calculation provided by the providers on their websites, and then the type of costing is considered for completing the calculation.

#### 3.2 Basic Pricing

##### 3.2.1 Google Cloud Platform (GCP)

**Table 1** : Introductory pricing of Google Cloud Platform, source - Cloud Storage Pricing

Pricing Category	Cost
Data Storage	\$1.00
Network	\$0.12
Operations	\$0.05
Operations	\$0.02
Total	\$1.19



Introductory pricing of Google Cloud Platform for a month. Table 1 shows the Introductory pricing of Google Cloud Platform, source - Cloud Storage Pricing.

Break down of cost structure in GCP for a month in general. Table 2 shows the Break down of cost structure in GCP, source - Cloud Storage Pricing.

**Table 2 :** Break down of cost structure in GCP, source - Cloud Storage Pricing

Pricing Category	Cost
Data Storage	\$1,597.44
Data Storage	\$1,024.00
Network	
	\$122.88
	\$1,013.76
	\$1,228.80
Network	
	\$122.88
	\$1,013.76
	\$1,228.80
Network	\$0.00
Operations	\$0.50
Operations	\$4.00
Operations	\$1.00
Retrieval	\$102.40
Total	\$7460.22

3.2.2 *Amazon Web Services (AWS)*: The pricing scheme for a specific activity of scalable cloud storage. Table 3 shows the Amazon Web Services (AWS) Cloud pricing scheme, source - Amazon S3 Pricing.

**Table 3 :** Amazon Web Services (AWS) Cloud pricing scheme, source - Amazon S3 Pricing

Asia Pacific (Mumbai)	
S3 Standard	Storage pricing
1 <sup>st</sup> 50 TB per Month	\$0.025 per GB
Next 450 TB per Month	\$0.024 per GB
Above 500 TB per Month	\$0.023 per GB
Infrequent Access Tier, All Storage / Month	\$0.019 per GB
Monitoring and Automation, All Storage / Month	\$0.0025 for each 1,000 objects

### 3.2.3 *Microsoft Azure*

Data storage prices pay-as-you-go, and all prices are per GB per month. Table 4 shows the Microsoft Azure Cloud Services Prices Data storage, source - Block blob Pricing.

**Table 4 :** Microsoft Azure Cloud Services Prices Data storage, source - Block blob Pricing

Category/Particulars	PREMIUM	HOT	COOL	ARCHIVE
First 50 terabyte (TB) / month	\$0.21 per GB	\$0.02 per GB	\$0.0152 per GB	\$0.002 per GB
Next 450 TB / month	\$0.21 per GB	\$0.0192 per GB	\$0.0152 per GB	\$0.002 per GB
Over 500 TB / month	\$0.21 per GB	\$0.0184 per GB	\$0.0152 per GB	\$0.002 per GB

### 3.2.4 Azure Storage Reserved Capacity

Reserved Data storage prices pay-as-you-go and all prices are per GB per month. Table 5 shows the Microsoft Azure Cloud Services Prices Reserve Storage, source - Block blob Pricing.

**Table 5 :** Microsoft Azure Cloud Services Prices Reserve Storage, source - Block blob Pricing

	1-YEAR RESERVED			3-YEAR RESERVED		
	HOT	COOL	ARCHIVE	HOT	COOL	ARCHIVE
100 TB / month	\$1,680	\$1,277	\$183	\$1,352	\$1,028	\$168
1 PB / month	\$16,358	\$12,432	\$1,783	\$13,003	\$9,882	\$1,636

## 4. Experiment

### 4.1 For Google Cloud Platform, Basic pricing considered from the website.

To calculate the price for 7632 GB per month, as per the specification of the basic pricing structure of GCP. Table 6 shows the GCP Basic Pricing Structure with calculations for Fixed costing, Variable/ Dynamic Costing and Semi-Variable Costing.

**Table 6 :** GCP Basic Pricing Structure with calculations for Fixed costing, Variable/ Dynamic Costing and Semi-Variable Costing

	Particulars	Storage	Calculation	Calculation	Cost
EG:	GCP Dynamic Cost Structure - with a tier system				
	For Data Storage	For 7632 Gb	7632 GB* \$0.11		\$839.52
EG:	Computed as semi-variable cost				
	For Data Storage	For 7632 Gb	1024GB * \$0.12 + 6608GB*\$0.11	122.88+ 726.88	\$849.76
EG:	Computed as Fixed cost				
	For Data Storage	For 7632 Gb	7632 GB* \$0.12		\$915.84

### 4.2 AWS Basic Pricing Structure - S3 Intelligent - Tier system and frequent user

To calculate the price for 502 TB per month, as per the specification of the basic pricing structure of AWS. Table 7 shows the AWS Basic Pricing Structure with calculations for Fixed costing, Variable/ Dynamic Costing and Semi-Variable Costing.

**Table 7** : AWS Basic Pricing Structure with calculations for Fixed costing, Variable/ Dynamic Costing and Semi-Variable Costing

	Particulars	Storage	Cost Per GB	Calculation	Cost
EG:	<b>AWS Semi Variable - Cost Structure - with a tier system</b>	Required is 502 TB			
1	1TB- 50 TB (1ST 50GB)	51200 GB	\$0.025	51200 GB*\$0.025	\$1,280
2	51TB-450TB (Next 450TB)	460800 GB	\$0.024	460800 GB*\$0.024	\$11,059.20
3	500TB + ( REQUIRED - ALLOTTED) (502TB- 500TB)	2048GB	\$0.023	2048GB*\$0.023	\$47.10
	Total cost for 502TB	514048GB			<b>\$12,386.30</b>
EG:	<b>AWS Variable - Cost Structure - with a tier system</b>	Required is 502 TB			
	For 502 TB, consider variable cost of \$0.024 /GB	514048GB	\$0.024	514048GB*\$0.024	<b>\$12,337.15</b>
EG:	<b>AWS Fixed Cost Structure - with a tier system</b>	Required is 502 TB			
	For 502 TB, consider fixed cost of \$0.025 /GB	514048GB	\$0.025	514048GB*\$0.025	<b>\$12,851.20</b>

## 5. Results

The fixed cost (salary, purchase, maintenance) is maximum, and variable costs are equally high due to technological factor in-house servers. Nevertheless, when it is a cloud, the fixed costs reduce and there is a higher rate of variable and semi-variable costs though much less compared when it is in-house servers since the cost of the repair is also reduced. It works on the "pay as you go" concept mainly. It is also understood that the providers used the Slot system or tier system for categorising the requirement of their clients and the cost with each tier though fixed when seen from the provider's perspective, the costs are variable costs. Moreover, as per the slots (tiers) created. From various sources being analysed, it can be concluded that; between providers, costs can vary by 17%, 27% of servers, which are operated as reserved instances, consume the majority of the costs. Costs could be optimised by studying cycles of peak activity. Expenses related to personnel, power, training. Have not been considered for this paper. The various Cost Models are being computed to ensure maximum EFFICIENCY is attained with OPTIMUM UTILISATION OF RESOURCES.

From the GCP Basic pricing structure, we understand that the dynamic pricing used by them is the most cost-efficient in the perspective of the consumer. Google Cloud Storage estimating depends on the accompanying segments are Data storage, Network usage, Operations usage and Retrieval and early deletion fees. Various activities, like using AI, AI, ML, cloud text – to speech. The costs are calculated in a tier system through the buckets selected by the consumer. Their Tier system allows various associations with varied requirements being satisfied with provided dynamic pricing. When fixed costing is implemented, the price increases, similarly, even when semi-variable costing is implemented, the price increases.

The total cost reduces when dynamic/ Variable pricing method is adopted, but this may benefit only the consumer, for the benefit of both the parties Semi-variable costing may also be adopted. GCP

has designed a pricing structure that has slots that are considered to be variable/ dynamic pricing and the cost within each tier is fixed, for the general experimentation purposes.

From AWS basic pricing structure also, it is noticed that the Dynamic pricing or the variable pricing structure provides the least cost for the consumers; therefore, may be considered the most efficient.

When we observe Azure's Basic Pricing Strategy, we notice that they follow a similar method to that of the subscription model and that HOT Azure cloud users, get a semi-variable type of pricing whereas, the rest get fixed pricing or static pricing model. However, the fixed cost varies according to the subscription or membership model adopted by the users.

## 6. Discussion

Here, the diverse evaluating models for Cloud Computing are broken down, similar to their inclinations and shortcomings. After that, these are pondered concerning various components for having such esteeming. These are then verified if they are being implemented or not, after which each of these has been explained similarly as which sort of industry or division requires them as per the affiliation's need and Structure.

Assessment relies upon various astute exploration papers and their choices with connection with what has been typical in the business. There are 14 pricing models which are considered study for further analysis. The discussion below provides the models'primary character, type of model, whether it is implemented or not, advantage and disadvantage of each model.

**Pay-as-you- go:** Cost is set by a specialist organisation and stays consistent. This model is static. It is implemented and used widely. Clients know about the exact cost of the administrations. Assets are saved for the clients for the paid fix time. Costs are not changing according to requests. Saved the asset for clients, which are underutilised or overused for the more drawn out timeframe. Over-provisioning and Under-provisioning' issues may happen. Cost is Unchangeable.

**Subscription:** Cost appointed depends on membership and subscription. This model is static. It is implemented and used widely. It is in the client's perspective; they pay less when used the assets widely. It is useful for customers when using Resources/Services. Customers may pay more than the actual use cost when he/she does not utilise it.

**Dynamic Resource Pricing:** It is a unique valuing model utilised for combined cloud and supports different asset types. It is a Dynamic model. There is no implementation, only theoretical study with simulation. It increments' the fulfilments of clients and maximal the beneficial number of solicitations. It is not generally bolstered by adaptability during the high pinnacle request.

**Pay-for- resources:** This model is cost-based and Offers maximum utilisation for resources. It is a static model and is implemented. Maximum utilisation of resources is its merit. Implementation is difficult.

**Hybrid pricing:** Cost is changed by the activity line hold up times. It is implemented. Effectively gauge the cost and decrease the overhead of calculation. It must be utilised for standard base cost and has a variety of limits.

**Dynamic Auction:** This model depends on honesty and dynamic change. It is not implemented but is theoretically studied with simulation. It is a highly efficient model. At some point income of suppliers would be diminished.

**Double Auction Bayesian Game-Based:** This model empowers individuals to purchase assets from different suppliers. There is only Theoretical study and is Not implemented.

Fulfilment with a level of the setting of cost of assets with high adaptability.

Implementation is not easy, however.

**Pricing algorithm for cloud computing resources:** This model depends on constant estimating. This model is dynamic. Theoretical study with simulation only, not yet implemented.

The cost cannot change as the speed changes; it is a popular model, however.

This model builds income and lessens the expenses.

**A genetic model for pricing in the cloud computing market:** This model depends on continuous valuing and pricing. This model is dynamic. It is not implemented and is theoretically studied with simulation. Effectively execution conceivable. Most extreme income gain is possible from this model. Does not perform well in high and low-interest conditions.

**Value-based pricing:** Cost doled out on the customer is on-premise. This model is dynamic and is implemented. Most extreme income gain is attained by adopting this model. Trouble happens in the usage, and when the procedures are not meticulously followed.

**"Cost-based pricing":** Building benefit is the need and is the specification of this model. It is implemented. It is simple to budget the cost. Does not focus on the job of clients.

**Competition- based pricing:** Contenders' costs allocate cost. This model is dynamic and is implemented. Easy implementation is observed in this model. Though, does not think about the client in the setting of cost.

**Customer-based pricing:** Cost doled out as per what customers need and the need to pay. It is an implemented model. Deals with the client's point of view precisely. Difficult to set the cost because of trouble in obtaining the information and translation.

**A novel financial-economic model:** This model is dynamic, which depends on utilisation.

There is an only theoretical study with simulation. They are expanding the benefit of providers. Improves the scope of nature of administrations. It does not account for the support cost.

## 7. Conclusion

From the discussions, we understand that there many more models which have been designed, yet are not completely implemented due to the fear of the Service provider or the cloud storage user, as it may be highly risky. The static model is straightforward for both to comprehend and estimation of benefit, however, a few issues may happen either under-provisioning or over-provisioning. So basically, need to select the model according to organisation structure and requirements and mission and vision statements. Every pricing model has its merit and demerit, but specific models are not yet implemented due to fear of high risks. A "risk-sharing model" must be designed for the providers and the users. In the future, significant consideration should be towards the development of an efficient and adequate pricing mechanism that will meet even more customer's requirements. Advancement of asset Utilisation: Security contemplations and arrangements for virtualisation alongside the ideal utilisation of the cloud framework likewise should be engaged and tended to. Furthermore, to ensure that there are cost reduction and cost efficiency to the maximum profits. Preferably work on the Optimisation of Resource Utilisation. The companies may not always be perfect choosing the model required. Therefore, they can try to minimise their risks and wastage (if any) by opting for cloud audits.

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