

Chandra Wadhwa & Co.
Cost & Management Accounting Firm
Capacity Measurement (Theoretical Understanding)

Summary Model	Industry Specific Model
Idle	Not Marketable
	Off Limits
	Marketable
Non- productive	Standby
	Waste
	Maintenance
	Setups
Productive	Process Development
	Product Development
	Good Products

Definitions

Idle Not Marketable Capacity

Where a market does not exist, or management made a strategic decision to no longer participate in the market. This is a target for abandonment.

Idle off-limits Capacity

This capacity includes government regulations, management policy, and contractual arrangements. Capacity held for strategic growth is off-limits until management decides it should qualify as marketable.

Idle Marketable Capacity

A market exists, but our capacity is idle. Reasons may include competitors' market share, the existence of product substitutes, distribution constraints, or price/cost constraints. The business team, not the operating team has direct responsibility for the capacity company could use but currently is unable to use.

Non-productive standby Capacity

This includes variability and process balance.

Variability (Supplier + Internal + Customer) = Cumulative Variability

Suppliers can cause non-productive capacity by designing materials and parts that do not meet specifications. This makes incoming inspection necessary and increases the potential for scrap or rework. This also includes capital equipment suppliers and people suppliers. If a company have backup machines available because of frequent failures in primary production centres, large amounts of non-productive capacity exist. On the other hand, the people suppliers may provide a workforce that does not have the necessary analytical and communicative skills to function in a modern technology-driven organisation.

Internal variability can be due to power failures. Also, other non-productive uses of capacity may exist. For example, adding capacity may require lengthy installation and many qualification runs.

Customer Variability can come from many sources. Business cycles, seasonal cycles, erratic order flows, and customers unsure of their needs all influence the amount of standby capacity a company must have available.

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Process Balance is the capacity in a non-constraint production centre that is greater than the constraint. For example, Equipment A is the constraint, and it can produce only 1000 units a day. All other equipment averages 1000 units a day in output. Any other equipment averages more than 1000 units a day, resulting in increased WIP inventory. If equipment B needs only 21 hours of productive and non-productive time to average 1000 units a day, then 3 hours is process balance capacity. Process balance capacity is an opportunity for improvement.

Non-productive waste Capacity

We focus on three types of waste: scrap, rework, and yield loss. Clear identification of the capacity associated with scrap may allow us to redesign or reengineer the process. Yield loss includes anything less than the maximum theoretical capacity conversion into good products.

Non-productive maintenance Capacity

It includes scheduled and unscheduled maintenance.

Non-productive setups Capacity

It results from changes in the products manufactured or services provided. When a paper mill changes the weight or colour of paper, production centre use continues, but the output is not usable. Other setups occur because of the volume of product produced. For instance, industrial furnaces often require reconditioning after a certain production volume. Other setups result from the passage of time. For example, we must clean the equipment after particles collect.

Productive process and product development Capacity

Organisations often use production capacity to develop new processes or new products. These activities add value to the company's future product portfolio. However, these activities, while they consume capacity, do not make the product for the current sale. The capacity model allows us to segregate these efforts and make their capacity consumption visible.

Productive Good Products Capacity

The productive use of capacity results in tangible changes in the product or service that are the value to the customer.

Cost Computation

It is advisable to compute the capacity in time (days/hours) to facilitate comparison and determine the cost of idle, non-productive and productive capacity.

The computation of capacity in time is a function of the operational team.

It shall be computed in a closed loop, i.e., for a 24-hour day, we shall know the amount of time used for idle, non-productive or productive capacity.

Thus, we shall be able to obtain the actual capacity of how the machinery is being used on a 24-hour day.

Now we shall think from the management's perspective and try to allocate/identify costs relating to the capacity. Thus, the production and interest/borrowing costs shall be part of the capacity costs. To allocate this cost to the relevant capacity, we shall identify the cost as being booked against the following products:

- 1) Compressor
- 2) Condensor
- 3) HVAC
- 4) Hose and Tubes

The challenge lies in segregating the capacity cost into idle, productive and non-productive. Again, refer to the illustration for the same.

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Capacity Measurement (Illustration)

An HVAC assembly line costs Rs 4,00,000 per year to operate. Therefore, the variable to a fixed proportion of the cost is 1:3.
 The line produces 200 HVACs per hour.
 The company does not work on weekends (104 days) or holidays (10 days).
 Downtime for maintenance, setups, etc., averages 15 days per year.
 The machine is idle because of a lack of materials for an average of 5 days per year.
 The equivalent of 8 days of production is lost each year because of defects produced by the machine.
 Management expects to produce an average of 10,00,000 HVACs per year over the next five years.
 The planned output for the current year was 10,50,000 HVACs.
 The actual output for the current year was 10,32,000 HVACs, requiring 215 days.
 If successfully negotiated, a new contract with a customer would increase demand for the HVACs by 24,000 units per year.

	Output	Operating Cost	Cost per unit	
<i>Theoretical / Installed / Rated Capacity</i>				
Units per hour	200			
Hours per day	* 24			
Days per year	* 365			
	<u>=17,52,000</u>	Rs 4,00,000	0.228	
Variable Cost		Rs 1,00,000	0.086	Productive + Non-productive capacity Rated / Installed Capacity
Fixed Cost		Rs 3,00,000	0.171	

Capacity Category	Days	Output (4800 units per day)	Cost per unit	Capacity Cost	
Rated	365	1,752,000	0.228	400,000	
Productive	215	1,032,000	0.257	265,190	Variable + Fixed Cos
Non-productive					
Setups	15	72,000			
Standby	5	24,000			
Defects	8	38,400			
	28	134,400	0.257	34,536	Variable + Fixed Cos
Idle					
Off-limits	114	547,200			
Marketable	5	24,000			
Not Marketable	3	14,400			
	122	585,600	0.171	100,274	Fixed Cost
Total	<u>365</u>	<u>1,752,000</u>		<u>400,000</u>	