

# Analysis of Capacity Management and Planning by Small Businesses in the Solar Industry

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**Abstract :** This study shows how to manage unpredictable demand and how challenging it may be to match it to the supply of services in solar industry while maintaining a successful business. All facets of an operation are impacted by capacity management. This study offers a descriptive as well an exploratory approach. Questionnaires were distributed to describe and understand the capacity management and planning by small scale enterprises serving in growing solar industry.

**Keywords :** Demand, Capacity, Management, Solar Industry

## 1. Introduction

This study shows how to manage unpredictable demand and how challenging it may be to match it to the supply of goods and services while maintaining a successful business. All facets of an operation are impacted by capacity management. The pace at which an operation can convert inputs into outputs is measured by capacity. The amount of a good or service that can be produced in a certain amount of time is known as capacity. It is a challenging time issue to match customer buying habits (demand) with what the suppliers and, consequently, small businesses in solar industry, can deliver (capacity) (forecasting). Careful planning and wise investment choices are necessary to deliver the proper quantity of goods at the right time. When examining the manufacturing of solar panels and related services, an operation must take into account three factors: capacity, demand, and forecasting.

All of these variables have an impact on one another, so a business must be able to assess the capacity it can offer and the alternatives it has to enhance or decrease this in order to meet market demands. It's not just a matter of providing the desired quantity of goods or services; it's also a question of when these are needed. When trying to design capacity, this might cause a number of issues for an organisation.

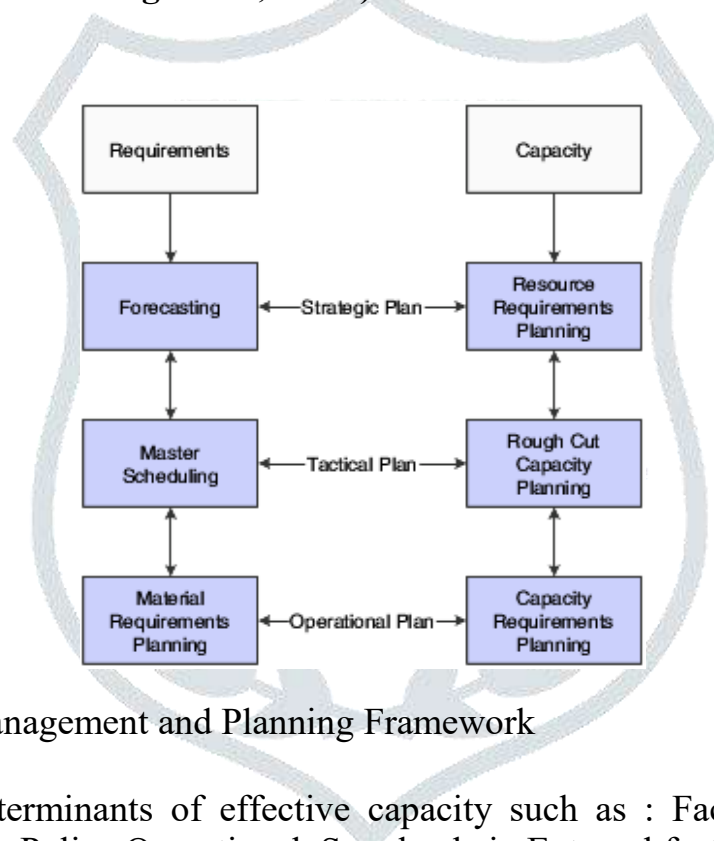
### 1.1 Capacity Planning

Capacity planning at the project level is all about figuring out whether you have adequate resources to finish a certain project. You must be aware of your team's availability and present workload in order to determine its capacity. Making sure you have enough resources to complete your project is a requirement of capacity planning. It has a predictive component as a result ( **Shahin, 2014** ). Resource planning focuses primarily on real-time workforce coordination: you assign employees to tasks while keeping an eye on resource usage ( **Ptak , Schragenheim, 2004** ).

Project managers should take the following actions to ensure they have access to enough resources:

1. Compile the project's specifications and costs. To properly complete the project, you must comprehend what needs to be done. How technical is the scope? What positions are essential to the project team? How long do you think this project will take?
2. List the materials accessible. Determine which individuals who meet the requirements for your project can join the team by analysing resource availability.
3. Match project requirements with capability. Select the person who will be tasked with the job and the number of hours they should be scheduled for. Even if your project hasn't started yet, you should ideally reserve certain resources.

Capacity for operations is constrained. By organising and managing the capacity of these operations, Awe should be able to accomplish organisational goals and objectives connected to supply chains ( **Slack, Chambers, Johnston, 2014**). Therefore, capacity planning and control are issues that every operation must deal with. This activity can have a significant impact on the operation's efficiency and effectiveness, and capacity might imply different things to different portions and departments ( **Operations Management, 2014** ).



**Figure 1** : Capacity Management and Planning Framework

There are different determinants of effective capacity such as : Facilities, Product/Service, Process, Human factors, Policy Operational, Supply chain External factors and Strategy Formulation.

When there is some ambiguity regarding demand, capacity cushion refers to an amount of capacity over the anticipated demand.

$$\text{Utilization} + \text{Capacity Cushion} = 100\%$$

## Evaluating Alternatives

### Cost-Volume Analysis

FC = Fixed cost

VC = Total variable cost

$v$  = Variable cost per unit

TC = Total cost

TR = Total revenue

$R$  = Revenue per unit

$Q$  = Quantity or volume of output

$Q_{BEP}$  = Break-even quantity

$P$  = Profit

$$TC = FC + VC$$

$$VC = Q \times v$$

$$TR = R \times Q$$

$$P = TR - TC = R \times Q - (FC + v \times Q)$$

$$P = Q(R - v) - FC$$

$$Q = (P + FC) / (R - v)$$

$$Q_{BEP} = FC / (R - v)$$

### 1.2 Small Businesses in the Solar Industry

The development of the energy sector is seen as the foundation of a nation's economy, thus policymakers must devote a great deal of attention to it. The success of these firms is largely dependent on a favourable and supportive business environment, which includes appropriate policies, strategies, a stable regulatory framework, and political leadership. Off-grid enterprises provide populations living off the grid with access to electricity, high-quality employment opportunities, and support for regional and national economic growth.

### 1.3 Strategies to match demand and capacity

when a company is fully aware of its capacity restrictions and is cognizant of demand trends. It is well situated to create plans for balancing supply and demand. For achieving demand and capacity, there are generally two methods : The first is to adjust demand to meet supply in order to smooth out demand swings and the second general tactic is to modify capacity in response to changes in demand.

### 1.4 Objectives

The major objectives of our study are:

1. To conduct a research on how capacity planning and management help the companies meet solar energy demand.
2. To assess capacity at small businesses and understand the elements that affect it.
3. To determine how difficult it is to balance supply and demand.

## 2. Research Methodology

A written strategy for conducting research is what is known as research methodology. There are several aspects to research methodology. Along with describing the research techniques, it also discusses how they were chosen for the study and criticises the decision to utilise only one particular approach or method. The main goal of research is to produce reliable data that can be used to make decisions. Research is the methodical, unbiased process of collecting, logging, and analysing facts to assist in commercial decision-making.

Both a descriptive and an exploratory research strategy were used in this study. Both primary data gathering techniques and secondary sources were used to gather the data. The purpose of the questionnaires was to statistically analyse the responses. We can collect data from the sales, production, and various administrative divisions of businesses that sell solar energy-related services and goods through the use of questionnaires and surveys. The information gathered from the respondents was entered into the resulting form.

## 3. Data Analysis and Interpretation

In order to compare the actual theory with the practical, whose variations can serve as the foundation for improvements, a thorough analysis of the study is required. With this in mind, an effort has been made to segment the different respondents based on some factors that were obtained from them via questionnaire in order to complete the evaluation versions that may serve as the foundation for the study's aims. The Table 1 shows the demographics of our 50 respondents.

**Table 1** : Demographic Variables

	Criteria	Frequency	Percentage ( % )
Working Experience	Below 2 Years	15	30
	2-4 Years	8	36
	4-6 Years	9	18
	More than 6 Years	8	16
Department	Admin	20	40
	Production	13	26
	Sales	9	18
	Others	8	16

Our data shows that 30% of the respondent's working experience is below 2 years. 36% of the respondent's working experience is between 2-4 years and 16% of the respondent's working experience is more than 6 years. Also, 40% of the respondents

were in admin department, 26% of the respondents were in production department and 16% of the respondents in other department.

**Table 2 :** Questions putted up in a questionnaire

	Criteria	Frequency	Percentage ( % )
When capacity needs to be increased or decreased, the operations department must consider how this is going to be achieved.			
	Highly Agree	30	60.00%
	Agree	10	20.00%
	Neutral	7	14.00%
	Disagree	1	2.00%
	Highly Disagree	2	4.00%
The decision to provide capacity depends upon the selected strategy and the ability to store the product or timeliness of service production.			
	Highly Agree	25	50.00%
	Agree	15	30.00%
	Neutral	5	10.00%
	Disagree	2	4.00%
	Highly Disagree	3	6.00%
The timing decisions of how and when to provide capacity need to be determined in line with demand.			
	Highly Agree	25	50.00%
	Agree	5	10.00%
	Neutral	10	20.00%
	Disagree	4	8.00%
	Highly Disagree	6	12.00%
Capacity Management phases are strictly followed at solar companies to fulfill the demand and delivery on time.			
	Highly Agree	18	36.00%
	Agree	15	30.00%
	Neutral	10	20.00%
	Disagree	5	10.00%
	Highly Disagree	2	4.00%

The capacity of your solar company measures how much company can achieve, produce, or sell within a given time period			
	Highly Agree	20	40.00%
	Agree	15	30.00%
	Neutral	9	18.00%
	Disagree	5	10.00%
	Highly Disagree	1	2.00%

The above table describes that the 48% of the respondents highly agree, 30% of the respondents agree with the techniques of capacity management helps the manager to implement the execution in time. 14% of the respondents neutral and 2% of the respondents highly disagree with the same. Also, 60% of the respondents highly agree, 20% of the respondents agree with the capacity needs to be increased or decreased, the operation must consider how this is going to be achieved. 14% of the respondents neutral and 2% of the respondents highly disagree with the same.

Also, 50% of the respondents highly agree, 30% of the respondents agree with the decision to provide capacity depends upon the selected strategy and the ability to store the product or timeliness of service production. 10% of the respondents neutral and 4% of the respondents highly disagree with the same.

#### 4. Recommendations and Limitations

Project management efforts must balance team capacity with project demand, but strategic capacity planning helps the entire company, not just the production teams. You shouldn't overlook capacity management when managing a large portfolio of projects. You'll be able to help not only other areas of your business but also make superior resource allocation decisions.

The staff members value capacity planning as well. Team members are not asked to work past their capabilities thanks to this planned approach to resource management. Additionally, staff members are aware that managers respect and are aware of their availability. They are unlikely to be given a pressing project in the midst of their summer break. Finally, if your business makes use of a resource management tool, your staff are aware of what is on their agenda, including the upcoming project they will be working on, its duration, etc.

Therefore, it is advised that capacity control be taken into account in future studies, as well as to combine these two viewpoints, and to consider capacity planning and control in a variety of fields, as well as modelling in this field, as well as implementing models in a large area, to ensure that the results have high credibility and can be applied to current issues, potentially ensuring the company's success in the future.

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