New Product Sales Forecasting

This module covers the concepts of hierarchy of effects, awareness, availability (ACV%), trial rate, repeat purchase, and intent to behavior translation.

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Marketing Metrics Reference: Chapter 4

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An Approach to Forecasting New Product Sales

- The sales forecasting approach in this presentation is based on a popular “pre-test market” model used by market research firms.
- The approach helps managers predict volume for new products.
- It is primarily used for new B-to-C and B-to-B products that are in established product categories where frequent, repeated purchase is common. Examples include:
  - Packaged grocery products
  - Food products
  - Personal care products
  - Commonly used office-supplies
While not as directly applicable, it may also be used for infrequently purchased new products. Examples include:

- Cars
- Electronics equipment

It is probably less useful for radical, new innovations that consumers find difficult to understand and for which they cannot provide information regarding their intent to purchase.
The forecasting methodology is based on an “extended hierarchy of effects”.

1. **Consumers** become aware of the new product’s existence.

2. **Retailers** decide to sell the product and give it shelf-space.

3. **Consumers** who are aware and have access to the product decide to try it.

4. **Consumers** who have tried the product and become repeat purchasers.

We can make forecasts of share or sales by predicting rates of awareness, availability, trial, and repeat purchase.  

The extended hierarchy of effects forms the basis of most pretest market or simulated test market models.

- Pretest or Simulated Test Market (STM) Models like BASES, ASSESSOR, and LITMUS, are used extensively by consumer packaged good companies to obtain reasonable sales predictions for new products, before, and sometimes instead of, test markets.

- The extended hierarchy of effects forms the backbone of most of these STM models.

- Consumers’ trial and repeat rates are estimated in a “simulated” purchase environment. They are shown concept boards, advertising, or sometimes real products in a lab setting and asked about their interest and intent to try. This is followed by an in-home use test and a follow-up survey to estimate repeat rates.
Definition:

**Awareness** = Percentage of the target market that is aware of the new product. Awareness is primarily driven by the consumer’s exposure to the product’s brand marketing message through advertising and other promotional vehicles.

For example, historical data can translate advertising spend ($) into an expected awareness rate.

Availability

Definition:
**Availability** = Percentage of retailers and other relevant sales channels that make the product available for sale to consumers. Product availability is primarily driven by trade spending and promotions to support retailers.

For example, historical data can translate trade spending into an expected All Commodity Volume (ACV) %.

**Trial**

**Definition:**

Trial = Percentage of a target market that purchases or uses a product for the first time in a given period*. Trial is driven by the effectiveness of the product’s value proposition with new customers.

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Repeat (Purchase)

Definition:
Repeat = Percentage of first-time customers who continue to purchase and become repeat customers. Repeat purchase is driven by a product’s ability to deliver on its value proposition.

We can use the hierarchy of effects to forecast the percentage of the target market that will become repeat purchasing customers.

\[
\text{% Repeat Purchasing Customers} = \text{1. Awareness Level} \times \text{2. Availability (ACV %)} \times \text{3. Trial Rate} \times \text{4. Repeat Purchase}
\]

- What percentage of consumers are aware of the product?
- In what percentage of distribution is the product available?
- Of those who are aware and have access, what percentage will try the product?
- Of those who try the product, what percentage will repurchase?

A simple example of forecasting the % repeat purchasing customers:

*Betty’s Fruits* is launching a new canned mango product. Market research has concluded that the marketing mix for canned mango will generate an awareness level with the target market of 40%.

60% of aware customers with access to the product at retail will try 1 can.

50% of those that try the product will become repeat purchasers.

The company expects to achieve an ACV% of 70%.
Forecasting Sample Problem (Solution)

Question 1: What percentage of customers do you forecast will be repeat purchasing customers of Betty’s canned mango?

Answer:

\[
\% \text{ Repeat Purchasing Customers} = \text{Awareness Rate} \times \text{Availability (ACV %)} \times \text{Trial Rate} \times \text{Repeat Purchase Rate}
\]

\[
\% \text{ Repeat Purchasing customers} = 40\% \times 70\% \times 60\% \times 50\%
\]

\[
\% \text{ Repeat Purchasing Customers} = 8.4\%
\]
Changes in marketing mix will drive changes in forecasting repeat customers and volume. The following hypothetical charts demonstrate how awareness rate and ACV% can vary with marketing mix.

**Awareness rate sensitivity to Ad Spend ($)**

- 8% at $0
- 13% at $2
- 22% at $4
- 37% at $6
- 54% at $8
- 68% at $10
- 84% at $12
- 89% at $14
- 92% at $16
- 100% at $20

**ACV% sensitivity to Trade Spend ($)**

- 2% at $0
- 7% at $2
- 16% at $4
- 20% at $6
- 30% at $8
- 50% at $10
- 67% at $12
- 80% at $14
- 88% at $16
- 90% at $18
- 91% at $20

**Note:** While there are several elements of the marketing mix, for this tutorial we will only consider these two.
This question builds on the previous question regarding Betty’s Fruits’ new canned mango product.

**Question 2:** What will be the increase (decrease) in the percentage of customers who will be repeat purchasers of Del Monte’s canned mango if Del Monte shifts $5 million from ad spend to trade spend?

Use the data tables below:

<table>
<thead>
<tr>
<th>Ad Spend</th>
<th>Predicted Awareness rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5M</td>
<td>5%</td>
</tr>
<tr>
<td>$10M</td>
<td>20%</td>
</tr>
<tr>
<td>$15M current plan</td>
<td>40%</td>
</tr>
<tr>
<td>$20M</td>
<td>45%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trade Spend</th>
<th>Predicted ACV%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5M</td>
<td>65%</td>
</tr>
<tr>
<td>$10M current plan</td>
<td>70%</td>
</tr>
<tr>
<td>$15M</td>
<td>75%</td>
</tr>
<tr>
<td>$20M</td>
<td>80%</td>
</tr>
</tbody>
</table>

\[
\text{% Repeat Purchasing Customers} = \text{Awareness Rate} \times \text{Availability (ACV %)} \times \text{Trial Rate} \times \text{Repeat Purchase Rate}
\]
% Repeat Customer Forecast (Solution)

**Answer:**

\[
\% \text{ Repeat Purchasing Customers} = \text{Awareness Rate} \times \text{Availability (ACV \%)} \times \text{Trial Rate} \times \text{Repeat Purchase Rate}
\]

Revised % Repeat Purchasing Customers = 20% \times 75% \times 60% \times 50% = 4.5%

% Repeat Purchasing customers will decrease from 8.4% to 4.5%, or by 3.9% points.
Forecasted volume is equal to the sum of forecasted trial volume and repeat volume.

The trial volume is equal to the total number of units purchased as trials.

Calculating Trial Volume

**Definition:** Calculating trial volume first requires calculating the total number of “triers”.

Formula for forecasted number of “triers”:

\[
\text{Forecasted Number of “Triers” (#)} = \text{Awareness rate (\%)} \times \text{ACV (\%)} \times \text{Trial rate (\%)} \times \text{Target market size (#)}
\]
Calculating Trial Volume, cont.

**Definition:** Trial volume is the product of the number of “triers” and units purchased per trial.

**Forecasted Trial Volume formula:**

\[
\text{Forecasted Trial Volume (\#)} = \text{Number of Triers (\#)} \times \text{Units per Trial (\#)}
\]

\[
\text{Forecasted Trial Volume (\#)} = \text{Awareness rate (\%)} \times \text{Trial rate (\%)} \times \text{ACV (\%)} \times \text{Target market size (\#)} \times \text{Units per Trial Purchase (\#)}
\]
Question 3

4N Corp. is launching a new and improved Tacky Note. Market research has concluded that the marketing mix for Tacky Notes will generate an awareness level of 80% with the target market of 100 million customers. Of aware customers who have access to the product in retail stores, 60% will try the product in the next year. 4N will achieve distribution of 80% ACV. Those who try the product will purchase a package of 10 units.

What trial volume do you project for 4N’s new Tacky Note?
Calculating Trial Volume (Solution)

**Answer:**

\[
\text{Forecasted Trial Volume (\#)} = \text{Awareness rate (\%)} \times \text{Trial rate (\%)} \times \text{ACV (\%)} \times \text{Target market number (\#)} \times \text{Units/trial purchase (\#)}
\]

\[
\text{Forecasted Trial Volume (\#)} = 80\% \text{ aware} \times 60\% \text{ trial} \times 80\% \text{ ACV} \times 100\text{M customers} \times 10 \text{ Units / trial purchase}
\]

Forecasted Trial Volume = 384M Units
Trial rates are often estimated by using historical data to translate customers’ stated intent into actual purchasing behavior.

- Trial rates are often estimated by surveying potential customers and asking them their intent to try a new product.
- They are an essential ingredient of Simulated Test Market Models.
- Potential customers are shown a concept board, or advertising, or the real product in a laboratory environment and asked about their interest and intent to try the product. They may also have the opportunity to “purchase” the product in the simulated lab.
- Unfortunately, customers do not always do what they say they intend to do.
Estimating Trial Rates (Continued)

- Forecasters often translate customers’ stated intentions into estimated trial rates.

- Historical data for the company’s products or the product category can help determine these translation rates.
  - For example, historical data may show that only 80% of those that say they will definitely try a new product actually do.
Adjusting Trial Rate (Example)

*(Based on an “intent-to-behavior” translation rate)*

The following is an example of translating stated purchase intention into estimated trial rates:

<table>
<thead>
<tr>
<th>Consumer Intention</th>
<th>% of Respondents</th>
<th>Translation Rate</th>
<th>Estimated Trial Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely will try new product</td>
<td>15%</td>
<td>80%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Probably will try new product</td>
<td>25%</td>
<td>30%</td>
<td>7.5%</td>
</tr>
<tr>
<td>May or may not buy</td>
<td>35%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Probably won’t buy</td>
<td>15%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Definitely won’t buy</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>TOTAL:</td>
<td>100%</td>
<td></td>
<td>20% = Adjusted Trial Rate</td>
</tr>
</tbody>
</table>

*Note: These are hypothetical numbers. Translation rates will vary from product to product and company to company. For some products, data will show that those that claim they won’t buy product actually do.*

Repeat Volume

**Definition:** Repeat volume is equal to the total number of units purchased after the initial trial in a particular time period.

- **Target customers**
- **Aware customers**
- **“Triers”**
  - Multiply by Awareness rate
  - Multiply by ACV%
  - Multiply by trial rate

Units per trial → Repeat rate → Repeaters

Units per repeat purchase

# of repeat purchases per period

Total Forecasted Volume = Trial Volume + Repeat Volume

Repeat rates are often predicted using surveys and customer usage tests.

- Potential customers are given the product for use in their home.
- After several weeks, telephone interviews are conducted with these customers.
- These customers provide their perceptions of the product’s value after using it and intention to purchase after trying it.
- Some Simulated Test Market Models use stated repeat purchase intentions to estimate repeat rates while others may also give the customer an opportunity to “repurchase” the product at retail price.
Repeat Volume

Repeat volume is driven by repeat rate of “triers” as well as volume and frequency of repeat purchase.

Repeat Volume formula:

\[
\text{Repeat Volume (\#)} = \text{Repeat rate (\%)} \times \text{“Triers” (\#)} \times \text{Repeat purchases per period (\#)} \times \text{Units per repeat purchase (\#)}
\]
Calculating Repeat Volume (Example)

This question builds on the previous question regarding 4N’s new Tacky Note.

**Question 4:** Market research has concluded that 30% of customers who try the product will repeat purchase. On average these repeat purchasers will buy 3 packages of 50 units of the new Tacky Notes per year.

What repeat volume do you project for 4N’s new Tacky Note over the next year?
Repeat Volume (#) = 38.4M “triers” x 3 repeat purchases per year x 50 units per repeat purchase

Repeat Volume (#) = 1,728M Units
**Forecasted Volume Definition**

**Definition:** Forecasted volume is the sum of trial and repeat volume.

\[
\text{Forecasted Volume (\#)} = \text{Trial Volume (\#)} + \text{Repeat Volume (\#)}
\]

- or -

Forecasted Volume formula:

\[
\left( \frac{\text{units}}{\text{trial purchase}} \times \text{repeat rate} \times \frac{\text{repeat purchase}}{\text{year}} \times \frac{\text{units}}{\text{repeat purchase}} \right)
\]

\[
\times \frac{\text{target customers}}{\text{awareness rate}} \times \text{ACV} \%	imes \text{trial rate}
\]
This question builds on the previous question regarding 4N’s new *Tacky Note*.

**Question 5:** Given 4N’s trial and annual repeat purchase volume, what do you forecast for volume sales in the year after launch?
Answer:

\[ \text{Forecasted Volume} = \left( \frac{\text{Trial Volume}}{384M \text{ trial units}} \right) + \left( \frac{\text{Repeat Volume}}{1,728M \text{ trial units}} \right) = \frac{\text{Total Volume}}{2,112M \text{ total units}} \]

- or -

\[ \text{Forecasted Volume} = 100 \text{ M Customers} \times 80\% \text{ aware} \times 80\% \text{ ACV} \times 60\% \text{ trial} \times \left( \frac{10 \text{ units trial purchase}}{3 \text{ repeat purchase year}} \right) \times \left( \frac{30\% \text{ repeat purchase}}{50 \text{ units repeat purchase}} \right) \]

\[ \text{Forecasted Volume} = 2,112 \text{ M total units} \]
Volume forecasts can be estimated by aggregating the volume forecast of different segments.

Segment 1

\[
\text{Total Volume Forecast} = \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right)
\]

Segment 2

\[
\text{Total Volume Forecast} = \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right)
\]

Segment 3

\[
\text{Total Volume Forecast} = \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right) + \left( \frac{\text{units}}{\text{repeat rate}} \times \frac{\text{repeat purch.}}{\text{year}} \times \frac{\text{units}}{\text{repeat purch.}} \right)
\]
A Simple Example

*Len & Harry’s* is launching a new ice-cream sandwich product. They predict they will achieve 80% ACV. The following chart provides data on two customer segments:

<table>
<thead>
<tr>
<th>Segment</th>
<th>Projected awareness</th>
<th>Est. trial rate</th>
<th>Trial volume</th>
<th>Est. repeat purchase rate</th>
<th>Estimated Repeat purchase frequency &amp; volume</th>
<th>Size of segment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy ice-cream eaters</td>
<td>70%</td>
<td>40%</td>
<td>1 box</td>
<td>10%</td>
<td>5 purchases per year; 1 box per purchase</td>
<td>35M customers</td>
</tr>
<tr>
<td>Light ice-cream eaters</td>
<td>50%</td>
<td>15%</td>
<td>1 box</td>
<td>5%</td>
<td>2 purchases per year, 1 box per purchase</td>
<td>200M customers</td>
</tr>
</tbody>
</table>

**Question 6:** What volume do you project for *Len & Harry’s* ice cream sandwich for the next year?
**Multi-Segment Forecasting (Solution)**

**Answer:**

\[
\text{heavy segment volume} = \frac{35M}{\text{customers}} \times \frac{70\%}{\text{aware. RATE}} \times \frac{80\%}{\text{CV}} \times \frac{40\%}{\text{trial RATE}} \times \left( \frac{1 \text{ unit}}{\text{trial purch.}} + \frac{10\%}{\text{repeat RATE}} \times \frac{\text{5 repeat purch.}}{\text{year}} \times \frac{1 \text{ unit}}{\text{repeat purch.}} \right)
\]

\[
\text{light segment volume} = \frac{200M}{\text{customers}} \times \frac{50\%}{\text{aware. RATE}} \times \frac{80\%}{\text{CV}} \times \frac{15\%}{\text{trial RATE}} \times \left( \frac{1 \text{ unit}}{\text{trial purch.}} + \frac{5\%}{\text{Repeat RATE}} \times \frac{2 \text{ repeat purch.}}{\text{year}} \times \frac{1 \text{ unit}}{\text{repeat purch.}} \right)
\]

\[
\text{Forecasted Volume} = \text{heavy segment volume} + \text{light segment volume} = 11.76M + 13.2m = 24.96M \text{ boxes}
\]

The framework and calculations shown here form the backbone of any new product sales forecast, particularly in frequently purchased consumer packaged goods.
Additional Details

• Of course, there are several details that are not explicit in this framework. For instance, the number of repeat purchases in a given period will depend upon how early in the period the trial occurred. The average repeat rate and repeat purchase amounts used here can be assumed to incorporate these timing issues.

• There is also the issue of pipeline filling. Since products are sold through the one or more levels in the channel (e.g. wholesaler and retailer) and not directly to the consumer, manufacturer sales and shipments will differ from the end consumer sales forecast here due to pipeline filling and inventory at each level of the channel.

• Thus, this framework provides reasonably good estimates of new product performance that can be used to identify potential winners and losers, not to pinpoint precise sales, shipment, and production forecasts.
Further Reference