Note on the Voice of the Customer

John R. Hauser, 2019

Understanding customer needs is a critical aspect of implementing segmentation, targeting, and positioning. After you identify a killer idea, the next step in your project is understand what consumers want and whether those wants and needs vary by segment. This note provides an overview of the voice of the customer. Four appendices provide “how-to” guides for your action-learning projects.

In this note we address how we get information about customers: who they are and what they want. This information is critically important early in your analyses to design products, set prices, or to design advertising and other promotion that communicate those aspects to customers. If you know customer’s needs you can design products that customers want to buy and you can design the right pricing strategy so that customers feel they are getting value for the price paid. Although we call the methods “voice of the customer (VOC),” they have also been used to understand the wants and needs of an organization (voice of the employee) and the wants and needs of both the channel of distribution and the upstream supply chain (voice of the collaborators).

What Do Customers Want from An Electric Utility?

A major electric utility (“MEU”) company in the US was concerned that it’s large business customers were seeking alternatives such as self-generation of power and were also complaining to the public utility commissions about the service they were receiving. Managers at MEU believed that they could do better and satisfy their cus-
tomers better. After much discussion, MEU decided to seek efficiencies that would enable them to reduce price, they would upgrade their systems to assure better power quality (consistency of a power without spikes, etc.), and they would assure that they had enough capacity to avoid brown-outs. These were all reasonable goals, but before MEU undertook capital improvements, they sought to learn the tradeoffs customers were willing to accept among price, power quality, and power consistency. They interviewed customers, such as head of a major bottling plant in their area. To carry out the interviews MEU hired an independent consulting company with experience in the voice-of-the-customer interviews.

The interviews were painful for managers at MEU to watch. Almost immediately after the interviewer introduced the topic, customers began berating MEU as non-responsive and arrogant. Customers were not particularly concerned with the price per kilowatt hour nor the power quality, which was quite good. They were extremely upset by a lack of perceived service and by the fact that MEU did not understand its customers’ businesses.

For example, the head of operations at the bottling company complained that, while the cost per kilowatt hour was low, the total cost of electricity was high. The operations head felt that MEU should work with the bottling firm to help the bottling firm identify how the firm might use electricity more efficiently to lower the total bill. For example, operations head wanted MEU to identify areas of operations where his firm could use more electricity at night when rates were low or were there alternative systems that could operate differently to use less electricity. The operations head was very explicit that the bottling firm wanted MEU to know the bottling operation and to listen to the bottling firm’s customer needs. The operations head wanted MEU to make the interviewee a hero to the bottling firm. The bottling firm would pay a premium for good ideas and strategic consulting.

Billing was a major issue. Many customers perceived the bills as hieroglyphics. They received one bill for multiple locations, but they needed greater detail by location, by time of day, and other variables so that they could analyze their own power needs. Customers were always experimenting with their operations and wanted MEU to work with them and provide data with which to evaluate those operations.

Customers expressed outrage over perceived fairness. For example, if one of MEU’s com-
ponents broke on a weekend, MEU charged a premium for repair (unless the customer wanted to wait until a weekday). Customers’ plants often ran on a 24/7 cycle and lost money whenever they were idle. Customers believed that if it was an MEU piece of equipment that failed, then MEU should fix it on the customer’s schedule.

There were many other insights from the interviews and many of the insights led directly to changes in the way MEU did business. The insights could be summarized by the observation that the customers wanted their businesses to run efficiently and wanted MEU to be a partner and “own” that goal. As long as MEU was taking an arms-length perspective on their customers’ operations, MEU would never satisfy their customers. On the other hand, customers were willing to pay for electric-use consulting—a business that could provide much higher margins for MEU than electric power generation and distribution.

Another Example: Blood-gas Monitors

When a patient is in the intensive care unit (ICU) of a hospital, the medical staff is constantly monitoring the patient’s blood gases. At the time of this analysis there were seven critical tests which, together, determine how well the patient is breathing. These tests are critical. If the patient is breathing poorly and nothing is done, the patient could die in less than an hour. Furthermore, the blood that is tested is arterial blood rather than blood that is carried back to the heart in blood veins. Arterial blood degrades quickly and should not be contaminated by air.

Blood gas monitors enable the medical staff to test blood at the point of care. Point of care testing is faster, more effective, but more expensive. It is also regulated. Everyone using the equipment has to be certified yearly, every test has to be logged, and the machine has to be recalibrated every eight hours.

One of the primary manufacturers of blood-gas monitors, disguised here as “BGM,” wanted to develop a more-accurate machine. To determine the requirements for accuracy, BGM asked a consultant to interview physicians and other medical staff. The interviews quickly determined that while “accuracy” is important, the medical staff really has no way to assess accuracy. Current accuracy is sufficient to make critical decisions and patients and the medical staff relies
on the government to certify accuracy. As long as the machine remains certified, perceived accuracy is sufficient.

But customers were not satisfied with BGM’s products. First, training was expensive. Three shifts of workers and virtually everyone in the ICU had to be trained on the machine and certified yearly. A second concern was wasteful tests. Not every one of the seven tests was required every time. Physicians often ordered additional tests that the machine did not do. Each test required reagents, which were costly. Indeed, BGM’s business model was “blades and razors.” They made significant margins on the reagents, which were expensive to customers but inexpensive for BGM. The medical staff resented paying for reagents for tests they did not need.

Customers were concerned about contamination. The machine itself had numerous buttons—perfect places for bacteria to grow behind the buttons. To use the machine, medical personnel put a syringe in a bag of blood, carried the syringe to the machine, put a few drops on a card, and put the card in the machine. Medical staff, who were used to injecting patients with a syringe, had a habit of squirting a few drops to clear the air. But this is an ICU with patients that are often infected with contagious diseases. Carrying blood-filled syringes across the room and squirting blood into the air was not good medical practice.

After listening to the interviews and discussing potential solutions, BGM identified creative solutions to each of the issues. The net result was a machine that made training, certification, and calibration easy, that greatly reduced the risk of contamination, and satisfied customers with respect to required tests and additional tests. (It was not feasible to engineer the machine to do a subset of the seven tests. BGM had to be more creative.) By listening carefully to the customer, BGM earned a two-year lead time on its competitors, earned the image as a top innovator in medical equipment, and became the top player in the market. Had they focused only on a machine that was more accurate, the market would have yawned. BGM would have remained a niche player.

What is the Voice of the Customer?

In electric utility example, in the blood gas example, and in thousands of examples every year, large firms, small firms, and entrepreneurs achieve breakthroughs by listening to their customers. The MEU and BGM examples are typical. The firm (or entrepreneur) sees the world
through its own eyes. The customer’s view can be very different. To be successful and to achieve sales (and profit), the firm (or entrepreneur) must develop creative solutions to fulfill customer needs better than competitors.

The voice of the customer (VOC) has three components. The first component is the identified set of customer needs. The second component is a structure that summarizes customer needs in a managerially relevant hierarchy. The third component is customer preferences with respect to the customer needs so that the firm (or entrepreneur) can set its priorities and make profitable decisions.

**Customer Needs**

Managers often fall into the trap of defining customer needs by easily measurable quantities. For example, MEU focused on price, power quality, and power consistency with measures like price per kilowatt hour, voltage spikes, and percent “up time.” For blood-gas testing, BGM wanted to identify how to quantify accuracy. Neither MEU’s strategy nor BGM’s strategy would have been effective or profitable. But when each listened to the voice of the customer, each identified extremely profitable actions.

Customer needs are qualitative descriptions of that which the customer wants from the product or service. For example, in smartphones it might be tempting to measure screen resolution in pixels per square centimeter. Clearly more pixels are better. What the customer really wants is a screen that is easy to read in all lighting situations, or a screen that gives clear, crisp images, or a screen that makes video playback look realistic, etc. Pixels are just one of many ways to achieve these goals. By defining needs in the words of the customer, product designers, marketers, and managers can be more creative in their solutions. Apple introduced a retina display (resolution higher than the eye can distinguish pixels) and has since improved on that. Amazon introduced automatic backlighting and a crisp screen in their Kindle Paperwhite.

A financial services example is illustrative. The firm was concerned with the service provided by their telephone representatives—their primary source of sales. It was clear that custom-
ers would prefer less wait time rather than more wait time, fewer transfers among representatives rather than more transfers among representatives, and quick answers to questions rather than long answers to questions. These metrics were easy to measure. In one experiment, the financial services firm rewarded representatives for answering the phone quickly, not transferring calls, and answering questions quickly.

During the experiment, customer satisfaction decreased! In retrospect, it is easy to see why. Yes, customers wanted fast responses all else equal, but customers did not want fast responses if their questions were not answered to their satisfaction. Customers preferred representative who took a little more time if that was what was necessary to get the best answer. Customers were willing to accept transfers if the new person was better able to answer their question. The customer need was “get my question answered accurately and quickly,” but with accurate being the more important of the two criteria.

A customer need is a description of what the customer wants in the customer’s own words. It is not yet a solution. ICU medical personnel want a blood gas monitor that minimizes the cost or disruption of training, calibration, and certification. It is up to BGM to decide how best to achieve those goals. MEU’s customers wanted MEU to help them run their businesses more profitably. It was up to MEU to come up with creative solutions to achieve those goals.

If successful, a VOC provides an articulation of customer needs which, as a whole, helps the firm (or entrepreneur) see the world through the eyes of its customers. The set of customer needs might be fairly long and detailed. 100 customer needs is not atypical; some lists can be 200-300 customer needs.

**Structuring Customer Needs**

To evaluate a marketing strategy or to design a product, we need more structure than a simple list of hundreds of customer needs. Some customer needs are more critical to the customer than others. Many customer needs describe similar concepts and some customer needs elaborate details that are summarized by other customer needs’ statements. Managers or entrepreneurs who are new to VOC often complain that there is too much information.

It is typical to structure customer needs into a hierarchy of primary, secondary, and tertiary customer needs. Primary customer needs, also known as strategic customer needs, are the
two-to-ten top-level customer needs that set the strategic direction for segmentation, targeting, and positioning. For example, primary customer needs for an automobile might be “fun to drive,” “interior is comfortable,” “vehicle has many uses,” “on-road economy,” “driver is in control,” and other needs. See Figure 1.

**Figure 1. Example Hierarchical Structure (Stylized)**

![Diagram of hierarchical structure](image)

Each primary customer need is elaborated into three-to-ten secondary customer needs. (Secondary customer needs are also known as tactical customer needs.) Secondary customer needs indicate more specifically what must be done to satisfy the corresponding primary (strategic) customer need. For example, if “driver is in control” is the primary customer need, then the secondary customer needs tell the marketing innovation team how the customer judges that the driver is in control, say by the data feedback, the steering feel, the smoothness of stopping, etc. These tactical customer needs focus efforts on more-detailed benefits that fulfill the strategic direction implied by the primary customer need.

The tertiary customer needs, also known as operational customer needs. Engineering, R&D, and, perhaps, advertising, use the tertiary customer needs to develop detailed product characteristics or advertising copy, that satisfy the primary and secondary customer needs. For example, a customer may judge data feedback by well-lighted instruments, an effective heads-up display, the feel of the accelerator and brake pedals, and information from an on-board computer on the instrument panel. Improving the tertiary operational customer needs improves the secondary tactical customer needs, which, in turn, improve the primary strategic customer needs.

**Prioritizing Customer Needs**

After listening to the customer, identifying customer needs, and structuring customer
needs, the manager or entrepreneur should be able to generate many creative solutions. But some solutions are more costly than others. Some solutions might improve performance on one strategic customer need at the expense of another. For example, making the interior of an automobile larger (and thus more comfortable) might sacrifice on-road economy. (Creative solutions might improve both more comfort and better on-road economy.)

To set priorities, we require an indication of the tradeoffs that the customer is willing to make among the customer needs. For example, if an improvement in interior comfortable is more important to the customer than the corresponding decrease in on-road economy (and if the improvement does not adversely affect other customer needs and costs), we may want to implement that change. If the customer is more concerned with on-road economy, we may not want to implement that change.

Engineers will immediately recognize a scaling issue in the measures of “customer-need importance.” Customer needs are qualitative constructs; they are not hard “engineering” measures such as miles per gallon, meters per second, or other constructs that can be measured on an easy-to-define natural scale. When we measure “importances” for the customer needs, we must make sure that both the customer and we understand what it means to improve a customer need by one unit of the measurement scale. Another note in this series discusses conjoint analysis to deal explicitly with varying scales and hard “engineering” measures. Conjoint analysis enables us to make quantitative tradeoffs among marketing actions and product development. For example, Apple used conjoint analysis to quantify customers’ willingness to pay for a smartphone’s touchscreen features.

In a VOC, we are interested in directional suggestions. We accept the approximate scaling of the customer needs as long as we can be reasonably consistent in how we interpret the scaling of customer needs. When we ask a question such as: “Is it more important that we improve interior comfort or on-road economy?,” most customers can answer this question. Customers answer this question because they have an implicit scale in mind when they evaluate alternative automobiles.

To anchor measured importances to customers’ implicit scaling, we ask customers about their perceptions of how products perform on customer needs. For example, a customer might
be able to evaluate the relative interior comfort and on-road economy of a Honda Accord and a Chevrolet Malibu. If we then ask the importance question in relation to the customer’s evaluation of the Accord and Malibu, we allow the customer to reveal to us the scale by which the customer judges importance. Suppose, for the sake of illustration, that the Malibu has more interior comfort and the Accord better on-road economy. Then the question we are really asking is: “Would you prefer that the Malibu had improved on-road economy (to that of an Accord), but sacrificed interior comfort (to that of an Accord)?”

**An Example:** MIT Management is always seeking new ideas for its curriculum. A few years ago, before action learning became a significant part of our curriculum, we surveyed potential students. The primary and secondary customer needs were:

**Enhances my personal brand**
1. The business school has wide-name recognition (e.g., known worldwide).
2. The business school is highly rated by independent publications (e.g., US News & World Report).

**I enjoy the time I am at the school**
3. Students at the business school have a strong sense of community.
4. The business school has a collaborative atmosphere.
5. Students are satisfied with their overall experience.

**Reputation as a thought leader**
6. The business school has a reputation for strong academics.
7. The business school is known for innovative research.

**I learn what I need to succeed**
8. The business school faculty are excellent teachers who are good at communicating complex material.
9. The business school professors have practical business experience.
10. Classes have a balance between theory and real-world application.

**I enhance my career**
11. The business school graduates have a high employment rate.
12. The business school has Career Services that will help me in many aspects of my career search.

13. The MBA degree from this business school continues to pay back on investment long after graduation (e.g., salary increases).

14. A wide selection of companies and industries that recruit at the business school meet my interests.

15. The business school has an active, organized network of successful alumni.

Potential students were asked to rate MIT Management, then called MIT Sloan, and its major competitors on these customer needs. We obtained the following map of customer perceptions.

**Figure 2. Customer Perceptions of Competitors Abilities to Fulfill Customer Needs**

Note the high correlation among the top schools. Among this highly-competitive set of schools, MIT Management did relatively well on some customer needs (innovative research, academic reputation) and relatively poorly on other customer needs (alumni network, collaborative atmosphere). But on which needs should MIT Management innovate?

To obtain priorities, potential students were asked to state the importance of each customer need. Because potential students had already provided ratings, we can interpret the importances relative to the differences in the ratings of the customer needs among schools. The importances were:
MIT Management had its greatest relative strength on the least important customer need! It did not have the highest rating on important needs. Based on this study, MIT Management made a number of changes to improve its ability to attract the best students. I won’t detail those changes here, but you might want to take a moment to evaluate our performance on these customer needs (and to consider your own importance judgments). For example, does action learning lead to a collaborative atmosphere, a balance between theory and application, and an ability to learn skills that will enhance our ability to attract recruiting companies and help you obtain interesting and exciting opportunities? Consider other initiatives such as “values at Sloan,” enhanced efforts by the development office to improve the alumni network, a one-semester core, or a change in the way we rate courses and professors (and make the data available), improvements in the physical space, tracks for finance, entrepreneurship, and enterprise management, etc. Do any or all of these improve our ability to deliver an education that meets important customer needs?

Summary

The voice of the customer is critical to marketing innovation. Measurement is both feasi-
ble and practical. Established methods excel at identifying customer needs, sorting these needs into a hierarchy, and providing priorities for the customer needs. Customer needs provide the insight to develop strategies to segment the market, target customers, and position your products. Insights are then refined.

You are required to complete a VOC analysis for your action-learning project. We believe you will enjoy the process and find it extremely valuable to improve your marketing innovation and develop a profitable strategy. To help you with each step—identifying customer needs, structuring customer needs, and prioritizing customer needs, we’ve provided three appendices, each focused on one of these steps. Please read the relevant appendix before you try your hand at each of the steps.

METHODS TO OBTAIN THE VOICE OF THE CUSTOMER

1. **Appendix 1. How to Identify Customer Needs.**

2. **Appendix 2. How to Structure Customer Needs.**

3. **Appendix 3. How to Prioritize Customer Needs.**

4. **Appendix 4. Machine Learning and User-Generated Content.**
Appendix 1

How to Identify Customer Needs

Traditional Methods Remain Most Common

To identify customer needs we experience the experience of customers. We want the customer to articulate customer needs in the customers’ words. We want the customer to describe the world through the customers’ eyes. We want to listen.

There are three widely-used methods to identify customer needs: experiential interviews, focus groups, and ethnography. In addition, a recent method has begun to be used. Firms are beginning to mine user-generated content (online reviews, social media, images that are posted by customers). With machine learning, firms are learning to identify how customers articulate customer needs in these new media. We’ll begin with the widely-used methods because they still dominate practice and are relevant to almost all products and services. They are relatively easy for you to implement for your action-learning projects.

Experiential Interviews. In an experiential interview, the interviewer asks the customer to describe the customer’s experiences in great detail. For example, an interviewer might ask a customer to imagine that he or she is driving to work and ask the customer to describe in detail everything the customer experiences from the moment (in the customers’ house or apartment) that the customer begins getting ready to commute until the moment the customer arrives in his or her workplace or school (workplace, not parking lot or garage, or off the subway or bus, etc.). The interviewer might learn about how the customer prepares his or her coffee so that it fits in the cup holder, or chooses clothing because the vehicle takes a ten minutes to warm up. Or the interviewer might experience the customer’s fear as he or she parks an unblemished vehicle in a tight parking space. Or the interviewer might hear about how visibility is poor at blind corners or that other vehicles dart in and out of lanes. Or the interviewer might learn that a customer commutes by bicycle and is perspiring when he or she arrives at work. Or that the customer finds no place to store materials that cannot be easily carried by bicycle. By the end of the interview, the interviewer should be able to understand everything that the customer cares about when commuting. An unbiased interviewer should be able to infer from the interview how the customer would react to new products, new features of products, or a change in the price of the product.
An experiential interview is not a series of questions. The most common mistake that is made by inexperienced interviewers is write out a set of questions. The interview then becomes a question and answer session and the interviewer is unable to follow conversation threads or obtain a deep understanding of the customer. More critically, a pre-written set of questions reflects how the interviewer thinks about the customer experience, not how the customer thinks about the customer experience.

It is better to use inquiries such as “tell me more,” “please elaborate,” “can you be more specific,” “how does that make you feel,” “what could be done better,” etc. Rarely will any given customer enunciate every customer need. Customer needs accumulate over customers. If the interviewer has already explored a customer need with a few customers, the interviewer may want to spend less time on that customer need with the remaining customers and spend more time exploring other customer needs that make not have been well-articulated by previous customers. Each interview is different; variety is good because the goal of the experiential interviews is to generate a set of customer needs.

Customers might not articulate a customer need because they assume a customer need is fulfilled—they will not even consider a product that does not fulfill that customer need. For example, a major shampoo manufacturer once launched many failed shampoos until they realized that, at minimum, the shampoo must clean hair well. Alternatively, a customer might not articulate a customer need if the customer believes that no product will fulfill that customer need. Many touchscreen features are now extremely important to customers—such features fulfill customer needs such as easy to navigate, easy to read content, easy to switch between content, etc. Until such customer needs were fulfilled routinely, they were difficult for customers to articulate. A good interviewer can encourage customers to articulate “unarticulated customer needs.” Unarticulated customer needs often lead to breakthrough (and profitable) new products. (I prefer the term, “difficult to articulate,” but firms continues to use “unarticulated.”)

Focus Groups. The traditional alternative to experiential interviews is experiential focus groups. The concept is similar except customers are interviewed in groups of 6-to-8 rather than interviewed one-on-one. The advantage of experiential interviews is usually more depth. The advantage of a focus group is inter-subjectivity—some customers will be stimulated by other cus-
customers’ discussions. Inter-subjectivity is important if there are group dynamics that must be studied. However, in focus groups it is usually best to have relative homogeneity among subjects within a group and seek heterogeneity by running multiple focus groups. The amount of heterogeneity is a judgment call. You want enough breadth to explore inter-subjectivity, but not so much breadth that the participants do not share common experiences. For example, in interviewing MBAs about their experiences, some of the best insight comes from listening to second-year students provide advice to first-year students. Such insights cannot be gained by interviewing students one by one. On the other hand, interviewing MBAs in one group and undergraduates in another group allows the interviewer to explore differences in the two experiences without contamination across groups.

One danger of focus groups is that a few customers might dominate the conversation. A good interviewer notices quiet customers and gets them to join in the discussion or subtly lets chatty customers know that they should let other customers talk. Focus groups work best when all customers have their say.

**Ethnography.** The third method is ethnography, which is just another way of saying you want to interview and observe customers in their natural habitat. For example, if you are developing products for oil exploration, you might want to visit drilling sites. If you are developing electronic products for sailboats, you might want to participate in a race or ride along on a cruise. With ethnography, it is important to observe the customer. For example, many software firms sit with customers as they try to download, install, and learn to use new software.

**How many interviews, focus groups, or ethnographic observations are enough?**

In the action-learning project in marketing innovation, you can either identify customer needs from experiential interviews (or focus groups), you can visit and observe your customers, or you can identify customer needs from UGC. If you choose to use experiential interviews (or ethnography), it is sufficient to interview or observe two customers each. I wish it could be more, but I recognize the time commitments you face. If you have time, I encourage you to do more interviews or observations to gain experience. There is a substantial learning curve. You will find that each interview or observation is better than the last and that improvements may continue for many customers. To simulate this learning curve your group might want to do interviews or
observations sequentially. One member of your group might interview or observe two customers and talk to your group about what was learned and about the process of interviewing or observing. The second member can incorporate this learned experience and build upon it, continuing until all group members have interviewed or observed two customers each.

Eight-to-ten interviews or observations (two each from 4-5 group members) does not seem like many interviews or observations. It is not enough, especially if there are segments in the market, in part, because you will still be learning the methods during your first interviews. Please share what you learn about interviewing or observing within your group. But in the action-learning project we pretend it is enough. It may surprise you, but it is almost enough if the market is not highly segmented. In professional studies, the rule of thumb is that you keep interviewing or observing until you reach the point where you can predict everything that will be said.

An MIT Management project quantified the number of interviews that were necessary. The product category was a complex piece of office equipment; the interviews and focus groups were run by a professional market research firm. (There were no ethnographic observations in this study.) Using methods developed by Abbie Griffin (a former course TA), the MIT Management project plotted the number of customer needs that were identified by subsequent interviews or focus groups. (This plot is a randomization over all possible orders of interviews so that the results are not sensitive to differences in the ability of customers to articulate needs.)

**Figure 4. Comparison of Focus Groups and One-on-One Interviews**

![Figure 4. Comparison of Focus Groups and One-on-One Interviews](image-url)
The surprising result was that roughly seven two-hour focus groups or roughly ten one-hour experiential interviews were sufficient to identify 90% of the customer needs. This result has been replicated in other categories. Sometimes more interviews are necessary, but usually twenty interviews (or observations) are more than sufficient for each distinct segment of customers.

**Experiential interviews vs. focus groups.** The comparison between focus groups and experiential interviews is also interesting. If we look horizontally at Figure 4, we see that two interviews gives about the same number of customer needs as one focus group; four interviews gives about the same number of customer needs as two focus groups, etc. Focus groups are about twice as effective as interviews, but take twice as long. As one experienced manager said: “An hour of transcript time is an hour of transcript time.” The key seems to be the time spent talking to customers.

**Use by entrepreneurs.** Figure 4 also suggests that entrepreneurs have the resources to do their own VOC interviews or observations. They may need to complete more than 10-20 interviews, because (new) entrepreneurs must learn the method as they interview or observe. But entrepreneurs can certainly substitute their own time for the monetary investment. (Training is also widely available and quite good.)

**User-generated content.** Please see Appendix 4, which describes new methods that combine machine-learning and human judgment to identify customer needs from online reviews, social media, and posted images.
Appendix 2

How to Structure Customer Needs

Whether you obtain customer needs from customer interviews, focus groups, ethno-graphic observations, or UGC, customer needs must be structured into primary, secondary, and tertiary customer needs before they can be used for marketing innovation. The key to structuring customer needs is that the structure must be based on the customer’s perspective. Table 1 compares two lists of primary needs from a study of portable coolers such as the type one would bring on a picnic, to a sporting event, or to the beach. The sorting began with 220 customer needs. Some were “winnowed” because they were redundant descriptions, but the remaining were sorted into primary, secondary, and tertiary customer needs. The primary customer needs on the left were those identified by customers; the primary customer needs on the right were those identified when the managerial team attempted to sort the customer needs on their own. It is clear that the primary customer needs on the left describe a cooler by how it is used by customers. The primary customer needs on the right describe how the cooler is built by the firm. Subsequently, product designers and managers found the customer-sort structure more descriptive and better for generating creative product designs than the team structure.

Table 1. Primary Customer Needs for Food-Carrying-Devices

<table>
<thead>
<tr>
<th>Customer-sort Diagram</th>
<th>Managerial-team-sort Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>attractive, good-looking</td>
<td>container utility</td>
</tr>
<tr>
<td>convenient</td>
<td>convenient</td>
</tr>
<tr>
<td>works well</td>
<td>physical characteristics</td>
</tr>
<tr>
<td>right size</td>
<td>container price</td>
</tr>
<tr>
<td>maintains food temperatures</td>
<td>thermal characteristics</td>
</tr>
<tr>
<td>carries many things</td>
<td></td>
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<tr>
<td>easily movable</td>
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The comparisons in Table 1 are indicative. Across hundreds of VOCs many have compared team-sort and customer-sort diagrams. In every comparison the customer-sort diagrams were much better at describing the way customers use products and services and much more useful.
for generating creative solutions. We now review two methods to obtain customer-sort diagrams.

**Customer Consensus Process to Structure Customer Needs**

The customer consensus process uses a team of customers to impose structure on the customer needs. Consensus processes are often known as “affinity charts.” Although some firms substitute managers for customers, we do not recommend doing so. Managers produce structures that represent how the design team or firm is organized, not how customers view the product or service.

To create an affinity chart each customer in the group is given a roughly equal number of cards or Post-It™ notes; each card or note bears one customer need. One customer from the group selects a card from his or her pile, reads it aloud, and places in on the table (or wall). Other group members add "similar" cards to the pile with a discussion after each card. Sometimes the card is moved to a new pile; sometimes it stays. The process continues until the group of customers has separated all the cards into some number of piles of similar cards, where each pile differs from the others in a way that the customers understand and can articulate. The customer group then structures the cards in each pile into a hierarchical tree diagram with more-detailed customer needs at lower levels, and more-tactical and strategic customer needs at the upper levels. To select a higher-order customer need, say a secondary customer need, to represent a group of tertiary needs, the customer group can either select from among the tertiary customer needs or add a new card to summarize the pile of relevant tertiary customer needs. Throughout the process, the customers can rearrange cards, start new piles, or elaborate the hierarchy.

For the action-learning project, you are required to obtain a hierarchy of customer needs. The most feasible method is a customer sort.

**Customer Sort and Cluster Process to Structure Customer Needs**

In a customer-sort process, twenty to fifty customers are given individual decks of cards; each card bears one customer need. Each customer is asked to sort (by themselves) the cards into piles such that each pile represents similar customer needs and differs from the other piles in some way. The number of piles and the exact definition of similarity is left unspecified. After completing the sort, each respondent is asked to choose a single customer need from each pile, called an exemplar, which best represents the customer needs in the pile. From the customer-
sort data we create a “co-occurrence matrix” in which the \( ij^{th} \) element of the matrix is the number of customers (respondents) who placed need \( i \) in the same pile as need \( j \). We label each customer need with the number of times it was chosen as an exemplar.

To develop a structured hierarchy from the customer-sort data, we use a statistical method known as “Wards’ cluster analysis” to cluster the co-occurrence matrix.\(^2\) The exemplars provide the names of the clusters. The details of Wards’ method are available in most statistical packages such as SPSS, SAS, or Stata. The basic idea is that similar customer needs are placed together into a tree structure. The primary customer needs are at the top of the tree, the secondary customer needs are further down, and the tertiary customer needs form the roots of the tree. Exactly where to cut the tree, that is, when a division of a primary customer need becomes two secondary customer needs rather than two new primary customer needs, requires judgment combined with information from the statistical analyses. The exemplars provide valuable guidance in making these judgments.
Appendix 3

How to Prioritize Customer Needs

One of the most-studied issues in marketing science is methods by which firms estimate customer priorities. We do not review all of these methods here, but rather demonstrate examples of the types of measurements that are used successfully when identifying priorities with respect to perceived customer needs. For measuring preferences for product features that are more-naturally measurable, see the “Note on Conjoint Analysis” in this series.

We illustrate three methods with data collected by one of the largest and most sophisticated consumer products firm—a firm that is known as a leader in marketing and in the use of marketing research for marketing decisions. This firm measured or estimated customer's importances for 198 customer needs using three different methods:

- 9-point Direct-rating scale in which customers answered for each need "How important is it or would it be if: ...?".
- Constant-sum scale in which customers allocated 100 points among the seven primary needs, then allocated 100 points to each set of secondary needs within each primary-need group, and finally allocated 100 points among each set of tertiary needs within each secondary-need group.
- Anchored scale in which customers allocated 10 points to the most important primary need and up to 10 points to the other six primary needs. Similarly up to 10 points were allocated to secondary needs corresponding to each primary need and to tertiary needs corresponding to each secondary need.

Figure 7 provides an example of an anchored scale. (These primary needs are illustrative only and are disguised relative to the true product category.)
Figure 7. Anchored Scale to Measure Customer Priorities Relative to Primary Customer Needs

When thinking about choosing a laundry detergent, how important is it that the laundry detergent satisfies the following needs. Assign 10 points to the most important item and assign up to 10 points to every other item.

- Cleans your clothes well
- Is safe and gentle for synthetic fibers
- Is good for the environment
- Clothes are ready to wear after drying
- It is easy to do the laundry
- My clothes smell fresh and clean
- Good value for the money

To test whether the importances made sense for setting priorities among marketing innovation, the firm’s product-development team created seven product concepts. Each concept was created to emphasize one of the primary customer needs while stressing that the other six primary customer needs would not be any better or worse than existing products. The concepts went through two pre-tests with consumers and were modified until the firm felt that the product concepts did indeed "stretch" the targeted primary consumer needs. (The actual concept statements are proprietary. The winning concept led to a highly successful product that revolutionized the product category.) Consumers were asked to evaluate the concepts by expressing their interest and preference for the concepts. Interest was measured by a 9-point scale. Preference was a rank ordering of the seven concepts. Table 2 indicates that consumers' interest and preference is highly correlated with the self-stated measures of primary needs.
Table 2. Comparison of Three Methods to Set Priorities for Perceived Needs

<table>
<thead>
<tr>
<th></th>
<th>Anchored Scales (max = 10)</th>
<th>Constant Sum (sum to 100)</th>
<th>Directly Stated (1 to 9 scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation with preference for concepts</td>
<td>0.93</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>Correlation with interest in concepts</td>
<td>0.96</td>
<td>0.96</td>
<td>0.96</td>
</tr>
</tbody>
</table>

The direct, anchored, and constant-sum measures give similar rank-order results and each correlates with interest and preference for the product concepts. These results are typical. Scientific data suggest that any reasonable question format can be used to measure importances for perceived needs, as long as the specific questions are pretested carefully so that customers understand the question format and as long as customers also rate products or product concepts on the customer needs. The ratings on customer needs establish a relative scaling of the customer needs. Other data, not shown here, suggest that conjoint analysis is the better method when decisions are made with respect to product features or physical characteristics rather than perceived needs.

Is Frequency Of Mention A Surrogate For Importance?

It is a reasonable hypothesis that customers will mention most those customer needs that are most important. If this were true, then we could save time and money by using frequency of mention as a surrogate for importance. Alas, data do not support this hypothesis. High priority needs do not seem to be mentioned more often than low priority needs. This is true both for experiential interviews (focus groups) and for user-generated content. We cannot use frequency of mention as a surrogate for customer priorities. To make good decisions about segmentation, targeting, and positioning or to make good decisions about product design and pricing, formal market research surveys (or conjoint analyses) are necessary to provide accurate priorities for fulfilling the customer needs. The frequency hypothesis has been tested for customer needs identified from experiential interviews, focus groups, and ethnographic and for customer needs identified from UGC. In all cases, frequency of mention has little or no correlation with importance.
Customer Segments

Once data on priorities are obtained for each respondent, these priorities can be “clustered” to identify different “benefit” segments in the market. For example, a clustering of the customer needs for the laundry product might identify one segment that cares primarily about cleaning clothes, another that cares primarily about clothes being ready to wear without much effort, and a third that puts a high priority on products that are safe for the environment. Marketing innovation can decide to target any or all of these segments.

In some cases, before undertaking a VOC, the marketing team might already have identified the segments of the market that they wish to serve. If marketing managers can identify segments by other means, they can interview or observe customers in each identified segment. A priori customer segmentation is more difficult with UGC, but may be possible if different customers either self-identify (hashtags) or if different segments use different social-media platforms. This remains an unexplored area.

Prioritizing Customer Needs in Your Action Learning Project

You are not required to use questionnaires for your action-learning project. First, it is often expensive to obtain a sample of customers to complete your questionnaires. We would rather you focus your energies on learning conjoint analysis. Second, writing unbiased questionnaires is surprisingly difficult. There are just too many pitfalls. You have to choose the sample carefully, you have to word the questions in a manner that motivates respondents, but does not create biases, and you have to implement the survey carefully. Writing questionnaires relies on “craft” that is best learned with experience and mentoring. We recommend that you take an advanced course on market research before trying your hand at a customer-need-prioritization questionnaire.

If you have experience writing questionnaires, we provide a software package, Discover, that can be used to create and implement a customer-need-prioritization questionnaire. You might “buy” respondents from Amazon Mechanical Turk inexpensively, but MTurk respondents may not give your questionnaire sufficient attention. MTurk respondents often fail simple “attention-check” questions such as “Have you ever had a fatal heart attack?.” Furthermore, MTurk respondents are rarely representative of your target market.
In practice, many large panel firms, such as Research Now Survey Sampling or ProdegeMR, provide pre-screened respondents. Such respondents are often representative and attentive. With careful “craft,” panel-based respondents are representative in the sense that answers from panel-based respondents can be used for effective business decisions. Most large firms, particularly sophisticated firms rely on customer panels. The cost per respondent is roughly $4-5 per completed questionnaire, although that can rise for hard-to-reach respondents. For the action-learning project, we do not expect that you can afford panel-based respondents.

Instead, we recommend that you use the insights that you obtained from the qualitative interviews, observations, or user-generated content to prioritize primary customer needs. Do not simply count mentions. Rather, treat the interviews, observations, or UGC as a holistic set of insights and use those insights to prioritize customer needs. By doing this, you gain experience in using customer priorities. In practice, you will have the time and resources to use customer surveys. There is really no substitute for asking customers themselves to provide priorities. through marketing analytics, either conjoint analysis or the analysis of data on customers.
Appendix 4

Machine Learning and User-Generated Content

User-Generated Content

The growth of user-generated content (UGC) is one of the most exciting developments in the identification of customer needs. In many product and service categories, UGC has rich textual (and sometimes visual, audio, and visual) content. It is readily available at much lower cost than customer interviews. And, when available, it is extensive. For example, there are 300,000 reviews of health and personal care products on Amazon alone. There are forums for smartphones, audio equipment, computers, automobiles, and other durable goods. UGC is posted continuously enabling the firm to update customer needs often and, unlike customer interviews, the firm can return to UGC at low cost to explore new marketing innovation insights further.

UGC is not a panacea. Against these benefits, we balance disadvantages. The very scale of UGC often makes it difficult for human readers to process more than a sample of the content. UGC is often repetitive and contains general content such as “I like this product,” rather than an articulation of a customer need. UGC often focuses most content on a relatively small subset of customer needs—“unarticulated” customer needs are posted rarely. Unlike traditional methods for which we can draw a random sample of customers, customers self-select to post UGC. We may miss those segments of customers who are not active in posting UGC. UGC is readily available for some categories such as oral care, food, electronics, and autos, but UGC is not extensive for every product category. For example, customers may not blog, tweet, or post reviews about specialized medical devices such as blood-gas monitors or about the industrial use of electric power.

Initial attempts. Initial attempts to extract customer needs from UGC tried word counts, word co-occurrences, and other machine-learning methods to identify “bags of words.” But experience suggested that bags of words were subject to multiple interpretations. For example, consider the following bag of words from a study of Italian restaurants.

“Real pizza:” pizza, crust, really, like, good, Chicago, Thin, Style, Best, One, Just, New, Pizzas, Great, Italian, Little, York, Cheese, Place, Get, Know, Much, Beef, Lot, Sauce, Chain, Got, Flavor, Dish, Find
Compare the “real-pizza” bag of words to customer needs that were obtained from web-based sources (albeit not systematically). The web-based customer needs provide greater insight into what customers really want when they order a pizza in an Italian restaurant.

Pizza arrives to the table at the right temperature (e.g., not too hot and not cold).

- Pizza that is cooked all the way through (i.e., not too doughy).
- Ingredients (e.g., sauce, cheese, etc.) are neither too light nor too heavy.
- Crust that is flavorful (e.g., sweet).
- Toppings stay on the pizza as I eat it.

Recent Developments. At MIT Management we have been experimenting with methods to improve bags-of-words analyses. We have had success with deep learning, in particular, convolutional neural networks. A few firms are now using these methods successful, but they are not yet wide-spread. UGC-based methods reduce costs substantially and provide slightly better sets of customer needs (when UGC is available), but require specialized knowledge of machine learning. (Easy-to-use tools have not yet been developed.)

The details of the methods are beyond the scope of this note, but I summarized them here. The methods will evolve and be improved as more firms adopt UGC-based methods and more researchers work to improve theory and application, but, for now, they give you a unique tool with which to identify customer needs.

1. Preprocess the UGC to remove stop words, punctuation, and to identify frequent category-specific word combinations such as “tb” or “oral_b.” (tb is short for toothbrush in oral care.)

2. Train “word embeddings” on the data. A word embedding is a numerical coding of every word to capture relational meanings. Word embeddings are amazing constructs. For example, if $v(word)$ is the word embedding for “word,” then word embeddings trained on the Google News corpus have the following properties:

$$v(\text{king}) - v(\text{man}) + v(\text{woman}) \approx v(\text{queen})$$

$$v(\text{walking}) - v(\text{swimming}) + v(\text{swam}) \approx v(\text{walked})$$

$$v(\text{Paris}) - v(\text{France}) + v(\text{Italy}) \approx v(\text{Rome})$$
3. Train a deep-learning network to identify informative sentences. Training entails three steps. Step a. Human coders label sentences as informative or not informative. The definition is based on human judgment. Step b. Train the deep-learning network to mimic the human coders. Step c. Use the deep-learning neural network to label a large corpus of UGC sentence as either informative or uninformative.

4. Use word embeddings to transform each informative sentence to a numerical vector and cluster the sentence embeddings so that similar sentences appear in the same cluster. Draw a sample sentence from each cluster.

5. Finally, human coders examine the diverse informative sentences (from clustered sentence embeddings) to identify customer needs.

**Comparison to traditional methods.** We compared UGC-machine-learning to experiential interviews in the oral-care category—the results surprised us. The UGC-based methods identified almost all of the customer needs identified from experiential interviews, and for good measure, identified customer needs that were not identified in the experiential interviews. See Figure 5. Indeed, the all of the important customer needs were identified by both methods. Interestingly, UGC was better at identifying unarticulated customer needs.

**Figure 5. Comparison of Customer Needs Obtained from Experiential Interviews with Customer Needs Obtained from an Exhaustive Review of a UGC Sample**

![Figure 5. Comparison of Customer Needs Obtained from Experiential Interviews with Customer Needs Obtained from an Exhaustive Review of a UGC Sample](image)

**UGC – Visual Images**

UGC also comes as pictures, audio, and video. Researchers have begun to mine such content for customer needs and strategic positioning. For example, a former MIT Management TA, her student, and a former MIT Management Marketing Professor developed a deep-
learning method to mine Flickr to identify how brands are perceived on primary customer needs. The authors give an apparel example (their Figure 1) where a picture with the hashtag #eddiebauer shows a customer wearing Eddie Bauer on a hike, while sitting on a rock, and facing mountains in the distance. This was very different from a picture posted with the hashtag #prada, where the customer wore sunglasses with bright red lipstick. The images differ in many ways such as content, style, intent, and visual palette. The machine-learning methods, trained on primary customer needs, monitor Flickr to track how the images of various brands change over time. While these methods do not identify customer needs per se, they are valuable to track customer images and to measure how customers perceive brands on customer needs.

Figure 6. Sample Images from Social Media (From Liu, Dzyabura, and Mizik 2017)

Structuring and Prioritizing Customer Needs

As of yet, there are no good machine learning natural-language-processing methods to sort customer needs. We have tried many, but none have been unsuccessful. Perhaps you’ll find a method and become famous.

Within the last year, some researchers have experimented with methods to prioritize customer needs using machine learning directly, that is, in lieu of customer-based questionnaires. These methods remain nascent, but you are encouraged to keep abreast of the developments.

UGC for your Action Learning Project

If UGC is available for your product or service category, you can use UGC rather than experiential interviews or ethnographic observations. Unless, you have extensive experience in machine learning, you’ll have to rely on human judgment. (Human judgment is as effective, but
not as efficient as a machine-human hybrid method.) First, randomly select reviews or other UGC. Second, quickly screen the reviews to identify informative sentences. Prescreen the sentences to remove redundant content—for example, skip over sentences that seem to say the same thing (in different words) as previous sentences. Finally, use your judgment to create an articulation of customer needs. In the oral-care example, human readers reviewed roughly 8,000 informative sentences—clearly too many for your project. But 200-250 sentences each might be feasible. This would give you about 1,000 total informative sentences. We only have systematic data for oral care, but in oral care 1,000 sentences identified roughly 65-70% of the customer needs.

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1. The blood gas example is due to Gerry Katz at Applied Marketing Sciences, Inc. Some details have been disguised for this note. The blood gas analyzer that is shown is not the particular blood gas analyzer in the example.
2. Ward’s method is also used to cluster UGC sentence-embeddings.
3. If you have access to an email list, you might try your hand at a questionnaire, but be aware of human-subjects considerations. Although you do not need human-subjects approval for a classroom project, such ethical considerations are important in any survey research. See https://couhes.mit.edu/.
4. The most common method was “latent Dirichlet allocation (LDA).
8. Figure 4 from Timoshenko A, Hauser JR (2017) Identifying customer needs from user-generated content. forthcoming, *Marketing Science*.