

Chapter 2

Examples from Industry

Abstract In this chapter, we provide a number of industry examples of how firms implement the strategy of flexible delivery times. The first example is Toyota China's dealerships. Dealerships use a price- and delivery-time-based segmentation strategy to ameliorate the supply-demand imbalance due to inaccurate demand forecast and a rigid production schedule. We also discuss examples such as multiple shipping options offered by online retailers and the priority queue system as commonly seen in the service industry. In all of these examples, firms segment customers based on their price and delivery-time sensitivities, and the critical question is how firms should implement the strategy optimally in a dynamically changing context. This question is elucidated by the theoretical discussion in the following chapters.

2.1 Introduction

Flexible delivery-time options have much practical value and can be widely seen in business practices. Firms make use of these options when they have limited inventories, have trouble in adjusting their production capacities to keep up with surging demand, or simply would like to improve on market segmentation. Delivery-time options segment customers based on their price and delivery-time sensitivities. Firms can thus generate a higher revenue from the on-hand inventory because this specific separating strategy, as noted by Shugan (2002), allows them to “keep price-insensitive customers buying at the *peak* period” for a higher margin and “shift only price-sensitive customers to the *off-peak* period” (peak periods are periods in which the demand far exceeds the capacity, and off-peak periods are defined as the opposite).

This chapter introduces a number of industry examples of the delivery-time segmentation strategy. Section 2.2 presents in detail the practice at Toyota China's dealerships. Dealerships use flexible delivery times to ameliorate the supply-demand imbalance caused by forecasting inaccuracy and rigid production schedules. We use data collected from this dealership example later in our numerical studies. Section 2.3 discusses several other examples, in which flexible delivery times benefit firms in a variety of ways. In Sect. 2.4, we summarize the managerial implications of these examples and conclude the chapter.

2.2 Toyota China's Automobile Dealerships

In this section, we introduce the practice of flexible delivery times adopted by Toyota China's dealerships. In recent years, we have observed that pricing and delivery-time considerations are playing an increasingly important role in the selling of cars in China. In the fast-growing Chinese automobile market, competition between automobile supply chains, consisting mainly of automobile manufacturers and dealerships, has also intensified. In particular, the strategy for automobile supply chains has changed from a simple strategy of access to the market (placement) to a customer-focused strategy (product and price), in which providing a number of different delivery-time options along with differentiated pricing is a tool for maximizing revenue and expanding market share. In the following, we describe how Toyota China's dealerships make use of flexible delivery times to handle the supply-demand imbalance.

2.2.1 *Toyota in the Chinese Automobile Market*

The automobile industry is one of the most important economic sectors in the world. Based on the total number of vehicles produced in 2005 (66 million), it was estimated that the global turnover of the automobile industry was equivalent to 1.9 trillion euros. The industry also created over 8 million jobs directly, representing more than 5 % of the world's total manufacturing employment, and about five times more jobs indirectly. According to a study of 26 countries conducted by the International Organization of Motor Vehicle Manufacturers (OICA), vehicle manufacturing and usage contributed more than 433 billion euros to government revenues.¹

The automobile industry in China has a history dating back to the first Five-Year Plan (1953–1957). In 1953, First Automobile Works (FAW) was founded in Changchun, the capital of Jilin province. In the more than five decades since then, and especially since 1978, when China began its economic reform (also known as “reform and opening up”), China's automobile industry has gradually grown into a pillar of the economy and has become one of the most important in the world. Between 2000 and 2011, it recorded an average annual growth rate of 22 %, much higher than the average global growth rate during the same period. Only in 2008 did China post a single-digit growth rate, due to the global financial crisis. The contribution of the automobile industry to the gross domestic product (GDP) in China has increased from 1.50 % in 2005 to 2.61 % in 2010.² In 2009, China surpassed Japan to become the top automobile producing country and also topped the United States to become the largest automobile market in the world. Nevertheless, the car penetration rate

¹“The world's automotive industry,” OICA, <http://oica.net/wp-content/uploads/2007/06/oica-depliant-final.pdf>, 2006.

²“The Overall Development Situation and Trend of the Automotive Industry in China,” Yang Dong, Shanghai Auto, Vol. 6, 2011.

(CPR, measured as cars per thousand people) is still quite low compared with that of the developed countries, indicating huge potential in this market.

China's automobile manufacturers were originally state-owned, either by the central government, such as FAW and Second Automobile Works (Dongfeng Motors), or by local governments, such as the Beijing Automotive Industry Corporation (BAIC), Chang'an Auto, Guangzhou Auto, and Fujian Auto. With the beginning of the economic reform in 1978, the government started to allow the operation of private automakers and joint ventures with foreign automakers. The first joint venture was Shanghai Volkswagen Automotive Co., Ltd. (SVW), established between Volkswagen (VW) and the Shanghai Automotive Industry Corporation (now SAIC Motor) in 1984. Although there were some conflicts in the process of collaboration, this form of joint venture was widely considered a "win-win" for both sides: foreign automakers could gain entry into the promising Chinese market, lower their production costs through localization of production, and enjoy some policy benefits, and local manufacturers could gain access to the advanced technology, management, and marketing expertise of the foreign partner and capitalize on established foreign brands. In 2011, the top 10 manufacturers sold 6,472,200 cars, accounting for 64 % of total car sales. Eight of them were joint ventures.

As one of the world's leading automobile manufacturers, Toyota Motor Corporation began exporting cars (starting with the Crown sedan) to China in early 1964. However, the localization of production got off to a late start compared with its rivals. Its first joint venture, Tianjin Toyota Motor Engine Co., Ltd., started operating in only 1988. In the same year, Sichuan FAW Toyota Motor Co., Ltd. was founded, and produced the first locally produced Toyota vehicle, the Coaster bus, four years later than its main competitor, the VW Group. Since then, Toyota has hastened its expansion. For each model, Toyota's usual strategy is to import first and then decide whether to localize production depending on the model's popularity. In 2003, the Sichuan plant began to produce the Land Cruiser Prado. In 2004, Toyota established a joint venture, GAC Toyota Motor Co., Ltd., with the Guangzhou Automobile (GAC) Group to produce the Camry in Guangzhou, the capital of Guangdong province and the largest regional automobile market in China. In 2009, Toyota decided to localize the production of its popular SUV model, the Highlander, in GAC-Toyota. By 2011, Toyota had localized the production of 19 sub-brands in China. Its market share in China was 5 %, compared with 18 % in the United States and more than 40 % in Japan. Despite the low market share, the Toyota Camry, RAV4, and Highlander are among China's top sellers in the higher price ranges.

2.2.2 Toyota China's Production Planning

To make the best use of Toyota's highly efficient production system, the real challenge lies in accurately forecasting demand and planning production accordingly. This is extremely difficult in a rapidly growing market such as China, particularly for newly introduced models with no historical sales data. Toyota China holds a sales

convention at the end of each fiscal year, that gathers major sales representatives from across China. One important mission of this convention is to collect the dealers' replenishment plans for the coming year, which should include both the total quantity and detailed numbers of specific models and configurations for each month. Toyota then determines the yearly quota for each dealer based on the numbers submitted and the consolidated sales in the past year. The general production plan for the coming year is arranged correspondingly. During implementation, Toyota China can make adjustments to the general plan according to the realized sales.

Toyota China has adopted a multi-level management structure. Regional sales managers are responsible for all of the sub-regions within their regions. They determine an overall quota and then allocate the quota among the sub-region dealers. When the demand is realized, they can also arrange transshipments between sub-regions if necessary. This centralized management helps to achieve coordination between dealers. Dealers also enjoy a certain amount of flexibility in demand realization. They must inform Toyota China of their replenishment quantities 3 months in advance, and can then adjust the quantity by up to 10 % until 2 months before delivery, and specify colors up to one month before delivery.

However, although adjustable production and replenishment can help to alleviate the risks of overstock and shortage, the effect is still limited. For instance, the Highlander, a popular SUV model, began local production in China in early 2009. During our field study at GAC-Toyota, we found that in the first half of 2009, the number of Highlanders ordered by dealerships was 60 % higher and the actual realized demand was 90 % higher than Toyota China's projected demand. As some core parts were imported and the capacity was constrained, Toyota China was unable to increase its production in time to fully satisfy the surging demand. Toyota China responded to the supply shortage by expanding production of the Highlander in September 2009, although there was already a long lag. The inevitable result was a prolonged delay in the delivery time to customers: up to 3–6 months compared with the usual one month or less.

2.2.3 Demand Management and Selling Strategies at Dealerships

Like other foreign automakers, the majority of Toyota's marketing, distribution and sales operations in China are conducted by its joint venture dealerships. The dealerships are called 4S stores (sales, spare parts, service, and surveys) and are designed to provide integrated services to customers. According to Toyota, by the end of 2009 it had around 650 4S stores in China, forming the distribution network for its vehicles. 4S stores currently generate most of their profits from new-vehicle sales.

We illustrate the normal operations of a 4S store in Fig. 2.1. The evolutionary Customer Relationship Building (e-CRB) system is an in-house customer relationship management system used by Toyota China's dealerships. Its two key components

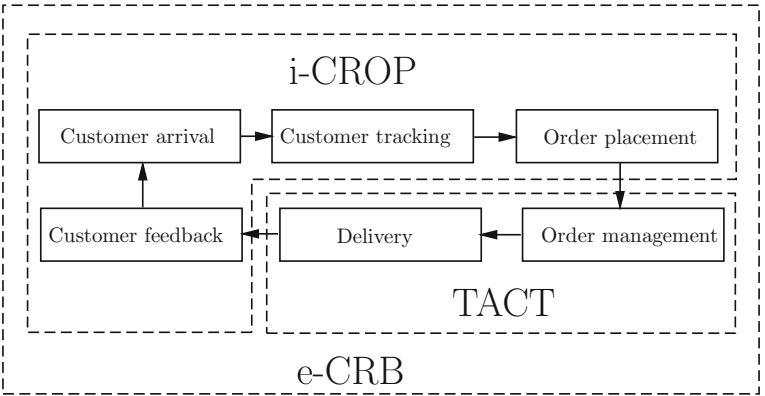


Fig. 2.1 Business process at a 4S store

Table 2.1 Customer categories

Class	Predicted purchasing time
A	1 week
B	Between 1 week and 1 month
C	Between 1 month and 3 months
D	>3 months

Source: Field study at GAC-Toyota

are the intelligent Customer Relationship Optimization Program (i-CROP) and the Total Arranging and Cultivating (TACT) system. The i-CROP is responsible for the management of customer information, and the TACT system is the interface between dealerships and Toyota China. The customer tracking block classifies customers into four classes (A, B, C, and D) according to their intended purchasing times. This classification is usually based on a subjective estimation made by 4S store clerks. A detailed description of the classification system is provided in Table 2.1. Once orders are placed, dealerships use the TACT system to track them until final delivery. According to the 2-month data we collected from a typical 4S store, about 20 % of the in-store customers who purchased the Highlander belonged to classes A and B, and the rest were split evenly between classes C and D.

The interests of Toyota China and its 4S stores are not always perfectly aligned. For example, Toyota China would like to maintain central control over decisions such as pricing, bundling sales, and cross-regional transshipments to avoid image damage and malicious competition, and 4S stores would like to have more flexibility in these decisions. This interest misalignment is particularly prominent when a supply-demand imbalance emerges. As Toyota China cannot fully address the supply shortage by increasing its production, the dealerships must make the best use of their limited inventories to retain customers. In the case of a supply-demand imbalance, dealerships commonly switch to a market segmentation strategy characterized

by price and delivery-time differentiation. Two purchasing options are offered to customers: spot and consignment. By choosing the spot option, customers get their desired cars immediately from the on-hand inventory at the expense of paying a higher price, buying a bundled insurance product, or upgrading the configuration. By choosing the consignment option, customers pay the manufacturer's suggested retail price (MSRP) and are put on a waiting list, with delivery usually taking 2–3 months. However, because the “mark-up” associated with the spot option is often determined by dealerships themselves based on the prevailing supply-demand condition, it varies from time to time and from place to place. This has caused a lot of controversy among customers, with some of them even blaming Toyota China for intentionally creating a shortage to rip off customers. Setting aside the controversy, the dealerships that carry out such selling strategies can ameliorate the supply-demand imbalance to some extent; however, they must also deal with extra complexity because they must decide not only whether to accept an order, but also when to fulfill the order.

2.3 Other Examples

Cases similar to the preceding dealership example can be found elsewhere, notably the selling of the iPhone in China.³ Similar to popular car models, the initial demand for a new iPhone model upon its release can far exceed its supply. As a result, sales must be rationed, and a large proportion of customers are left unfulfilled. However, unlike the dealership example, because Apple itself does not adjust the price or provide customers with multiple delivery options, the market segmentation is carried out by scalpers. Scalpers are usually better at getting newly released iPhones than normal customers. They then immediately put the iPhones they purchased up for sale at a higher price. Hence, a normal customer has two options: he/she can either buy a new iPhone from scalpers right away at a higher price or wait until the initial frenzy fades away, which may take months.

Flexible delivery times may also appear in other forms. For example, it is now a common practice for online retailers such as Amazon.com to offer multiple shipping options to customers. In this case, the scarce resource is the shipping capacity rather than the physical inventory. Shipping capacity is perishable and cannot be carried over. Instead of serving all orders on a priority rules (FCFS) basis, online retailers provide expedited shipping to some priority orders and standard shipping to others. To enjoy the expedited shipping service, however, customers must pay a premium. Compared with the traditional shipping approach, which treats all orders equally, the main merit of multiple shipping options comes from a refined market segmentation based on customers' heterogeneous delivery-time requirements.

In addition to the preceding manufacturing and retailing examples, the application of flexible delivery times can be found in the service industry. The delivery time now corresponds to the delay between when customers arrive and when they are

³“China iPhone Craze Breeds Scalpers,” Loretta Chao, Wall Street Journal, Sep 30, 2010.

served. A common example is the priority queue system, which is visible at banks, boarding gates, highways, etc.⁴ Although a faster service may not be the only reason why customers are willing to pay a premium, it is an important one. Similar to the preceding shipping example, service providers give higher priority to customers who pay to be served ahead of others. Although priority customers can enjoy faster service, normal customers who do not pay are worse off (e.g., they must wait longer). Service providers must decide how to reserve their capacities for different classes of customers.

2.4 Concluding Remarks

It is now well acknowledged that customers are both price and delivery-time sensitive. Although manufacturers and retailers are striving to fulfill customers' orders as soon as possible, there are times when the demand can far exceed the supply and a delay is inevitable. Flexible delivery-time options are an effective means to cope with such situations. As seen in preceding example, because Toyota China is unable to respond to the surging demand in time, dealerships resort to multiple delivery-time options themselves by charging a premium for spot delivery. Even when supply-demand imbalance is not a major concern, firms can make use of flexible delivery times to improve their revenue. As seen in the examples in the retailing and service industries, firms offer multiple delivery-time options to customers or assign higher priority to those customers who are willing to pay a premium to get the service faster.

In all of the examples discussed in this chapter, the firms' optimal strategies are not fixed. That is, both the optimal selling strategy in the dealership example and the optimal capacity allocation strategy in the service-industry examples are contingent on the inventory/capacity status and on realized and future demands. Hence, firms need to adjust their execution of the strategy dynamically. In the following chapters, our theoretical discussions provide an analytical framework for analyzing the preceding examples in terms of how firms should derive their optimal policies dynamically.

The example in Sect. 2.2 is based on Liang et al. (2013).

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⁴“Priority queues: Paying to get to the front of the line,” Benjamin Walker, BBC, Oct 10, 2010.

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