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Business Model Analysis for Entrepreneurs

Models are used to understand and predict phenomena. An architect's model, for example, is a simplified representation of a proposed building, depicting its key structural elements. A scientific model explains a system in terms of hypotheses about cause-and-effect relationships between variables. A business model serves similar purposes. It addresses the defining conditions of entrepreneurship—uncertainty and resource constraints—and thereby illuminates a new venture's path to economic self-sufficiency. Specifically, business model analysis forces a realistic appraisal of the gap between available and required resources; it stimulates creative thinking about ways to reduce resource requirements or secure resources under more favorable terms. Also, business model analysis makes explicit the key assumptions in a new venture's profit-making logic, exposing critical uncertainties and encouraging entrepreneurs to devise experiments to resolve them.

What Is a Business Model?

In an entrepreneurial context, a business model is an integrated array of distinctive choices specifying a new venture's unique customer value proposition and how it will configure activities—including those of its partners—to deliver that value and earn sustainable profits.[1] These choices can be grouped into four broad categories:

- **Customer Value Proposition.** What unmet needs will the venture address? In creating customer value, will the venture emphasize differentiation or cost savings? Which customer segments will it target? What will be the key features of the venture's product? Will customers require complements and ancillary services from third parties? If so, who will provide them, and under what terms? How will the product be priced? Can the venture leverage network effects? What switching costs will confront customers? How will customers' willingness to pay for the venture's product compare to their total cost of ownership?

- **Technology and Operations Management.** What activities are required to develop and produce the venture's core offering? Which of these activities will be performed in-house? Who will perform outsourced activities, and under what terms? Should the venture race to secure preemptive access to production inputs that are likely to be scarce in the future? Will it create valuable intellectual property (IP)? If so, how will that IP be kept proprietary? Over time, will the venture seek to exploit scale economies in operations by substituting fixed for variable costs? Given capacity and hiring constraints, will it be feasible to scale operations rapidly?

Professor Thomas Eisenmann prepared this note as the basis for class discussion.

- **Go-to-Market Plan.** Through what mix of direct channels (e.g., in-house sales force, website) and indirect channels (e.g., wholesalers, franchisees) will the venture educate prospects, configure and deliver its product, provide after-sale service, etc.? What margin will channel partners require? Given the expected lifetime value (LTV) of a customer, what average customer acquisition cost (CAC) will the venture target? What mix of free and paid demand-generation methods (e.g., mass advertising, public relations) will it employ to achieve this target? If the venture sells a fundamentally new product, is it likely to confront a "chasm" between early adopter and mainstream customer segments? If so, what is the plan for crossing the chasm? Will the venture have strong incentives to invest aggressively in customer acquisition due to network effects and/or high switching costs?

- **Profit Formula.** What contribution margin will the venture earn per unit of product sold? What fixed costs will the venture incur, and what breakeven sales volume does this imply? What share of the total addressable market does the breakeven sales volume represent? How much investment in working capital and property, plant, and equipment will be required per dollar of revenue? How will the venture's contribution margin, fixed costs, and investment/revenue ratio change as the business scales? Given projected growth, what is the profile of the venture's cash flow curve? In particular, how deep is the curve's trough, and when will it be reached?

What Does Initial Business Model Analysis Not *Encompass?*

Our perspective here will be that of an entrepreneur who has just started evaluating opportunities and assembling resources. Once entrepreneurs have validated their models, they face choices about how rapidly to scale their businesses. These choices are mentioned in this note, since entrepreneurs should have them in mind when making initial business model design decisions. However, since most models will morph in unexpected ways, it doesn't make sense for entrepreneurs to invest too much time in analyzing scaling options at the outset. Such options are examined in greater detail in a companion note, "Scaling a Startup: Pacing Issues" (HBS No. 812-099).

Likewise, during the earliest stages of a venture, organizational structure is typically fluid and processes are often improvised. For that reason, we do not address decisions about organizational design here. Such decisions, which can be crucial to success as a startup matures, are covered in a companion note, "Scaling a Startup: People and Organizational Issues" (HBS No. 812-100).

Business models and strategy The long list of questions above may seem like issues one would address in formulating a firm's strategy. That is not an accident. We view a firm's business model as a direct reflection of its strategy. To be more precise, when you comprehend a firm's business model you understand *a* strategy for that firm, but not necessarily its *entire* strategy.[2] A well-crafted strategy spells out the firm's plans for dealing with important contingencies, for example, moves by competitors or shifts in regulation. For each contingency, the strategy calls for a different integrated array of distinctive choices—that is, a different business model.[3]

However, such an options-based approach to strategy is beyond the means of most early-stage startups—especially those that target new markets, in which rosters of rivals are not yet known and the basis for competitive advantage may still be blurry. In fact, given the high levels of uncertainty confronting startups, it often makes sense for entrepreneurs to design their initial business model, and then formulate a comprehensive strategy—a contingent plan for choosing between multiple models—only over time, as options become better understood after iterating on the initial model.

Recruiting a team and investors An entrepreneur who can present well-reasoned hypotheses regarding all of the questions listed above is off to a good start in terms of validating his or her business model. However, an attractive business model alone does not guarantee a new venture's long-term viability. To succeed, the venture also needs a management team able to execute the business model. The business model dictates what types of management skills will be needed, but an entrepreneur must still recruit a team with those skills.

Likewise, a business model specifies how much capital a new venture will require, but it does not tell the entrepreneur who should provide that capital and under what terms. Unless the venture is funded entirely from operating cash flows or from the founders' personal assets, the entrepreneur will need to attract outside investors whose preferences regarding risk/reward and timing trade-offs are consistent with choices that follow from the business model—and ideally, with the entrepreneur's personal preferences.

Structure and Content of This Note

This note is organized into five sections. The first four sections discuss the four categories of business model choices listed above, which concern a startup's customer value proposition, technology and operations management, go-to-market plan, and profit formula, respectively. The note's final section offers some practical suggestions for designing and analyzing an early-stage startup's business model.

Analysis of business model choices typically draws on frameworks from introductory business courses on strategy, marketing, technology/operations management, and finance. We will not recapitulate those frameworks here; doing so would require hundreds of pages. Rather, we focus on ways in which familiar frameworks should be adapted to fit early-stage ventures, and on concepts that may not be covered in depth in introductory MBA courses (e.g., network effects, first-mover advantages, virality).

Customer Value Proposition

The starting point when designing a new venture's business model is articulating a customer value proposition. This entails addressing the following questions:

- What *unmet needs* will the venture's product address?
- In creating customer value, will the venture emphasize *differentiation*, by increasing customer willingness to pay relative to rivals' offerings, or *low cost*, by reducing expenses that customers incur—again, relative to rivals' offerings—for a comparable bundle of benefits? If it emphasizes differentiation, will the venture's edge principally be *vertical* (i.e., outperforming rivals' products on dimensions for which most customers would agree that "more is better," e.g., a car's gas mileage) or *horizontal* (i.e., distinguishing itself on dimensions of taste that cannot be intrinsically rank-ordered, e.g., an Audi's styling compared to a Saab's)?
- Which *customer segments* will the venture serve upon launch? How will targeted segments change over time?
- Will the venture serve (1) a fundamentally *new market,* offering a radically innovative product; (2) an *existing market,* offering a product that offers superior relative performance against well-established benefit and/or cost metrics; or (3) a *re-segmented market,* offering a product that

offers superior performance on familiar attributes strongly valued by a subset of the existing market's customers?[4] (References to "product" throughout this note encompass services as well as physical goods.)

- What will be the venture's *minimum viable product* for launch, that is, the smallest set of features needed to validate key business model assumptions?[5] What is the plan for adding features over time, that is, the *product road map*?

- To access a *whole product solution,* will customers need to acquire any complements or ancillary services from third parties? If so, who will provide them and under what terms?

- How will the product be priced? Will revenue be collected per transaction, per period (as with a subscription), or through some hybrid approach? Will prices/fees be (1) fixed per transaction/period (e.g., a $20 price for a book, a flat fee for a consulting assignment, a $16 monthly subscription fee for Netflix); (2) variable, based on a fixed fee per unit of activity (e.g., hourly billing for a legal case, a per unit royalty to a patent holder, a per minute charge for long-distance calls); (3) tiered based on feature/service level (e.g., "freemium" pricing that is free for a basic product or $10/month for a "pro" version); or (4) linked to some outcome (e.g., "pay-per-click" advertising, a broker's fee on a home sale)?

- If the venture's product is a physical good, will it be sold outright—transferring title—or will it be rented/leased?

- Will the venture initially pursue a *skimming strategy,* that is, pricing high to capture value from early adopters with high willingness to pay? Alternatively, will the venture engage in *penetration pricing* to exploit strong scale economies or high switching costs?

- Does the venture have opportunities to capture value through *price discrimination,* for example, through negotiated pricing, auctions, or discounts for early booking? Through *bundling*, for example, by including after-sale service with the product's purchase?

- Will the venture leverage strong, proprietary *network effects*?

- What *switching costs* will confront customers, and what will be the expected average life of a customer relationship? Can the venture improve customer retention through incentives, for example, a penalty for early contract termination or a rewards program for heavy users?

- Relative to offerings from likely rivals, how will customers' *willingness to pay* for the venture's product compare to their expected *total cost of ownership*?[6]

Most of these questions address concepts that should be familiar from introductory marketing and strategy courses; we will not review them here. Rather, we focus on a few unique aspects of customer value proposition analysis that follow from the nature of new ventures. Three points warrant emphasis:

- **Reliance on Powerful Partners.** In contrast to deep-pocketed large corporations, resource-constrained startups are often unable to fund the in-house development of all the elements of a whole product solution; they are more likely than large corporations to need to rely on partners to deliver complements and ancillary services. Consequently, entrepreneurs must confirm that their venture can create and share enough value to attract partners' support. Startups often must negotiate for this support from a weak bargaining position. Their products are not proven, their reputations are not established, and they have not yet

assembled all the resources needed to implement their ideas. Partners will often be understandably skeptical of startups' survival prospects and may require significant economic concessions.

- **Customer Skepticism.** Since a new venture lacks a track record and a brand, its claims regarding differentiation or cost savings also may not be credible to prospective customers. Deep discounts may be necessary to attract skeptical early adopters. Value proposition analysis requires a brutally honest appraisal of customers' willingness to pay in the face of uncertainty about a new venture's promises.

- **Limited Market Research Options.** The market research methods used by managers in large corporations to analyze existing products' value propositions may not be reliable with radically innovative products. For example, surveys and focus groups are not likely to be helpful if customers cannot draw on personal experience in articulating their preferences. Other techniques employed in large corporations, such as conjoint analysis of willingness to pay for product features, must be implemented by skilled market research professionals and may be too expensive for bootstrapping startups.[7] Consequently, when refining a value proposition, entrepreneurs often rely on low-cost techniques, such as landing page "smoke tests" that solicit early adopters' reactions to a product that has not yet been built. A companion note, "Customer Discovery and Validation for Entrepreneurs" (HBS No. 812-097), explores such techniques.

The balance of this section focuses on two business model attributes that can have a big impact on a new venture's ability to create and capture value: customer switching costs and network effects.

Customer Switching Costs

Switching costs are incremental expenditures, inconveniences, and risks incurred when a customer changes from one supplier to another.[8] For example, when consumers switch from a Windows PC to a Macintosh, they must buy and install Mac-compatible application software and invest time in mastering a new interface. Switching costs fall into three broad categories:

- **Redundant Relationship-Specific Investments.** Because their old and new vendors may have different requirements, customers who change suppliers sometimes must invest in new software/hardware or repeat certain activities they have already completed. For example, to switch online stockbrokers, users incur the hassle of transferring funds and securities. For that reason, among others, customer retention rates for online stockbrokers have been high.

- **Disruption Risks.** When businesses outsource "mission critical" activities, changing vendors may involve considerable risk. For example, some companies reduce their need for IT staff and infrastructure by relying on cloud computing services. Switching from one cloud service to another exposes a company to significant risk if customer records are lost or corrupted during the transfer.

- **Contractual Penalties.** Companies can impose penalties on customers if they end a contractual relationship prematurely. For example, mobile phone carriers often charge an early termination fee to customers who have signed multiyear contracts. In some cases, these contractual penalties significantly exceed the true costs incurred by a firm due to customer attrition.

Switching costs are relevant to analysis of a venture's customer value proposition in two ways. First, if the venture serves an existing or re-segmented market, then it must steal customers from a

market incumbent. To do so, it must deliver value greater than the sum of the value that customers derive from the incumbent's product *plus* any switching costs confronting those customers. In this context, to confirm that their venture's value proposition is attractive, it is crucial for entrepreneurs to understand the nature and magnitude of the relevant switching costs.

Second, once the venture has acquired customers, it can capture a larger portion of the value it creates if those customers confront high switching costs. Specifically, by raising its price just below the point where current customers are indifferent between staying with the venture's product and switching to a rival's, a venture should be able to earn above-normal profits equal to the sum of the switching costs confronting its customers. (The term "above-normal profits" implies profits in excess of a competitive return on capital; see **Appendix A** for analysis of the impact of switching costs on pricing and profitability.)

Companies often seek to boost switching costs for customers, through either contractual or technological means. Apple, for example, has employed proprietary digital rights management software, locking in its customers by making it difficult for them to transfer iTunes Store purchases to rival media players. However, efforts to increase switching costs are not likely to escape the notice of prospective customers, who will fear holdup in the form of a "low-then-high" pricing strategy. Anticipation of lock-in can represent a significant barrier to adoption for a new product. To ease customers' concerns about lock-in, firms sometimes license their products to "second source" rival suppliers.

Network Effects

Many startups aspire to harness network effects, either by building new platforms (e.g., Facebook) or by leveraging existing platforms (e.g., Zynga, which relies on Facebook to host its social games).

In these ventures, network effects are evident when any given customer's willingness to pay (WTP) for a product depends on the number of other customers with whom they can interact by using the product. In the classic example, the first fax machine sold was worthless until someone purchased a second machine. By providing another potential destination for messages, the subsequent arrival of each new fax machine increased the value of every existing machine and likewise increased the WTP among prospects who had not yet acquired a fax machine. (See **Appendix B** for an example of the impact of network effects on customer willingness to pay.)

Network effects arise in *platform-mediated networks* (PMNs), which include networks of customers—often called *users*—who wish to interact with each other, along with one or more intermediaries who provide a *platform*, encompassing infrastructure and rules to facilitate users' interactions.[9] PMNs form the heart of the computer, telecommunications, media, and Internet sectors. However, PMNs are not limited to information industries. They can also be found in financial services (e.g., stock exchanges, credit cards, ATMs), health care (e.g., HMOs), energy (e.g., the power grid), transportation (e.g., airlines, container shipping, gasoline stations), and retailing (e.g., shopping malls, bar codes). A diverse array of matchmaking businesses mediate network transactions, too, including auctioneers, executive recruiters, real estate agents, and travel agencies. Ranked by market value, 60 of the world's 100 largest companies—including American Express, Cisco, Citigroup, Time Warner, UPS, and Vodafone—earn most of their revenue from PMNs. In short, PMNs are essential features of modern economies and, as such, represent attractive targets for entrepreneurs.

Pricing can be complex in markets with network effects. In **Appendix B**, we explain why a platform must be proprietary—controlled by a single company—for its provider to capture value created through network growth. We also consider rules for setting prices in a two-sided network—

one with two distinct user groups (e.g., job seekers and prospective employers in an online recruitment network).

Technology and Operations Management

Having defined their customer value proposition, entrepreneurs next should consider the following choices for technology and operations management:

- What activities are required to develop and produce the venture's core offerings?
- Which of these activities should the venture perform in-house? Put another way, to what extent should the business be *vertically integrated*? Who will perform outsourced activities, and under what terms?
- What are the *cost drivers* for key activities (e.g., unit volume, capacity utilization, number of customers)? Can the venture exploit *scale economies* in operations by substituting fixed for variable costs? By leveraging *learning-by-doing* opportunities?
- Will the venture create any valuable *intellectual property* (IP)? If so, how will this IP be kept proprietary?
- How strong are *first-mover advantages* related to technology and operations management, for example, scale economies in production or preemptive access to scarce production inputs? How do first-mover advantages compare to *late-mover advantages*, such as opportunities to reverse-engineer pioneers' products or leapfrog leaders by leveraging new technology?
- Given capacity and hiring constraints, will it be feasible to scale operations rapidly? (See "Scaling a Startup: Pacing Issues," HBS No. 812-099, for further discussion of operational capacity constraints).

Below, we examine decisions about vertical integration through an entrepreneurial lens. We then consider first- and late-mover advantages that pertain to technology and operations management in startups.

Vertical Integration

New ventures frequently face conditions that encourage vertical integration. There are economic advantages to completing transactions within a vertically integrated company—rather than between two independent firms—when the transactions entail *high levels of uncertainty*, *small numbers bargaining*, and *asset specificity*.[10] With transactions between independent firms, uncertainty makes it difficult to draft a contract that specifies each party's obligations under any contingency that might arise. Absent a complete contract, the parties periodically will need to renegotiate transaction terms. If either party is subject to "small numbers bargaining," that is, if it has few potential transaction partners, then that party may be vulnerable to holdup when it renegotiates. Finally, if either party's assets are tailored for a specific transaction type and cannot be redeployed into other uses, then failing to complete a crucial transaction—for example, securing an input required for production—may lead to bankruptcy with little liquidation value.

Startups often meet these conditions. By definition, they confront high levels of uncertainty. Also, when they target new markets with radical innovations, startups may require access to idiosyncratic assets controlled by only a few potential partners.

However, vertical integration poses challenges for resource-constrained startups, because it often requires major investments. Cake Financial, an online service that gave investment advice to consumers based on analysis of their stock trades, illustrates this dilemma.[11] Cake's founder had a choice between building software that could extract a customer's trading data (with their permission) from their online brokerage accounts, or licensing access to the data from a firm that had already developed similar software. Concerned about that firm's fees and whether it would be responsive to a small startup's needs, Cake's founder chose to build the software in-house. This consumed most of the $9 million in venture capital that Cake had raised, and put the startup in a precarious position when demand for its service was slow to emerge and then capital markets slammed shut during the 2008 global economic crisis.

First- and Late-Mover Advantages

In designing business models, entrepreneurs should consider the relative magnitude of first- and late-mover advantages. Entrepreneurs (and corporate managers) have a propensity to overestimate first-mover advantages and underestimate the difficulty of pioneering when a new market requires significant behavioral change by customers.[12] If late-mover advantages are strong, then startups that have the means to open up a new market may have an incentive to invest less aggressively, and at the extreme may wish to delay launch.

Potential first-mover advantages from technology and operations management include the following:

- **Preemption of Customer Relationships.** A firm with high fixed costs can realize significant scale economies by spreading those costs over a greater unit volume. Likewise, through *learning by doing*, a firm with greater cumulative production volume (i.e., more "doing") is likely to identify more cost-reduction opportunities.[13] When scale economies in production are strong, a first mover that acquires a big customer base before rivals can enter the market may realize significant unit cost advantages.

- **Preemption of Scarce Assets.** Through long-term contracts or purchases, first movers can lock up valuable assets, for example, skilled labor, attractive geographic locations for factories or retail outlets, and exclusive supplier or distributor agreements. Scarce assets become more costly to acquire after rivals enter. In some cases, entry may be impossible once a crucial asset is locked up, as with government-licensed spectrum for telecommunications services.

- **Preemption of Key Patents.** By exploiting a head start in research and development, first movers may be able to secure patent protection for key technologies. If the pioneer decides not to license its technology, prospective rivals may find it costly to "invent around" the patents and, at the extreme, may be unable to enter the market.

- **Preemption of Capacity.** If the minimum efficient scale of production facilities is high in relation to the expected size of the mature market, then the first firm to build such facilities may be able to deter prospective rivals from ever entering the market. In the early 2000s, for example, Teledesic and SkyBridge both proposed to spend billions of dollars to launch scores of low Earth orbit satellites that could provide high-speed Internet access anywhere in the world.[14] However, it was unclear whether the market was large enough to support even one competitor, so each firm had to decide whether to offer its service at all if its rival managed to launch first.

Potential late-mover advantages related to technology and operations management include the following:

- **Reduction of R&D Costs through Reverse Engineering.** While some pioneers enjoy strong patent protection, others are unable to prevent rivals from copying their products. Reverse engineering usually results in significant R&D cost savings compared with amounts spent by the pioneer on the original product.

- **The Chance to Leapfrog Leaders with Newly Invented, Superior Production Technology.** Late movers may gain an edge in terms of cost or product performance by leveraging new technology that was not available when the pioneer launched. For example, Qualcomm was a successful late mover in establishing standards for cellular telephone equipment.[15] Qualcomm's CDMA (code-division multiple access) standard leveraged leading-edge spread-spectrum technologies that delivered superior capacity and reliability relative to other early digital standards.

Go-to-Market Plan

The attributes of new ventures mentioned previously—uncertainty about their solutions as well as their lack of brand equity, customer relationships, and other resources—loom large when startups first go to market. Compared to managers in established corporations offering familiar products through tested channels, entrepreneurs face much bigger marketing challenges.

A go-to-market plan specifies how a new venture will address these challenges. The plan focuses on the following choices:

- What mix of *direct channels* (e.g., in-house sales force, company website, wholly owned retail stores) and *indirect channels* (e.g., wholesalers, independent reps, value-added resellers, franchisees, third-party retailers) will the venture employ to educate prospects, configure and deliver its products, provide after-sale service, give feedback for future product development efforts, and so on? What margin will channel partners require? Should any partners be granted exclusive distribution rights?

- Given the expected *lifetime value* (LTV) of a customer, what average *customer acquisition cost* (CAC) will the venture target? (See **Appendix C** for guidelines on calculating LTV and CAC.)

- What mix of free and paid demand-generation methods (e.g., mass and targeted advertising, product sampling, trade promotions, "freemium" pricing, public relations, customer word of mouth) will the venture employ at each stage of the *conversion funnel* (i.e., awareness > interest > trial > repurchase)? What will be the resulting shape of the funnel? What will be the average CAC for each paid demand-generation method?

- If the venture relies heavily on free customer acquisition methods, how will its product's design encourage *virality,* and what will be its *viral coefficient*?

- If the venture sells a fundamentally new product, is it likely to confront a *chasm* between early adopter and mainstream customer segments? If so, what is the plan for crossing the chasm? (See "Scaling a Startup: Pacing Issues," HBS No. 812-099, for further discussion of chasm challenges).

- Does the venture have strong incentives to race to acquire customers due to increasing returns to scale (deriving from network effects or economies of scale in production) or high switching costs? How do these incentives compare to factors that may discourage aggressive investments in customer acquisition, in particular, constraints on operational capacity? (See "Scaling a Startup: Pacing Issues," HBS No. 812-099, for further discussion of business model attributes that encourage startups to race for scale.)

The choices above hinge crucially on whether the venture is targeting a *new market* with a radically innovative product or an *existing market* (or a subsegment thereof) with a product that is superior on conventional performance dimensions. In both cases, the startup must be prepared to make a big investment in marketing.[16] However, with a new market, these investments typically will be spread over many years, as the startup courts early adopters and engages in missionary work. By contrast, a push into an existing market is more likely to require a frontal assault implemented over a shorter period of time.

Below, we discuss viral customer acquisition methods, which are prevalent with startups that rely on online networks.

Virality

A product grows virally when its use spreads through direct, customer-to-customer transmission. Viral growth occurs through four different mechanisms, listed below. With the exception of incentives, these mechanisms do not entail any marketing expenditures, so business models that harness strong viral growth can be very attractive.

- **Direct Network Effects.** To function properly, some products must be used jointly by two or more parties. These products are said to exhibit *direct network effects,* because their users interact directly. For example, early versions of Skype required both a call originator and a recipient to use Skype software. When one party who already has such a product wishes to interact with another who does not, the first party can contact the second party to suggest that he or she acquire the product.

- **Word of Mouth.** Even if they do not enjoy direct network effects, products can spread virally when a happy customer recommends them to another party, as when a satisfied diner suggests a restaurant to a friend.

- **Casual Contact.** Like the common cold, some products can spread virally through casual customer-to-customer contact. For example, the free, web-based email service Hotmail grew explosively in 1996 after its founders added a link at the bottom of users' emails that simply said, "Get your free email at Hotmail."

- **Incentives.** Many companies structure incentives that encourage their existing customers to recruit new customers, for example, MCI's 1990s "Friends and Family" plan, which offered reduced long-distance rates for calls between MCI customers in a circle of up to 20 members.

Virality and network effects are often conflated and confused, so the distinction between them warrants clarification. It should be clear from the list of mechanisms above that not all products that spread virally exhibit network effects. Likewise, not all users of products with network effects are acquired through viral, customer-to-customer transmission mechanisms. For example, a new user of a product with direct network effects might sign up based on mentions of the product in mass media, and then discover parties with whom he or she can interact *after* using the product. This pattern was

evident in the rapid growth of MySpace, Second Life, Twitter, and the question-and-answer service Quora.

Many startups combine more than one viral mechanism in their go-to-market plan. Dropbox, for example, (1) harnessed a *direct network effect* when users employed the service to collaborate on documents; (2) benefited from *word-of-mouth* referrals from loyal customers; (3) acquired customers through *casual contact* when users emailed links that allowed recipients to download (without installing Dropbox) files stored in Dropbox by the sender; and (4) offered a two-way "user-get-user" *incentive* that gave both the inviter and the recipient an additional 250MB of free storage.

Viral coefficient A firm's viral coefficient is calculated as the number of additional customers subsequently acquired through viral mechanisms for every new customer initially acquired. Startups that rely heavily on viral growth should track their viral coefficient overall and by customer cohort—that is, for each "vintage" of new customers acquired during a given period through different types of marketing programs employed by the firm. As shown by the table below, a viral coefficient greater than 1.0 yields self-sustaining growth from an initial "seed"—that is, a batch of new customers acquired in period 1. In the table, we assume that a seed group of 1,000 new customers each purchase one unit of a firm's product in year 1. These seed customers do not repurchase the product, but through viral means they attract some additional customers who purchase in year 2, who in turn attract some more customers in year 3, and so forth.

Table: Impact of Viral Coefficient on Customer Acquisition

	Number of Customers Acquired				
Viral Coefficient	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
0.3	1,000	300	90	27	8
1.0	1,000	1,000	1,000	1,000	1,000
1.3	1,000	1,300	1,690	2,197	2,856

When modeling viral growth dynamics for customer relationships that have a multiyear life, it is important to be specific about whether the viral coefficient should be applied only in year 1 or in each year. In some contexts, new customers are likely to quickly exhaust word-of-mouth recommendations or other viral mechanisms (e.g., opportunities to leverage "member-get-member" bonuses).

Profit Formula

Analysis of a new venture's profit formula does not require additional choices about business model design. Rather, this analysis evaluates the venture's economic viability, based on assumptions about its customer value proposition, technology and operations management, and go-to-market plan. To confirm that these assumptions yield a profitable business, an entrepreneur must answer the following questions:

- What *contribution margin* will the venture earn? What will be its *unit economics,* that is, contribution per unit of product sold?
- What *fixed costs* will the venture incur? What breakeven level of capacity utilization and sales volume does this imply?
- How large is the *total addressable market* for the venture's product, and how fast is the market likely to grow?
- What share of the total addressable market does the breakeven sales volume represent?
- How much investment in *working capital* and *property, plant, and equipment* will be required per dollar of revenue? Can the venture reduce working capital by delaying payments to suppliers? Receiving payments from customers before delivering its product (as with subscriptions)? Shifting inventory to partners?
- How will the venture's contribution margin, fixed costs, and investment/revenue ratio change as the business scales?
- Given projected growth, what is the profile of the venture's *cash flow curve*? In particular, how deep is the curve's trough, and when will it be reached?

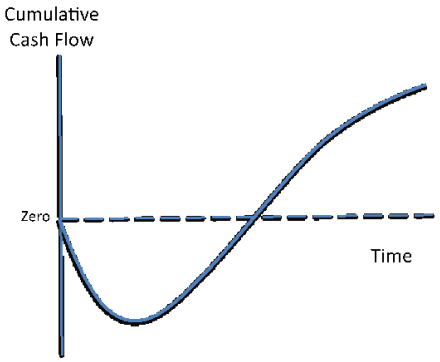
For resource-constrained early-stage startups, managing cash flow is absolutely crucial. The following formula shows how key metrics in the questions above contribute to cash flow:

$$\left(TAM \times \frac{REV}{TAM}\right) - \left(REV \times \frac{VC}{REV}\right) - FC - \left(\Delta REV \times \frac{INVESTMENT}{REV}\right) = CASHFLOW$$

In the formula, TAM = Total Addressable Market, VC = Variable Costs, and FC = Fixed Costs.

Projecting the formula above over time—and taking into account any interest payments and taxes—yields the venture's cash flow curve (see **Figure A**). The curve reveals the two most important facts that an entrepreneur needs to know about his or her business model: What is the magnitude of maximum cumulative negative cash flow, and when will that point be reached?

Figure A Cash Flow Curve



Guidelines for Business Model Design and Analysis

Figure B summarizes the questions that entrepreneurs should consider when designing and analyzing initial business models. Since the figure includes dozens of questions, entrepreneurs may see business model analysis as a daunting task and an unwelcome distraction at their venture's outset. They may prefer to conduct a few interviews with prospective customers and then start building, in order to learn by doing in an improvised manner. However, this "Just do it!" approach to entrepreneurship can be risky for reasons outlined in a companion note, "Hypothesis-Driven Entrepreneurship: The Lean Startup" (HBS No. 812-095).

If the amount of work required to analyze a business model is a deterrent, entrepreneurs should keep this in mind: due to serial dependence between the questions—some cannot be considered unless others are addressed first—it is not possible, necessary, or even desirable to answer all of the questions immediately and simultaneously. Business model analysis is an iterative and ongoing process.

Most entrepreneurs begin the process with an insight about an unmet need and a potential solution for that problem. They explore an opportunity through interviews with prospective customers and other quick, low-cost research methods, and then use early feedback to refine their concept (as described in "Customer Discovery and Validation for Entrepreneurs," HBS No. 812-097). Until their idea settles down, it makes no sense for entrepreneurs to push for deep understanding of pricing options, customer acquisition costs, working capital requirements, and so on. Any in-depth analysis of these "downstream" topics could be rendered obsolete as an entrepreneur's views change with regard to fundamental, upstream choices.

While entrepreneurs should avoid overinvesting in detailed analysis of downstream topics, at some point early in the process of evaluating an opportunity, they should make a quick pass through all of the questions in **Figure B**. Their goal should be to articulate hypotheses for as many questions as possible, and to gauge their team's confidence that these hypotheses are on target. Back-of-the-envelope analysis is adequate at this stage.

This quick but comprehensive scan is intended to ensure that the entrepreneur has not ignored any important business model elements. The goal is to surface potential deal-breaking issues early—in particular, any lack of internal consistency between business model elements—and to stimulate a search for ways to address them. For example, based on the initial scan a team might conclude: "We

envision a complex new product that would probably best be sold through a face-to-face demonstration, but our ballpark unit economics suggest we cannot afford a direct sales force."

Write It Down!

When conducting this first pass through the business model questions, entrepreneurs should write down all of their hypotheses, along with the key assumptions behind them. As their model evolves, entrepreneurs should adhere to this "Write it down!" discipline. They should consider displaying a summary of their model as an "information radiator"—a prominent visual display that can be readily referenced and amended by team members. For example, a wall-mounted whiteboard could depict a business model "canvas"—a summary of key model elements, arrayed in a grid—following the approach suggested in Alexander Osterwalder's book *Business Model Generation*.[17]

Using the information radiator approach, team members could affix different-colored Post-it notes in the different cells of the canvas, showing the status of hypotheses for each business model question, for example, (1) green = the hypothesis has been validated through a decisive test; (2) yellow = a test that *could* validate the hypothesis has been identified but not yet executed; (3) blue = a hypothesis has been advanced without a way to test it; and (4) pink = the question is important, but it is too early to offer a hypothesis.

As the team makes progress, pink notes will be replaced with blue ones, blue will be replaced with yellow, clusters of notes representing competing hypotheses about a single question will be pruned, and so on. And when the team makes a pivot—that is, when it changes its business model in significant ways due to a failure to validate a key hypothesis—large swaths of the board may revert from green notes back to yellow, blue, or pink ones.

As a startup pivots, its team will often feel the need to retrace its steps to reconsider hypotheses that were sidelined or previously rejected. For this reason, when using an information radiator, it is important that entrepreneurs make a record of their business model's evolution, for example, by using dated photographs of the display.

Generic Models

Entrepreneurs and investors often characterize a startup's business model as being representative of a generic type, for example, biotech startups, chain restaurants, or talent agencies. The variety of generic business models is almost endless; they can be categorized in many different ways:

- Generic value-chain position (e.g., platform, franchisee, OEM)
- Revenue-collection approach (e.g., subscription, "razor and blades," rental)
- Value-adding approach (e.g., matchmaking, "long tail" aggregation, outsourcing, multilevel marketing, auction)
- Broad industry sector (e.g., professional services, packaged goods, creative industries)
- Strategic positioning within an industry (e.g., software-as-a-service, low-cost airline, free commuter newspaper, fashion designer, "fabless" chipmaker, art gallery)

Entrepreneurs who slavishly shoehorn policy choices or bolt on structural elements simply for the sake of conforming to the familiar patterns of a generic model run the risk of "me, too" performance. Also, generic business models are subject to fads, especially in the Internet and mobile sectors, where

recent examples include daily deal sites, open source software, "freemium" pricing, location-based services, and "gamification" models. Entrepreneurs who chase such waves are more likely to fail by launching too late or surfing in the wrong spot.

Consequently, entrepreneurs should be on guard—but they still should study generic business models for at least two reasons. First, generic models represent a good starting point for analysis. Understanding best-practice prescriptions for a generic model can be viewed as "table stakes" in many instances. Such understanding may be necessary but not sufficient for success with a startup that draws upon some—but not all—of the generic model's elements. Second, generic models can serve as a useful tool for initial communications with investors and potential partners. Entrepreneurs must regularly rely on "elevator pitches," and the shorthand of generic models can help orient other parties.

Conclusion

This note has defined the elements of a business model and has described how an entrepreneur who has just started evaluating a new business opportunity should analyze those elements. The note is meant to be read in tandem with a series of other course notes. A process for rigorously testing business model hypotheses is reviewed in "Hypothesis-Driven Entrepreneurship: The Lean Startup" (HBS No. 812-095). A pair of companion notes offers practical guidance for early-stage entrepreneurs on techniques for researching customer demand: "Customer Discovery and Validation for Entrepreneurs" (HBS No. 812-097) and "Customer Visits for Entrepreneurs" (HBS No. 812-098). Business model issues and related organizational challenges that are relevant to an entrepreneur who is aggressively scaling a later-stage venture are discussed in "Scaling a Startup: Pacing Issues" (HBS No. 812-099) and "Scaling a Startup: People and Organizational Issues" (HBS No. 812-100), respectively.

This note presents a static, "snapshot" view of an early-stage startup's business model at a specific point in time. However, in such firms, business models tend to evolve rapidly. As they analyze opportunities, entrepreneurs should remember that refashioning a business model—pivoting—is almost always part of a successful entrepreneurial journey, and presents both intellectual and emotional challenges.

Figure B Summary of Business Model Questions

Customer Value Proposition	**Go-to-Market Plan**
• What *unmet needs* will the venture serve? • Will it emphasize *differentiation* or *low cost?* • Which *customer segments* will it target? • Will it serve a *new, existing*, or *re-segmented* market? • What will be the *minimum viable product* at launch? The *road map* for adding features? • Who will provide *complements* required for a *whole product solution?* On what terms? • How will the product be priced? Does *skimming* or *penetration pricing* make sense? • Can the venture leverage *price discrimination* methods? *Bundling? Network effects?* • What *switching costs* will customers incur? What is the expected *life of a customer relationship*? • Relative to rivals' products, how will customers' *willingness to pay* compare to their *total cost of ownership*?	• What mix of *direct* and *indirect channels* will the venture employ? What margin and/or exclusive rights will channel partners require? • Given expected customer *lifetime value* (LTV), what *customer acquisition cost* (CAC) will the venture target? • What mix of free and paid *demand generation methods* will the venture employ? What will be the shape of its *customer conversion funnel*? The CAC for each paid method? • If the venture relies on free demand generation methods, what will be its *viral coefficient?* • Will the venture confront a *chasm* between early adopter and early mainstream segments? If so, what is the plan for crossing the chasm? • Does the venture have strong incentives to race for scale due to network effects, high switching costs, or other first-mover advantages? Do scalability constraints and late-mover advantages offset these incentives?
Technology & Operations Management	**Profit Formula**
• What activities are required to develop and produce the venture's product? • Which activities will the venture perform in-house and which will it *outsource*? • Who will perform outsourced activities, and under what terms? • What are the *cost drivers* for key activities? Can the venture exploit *scale economies* in production by substituting fixed for variable costs? • Will the venture create any valuable *intellectual property*? If so, how will it be kept proprietary? • Are there other *first-mover advantages* in technology and operations (e.g., preemption of scarce inputs)? *Late-mover advantages* (e.g., reverse engineering)? • Given capacity and hiring constrains, can the venture scale operations rapidly?	• What *contribution margin* will the venture earn? • What *fixed costs* will the venture incur, and what *breakeven capacity utilization and sales volume* does this imply? • What share of the *total addressable market* does breakeven sales volume represent? • How much *investment* in working capital and property, plant & equipment will be required per dollar of revenue? • How will contribution margins, fixed costs, and investment/revenue ratios change over time? • Given projected growth, will be the profile of the venture's *cash flow curve*? How deep is the curve's trough, and when will it be reached?

Appendix A: Switching Costs and Pricing Leverage

To see how switching costs can impact firms' pricing flexibility, consider the following example.[18]

Assume that two firms, Alpha and Beta, offer identical products. A typical customer purchases one unit of either firm's product in period 1, then requires a replacement unit in period 2. The variable cost of producing one unit is the same for both firms: $100. In a perfectly competitive market *without* any switching costs, Alpha and Beta would both price their products at $100 in periods 1 and 2. If either firm tried to raise its price, the other could steal all of its customers by slightly undercutting the rival's new, higher price.

Now assume that each firm has a base of customers that it acquired in period 1, but these customers would incur a $50 cost by switching suppliers in period 2. Assume further that during period 2 the firms are able to offer one price to their existing customers and—in an effort to steal share—a different, lower price to their rival's customers (e.g., a special promotional offer for new customers only).

If Alpha wanted to steal Beta's customers in period 2, it would have to compensate those customers—in the form of a lower promotional price—for the $50 switching cost they would incur. However, Alpha must also recover its $100 variable cost, so the lowest possible price it could offer in period 2 to Beta's customers and still break even would be $150. If, in response, Beta set its period 2 price for existing customers at $149.99, its existing customers would not bother to switch to Alpha's product. Beta would retain all of its existing customers and earn a period 2 profit equal to $49.99 from each of them.

Now imagine that a new, first-time buyer—as yet unaffiliated with either Alpha or Beta—enters the market during period 2. Like other customers, this first-time buyer will wish to purchase a replacement unit—albeit during *period 3*. Also, like other existing customers, the first-time buyer will face a $50 switching cost after he or she commits to a vendor.

Assuming once again that Alpha and Beta can offer different prices to existing versus new customers, what price would they offer to this new, first-time buyer during period 2? Following the logic above (and ignoring the time value of money), we can see that the lowest period 2 price that each firm could afford to offer would be $50.01. Whichever company secures this new customer would then raise its period 3 price for this customer to $149.99. Total revenue across the two periods would equal $200, as would total cost, and net profit across the two periods would be zero.

In this manner, switching costs allow firms to raise prices to their existing customers, but the resulting profit opportunity also motivates them to race to acquire first-time buyers. In a competitive market, deep discounts or heavy marketing spending to attract these first-time buyers may dissipate any above-normal profits that otherwise would accrue due to switching costs.

Appendix B: Network Effects, Willingness to Pay, and Pricing

In a market that exhibits network effects, a company must consider the present and future benefits of building its customer base when making current-period pricing and investment decisions. Absent network effects, a company typically maximizes current-period profitability by setting its price and marketing spending at levels that equate current-period marginal revenue and marginal cost. With network effects, however, optimization is less straightforward. Acquiring an additional customer—call that customer "X"—in the current period yields revenue directly from X during that period and also boosts—very slightly—the willingness to pay (WTP) of all other customers, who value a larger network. Other customers' WTP remains higher by this tiny increment in future periods, until X exits the network. This increase in other customers' WTP in current and future periods should be factored into decisions about whether to invest in accelerated growth.

These dynamics can be illustrated using a stylized example of a fictional company—let's call it "Blossom"—selling spreadsheet software in 1989 (before most office productivity software was sold in bundled suites). Then as now, spreadsheet software was subject to a fairly strong network effect: users value the ability to exchange files and require software that employs a compatible standard to do so. We use this example because scholars have estimated the impact of network effects on customer WTP for spreadsheet software in 1989 using an econometric technique called hedonic regression.[19] Those estimates are employed in the stylized example below to show how network effects can influence optimal marketing spending levels.

Assume that Blossom's unit price was $360 and its variable expenses (excluding customer acquisition costs) for supplying an additional unit were $72, or 20% of revenue. To keep the analysis simple, we also assume that a new customer would use the product for four years, at which point the product would be rendered technologically obsolete and the customer would be in no way loyal to Blossom. This assumption is unrealistic, but it lets us avoid factoring the present value of future product sales into our calculations. In reality, customers might prefer to buy Blossom's next-generation product if it provided backward file compatibility or reduced the time spent mastering a new interface.

First, consider a scenario in which spreadsheet software was *not* subject to a network effect. What is the largest amount Blossom should be willing to spend to acquire an additional customer in 1989? This calculation is straightforward: the company could afford to spend up to $288 ($360 minus pre-marketing variable expenses of $72) to acquire a customer. Beyond $288, the marginal cost of acquiring and supplying a new customer would exceed the marginal revenue from that customer.

How would network effects influence the maximum amount that Blossom should be willing to spend to acquire a customer? The research mentioned above provides the following formula for predicting the logarithm of a spreadsheet's product price in 1989 ($\boldsymbol{P}$), based on its publisher's installed base share ($\boldsymbol{S}$), after controlling for differences in product quality. Consistent with the concept of network effects, the formula indicates that customers would pay more for a spreadsheet used by a bigger installed base:

$$\text{Log } \boldsymbol{P} = 5.7376 + .0075\boldsymbol{S}$$

If we assume that Blossom had a 20.000000% share of the total installed base of spreadsheet software, then this formula would predict customer willingness to pay equal to $360.5389517 (the reason for showing so many decimal places should be apparent in a moment). Assume further that:

- The total installed base for spreadsheet software was exactly 50 million in 1989—about half of the actual size of the worldwide installed base of personal computers in that year.

- The spreadsheet market was not growing. This is clearly not realistic, but it simplifies our analysis in ways that do not meaningfully change the conclusions.

- Annual unit sales for the industry equaled one-quarter of the industry's total installed base, corresponding to the four-year replacement cycle described above.

Based on these assumptions, how much pricing leverage would Blossom gain by boosting its installed base by *exactly 1 user,* from 10,000,000 to 10,000,001? This corresponds to a market share of 20.000002%, which yields a predicted price of $360.5389571, and hence a price increase of $0.0000054. Across Blossom's 1989 unit sales of 2,500,001, this additional pricing leverage would be worth $13.50 (2,500,001 x $0.0000054). If Blossom maintained its new market share of 20.000002%, it would realize this tiny pricing advantage in each of the three subsequent years. The present value of $13.50 over four years at 15% is $38.54. Thus, with network effects, it would be economically rational for Blossom to invest up to $326.54 ($288 + $38.54) to acquire a new customer—13% more than the $288 maximum it could spend under the "no network effects" scenario.

Obviously, a company cannot raise its price in increments as small as $0.0000054, but larger market share gains may yield material pricing benefits. Specifically, based on the formula above, a 1% share increase yields a 0.75% increase in customer WTP for spreadsheet software in 1989. For this reason, proprietary network effects provide an incentive for companies to invest more aggressively in accelerated growth strategies—that is, to race for scale.

Proprietary Platforms and Pricing Leverage

When a platform-mediated network's user base expands, the resulting increase in users' WTP for platform access does not automatically translate into higher prices for the platform. Providers gain pricing leverage with network growth only when they keep their platforms proprietary. A *proprietary platform* has a single provider who exclusively controls its technology, for example, eBay, FedEx, Google, or (in the example above) Blossom. With a *shared platform* such as bar codes, DVDs, or Wi-Fi, multiple firms collaborate in developing the platform's technology and then compete with each other to provide differentiated but compatible versions of the platform. Compatibility ensures that users can switch between products offered by a shared platform's various providers without incurring significant costs. For example, when replacing one Windows-compatible PC with another—say, moving from a Dell to a Compaq—a user need not invest in new application software. By contrast, switching to a rival platform—for example, from Windows to Macintosh—would be much more costly.

For a shared platform's providers, lower customer switching costs limit pricing leverage. By contrast, a proprietary platform's sole provider can raise its price when user base growth increases users' WTP, up to the point where a user is indifferent between sticking with the platform and switching to a rival platform, if one exists.[20] Such pricing leverage allows platform providers to capture a larger share of the value they create through network effects. Consequently, entrepreneurs will normally prefer proprietary platforms when designing business models. However, there are circumstances when it may be advantageous to share platforms with rivals. In particular, when many equally matched rivals simultaneously enter a new market that is destined to be dominated by a single platform due to strong network effects, the firms may be better off sharing the market than conducting an expensive winner-take-all battle. Even though they offer competing versions of a

compatible platform, firms may still be able to profit by contributing new technology to the shared platform, in exchange earning licensing fees or gaining a time-to-market edge.

Pricing in Two-Sided Networks

Platform-mediated networks (PMNs) can be categorized according to the number of distinct user groups they include. In some PMNs, users are fairly homogenous in terms of the platform functionality they require. For example, although a given stock trade has a buyer and seller, these roles are transient; almost all traders play both roles at different times. PMNs with homogenous users are called *one-sided* to distinguish them from *two-sided* networks, which have two distinct user groups whose respective members consistently play a single role in transactions (e.g., cardholders and merchants in credit card networks).

Platform providers who seek to mobilize new two-sided networks face a catch-22: each side will refuse to join until the other side is on board. To avoid this impasse, platform providers often subsidize users on one side; that is, they price below marginal cost to that side or even give its users free access to the platform, as with Adobe's PDF reader software or Google's search engine. Due to network effects, attracting users to this "subsidy side" boosts users' WTP on the network's "money side," as with customers for Adobe's PDF creation software or Google's advertisers. Generally, it makes sense for platform providers to permanently subsidize the network's more price-sensitive side and charge the side that increases its demand more strongly in response to the other side's growth.[21]

Appendix C: Calculating CAC and LTV

The ratio of customer lifetime value (LTV) to customer acquisition cost (CAC) is a crucial measure of the economic viability a startup's go-to-market plan. LTV equals the discounted present value of variable contribution—revenues minus variable costs—earned over the life of a typical customer's relationship with a company. LTV does not deduct CAC. As explained below, CAC = LTV is the maximum amount that a startup can profitably afford to spend to acquire a new customer, unless its business model exhibits (1) viral growth, (2) increasing returns to scale due to network effects or strong economies of scale in production, or (3) high switching costs.

Calculating a firm's maximum CAC based on the average LTV of a customer involves four steps.

Step 1: Determine contribution per customer. Variable contribution equals revenue earned less all variable costs incurred in serving a customer in a given year, excluding marketing costs related to customer acquisition. A back-of-the-envelope approach for calculating the average contribution per customer—usually sufficient for providing a rough reality check on a business model—simply subtracts a company's total variable cost from its revenue for the most recent period, then divides the remainder by the average number of customers served during that period.

A more sophisticated approach recognizes that (1) contribution per customer may vary substantially for different customer segments, and (2) the annual contribution per customer is likely to change over the life of a customer relationship. With respect to the latter point, a company may be able to increase its prices over time. Also, the company should be able to collect information about the customer's preferences and may be able to use that information to cross-sell related products. Finally, over time, variable costs incurred in serving a customer tend to decline as a percentage of revenues for two reasons. First, experienced customers tend to generate fewer customer service inquiries because they know the ropes. Second, as a company grows, it typically can improve its operational efficiency and realize volume discounts in procurement.

Step 2: Determine annual churn rate. The annual churn rate is the share of customers who leave each year. For example, if 80% of customers who signed up in year 1 renew their relationship with the firm in year 2, and so on, the annual churn rate is 20%. Of course, this may vary widely for different customer segments.

Step 3: Determine the appropriate discount rate. Since the contribution for customers paid in years further out in the future is less valuable than those paid in more recent years, it is important to discount these future cash flows to the company. Although the "ideal" discount rate factors in the beta to account for the riskiness of the cash flows, one can stick to a shorthand of using something like 10%.

Step 4: Calculate LTV. The annual cash flows per customer calculated in Step 1 are discounted to their present value, using the annual churn rate and discount rate calculated in Steps 2 and 3 using the formula $C/(k + h)$, where C is the annual contribution, k is the discount rate and h is the annual churn rate.

Step 5: Calculate CAC. A back-of-the-envelope approach for calculating the average cost of acquiring a new customer takes total sales and marketing expense incurred during a period, then (1) subtracts any costs related to retention and usage stimulation efforts targeted at *existing* customers (e.g., time spent by sales reps calling on existing accounts, rather than prospecting for new customers) and (2) divides by the total number of new customers acquired during the period.

As with the other inputs described above, average CAC will vary considerably by customer segment. Likewise, different acquisition methods may have very different costs. Each method will be subject to decreasing returns during a given period as available prospects in the most attractive segments are converted into purchasers and the company is then forced to target prospects for whom the product is less compelling. For this reason, entrepreneurs employ *cohort analysis*: they measure the productivity of their marketing efforts—and optimize their efforts accordingly—by tracking, over time, the LTV and CAC of "vintages" of new customers acquired during a given period through different marketing methods.

Step 6: Compare LTV and CAC. In theory, for any given new customer, a company can afford to increase CAC up to the point that CAC = LTV for that customer. Of course, if CAC = LTV for *every* new customer that a company acquired, the company would not generate enough contribution to cover its fixed costs. For this reason, many companies employ a target LTV/CAC ratio. For many software-as-a-service businesses, for example, the target ratio is 3:1.

Calculating LTV and CAC with Virality and Network Effects

When calculating LTV and CAC for businesses that exhibit virality and/or strong network effects, complications may arise:

- **Virality.** The maximum amount that a firm can afford to spend to acquire a customer through paid marketing methods should take viral growth opportunities into account. In theory, in calculating the value of a "seed" customer, one should reflect the LTV of every additional customer who will be subsequently acquired due to free, viral mechanisms that are put in motion by the seed. This could conceivably involve a chain of viral acquisitions that stretches for many years into the future. In practice, it is more conservative to credit the seed customer with only one year's worth of viral acquisitions. A straightforward way to do this is to multiply the LTV directly generated by the seed customer by $1.0 + V$, where V is the viral coefficient for a new customer of that cohort type.

- **Network Effects Generate Value for *Other* Customers.** When a business exhibits increasing returns to scale due to network effects or scale economies in production, acquiring a customer in the current period increases *future* cash flows from *other* customers, as explained in Appendix B. In calculating LTV, this incremental value should be added to the present value of future cash flows derived directly from a new customer.

- **Variable Costs Depend on Network Density.** When networks have a spatial component, the physical proximity of customers may be an important factor in determining variable costs. For example, an online grocery service can achieve much lower delivery costs per customer when a driver's stops are just a few minutes apart. Hence, to calculate contribution margins accurately, managers need a reliable forecast for network density.

- **Two-Sided Networks.** Two-sided networks have two distinct user groups whose respective members consistently play the same role in transactions, for example, cardholders and merchants in American Express's credit card network; job seekers and recruiters in Monster.com's online recruitment network. To mobilize a two-sided network, platform providers must attract users to both sides.

    - In this context, LTV calculations can become very complicated; explaining their mechanics is beyond the scope of this note. In fact, marketing scholars have only recently begun to develop statistical models that can be used to estimate LTV in two-sided networks.[22]

Consistent with the previous point, these models factor the impact on future cash flows from Side B users in estimating the value of additional Side A users, and vice versa.

- In some companies serving two-sided networks, distinct organizational units will be charged with marketing to the separate sides; these units must coordinate their plans to ensure that overall marketing spending is optimized. In particular, it is important to avoid double-counting the profit increase attributable to network effects when separate organizational units each calculate LTV for their respective sides. Complicating matters further, certain marketing programs will impact user acquisition rates on *both* sides (e.g., Monster.com's Olympic sponsorships, which built awareness among both recruiters and job seekers). Managers must determine how to allocate these expenses across the two sides when calculating CAC.

Endnotes

[1] Our definition of a business model—an integrated array of distinctive choices specifying a new venture's unique customer value proposition and how it will configure activities to deliver that value and earn sustainable profits—echoes the definition of strategy used in Harvard Business School's introductory strategy course for MBAs. For other definitions and descriptions of business models, see H. Chesbrough & R. Rosenbloom, 2002, "The role of the business model in capturing value from innovations: Evidence from Xerox Corporation's technology spinoff companies," *Industrial and Corporate Change* 11: 529-555; J. Magretta, "Why business models matter," *Harvard Business Review,* May 2002; T. Malone et al., 2006, "Do some business models perform better than others?" MIT Sloan working paper 4615-06; L. Applegate, "Crafting business models," HBS 808-705; M. Johnson, C. Christensen, & H. Kagermann, "Reinventing your business model," *Harvard Business Review,* December 2008; J. Mullins & R. Komisar, 2009, *Getting to Plan B: Breaking Through to a Better Business Model* (Boston, MA: Harvard Business Press); A. Osterwalder, 2010, *Business Model Generation* (New York: Wiley); and R. Casadesus-Masanell & J. Ricart, "How to design a winning business model," *Harvard Business Review,* January–February 2011.

[2] Casadesus-Masanell & J. Ricart, in "How to design a winning business model," note: "Strategy refers to the contingent plan about which business model to use. The key word is contingent; strategies contain provisions against a range of contingencies (such as competitors' moves or environmental shocks), whether or not they take place. While every organization has a business model, not every organization has a strategy—a plan of action for contingencies that may arise." Casadesus-Masanell has published a series of notes and cases (available from Harvard Business Publishing) used in his elective course. See in particular "Competing through business models: Introductory note for students," HBS 710-409.

[3] The definition of strategy employed here and the concept of options-based strategy formulation are adapted from J. Rivkin, "An options-led approach to making strategic choices," HBS 702-433.

[4] This distinction between new, existing, and re-segmented markets and the implications of each for the magnitude of marketing expenditures are from S. Blank, 2005, *Four Steps to the Epiphany* (Café Press).

[5] The concept of a minimum viable product is described in E. Ries, 2011, *The Lean Startup* (New York: Crown).

[6] See in particular P. Ghemawat & J. Rivkin, "Creating competitive advantage," HBS 798-062; J. Rivkin & H. Halaburda, "Analyzing relative costs," HBS 708-462; and D. Collis, "Quantitative analysis of competitive position: Customer demand and willingness to pay," HBS 711-495.

[7] See R. Dolan, "Conjoint analysis: A manager's guide," HBS 590-059.

[8] This section is adapted from T. Eisenmann, "Note on racing to acquire customers," HBS 803-103. For academic analysis of switching costs, see P. Klemperer, 1987, "Markets with consumer switching costs," *Quarterly Journal of Economics* 102: 375–394.

[9] This section is adapted from T. Eisenmann, "Platform-mediated networks: Definitions and core concepts," HBS 807-049. For more background on platform-mediated networks and network effects, see O. Shy, 2001, *The Economics of Network Industries* (Cambridge, England: Cambridge University Press); C. Shapiro & H. Varian, 1999, *Information Rules: A Strategic Guide to the Network Economy* (Boston, MA: Harvard Business School Press); and D. Evans & R. Schmalensee, 2007, *The Catalyst Code: The Strategies Behind the World's Most Dynamic Companies* (Boston, MA: Harvard Business School Press).

[10] See chapters 4 and 5 in O. Williamson (1985), *The Economic Institutions of Capitalism* (New York: Free Press).

[11] T. Eisenmann & A. Wagonfeld, "Steve Carpenter at Cake Financial," HBS 811-041.

[12] For more background on first- and late-mover advantages, see M. Lieberman & D. Montgomery, "First-mover advantages," *Strategic Management Journal* 9 (1988): 41–58; S. Schnaars, *Managing Imitation Strategies: How Later Entrants Seize Markets from Pioneers* (New York: McGraw-Hill, 1994); G. Tellis & P. Golder, *Will and Vision: How Latercomers Grow to Dominate Markets* (New York: Free Press, 2002). G. Tellis, E. Yin, & R. Nira, "How quality drives the rise and fall of high-tech products," *Sloan Management Review,* Summer 2011, summarizes research that shows that market leadership shifts are common in high-tech industries; leadership is more strongly linked to product quality than early market entry that leverages network effects.

[13] For background on learning curve strategies, see P. Ghemawat, "Building strategy on the experience curve," *Harvard Business Review* 63 (1985). For academic analysis, see G. Day & D. Montgomery, 1983, "Diagnosing the experience curve," *Journal of Marketing* 47: 44–58: 143–149; P. Ghemawat & A. Spence, 1985, "Learning curve spillovers and market performance," *Quarterly Journal of Economics* 100: 839–852; R. Amit, 1986, "Cost leadership strategy and experience curves," *Strategic Management Journal* 7: 281–292; and M. Lieberman, 1987, "The learning curve, diffusion, and competitive strategy," *Strategic Management Journal* 8: 441–452.

[14] T. Eisenmann & D. Green, "Teledesic," HBS 802-154.

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