

Value Creation and Profit Optimization

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Abstract

The present paper presents a basic framework for evaluating and optimizing profits in a business operation. In building up a business we are often faced with an infinity of choices ranging from what products or services to sell and what customers to target to how to manufacture and market the products. To support the decision-making process a semi-quantitative dimension is here added to the traditional strategic scenario planning. It consists of a general-purpose seven-step evaluation process: The first step is to identify who influences the value creation process, and what value drivers each of them use to influence it. The second step consists of finding the relationship between the value to the user and each of these value drivers. The third step takes the risk to the user into account, and adjusts the value accordingly. The fourth step identifies the relative market power between the buyer and the various sellers in the market, and based on that it becomes clear how much of the value to the end user actually can be charged as a selling price. In the fifth step the cost is analyzed. The sixth step brings these various estimates together for the entire market to show how profits relate to the configuration of nodes in the value net, the value drivers, the risk, the market power and the cost structure. In the final step the strategic implications of the various options are integrated with other knowledge to form the basis for selecting a winning business strategy. An example of a yet-to-be consumer product is used to illustrate the process.

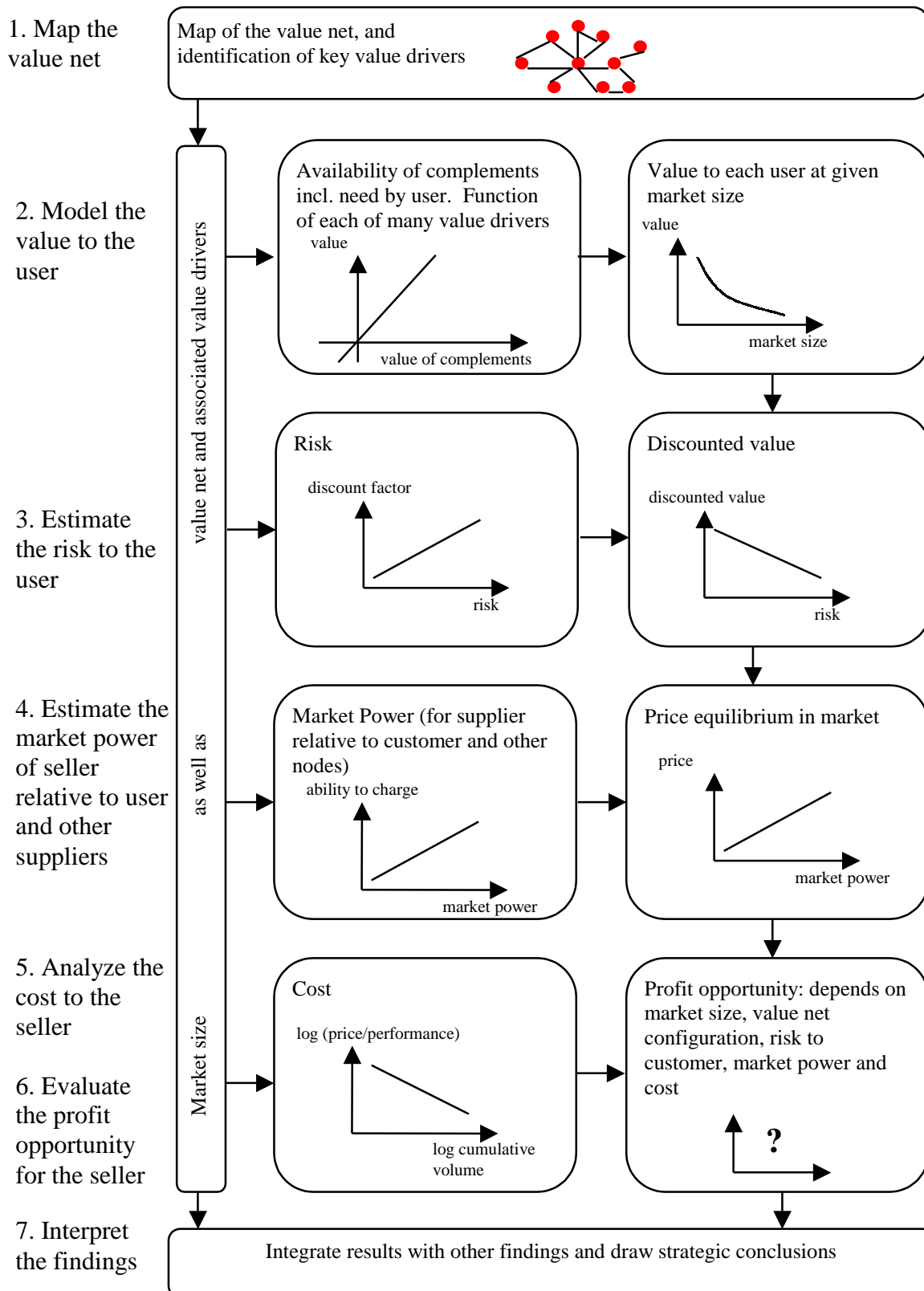
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Introduction

So what will I get out of an Advanced Kitchen Center? An Advanced Kitchen Center is a computer driven kitchen appliance that performs simple kitchen tasks such as loading and opening food containers, measuring by weight or volume, mixing, stirring, boiling and baking. Ideally it will be able to cook delicious meals based on recipes stored in the computer, but today there is a long way before it can be considered either economical or practical. Unless there is easy to use software, all the ingredients are available in the right type of containers and there is technical service and support most people will probably shy away from it. The problem is a classical business problem. Inventing a new product can propel business profits, but when the new product is part of a complex value net, all the network externalities need to be in place before it will start to take off.

Exhibit A: outline of the methods used in analyzing profit opportunities and taking strategic decisions. The seven key steps in the process are listed to the left.



It can be a real challenge to understand how each of the many interactions among all the various people and businesses in the value net will impact the bottom line, and what strategies to select, in a world of unknowns, such as we are faced with before bringing a radical innovation to the market. To overcome this challenge the following seven-step process is used (Exhibit A): (1) mapping the value net, (2) quantifying the value to the customer using value drivers, (3) discounting that value according to the risk faced by the customer, (4) analyzing the market power between the different entities to see how much of this discounted value can be charged as a selling price, (5) investigating the cost structure, (6) bringing all the previous estimates to together and integrating across the entire market to obtain overall cash flows and profits and (7) utilizing the results to support strategic as well as tactic decisions. A quantitative way of looking at this approach is explained further in note 1.

Step 1: Map the Value Net

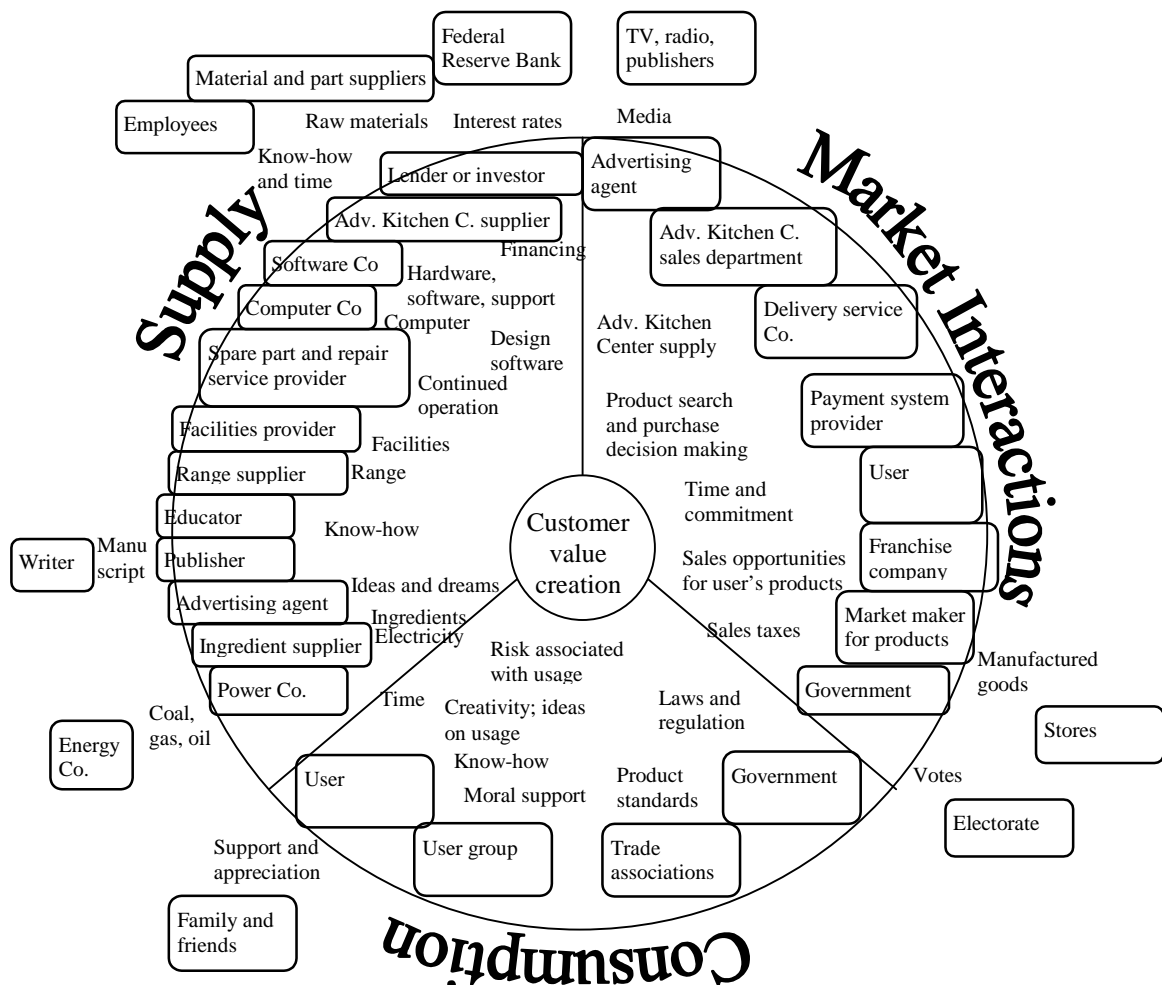
We are all too used to think of value being something delivered by a supplier. However, in most modern products the customers are better than anybody else at creating value for themselves and as a supplier the best we can do is to facilitate this process. The unique dishes the users are able to create with the Advanced Kitchen Center are after all what make the whole thing worthwhile. Even for a consumer product like a pair of jeans an important part of the value stems from the user's consumption: keeping warm inside of them and showing them off to piers; and as more other people use that type of jeans their value goes up in terms of fashion.

Besides the supplier of the Advanced Kitchen Center there are many other entities who are critical in helping the user create value, such as the supplier of the computer that controls the Advanced Kitchen Center, the books who teaches the user how to cooked this way and the advertisement agent who creates the dreams that the user is fulfilling by using the Advanced Kitchen Center. The value net contains all these people and organizations (nodes) that have an impact on the value, either by creating value or by destroying it. While the traditional value chain focuses on the core line of suppliers, distributors and customers, the value net includes also the ones that directly or indirectly interact with the core line. For example, if the customer and five of his/her friends have a club on automated cooking then the social interactions in this club can contribute to the value that the customer gets out of owning an Advanced Kitchen Center. This club is therefore part of the value net although there is no monetary transaction that ties it to the conventional value chain.

The purpose of mapping out the value net is to better understand how the user of an Advanced Kitchen Center will create value. However, it is important to be creative in identifying nodes in the value net; sometimes they are not obvious. For example, it is easy to overlook not-yet-existing nodes such as a hypothetical company outsourcing catering work to individuals working at home, thereby helping the owners of Advanced Kitchen Centers create more value. The nodes in a value net fall into three different groups according to the role they play: (1) the ones who act as suppliers, (2) the ones who create the market interactions and (3) the ones who take part in, or influences, the consumption process. It is a good idea to search for any entity that potentially can take on any of these three roles and question if they should be included in the value net.

A subset of the value net surrounding the user of an Advanced Kitchen Center is shown in Exhibit B. Along the outer circle is listed a variety of nodes and inside each node are shown some of the value drivers they use to influence the value creation. The second layer of nodes placed outside the outer circle show examples of second tier entities that influence the value creation through the nodes along the outer circle. Mathematical models based on historical financial records have revealed that second or even third tier nodes can significantly impact a user. It can be a daunting exercise to look at all these higher order nodes, because the number of them goes up exponentially as they become more distant to the user.

Exhibit B. Some of the nodes in the value net (in boxes) and specific value drivers (listed next to the boxes) as they relate to the user of an Advanced Kitchen Center. They are grouped according to how they fall into three basic groups of value drivers: supply-, market interaction- and consumption- related value creation.



In this simplified value net for the Advanced Kitchen Center we have one supplier selling directly to the end users. But who is the end user really? here are some examples:

1. A *Home User* who cooks meals for the family.
2. A *home producer* producing meals to sell to others.
3. A *commercial user* who for example has a restaurant or a hospital.

Each of these three different types of end users will benefit particularly from different nodes in the value net. The home producers could benefit from a franchising company that can give brand equity and technical support to their home production. The commercial user may be particularly sensitive to nodes that can provide timely service and spare parts. In the next section we will look at ways of quantifying what is important to a particular user.

Step 2: Modeling Value Creation

The price that a customer at most is willing to pay for a product will depend on the value the customer expects to receive from the product. We can look at the value as a combination of all the value drivers that the different nodes are providing. If an essential complement, let's say electricity, is not present the value of the entire bundle vanishes. If there are many supporting offerings, e.g. ingredients, self-help guides, evening classes and user communities, then the value goes up. Exhibit C shows some selected exchanges in the value net related to the Advanced Kitchen Center and a qualitative assessment of their relative importance.

Exhibit C. Value exchanges for selected nodes interacting with the user.

Node in value net	Delivered to user	Received from the user	Value	Market Power	Transaction flow
Supplier	Hardware, internal software, customer support	Money, user feedback	High	High	One time
Software co.	External software, customer support	Money, user feedback	High	Medium	One time
Supplier of semi-ready solutions	Catalogues of base recipes that the user can modify or incorporate into their meals	Money, user feedback	Medium	Medium	Ongoing
Ingredient suppliers	Ingredients used in the Advanced Kitchen Center	Money	High	Low	Ongoing
Power co.	Electricity	Money	High	Low	Ongoing
User group	Support, ideas, social aspects	Support, ideas, social aspects	Medium	Low	Ongoing
Publisher	Books and tutorials	Money	Medium	Low	One time
Government	Legal limitations on usage	Sales tax	Low	Very high	Ongoing

It is possible to build a mathematical model that depicts all of these relationships (see note 2), however, in this short paper we will only look at the general principles and use some crude estimates as an illustration. There are two key challenges associated with the development of a model: how to quantify value and how to estimate it for a product that does not yet exist.

Quantifying the overall value by combining the effect of the various value drivers means that each and every contribution must be measured in the same unit. If we elect to

measure value in terms of dollars, which is very convenient, then it is important to keep in mind that the dollar itself has a different value to each customer. So for a group of customers, not only will each of them will assign a different importance or utility do the different value drivers, but each of them will also have their own exchange rate to dollars so we will see a broad range of different dollar values assigned.

If we look at one single customer then we can estimate a base value as well as changes in this value based on changes in specific value drivers. The base value ties to the most important of all complements, namely what we can call the need. We can estimate the base value from what the customer is already paying for obtaining a similar utility or from the size of the savings that the product brings. It is challenging to estimate the base value far out in the future because unexpected new applications are often discovered over a very long period of time. It took more than a century from the invention of the telephone until somebody started using cell phones for email! Of course the wireless infrastructure and the Internet are both complementary offerings, which Graham Bell did not even have a notion of.

The changes in this base value are estimated based on positive or negative impact of specific value drivers. We can estimate the negative impact an increased cost or total lack of availability (that is the same as an infinite cost) of any of the complements will have on the overall value. Estimating value drivers for a new product can be tricky because there is not direct historical data. However, we can assume that the impact from changes in price or availability of complements will be similar to what other markets have experienced. For example, we can learn about software from the computer industry, and about electricity from other home appliances. In a similar fashion we can estimate the impact of value drivers relating to different product configurations or designs, e.g. existing products can reveal the value added from a sleek contemporary design or an added product feature such as being able to control it over the internet.

Examples of some of the estimates for two different specific users of an Advanced Kitchen Center are shown in Exhibit D. All estimates in this paper are for the automation component, over and above a standard range and a standard personal computer.

Exhibit D. Estimates of value to two specific users, one of them being a Home User, the other being a Commercial User. Note that the total cost of the Advanced Kitchen Center is not yet included but the impact of a change in this cost is shown in the lower half of the table. While the data shown here are hypothetical the actual data are based on surveys of potential users.

	Change by	Home User	Commercial User
Estimate of value delivered during first year of ownership			
Utility of objects produced (compare to commercially available solutions)		\$700	\$100,000
Cost of materials and paid labor consumed		(\$350)	(\$90,000)
Satisfaction of getting home made fresh meals		\$100	\$0
Uniqueness of meals		\$75	\$0
Ability to meet specific unique needs		\$50	\$5,000
Ability to keep inventory low		\$1	\$3,000
Value of fast delivery		\$40	\$5,000
Total expected value		\$616	\$23,000

Estimate of impact on base value though changes in selected value drivers			
Cost of Advanced Kitchen Center	+\$1.00	(\$0.30)	(\$0.45)
Cost of additional software (cf. computer)	+\$1.00	(\$0.25)	(\$0.75)
Cost of ingredients	+\$1.00	(\$1.00)	(\$1.00)
Branding of Advanced Kitchen Center and supplies (compared to generic)	10% more people recognize brand	\$50	\$1,000
Ease of use (time saving)	10% less time	\$50	\$5,000
Additional customer service and support	+\$1.00 spent	\$0.75(*)	\$1.00
Customer support during sale	+\$1.00 spent	\$1.25(*)	\$1.00

(*) The equilibrium will be when these numbers equal one, as more is spent on either item the incremental value to the customer will decrease.

Step 3: Estimate the Risk

With a new product like the Advanced Kitchen Center most customers will be in doubt about how much value they ever will be able to harvest, and naturally they will be discounting the product accordingly. If we through promotion can educate the potential users and convince them about the benefits, then the discount will be less and the value higher. A warranty or a money back guarantee can also help reduce the risk and thereby increase the value.

For financial products we are familiar with using risk related discount rates of future cash flows. We do not have a similar market line for consumer products, but again here historical data from other products can help us. For example, many electronics retailers sell extended warranties and from that we can estimate the value to the end user for reduced risk of product failure. Exhibit E lists estimates for some specific risk factors.

Exhibit E. Risk discount-factors relating to potential threats within one year of ownership.

		Home User	Commercial User
Discount associated with	Risk of product failure	4%	10%
	Risk of not being able to get service and support	2%	8%
	Risk of not finding a use for product	10%	2%
	Risk of obsolescence	5%	10%
	Risk of not becoming a proficient user	10%	1%
	Risk of not having time and money to use it	6%	1%
	Other risks	10%	5%
Total combined risk discount		39%	32%

In the absence of risk mitigating measures such as warranties, free upgrade subscriptions, money back guarantees and insurance the values to each of the these two types of users will be reduced as follows (Exhibit F) if we assume a uniform risk each year and no changes in the value harvested by the user. More exact models will naturally take changes in value and risk over time into account.

Exhibit F. Discounted future value for user who buys an Advanced Kitchen Center in the year being analyzed.

	Home User	Commercial User
Year 1	\$443	\$17,424
Year 2	\$319	\$13,200
Year 3	\$230	\$10,000
Year 4	\$165	\$7,576
Year 5	\$118	\$5,739
Total for first 5 years	\$1,275	\$53,939

Step 4: Estimate the Market Power

If value is depicted by the size of a cake then market power describes how large a fraction of that cake you possibly can get. The user will look at the value of the entire bundle, of which the physical Advanced Kitchen Center is only a small portion. It is legitimate to charge for value that others create, including value created by the customer. However, in order to do so you must have adequate market power. It is easier to create value than to charge for it, many Internet companies were excellent at creating value, but failed when it came to turning this value into profits.

There are two aspects of market power. The market power relative to the customer determines how much of the value to the consumer actually can be charged as a selling price. The market power among the suppliers of complementary products (hardware, software, ingredients, power, and so on) determines how much each of them can charge. In terms of the Advanced Kitchen Center, the customer has relatively little power because there is almost no direct competition and the initial limited supply of Advanced Kitchen Centers. Both factors leave the supplier in a strong position, and in a position to only serve the clients that value the Advanced Kitchen Center the most. On the other hand there is plenty of indirect competition from suppliers of ready-made meals to home-helpers.

In case of the relative power between the Advanced Kitchen Center supplier and the suppliers of complementary products, then it will to a large degree depend on the competitive structure of each of their markets. Exhibit G shows the estimated relative market power of some of the key players. These estimates are among other things based on the ratios of profitability between various already existing industries. It is seen that here again, the Advanced Kitchen Center supplier is in a fairly strong position. Many old economy businesses are used to think of the market price as “cost plus”, however, that assumes that there is a strong competition and that the suppliers are willing to quit doing business if they cannot get their “plus” above cost. That type of market weakness holds for some of the suppliers of complementary products.

Exhibit G. Relative market power

	Home User	Commercial User
Customer in part as a result of indirect competition	0.05	0.20
Advanced Kitchen Center supplier	0.70	0.28
Range supplier	0.13	0.15
Ingredient supplier	0.03	0.25
Electric power	0.02	0.02
Education and publishing	0.02	0.02
Other (not listed above)	0.05	0.08

According to these estimates the highest price that can be charged to the end user is \$873 (0.7 times \$1,247) for the Home User and \$15,102 for the Commercial User (this is for the automation component only). In most cases businesses elect to charge less than what the value and power would allow them to do. For example, if the Advanced Kitchen Center is sold at a fixed list price independent of individual differences in customer value it will be impossible to capture all the value delivered.

Step 5: Analyzing the Cost Structure

We can break the cost into three different types:

1. Knowledge related. Most of this is tied to product R&D, manufacturing process development, market intelligence gathering, and other up front investments that are almost the same independent of the subsequent production volume. For most high volume products there are huge potential benefits from using fixed initial cost to reduce subsequent variable cost.
2. Scarce resource related cost such as raw materials and labor. These are mostly variable in nature. A large knowledge component will often facilitate a reduced scarce resource cost.
3. Customer specific cost. An Advanced Kitchen Center is a software intensive product and in average a third to half of the total price of a piece of software can be expected to go towards customer support. However, some customers need a lot more help than others; some customers will even cost more in customer support than they paid for the product initially. As long as it is practically possible to separate the customer specific cost it opens for the possibility of identifying where the profit really is generated.

The cost broken down into these three groups for a Home User and a Commercial User are shown in Exhibit H.

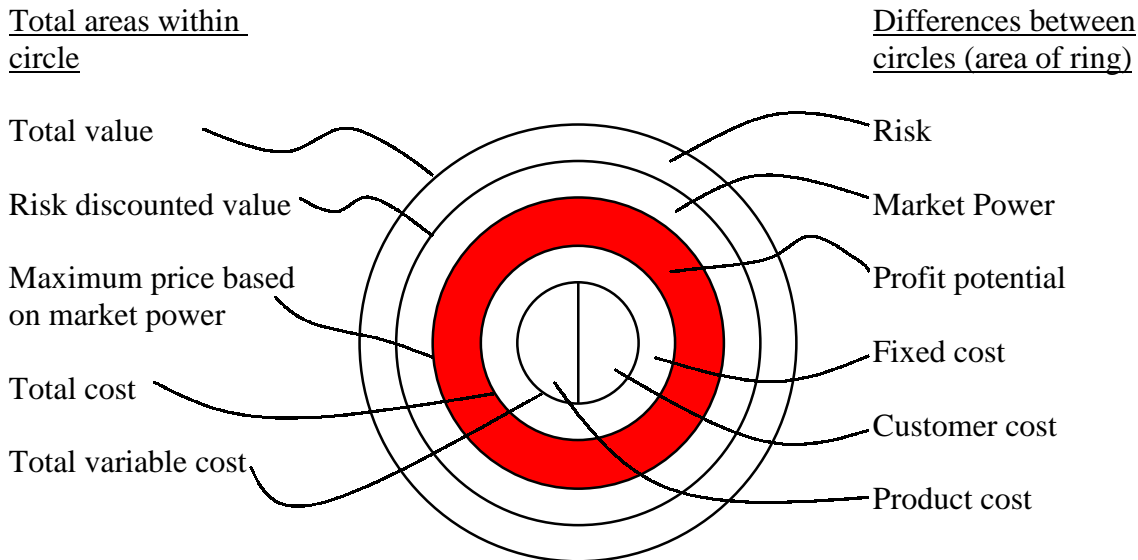
Exhibit H: Estimated cost structure for the Advanced Kitchen Center

	Home User	Commercial User
Fixed cost (for all units)	\$50M	\$7.5M
Variable cost	\$113	\$652
Customer specific cost	\$217	\$357

Step 6: Evaluate the Profit Opportunity

We are now in a position to calculate the profit. The following diagram illustrates how the different estimates found so far fit together conceptually. The size of the outer circle represents the total value to the user (step 2). By subtracting the risk, we get a smaller circle that represents the risk-discounted value (step 3). By identifying the market power we can further scale this circle down to a smaller circle that represents the maximum price that can be charged to the customer (step 4). Starting at the other end we can estimate the cost (here broken down into a variable cost circle and a larger total cost circle) (step 5). The difference between the cost circle and the maximum price circle leaves us with a ring, the thickness of which represents the range of feasible profits (step 6).

Exhibit I. Diagram illustrating how the different parts of the process relate to the profit estimation.



So far it has all been about understanding one user and one base configuration of the value network. Getting to the bottom line requires that we look at the entire market and all the possibilities. Every aspect of this evaluation will change as the volume goes up:

- The value to the user will often go up as the user base increases and more complements become available. At the same time a large market will include customers, that do not necessarily have that much of a need for the product.
- The sensitivity to changes in price and availability of complements will typically go up. The lead users, can get by with very little help while late adapters will need a much broader selection of supportive offerings, and probably even a different configuration of the value net.
- When the market is small it is often limited to the users with the lowest risk exposure, such as the ones who know for sure that this is what they want or who can afford a mistake. As the audience broadens more of the maybes appears.
- The market power to the supplier goes up as the market grows. Any single customer becomes less important and the other suppliers will become more dependent on this product. At any given power level it is good to check that the other key suppliers have enough of an opportunity to be willing to participate in delivering a solution to the customer, for example is there enough of a profit opportunity for a publisher to be willing to publish a teach your self guide?
- The fixed cost is not quite fixed as higher volumes will require more in terms of automated manufacturing facilities, but yet the overall fixed cost per unit goes down. The variable cost goes down as well at higher volumes. The customer specific cost is sometimes going up per unit at higher volumes, again because these users are generally less skilled and need more support.

The various exhibits, so far, have been based on an estimated market volume of 50,000 units per year for the Home User version and 500 for the commercial version. It is now

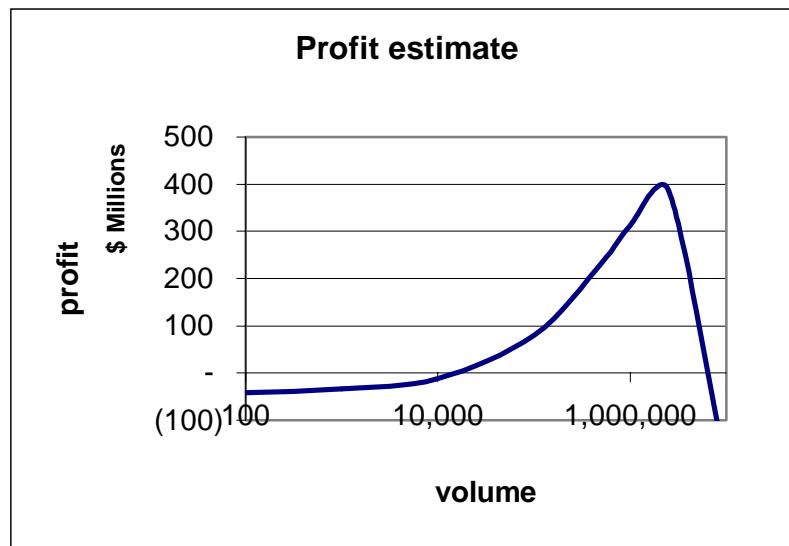
time to look at how key parameters change as a function of volume that is shown in Exhibit J for the home version.

Exhibit J. Key parameters at different volumes for the home Advanced Kitchen Center.

Volume	10	100	1k	10k	100k	1M	10M
Total expected value per year (the lowest for any user at this volume)	\$500k	\$50k	\$10k	\$2.5k	\$1k	\$500	\$300
Risk discount	10%	15%	20%	25%	30%	43%	65%
Discounted value over 5 years	\$1.9M	\$167k	\$30k	\$6.7k	\$2435	\$968	\$424
Market power to Advanced Kitchen Center supplier	0.46	0.53	0.59	0.64	0.68	0.71	0.73
Fixed cost	\$50M	\$50M	\$50M	\$50M	\$50M	\$50M	\$50M
Variable cost (average per unit)	\$2k	\$1k	\$500	\$250	\$150	\$100	\$75
Customer specific cost (average per unit)	\$350	\$150	\$150	\$175	\$200	\$225	\$250
Profit if there is one price and it is set as high as possible	(\$41M)	(\$41M)	(\$33M)	(\$11M)	\$81M	\$312M	(\$206M)

The following figure (Exhibit K) shows the profit estimate as a function of volume.

Exhibit K. Profit originating from the home market of the Advanced Kitchen Center.



For the given set of input data the optimum price-volume combination is 2.5 million units sold at \$407 each to the end user (taxes and distributor markup included) giving an estimated profit of \$386 million.

At this point the sensitivity to changes in each of the basic parameters (Exhibit D) can be evaluated. It is also possible to evaluate how changes in any of the value drivers will impact the bottom line. Furthermore, calculations covering several years can be done to find the highest possible net present value of the investment.

Step 7: Draw the Conclusions

Numbers are here to support business decisions, not dictate them. Business is about profiting from carefully constructed and maintained value networks. The framework presented above can be used to analyze the different strategic alternatives. While the discussion above took many things for granted, it is now time to question every

condition, and quantitatively look at the impact of these changes. Here are some of the questions as they relate to the different steps:

Step 1: The Value Net

- Who should the customer be?
- What is needed to create value for this customer?
- What part of the value net should we occupy? What part should others take care of? What can we do to ensure they will do a good job?

Step 2: Value Drivers

- How does this customer create value?
- How can we help the customer create the need for the Advanced Kitchen Center?
- How is the customer impacted by changes in any of the value drivers? What network externalities do we need to make sure exists?

Step 3: Risk.

- What risk mediating options should we elect to reduce the risk (warranty, money back guarantee)?

Step 4: Market Power

- What tools should be used in creating market power (patent, standard such as standard for food containers)?
- Do we occupy the best part of the value net?

Step 5: Cost

- What is the right balance between the three types of costs?

Step 6: Profit Opportunity.

- What is the right price-volume strategy over time?
- How can we plant the seed for the next generation of revolutionary technology?

Addressing these kinds of questions and estimating their impact on the bottom line places us in a unique position to formulate a strategy that is based on much more than business savvy and intuition.

Notes

(1) The concepts described in this paper correspond to the following equations:

$$P = V * M * f$$

where P is the selling price, V is the value, M is the market power and f is a ratio between what could be charged and what is actually charged to the customer. V can be found as a combination of individual value drivers, in general values of complementary goods are multiplied and values of substituting goods are added.

$$C = a/X + b + c$$

where C is the total cost for one unit, a is the general fixed cost, b is the variable cost, c is the customer specific cost and X is the total quantity sold. If there were no difference in time between cash flows the profit would be P minus C.

When all the different estimates of value, risk, market power and cost are in place optimizing profit can be treated as an optimization problem. Value is not a linear function of the individual value drivers, so a full model must be constructed.

(2) The mathematical approaches used include multivariate regression, support vector machines and partial least squares combined with neural network analysis. The models derived show the relationship between value created and a subset of value drivers that have been identified as important.