

Value-Based Pricing For New Software Products: Strategy Insights for Developers

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Software pricing has traditionally been focused on the vendor's internal business objectives of covering costs, achieving specified margins, and meeting the competition. Pricing methods such as flat price, tiered pricing, MIPS-based, usage-based, per user, per seat, and pay as you go, are often tactical in nature and easily matched by competitors, which can undermine profitability by accelerating the commoditization process. Conversely, a value-based approach charges a price based on the customer's perceived value of the benefits received. Value-based pricing methodologies can be used to estimate the market value of new software concepts at various stages of the development process in addition to pricing new products for launch. This paper describes a value-based approach to pricing that is dependent on the firm's commitment to invest in the development of its long-term "pricing capital." This investment in methodologies, infrastructure, and processes to create, measure, analyze, and capture customer value is the key to successful long-term pricing strategy.

I. INTRODUCTION

No tool in the marketing toolbox can increase sales or destroy demand more quickly than pricing strategy. The pricing decision is one of the most critical decisions that a firm can make in the launch of a product. Managers in the software industry have traditionally developed their pricing strategies by overemphasizing cost-related criteria at the expense of focusing on the value of the product to the customer. Cost-based pricing strategies are focused on short-term value to the vendor. Conversely, value-based pricing is based on the customer's perception of the value of the product, not on product costs (see Figure 1). Value-based pricing strategies are focused on creating long-term value for the customer.

From a marketing perspective, the goal of pricing strategy is to assign a price that is the monetary equivalent of the value the customer perceives in the product while meeting profit and return on investment goals [37]. This paper posits the view that traditional cost-based approaches to software pricing are short-term, tactical in nature, and place the interests of the seller over the interests of the buyer. Conversely, pricing approaches based on customers' perceptions of value are strategic and long-term in nature since they are focused on capturing unique value from each market segment through the pricing mechanism. We will argue that software firms need to invest to create "pricing capital" to ensure the long-term benefits of value-based pricing. Firms that invest in a strategic pricing center can make better product decisions throughout the development process by understanding how customers value product alternatives and arrive at prices that they are willing to pay.

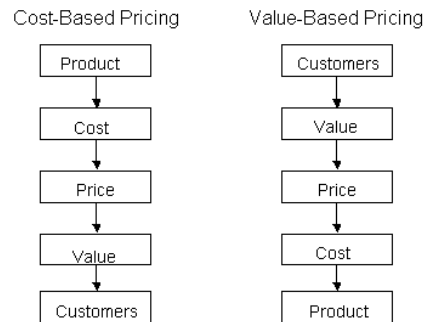


FIGURE 1. Pricing Conflict in the Product Development Process

II. TRADITIONAL COST-BASED PRICING

Cost-based software pricing is historically the most popular method since it relies on more readily available information from the cost-accounting system. This data is generated as a matter of course to produce operating results, budgets, and financial statements. It is imbued with an aura of authenticity. Financial, marketing, and product managers are schooled to price the software product to yield a desired return on fully allocated costs. No product development/business plan for a new software product would be approved without an attractive ROI as its centerpiece [33]. This financial roadmap to profitability, which ignores the voice of the customer, can become a blueprint for mediocre market results. Cost-based pricing strategies can exploit the market power of the seller to force a higher price on to the seller.

The fundamental problems with cost-driven pricing derive from the assumptions that must be made about product costs. First, unit costs are volume dependent. Fixed cost per unit is an allocated number that varies with projected volume. The allocation procedures, be they direct labor hours, or some other surrogate metric, are not very precise. Therefore, product costs are imprecise at best and a continually moving target at worst [31].

In addition, cost-based pricing is bedeviled by a circular logic—price is based on unit-volume assumptions, but price will determine sales volume. The inability of managers to successfully model the impact of price on volume and of volume on price calls cost-based pricing into question. The circular nature of cost-based pricing can lead to overpricing in weak markets and under-pricing in strong markets [52]. For example, if a firm loses volume and market share to an aggressive competitor, managers using a cost-based pricing model will be under pressure to raise prices to recover their increasing costs

and to recapture lost margins. The predictable result is the further erosion in competitive position. Conversely, in conditions of excess demand, where a backlog of orders exist, the cost-based system is slow to raise prices since profit and volume goals are being met. Therefore, the company subsidizes customers who would be willing to pay more to acquire the product more quickly and thereby loses out on potential profits. A smart competitor that discovers this situation can take advantage by drawing these backordered customers away.

Finally, the generally accepted accounting principles (GAAP) for determining the value of high-technology companies have come under considerable criticism over the appropriateness of reported cost data [72]. GAAP accounting was developed during a time when there was a very clear distinction between labor and capital. The costs of the factors of production such as machine tools, rolling stock, and computers were placed on the firm's balance sheet and depreciated over time as the assets were used to generate revenues. By matching expenses to the revenues in the appropriate time periods (through depreciation schedules), a relatively accurate picture of the company's costs and profitability emerged, at least theoretically. This GAAP treatment, when applied to businesses where the factors of production are labor-related, such as software, can produce misleading results that not only overstate product costs, but also can cause valuation problems concerning the company's stock price [57]. Furthermore, software companies are characterized by the intellectual effort of their employees. Under GAAP, the salaries of software programmers and architects are written off as they occur. They generally do not appear on the balance sheet. This practice raises product costs and places tremendous pressure on the pricing mechanism to try to maintain margins. Therefore, the last reason for the overemphasis on cost-based pricing is the lack of relevance of outdated accounting practices that inflate product costs in the short run. GAAP does not accurately match knowledge-based product costs to the resulting revenue stream [11,72].

A. *Cost-Based Notions of Value*

To the extent that customer value is addressed in the traditional software pricing models it is often calculated as "net value" or profit. Net value is calculated by subtracting the software's development cost from its price, or total value to the customer. The assumption is that the relevant value drivers can be identified and translated into dollar-equivalent values indicative of the price the customer is willing to pay. The total value to the customer is defined in terms of specific needs fulfillment, good will, ease of use, opportunity costs, the business value of information, or other *unmeasured* factors [8,9].

Although this type of customer-value measurement is possible through sophisticated market research techniques, many software development projects proceed *without* this critical information. It is often perceived to be too expensive or time consuming to collect such data from actual or potential customers. The default value measurements are the ones that can be more readily discerned and quantified through economic analysis. Typically, factors such as transaction costs savings and other TCO related metrics are the most often used, but this method omits potential value drivers that may be more important to the customer [17].

Earned value (EV) is a related cost-based concept that is used for tracking a software project's adherence to the original project budget. EV analysis focuses on explaining the cost variances between the amounts budgeted for the work and the equivalent dollar volume of work accomplished during a specified time period. The cost variances are identifiable to specific project tasks, which can then be evaluated for corrective action [40]. These cost-based approaches to measuring value form the basis of the dominant software engineering economics models [8,9,43].

The cost-based approach to valuing software products has considerable support from the field of strategic cost management [11,32,59]. Practitioners of the activity-based costing (ABC) approach to determining product costs recognize that traditional cost information is not useful for managers who need to base strategic resource allocation decisions on accurate product costs. ABC methods can improve the overhead allocation process for assigning costs such as logistics, marketing, sales, production, finance, and general administration to individual products or product lines. Traditional methods of overhead allocation use direct labor hours that tend to over burden less-complex products and high-volume products. Conversely, they under allocate overhead cost to complex to low-volume products. The resulting cost distortion can produce misleading profit estimates and lead to poor decisions.

A firm's cost behavior and relative cost position in an industry are derived from the value-producing activities of the firm. Each value activity has its own cost structure. After identifying the relevant value chain, operating costs and asset costs are assigned to the product-related activities that they support. By analyzing the "cost drivers" of its value producing activities the firm can better assign costs to products and understand its true cost position [11].

Whereas, ABC methods can lead to more accurate product costing, they do not shed much light on how to price software products. Managers can, however, have a more accurate understanding of the true cost of the product over the relevant volume range. This is helpful in knowing if a profit can be made at the price the customer is willing to pay. If the product price is known, ABC can lead to better product mix and capital investment decisions [11].

The practitioners of cost-based pricing recognize that improvements in product and process designs can be extended to customers by lowering their total cost of ownership and increasing customer ROI. This ability of new products to lower the customer's total costs is viewed by ABC proponents as "adding value" to the customer. The goal is to capture most of this value increment through higher prices. Total value added is defined as the accounting difference between the delivered market price (however determined) and the total cost of the product. This is similar to the net value of software economics.

Porter [54,55] popularized the notion that competitive strategy is based on the creation of sustainable competitive advantage through cost leadership and differentiation. Cost leadership strategies seek to achieve a lower cost relative to competitors through scale economies, experience curve effects, effective cost controls, and value engineering of products, processes, and materials. Cost leadership strategies move the firm down the demand curve as volume increases. This approach to strategy fits in quite well with the traditional notion of software pricing, particularly for commercial software. The value

added is a function of cost leadership, some of which is shared with the buyer of the software.

Differentiation-based strategies seek to create products that are perceived to be unique on dimensions that are valued by specific customer groups. Differentiation is based on features, advantages, or benefits that are perceived to be important, distinctive, preemptive, superior, and affordable by target customers [38]. In order to determine which product attributes will affect a strong differentiation strategy, product developers will need to conduct market research. Without market research, the default strategy will revert to cost leadership, which can be modeled and measured with relative accuracy. Low cost can be an effective differentiator if the cost advantage is so overwhelming that competitors cannot match it. However, in technology related markets such as software, technology advances tend to reduce or eliminate cost advantages relatively quickly.

B. Cost-Based Software Pricing

Disputes over pricing are perhaps the most contentious hot button issues that arise between software vendors and their customers. Pricing resistance arises from high software prices and perceptions that the vendor puts its own interests ahead of those of the customers. A lack of trust can result from heavy-handed, cost-based pricing. As a result of the relatively heavy investment in software R&D when compared to other product costs, software vendors have high fixed cost in terms of software development and relatively low variable costs (excluding service and support). This situation results in the heavy emphasis that software product managers place on the goals of cost recovery and rapid return on investment through the pricing mechanism. This pressure often leads to pricing strategies that are not explicitly customer-value oriented [50,23,24].

The vendors' cost-driven, rate-of-return-based pricing models are supported by promising the customers improved ROI through increased sales, reduced costs, and reduced risks [33]. Risk includes customer benefits that have indirect financial effects such as creating competitive advantage, legal compliance, reduced liability, or minimized financial exposure. Since these benefits are difficult to quantify, customers look to the default metric of increased ROI through cost savings and increased sales as the primary justification for purchasing enterprise-scale software [63,64]. A review of common approaches to software pricing follows.

1. Flat pricing. Users pay a fixed price for unlimited use of the software product. This approach enables customers to more easily predict what they will pay for the use of the software. The fixed price is usually restricted to a particular user and/or machine. Many consumer software offerings are priced in this manner. Some level of online support is typically built in for a set period of time. The primary drawback to this method is the lack of flexibility in customizing a price for each customer based on the value the customer requires. Some customers will have to pay more than they would like and may be motivated to seek better deals. Others will enjoy a subsidy since they would be willing to pay more for the higher value they perceive. A fixed-price strategy can be segmented to embrace discounts for large purchasers, government, and members of preferred buying organizations [53].

Flat pricing simplifies the vendor's pricing model since the price is set to return a dependable but fixed rate of return. Prices are based on a financial return

model, not on customer value. Prices are increased when costs increase. AOL has used such a pricing strategy throughout much of its business life. It charged a high fixed price for dial-up internet connectivity and justified it by offering captive media content. More recently, the company has been forced to revise its pricing to stem the loss of customers to broadband. These customers want fast connections. AOL is trying to keep them engaged by offering AOL content over any broadband connection and a limited backup dial-up service for out-of-home connectivity. AOL switched to a lower flat-rate price to try to keep the broadband customers [6].

Enterprise software vendor Oracle has introduced a fixed price option covering the purchase, installation, and support for its business applications. Buyers of its E-Business Suite 11i for accounting, human resources, and manufacturing operations can choose an “all-in-one” monthly fee option, without upfront payments, that covers the above mentioned costs in addition to outsourced software management by Oracle [58]. This change in pricing strategy has enabled the company to position itself in the small and medium-sized market. Large customers also like the arrangement since it allows them to test the viability and return on investment of the software. The goal for Oracle is to convert these larger month-to-month customers to long-term, fixed price contracts after an evaluation period [36].

2. Tiered-pricing. Tiered-pricing attempts to package software benefits according to user requirements and their willingness to pay. This approach to pricing is an attempt to link software product costs to perceived customer value. IBM was among the first software vendors to use tiered-pricing plan that was based on the categories of processors for its mainframe computers [1]. Costs to the customer were arbitrarily increased when software was run on a more powerful system, increasing profits for IBM. The logic here is more powerful systems increased the user’s productivity and ROI. The added benefit to IBM of this approach is IBM’s cost did not increase proportionally, resulting in more profit. The assumption was that the customer should be willing to pay more for the increase in value. Since customers were skeptical of unmeasured increases in productivity, and aware of IBM’s software economics, this method tended to increase the already high pricing tension between IBM and its customers.

Tiered-pricing is viewed more favorably when the customer can easily see the increase in value received and the pricing scheme offers desirable choices. Nokia recently created pricing tiers for its software development tools [7]. The developers’ forum is now free, but heavy users of support services will be charged on a tiered basis for bundled services. Similarly, Adobe introduced tiered prices for its Acrobat products based on how customers use them [20]. For example, customers who create PDF documents, add comments, and sign them will pay more than customers who only create PDF documents.

3. MIPS-based pricing. Software prices are based on the on the theoretical throughput of the system (MIPS) on which the software is running [18]. Use more MIPS, pay more licensing fees. MIPS pricing schemes evolved from earlier tiered approaches. This scheme is based more on the vendor’s attempt to recover cost and ensure margins than it is on precise measurement of customer value. The user paid upfront for this capability based on the computing power of the machine the software was running on. However, this scheme could result in different costs for the same

software doing the same tasks, but run on different machines with different MIPS signatures [68,69].

In 2000, IBM was the market leader in the mainframe software market with a market share that exceeded 60%. This market position provided IBM with tremendous pricing power. Most ISVs followed IBM's pricing methods and customers had little choice but to pay if they wanted IBM software. Since 1980 the cost of IBM software had remained approximately \$2000 per MIPS for the average user. On the surface IBM appears to have increased customer value by not passing on cost inflation to its users. However, a user in 1980 with a capacity of 10 MIPS that was using 2,000 MIPS in 2000 would have seen its licensing fees increase from \$20,000 to \$4 million a year. This increase equates to a CAGR of approximately 30% in software prices for IBM. Needless to say, IBM customers, facing accelerating needs for installed MIPS, were not pleased with these economics [25].

The current variant of the MIPS model is called workload license charges (WLC) [68]. WLC pricing attempts to resolve the customer's distaste for being charged for capacity they do not use by introducing variable WLC and flat WLC options. Under the variable option a user may choose to pay for full capacity (based on the software's capacity units constrained by the hardware's capability) or for some sub-capacity WLC [69,70]. The monthly subscription charge for sub-capacity WLC is based on the software's capacity, given the capability of the logical partition in which it runs, not the full capacity of the central processor complex. The software vendor sets the WLC based on its cost structure and desired margins. As the price of computer hardware has continued to fall, and competitive options have increased, customers have increasingly pushed back on this type of pricing model [70,71].

4. User-based pricing. This is another cost-based pricing method that tends to benefit the vendor more than the user by maximizing license fee revenues. The charge is based on the number of users that utilize a collection of software features over a given period of time. It attempts to assign costs to a particular number of users or workstations. It is an easier model to work with than tiered or MIPS-based approaches [62]. The principal variations on this theme are described below.
 - a. *Per-user pricing*. Prices to the individual user who typically can use the product on an unlimited basis for the term of the license [3]. The price is set on assumptions about product costs and customer use. This approach typically offers one price for a specified number of users. Oracle has recently introduced user-based pricing for its E-Business Suite. The goal is provide a simplified licensing model that is sensitive to the customer's changing, and sometimes unpredictable, IT needs [62].
 - b. *High water mark pricing*. Charges are based on the maximum number of concurrent users over a given time period.
 - c. *Per seat or per client pricing*. Similar to per user pricing, except that the license is assigned to the workstation and can be used by a designated number of users.

The big problem confronting software vendors is nobody knows how to define what a "user" is anymore. With outsourcing, a user could be someone outside the corporation. User-based pricing also makes customers pay for software that may not be used sufficiently to justify its cost [65].

5. Usage-based pricing. Customers pay only for what they actually use on a transaction basis. This model is also known as “pay-as-you-go pricing” or network-based pricing model. It is often associated with an application service provider (ASP) model [2]. This model charges for outsourced services by transaction, time in use, peak period, or some other subscription metric. The application is delivered over the Web. Typically, users pay a minimal set up charge, the use fee, and for service and support. In addition to the lower TCO for the ASP model, customers can deploy their applications more quickly, which reduces their time-to-market.

III. VALUE-BASED PRICING

As we have seen from the previous section, software vendors often approach pricing from the requirements to cover costs and achieve profit objectives—often to the detriment of their customer relationships. The circular logic of the cost approach where costs sets price and price influences sales volume bedevils the pricing process. The key to value-based pricing success is the recognition that the price the customer is willing to pay depends on the *customer’s* value requirements, not the vendor’s. Buyers make judgments about benefits and prices and choose those products that maximize their perceived value. The goal of value-based pricing is to enable more profitable pricing by capturing more value. That price should, in turn, determine the level of product (development) costs that the company is willing to incur.

A. *Building the Foundation for Value-Based Pricing*

Customer value is the overall benefit derived from the product, as the customer perceives it, at the price the customer is willing to pay [29,60]. At the core of perceived-value pricing is the requirement that companies must first understand how the customer perceives value. Perceived value can be defined in terms of the tradeoff between perceived benefits received and the perceived price for acquiring the product or service that delivers those benefits [30]. Software developers should understand what these tradeoffs are and how they should influence software design.

In addition to understanding the product’s cost structure, the software-pricing manager must set the market objectives for how the product will be priced. A key factor that must be taken into account in all pricing decisions is the shared economies or cross-subsidies that occur in multi-product firms [66]. Shared economies can distort the pricing picture when one product or segment absorbs more of the average costs than another. The average price across the product line or across segments may obscure distortions in individual products or segments. In order to control the potential for shared economies to distort pricing strategy, three global pricing objectives will be considered: differential pricing objectives, competitive pricing objectives, and product-line pricing objectives [13].

Differential pricing objectives are considered when the product is sold across segments at different prices with shared costs and potential shared benefits [76]. For instance a high-price segment may subsidize a low-price one. But the increased volume in the low-price segment may lower overall product costs to the long-run benefit of all consumers. Competitive pricing objectives are set to exploit a competitor’s vulnerability.

A sufficiently low price may keep competitors out of a key segment. Product-line pricing objectives enable the exploitation of shared economies across the product line and across segments. Shared engineering, production, and marketing costs should be considered in setting the pricing objectives.

The second major factor to be considered is the pre-purchase characteristics of consumers that may predominate in any pricing situation and enable different pricing strategies to be utilized [13,66]. Some customers have high search costs since they place a high importance on their time and opportunity costs. They are not willing to spend time searching for product information. Since they are not well informed they tend to associate high prices with high quality [22] or to buy randomly at higher prices. Others may search somewhat more actively to take advantage of discounts. Customers with low reservation prices have no pressing need for the product and will wait for a lower price. Others may have high reservation prices for the same product but are in another defined value segment. Finally, customers can be segmented into unique groups based on special transaction costs. These costs include product evaluation, shipping and handling, installation, switching costs, cost of capital, and investment risk [24]. This is a key characteristic in enterprise software pricing since the transaction costs are often a significant part of the lifecycle costs.

Table 1 presents a prescriptive taxonomy of value-based pricing strategies defined by the shared economics (pricing objectives) and customer characteristics dimensions. The following discussion of penetration, skimming, and hybrid pricing strategies considers the links to pricing practices in the software industry.

B. *Value-Based Software Pricing*

1. Penetration Pricing Strategies. Penetration strategies target market segments where buyers have a high degree of price sensitivity [46,56,61]. Price-sensitive buyers typically have low reservation prices. Delivering benefits that are perceived as industry standard at a price that is sufficiently low to generate increases in sales volume creates customer value.
 - a. *Low-price leader (low reservation price/competitive pricing)*. Low-price leaders target buyers with low reservation prices. This strategy targets the mass-market buyers with reasonable features at a low price. The competitive pricing objective recognizes that the market has reached maturity. Linux and StarOffice are using this strategy to target Microsoft. Sun Microsystems has launched an attack on Microsoft's desktop software by charging only \$100 per user for a suite of StarOffice productivity applications that also includes Java-Linux, Mozilla browser, and Java security and email [3]. Sun's average per user license fee is 40-50% of that charged by Microsoft [27]. Buyers following an economic value added (EVA) model would be attracted to the lower software prices that would increase ROI provided the features, advantages, and benefits were industry standard.
 - b. *Experience-curve pricing (low reservation price/competitive pricing)*. This competitive strategy targets buyers with low reservation prices. The initial price is set below cost in order to build volume and move more rapidly down the cost curve toward profitability. The low price is intended to ramp volume quickly and to keep out competition. Vendors that market shrink-wrapped consumer software

- may use this approach to target high-volume price-sensitive segments in mature markets [46].
- c. *Bundling (low reservation price/product-line pricing)*. This strategy features several applications that are packaged together and priced as a single product. It targets buyers with low reservation prices. It is a product-line strategy since it maximizes sales of complementary products within the product line. There may be differing preferences for each individual product, but overall demand is increased if the value is perceived to be greater for the bundled package. A good example is Microsoft Office Suite. The intent is to provide outstanding value by bundling products that are used together at an attractive price. Microsoft benefits since their incremental packaging costs and transaction costs are minimized. Bundling increases volume and penetration while creating barriers to the competition [46,53].
2. Skim-Pricing Strategies. Skim strategies target buyers that are relatively insensitive to price [46,56,61]. All have high search costs. Some will engage in search behavior and perceive a high degree of value in the features, advantages, and benefits of the product. For example, innovators are often willing to pay more since they perceive opportunity in their ability to exploit the unique value of a new product. Others are unwilling to search and see the high price as a cue indicating high quality.
 - a. *Price signaling (high search costs/segment differential pricing)*. This strategy is often used for segment differential pricing of new products where time is a primary factor in the decision process. Innovators with high search costs and a high degree of trust in the brand do not want invest heavily to evaluate product alternatives. Information about price is more easily acquired than that about quality or performance. The high price signals the benefits these buyers desire [21,22,44,45]. Buyers in this situation demand a high level of service and rapid response for their continued loyalty.
 - b. *Reference pricing (high search costs/competitive pricing)*. This competitive pricing strategy is a variant of price signaling. Buyers have high search costs and higher perceived risk than the innovators. They need a reference point to calibrate the value in the price-quality relationship. Use of a reference price strategy can benchmark the higher price of an established competitor. Comparison with the higher-priced product highlights the value of the moderate priced product and vice versa [19,46].
 - c. *Image/prestige pricing (high search costs/product-line pricing)*. This product-line strategy targets customers with high search costs who are attracted to brands that have achieved a reputation for high quality and exclusivity [44,45,61]. The buyer's self image is emotionally linked to the brand's image. Buyers have expectations for exclusiveness and high levels of support and service.
 3. Hybrid Pricing Strategies. Hybrid strategies combine elements of skimming and penetration strategies. Combinations of high search costs, low reservation prices, and/or special transaction costs may characterize potential buyers. Special transaction costs might include the complex and expensive evaluation process for

TABLE 1. Taxonomy of Value-Based Pricing Strategies. Adapted from Tellis [66]

Customer Characteristic	Pricing Objective	Penetration Pricing	Skim Pricing	Hybrid Pricing (Shared Characteristics)
High Search Costs	Segment Differential Pricing		Price Signaling	Random discounting
	Competitive Pricing		Reference pricing	
	Product-Line Pricing		Image-prestige pricing	Premium pricing —higher priced product
Low Reservation Price	Segment Differential Pricing			Periodic discounting
	Competitive Pricing	Low-price leader Experience curve		
	Product-Line Pricing	Bundling		Complementary pricing —base product Premium pricing —lower priced comparator
Special Transaction Costs	Segment Differential Pricing			Second market discounting
	Competitive Pricing			Cost-plus pricing
	Product-Line Pricing			Complementary pricing —consumed product

enterprise software or the switching cost for changing software vendors.

- a. *Cost-plus pricing (special transaction costs/competitive pricing)*. Competitive pricing strategy that is often used by software vendors that develop systems for the government, or other large customers, where risks are not easily quantified, and special transaction costs are high. Cost-plus pricing guarantees the vendor a rate of return on project costs [41,66]. Perhaps this strategy should be classified as a “skimming” strategy since costs usually are higher than budgeted. In a response to the high prices that often result from cost plus, government customers place COTS (commercial off-the-shelf) pricing specifications in the contract where non-custom software applications can meet their requirements.
- b. *Complementary pricing*. Complementary pricing is a product-line strategy that exploits the special transaction costs of products that are used jointly but sold separately [53,66]. The base product (*low reservation price/product-line pricing*) is sold at a low price that minimizes resistance to purchase. Higher profits are

- then made on the complementary consumable products (*special transaction costs/product-line pricing*) or services due to the special transaction costs. For example ASP software services minimize the front-end investment and special transaction costs by eliminating the need for purchasing software or servers [2]. Profit is made on the higher margin complementary transaction-based services and support. Similar relationships exist in the marketing of printers and ink, razors and blades, and anti-virus software and virus definition support. The “loss leader” strategy is a variant approach. A complementary pricing strategy is used by SPSS, Inc. The company sells the license for a basic package of statistical programs at an attractive price, especially for academic users. Sophisticated users that opt for additional functionality are charged a premium for add-in programs that depend on the functionality of the base module. Microsoft extended this pricing strategy to exploit its complementary relationship with computer manufacturers using Intel processors to achieve near monopoly pricing power for operating systems and office application software. The company is attempting to use a complementary pricing strategy with its web services offerings and meeting customer resistance as it reverts to a cost-based pricing mentality [15].
- c. *Premium pricing.* Marketers address different groups of customers by using a product-line strategy that addresses the higher search costs of some groups and the lower reservation prices of others [46]. This practice is also known as “price lining.” The strategy is implemented by pricing versions of the product to address entry level, mid-level, and high-end premium-buying customers. Prices are set based on the levels of the value the buyer perceives in each market segment. EndNote is a popular bibliographic software product that is priced differently for students and professors, although the product’s functionality is identical. Professors pay twice as much as students. The logic here is the student market (*low reservation price/product-line pricing*) is much larger and has lower unit costs, than the professorial market (*high search costs/product line pricing*), which is small and perceives higher product benefits due to the publication requirements of their profession [13].
 - d. *Random discounting (high search costs/segment differential pricing).* A random discounting strategy maintains a high skimming price but offers discounts on a random basis as an incentive to new buyers to try the product [13,66]. The price break serves to draw attention to the product. This strategy can be applied for a variant of the ASP pricing scenario where users can try the product at a discount before they sign up for a longer-term license.
 - e. *Periodic discounting (low reservation price/segment differential pricing).* Periodic discounting strategy creates customer value for sequential classes of buyers with increasingly low reservation prices. The initial strategy focuses on skimming the inelastic demand of the innovator then reducing prices on a predictable basis as the market matures in order to attract more price sensitive customer groups [66]. Intel uses this strategy to market its microprocessors. The strategy works best for products that enjoy relatively long technology and market-life cycles with multiple applications across numerous segments [41]. Software companies generally do not use this strategy since they would prefer existing

customers to upgrade to the new version where their costs for customer acquisition would be zero.

- f. *Second-market discounting (differential pricing special transaction costs)*. For second market discounting, marketers introduce an existing product to a new market where buyers are more price-sensitive than the primary market and have identifiable special transaction costs. For instance, Microsoft has offered second market discounts to buyers that are contemplating implementations of Linux-based operating systems in the server market [23]. Microsoft is offering a standard solution with predictable costs vs. the Linux installation that might generate higher installation, customization, and maintenance costs. Second market discounting is often used to penetrate international market and private label/generic products markets.

IV. MOVING FROM COST TO VALUE

As the software business has matured and become more competitive it is increasingly important that pricing strategy be based on perceived customer value. Software should be designed with the knowledge of how customers value specific attributes and how much they will pay for them. The power of choice mandates that those products that deliver superior value will win in the market place. To be successful software development must become more value based. The following discussion reviews the basics of customer value analysis and the dimensionality of the factors that drive the customers' perceptions of value.

A. *Customer Value Analysis.*

As we discussed above, software vendors typically concentrate on cost-based metrics to arrive at their product prices. Once the vendor has quoted a price, potential buyers can readily compare the price with offers from the competition. However, if the vendor instead offers demonstrably superior value, even at a higher price, the advantage is far less easily duplicated by the competition [19]. The following value concepts are foundational to the development of value-based pricing strategies.

1. Perceived Value. Not all customer value drivers have economic impacts that can be measured directly. A software product that has a better graphical display may be more pleasing to the eye, but has no value in the traditional economic sense. A buyer may feel "safer" buying software from IBM if there is a higher perception of reliability, trust, and commitment to the market, but it is hard to quantify objectively in product value terms. One technique that is often used to measure perceived value is *conjoint analysis* or *trade-off analysis* [35,47]. This technique enables managers to compute the consumers' utility functions for individual variables and to understand how they are combined, traded off, and otherwise valued. Conjoint analysis is useful for pricing since the feature tradeoffs at different levels of price can be mapped [12,26].
2. Economic Value to the Customer (EVC). Alternately called "value-in-use" or "exchange value", EVC is the maximum amount a customer would be willing to pay for the software, assuming s/he is fully informed about the product and competitive offerings. It is analogous to the reservation price. EVC answers the question,

“What’s it worth to you?” EVC measures the life-cycle economic costs and benefits to the user of one product when compared with a reference product. Software products are evaluated on purchase price, installation costs, maintenance costs, operating costs, disposal costs, and benefits that can be monetized over the use cycle. These costs and revenues are benchmarked against the buyer’s reference product [19,39].

3. Economic Value Added (EVA). Broadly stated, EVA measures a company’s net operating profit after taxes. It focuses the organization on earning a target rate of return over and above the cost of capital [5]. Both software developers and purchasers use the concept to answer the question: “Will this asset generate returns above the cost of capital?” For software or other IT investments customers substitute the monetized net financial benefits of the investment for net operating profit. EVA forces managers to measure the financial impact of software investments and to be aware of the impact of the cost of capital on investment returns.
4. Price Sensitivity Measurement (PSM). PSM models are useful for estimating market demand and for calculating the proportion of buyers that would buy the product within a specific price range [30,46]. PSM determines the limits of buyer resistance over a range of prices that relate to the product’s value perceptions. These value perceptions are market segment specific and based on the buyer’s perceptions of product value, buying intentions, and spending capabilities. Typical outputs from the model are the upper and lower bounds for the acceptable price range and the optimal pricing point. PSM is very useful for pricing alternate software configurations in the early stages of development and throughout the development cycle.

B. *Customer Value Drivers.*

In order to create the foundation for setting prices, it is necessary that product developers and managers understand what the customer’s value drivers are and how important each is in the purchase decision [29,34]. Customer value drivers are emotional links that summarize customer beliefs about the product and firm, create positive attitudes and feelings, provide the basis for differentiation, and provide the reason to buy [29]. Value drivers are the expression of the customer’s evaluations of the product, the perceived credibility of the vendor, and the confidence the customer has in the brand [60]. The customers’ value drivers need to be reflected in the design requirements of the software if the value is to be subsequently captured by the pricing mechanism on the product’s launch.

Table 2 maps cost-based and value-based pricing strategies to common classes of customer value drivers [29,60]. It can readily be seen that cost-based pricing is exclusively associated with economic value and performance value. This is consistent with the cost/benefit and price/quality themes inherent in the cost-based approach. Unlike the cost approach, where competitors readily match price-performance attributes, value-based pricing strategies provide the strategist with a full complement of customer value drivers to appeal to. The primary value driver classes are:

TABLE 2. The Customer Value Dimensions of Cost-Based and Value-Based Pricing

Customer Value Driver	Cost Based-Pricing	Value-Based Pricing
<p>Economic Value</p> <ul style="list-style-type: none"> • Delivered initial cost • Cost of ownership & disposal • Price sensitivity • Degree of budget fit • ROI/Profitability • Smooth out cash flow • Volume discounts • Terms and financing • Environmental costs • Opportunity costs • Search costs • Switching costs 	<ul style="list-style-type: none"> • Flat pricing—delivered initial cost is the key driver. • Tiered-pricing—Cost to customer will vary with need for higher performance. • MIPS-based pricing (1)—User pays up front based on power of host processor. • User-based pricing—Pay by number of users. • Usage-based pricing (1)—Match price to usage. 	<ul style="list-style-type: none"> • Low-price Leader • Bundling (1)—Lowers initial costs and increases switching costs. • Experience-curve pricing—Lowers initial cost to obtain volume. • Complementary pricing: base unit (1)—Lower initial cost. • Premium pricing (1): Low-end product • Second market discounting
<p>Performance Value</p> <ul style="list-style-type: none"> • Best quality/reliability/durability • Best feature set • Exceeds specifications • Outperforms competition • On-time delivery • Best technical solution • Faster/easier installation & maintenance • Ease of training • Easy integration • Complementary product • Complies with standards • Best customer service/support 	<ul style="list-style-type: none"> • Tiered-pricing—Pay more for higher performance potential. • MIPS-based pricing (2)—Pay more for higher performance potential. Workload license charges (WLC) attempts to match license fees to actual workload. • Usage-based pricing (2)—Pay more as usage (performance) increases. 	<ul style="list-style-type: none"> • Bundling (2)—Increased performance at a given price. • Complementary pricing (2): consumable—High margins on matched consumable item. • Premium pricing (1): High-end product—High-performance product contrasts with lower price members of product line.
<p>Supplier Value</p> <ul style="list-style-type: none"> • Shared values-understands customer • Source credibility (Expertise, Trust) • Loyalty to customer • Innovative problem solver • Ability to meet specific needs • Good strategic partner • Safety/liability • Ensures customers' success • Long-term market commitment • Sufficient financial & human resources 		<ul style="list-style-type: none"> • Price signaling—Brand name is synonymous with high quality and commands higher price. • Reference pricing—Buyers with high-perceived risk will look to high-credibility brand. • Image/prestige pricing—Reputation of the supplier is key to the purchase decision.
<p>Buyer Motivations</p> <ul style="list-style-type: none"> • Visibility, recognition, self esteem • Self image-brand image • Avoid pain, technology blind alleys • Share/mitigate risks • Be viewed as problem solver • Seek the best business partners • Be seen as an astute deal maker • Have unique needs meet • Keep production on schedule • Privacy, security, anonymity 		<ul style="list-style-type: none"> • Reference pricing—Buyer has high-perceived risk and needs a reference point. • Random discounting—entice buyers with high-perceived risk to try the product. • Image/prestige pricing—Buyer is emotionally involved with brand image.
<p>Buying Situation</p> <ul style="list-style-type: none"> • Buyer's Task Requirements • Buyer's Resource Capability • Decision Time Horizon • Organizational/Social Influences • Experience with Related Products • Product Availability 	<p>The buying situation can impact any pricing strategy. The net effect is to serve as a constraint or facilitator on the purchase decision. The situation may also influence price sensitivity. For instance, a buyer with very specific task requirements may be less price-sensitive and accept a higher price for the right solution. A company with its own in-house IT department and a high degree of product experience may be more price-sensitive.</p>	

1. Economic value. Economic-value drivers are based on the buyer's perceptions about the cost of acquiring, owning, installing, using, and disposing of a product or service [19,51,53]. Economic value is associated with cost element of Sheth's functional value. The concept encompasses costs savings and ROI impact deriving from the purchase of the product [33,60].
2. Performance value. Performance value is based on the buyer's perceptions of the utility to be derived from the functional features, advantages, and benefits associated with a product or a service . This value driver is associated with Sheth's functional value [16,60].
3. Supplier Value. The buyer's perceptions about credibility of the vendor and trust in the business relationship links directly to brand acceptance. It is relatively easy for competitors to match economic and performance value by changes in price and product design. A strong brand provides a greater barrier to competition since it takes much longer to change perceptions about a company [28]. Strong brands support skimming strategies across a broad range of pricing objectives.
4. Buyer Motivations. The buyer's psychological motivations and goals for a particular purchase are central to the decision process [75]. Cost-based pricing does not consider these higher-level motivations. Psychological motives arise from the buyer's need for recognition, esteem, and belonging. Additional motivations may involve novelty seeking and knowledge acquisition. Buyer motivations are often subjective and emotional [44,45]. This value driver is analogous to Sheth's emotional value and epistemic value[60].
4. The Buying Situation. Purchase behavior always occurs within a situational context. The situation may act as a constraint or to facilitate a given purchase or it may have no effect at all [4]. The buying situation is analogous to Sheth's conditional value [60]. Key situational variables are:
 - a. *Task definition* [4,10,28]. The task situation addresses the question: "What objective or task will the software be used for?" Knowledge of the specific task will help to define the software use situation and product requirements.
 - b. *Resource capability* [4]. This variable focuses on the physical and intellectual resources of the buyer including budgets, infrastructure, and technical skills. Software marketers would be interested in whether the buyer has in-house IT department and how self-sufficient the company is. Customers with a high degree of IT resources may qualify as potential development partners. They are good sources of product and price-related information.
 - c. *Time horizon* [73,74]. Time is an important influence on price perceptions. Buyers with short decision time horizons tend to be less price sensitive. Key questions to be addressed are: "How long until the buyer is ready to make a decision? How long does the buyer anticipate using the software?"
 - d. *Social influences* [4,75]. What is the composition and role dynamics of the buying center team that will influence the purchase the software?
 - e. *Experience* [49]. Highly experienced buyers tend to have stronger product-related attitudes, which influence subsequent evaluations of product and price. Developers and marketers need to answer the question: "How experienced is the buyer with similar software?"

- f. *Availability* [49,67]. Availability refers to the ease of finding purchase related information about the product or company. The operant questions are: “Is the product available? How available is objective information on the product’s performance and risks?”

V. IMPLEMENTING VALUE-BASED PRICING

A. *The Value-Based Pricing Model*

Customer-value based pricing strategy is market segment specific, since value perceptions vary between customer groups. After choosing the target market, marketers must determine the value that customers perceive in the product. This assessment includes identification of the customers’ value drivers, price sensitivity, EVC, and other price-related characteristics. This analysis may include an assessment of the attribute (feature-benefit) tradeoffs that customers are willing to make at various price levels. Once the price the customer is willing to pay is determined, this information is integrated with cost-volume estimates to determine if the product, as configured, can be sold at a profit [48]. This type of information, which is interactive with the market, can be used to adapt the product’s design to meet the customer’s value expectations or to cancel the project.

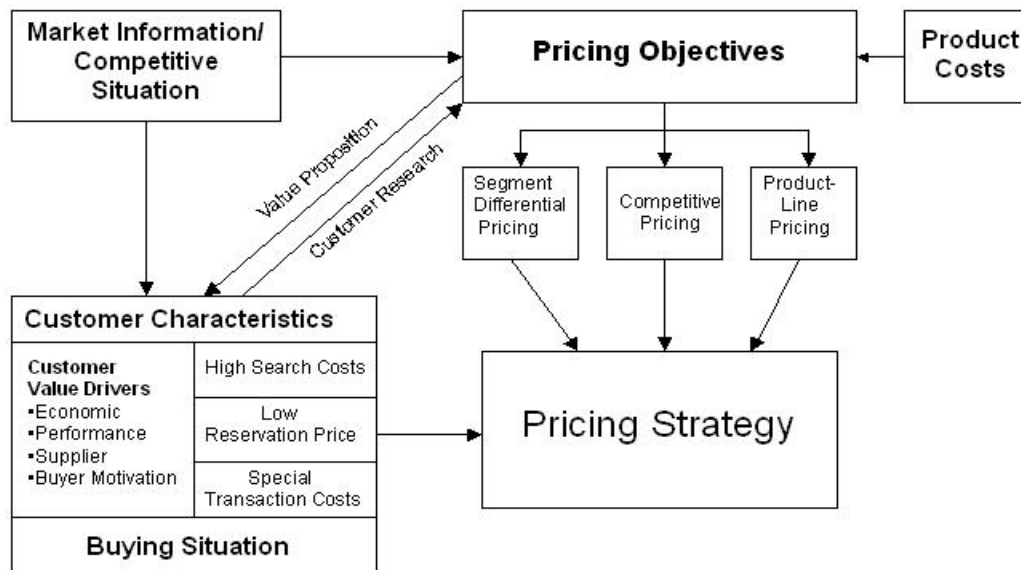


FIGURE 2: Framework for a Customer-Value Based Pricing Model

Figure 2 shows the framework for the development of customer-value based pricing strategies. Pricing strategy is dependent on the software marketer's knowledge of customer characteristics (value drivers, search costs, reservation prices, transaction costs, buying situation), the competitive situation, product costs, and pricing objectives. The dynamics depicted in the diagram can be assessed at any time in the development process in order to associate customer price perceptions to product configurations. This early-stage analysis, by linking product cost estimates to anticipated prices, can help to determine if a particular product configuration should be pursued [17,30,42]. Price information gained in this way can be used to price the products for launch and to check post-launch pricing efficacy.

This type of value-related information is superior to the cost-oriented approach that is most often based on projections of product-costs, project management oriented economic analyses, and managerial rules of thumb. Adding a margin to standard costs is not a defensible way to price software products [15,23,24]. Software firms need to use value-based pricing methods that model actual customer value, price sensitivity, and value in use scenarios [63,64].

A. Developing Pricing Capital

In order to better match anticipated product costs with customers' pricing expectations, software firms should pay more attention to pricing throughout the development cycle. In order to accomplish this goal, firms will need to invest in the "pricing capital" that is necessary for success [14]. Pricing capital includes marketing managers trained in value-based pricing methods (human capital), IT infrastructure (systems capital), and organizational influence (social capital).

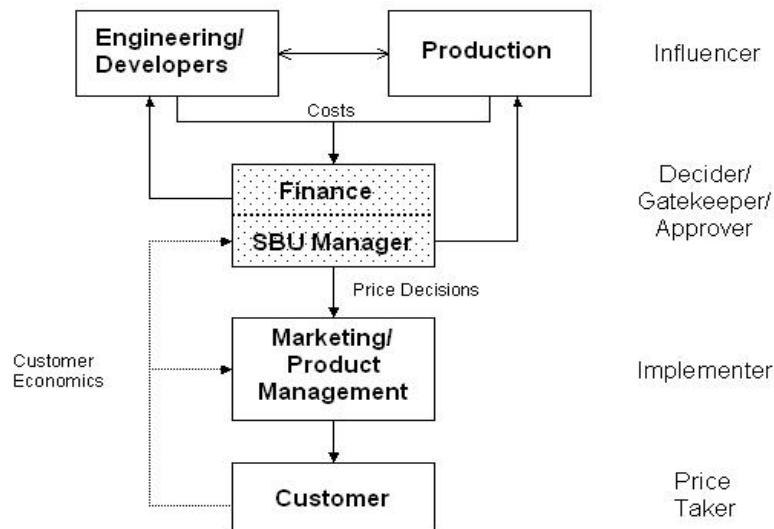


FIGURE 3. Traditional Cost-Based Pricing Decision Process

Human capital requires well-trained managers that understand the elements of company's strategy including: the customers, competitors, products and services, the development process, and the cost structure. They are well schooled in market research methods for assessing customer value and competitive advantage as well as tracking competitors and pricing trends.

Systems capital is the IT infrastructure that is necessary to support the development of pricing strategy. It includes up to date access to customer preference data, cost data, and development issues. It involves have the computer hardware and software to collect, analyze, store, disseminate, and track relevant cost and pricing information. Data warehousing, data mining, statistical-modeling, and CRM capability are necessary components.

The development of social capital is perhaps the most difficult challenge if the software company is to develop true strategic pricing capability. The marketing function in many software organizations is not a strategic function. Generally speaking, marketing grew out of the sales function and has all too often assumed the role of sales support and marketing communications. Figure 3 depicts the traditional role of the marketing function in terms of being the implementer of cost-based pricing decisions that are made by the finance or general manager. The customer is confronted with a price that may not reflect his/her value requirements.

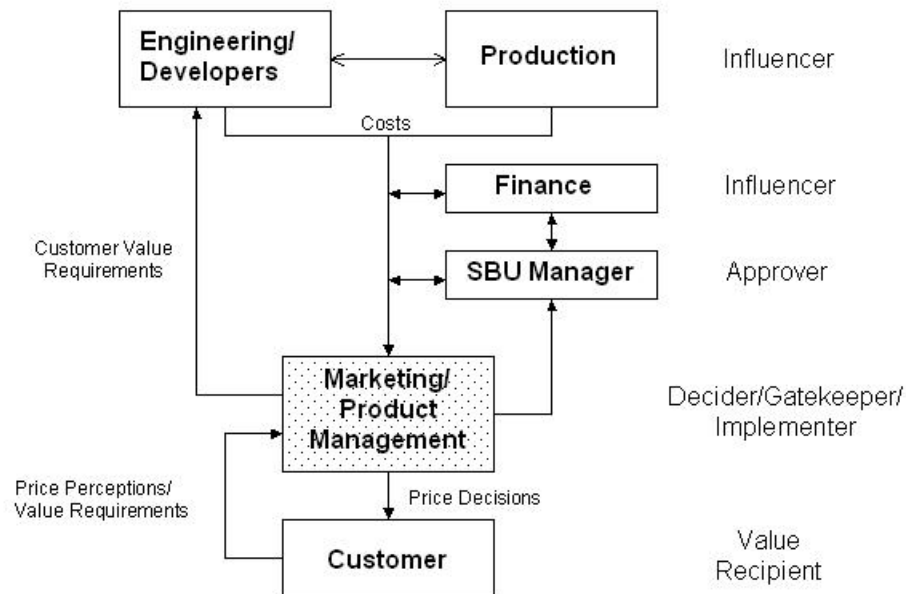


FIGURE 4. Value-Based Pricing Decision Process

In today's more competitive software markets the historical cost-driven approach to pricing has become less useful. Marketing and its strategic pricing capability need to have the core role in setting the firm's pricing direction. The marketing team needs to build social capital both internally with other functional groups, especially software development, and externally with the customer. In both instances the ability to build and manage long-term relationships will result in better understanding and communication of customer value expectations, better software products, more effective pricing strategies and happier customers whose value expectations are being met (Figure 4)

VI. CONCLUSION

This paper presented a review of contemporary cost-based software pricing models. These models have developed from a financial perspective based on the economics and internal cost-drivers of the software development process. As software markets have become more competitive and buyers are faced with more choices, cost-based pricing models that ignore customer-value requirements can no longer ensure a favorable rate of return to the software vendor. A taxonomic analysis of customer value drivers indicates that cost-based models appeal to price-performance value drivers with promises of improved ROI for the customer while ignoring other potentially more important value drivers that are more intangible in nature.

The primary contribution of this paper is the detailed discussion of value-based pricing strategies as they relate to the software industry. The article develops a prescriptive pricing taxonomy that depicts the relationships between customer characteristics, company objectives, and pricing strategy. It suggests that deep knowledge of the customer can result in more appropriate approaches to pricing strategy.

Finally, we propose that software firms develop the organizational commitment to create human, systems, and social pricing capital that places the marketing organization at the center of value-based price decisions. In such a scheme the software that companies develop will more accurately reflect the value that customers expect and are willing to pay for. Software that cannot be profitable at the price that customers are willing to pay will not be developed.

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