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Strategic pricing across the product's sales cycle: a conceptualization

Abstract

Establishing the initial price for a new product is one of the most important decisions a firm will make. Implementing and adjusting this price over the sales cycle of the new product are crucial decisions for both its short- and long-term success. A modification of the product life cycle (PLC) concept is presented to reflect one of the many alternative price-setting strategies available to the company. After justifying and illustrating the modified PLC pricing strategy, applications and limitations are presented and discussed.

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Introduction

Since the birth of marketing, academicians have worked diligently to formulate theories they felt would benefit practitioners. The product life cycle (PLC) concept was one of these. It originated in the sciences as the life cycle notion (e.g., Tarde, 1903; Prescott, 1922; Pearl, 1925), and was later distilled from the business consulting experiences of Dean (1950 and 1951). The rationale for the PLC is deeply rooted in the theory of diffusion and adoption of innovations (e.g., Rogers, 1962; Kotler, 1972). Proponents of PLC proclaimed it would assist executives in planning, executing, evaluating, and controlling the marketing mix as well as in forecasting and formulating strategy[1]. Several writers[2] even prescribed the PLC as "a basis for recommendations about the content of marketing programs at different stages of the life cycle" (Polli & Cook, 1969, p. 385).

Interest in the PLC concept rose appreciably in the late 1950s and early 1960s because of increased emphasis on the development and marketing of new products. Firms viewed innovations as "an indispensable step to achieve sales growth … and, hence, success". As a result of the "increased flow of new products into the market", a need arose among practitioners for conceptual models to manage a dynamic environment consisting of constantly changing variables, such as technology, customer preferences, competitors' strategies, and the economy. The PLC was one of these (Polli, 1968, pp. 12, 14, 15).

1. Development of the problem

In the late 1960s, however, several researchers discovered that marketing executives were not readily adopting PLC. Following a survey of corporate managers, Levitt found that while most had heard of the PLC notion, "none … used the concept in any strategic way whatever, and pitifully few … used it in any kind of tactical way" (Levitt, 1965, p. 81). Similar findings were reported by Clifford (1965A) and Cunningham (1969).

Several reasons were offered as to why more practitioners were not using the PLC concept. First, executives may not have realized products even having a life cycle. Second, if managers did accept the existence of PLC, they may not have recognized and employed the concept as a basis for developing timely strategies (Clifford, 1965B). Second, academicians' guidelines for the composition of the marketing program may have been too general and vague for practitioners. This lack of specificity then created an insurmountable barrier, which prevented executives from implementing academicians' prescribed strategies. Finally, managers demand a certain minimal level of proof that PLC was an appropriate notion to utilize before applying it. While some empirical studies have been forthcoming, support for this concept has been sketchy. Researchers attempting to validate the existence of PLC have focused almost exclusively on consumer goods, primarily those items frequently purchased, low-priced, widely distributed, and not subject to wide variations on the supply side (e.g., Polli, 1968; Polli & Cook, 1968; Kotler, 1972).

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[1] For example, Dean (1950), Forrester (1958 and 1959), Patton (1959), White (1962), Kotler (1965A), Clifford (1965A and 1965B), Levitt (1965), Kotler (1965B), Management of New Products (1965), Bell (1966), Belville (1966), Buzzell (1966), Cox (1967), Wills (1968), Godin (1968), Wasson (1968), Polli (1968), Cunningham (1969), Buzzell & Cook (1969), Scheuing (1969), MacKenzie (1971), McCarthy (1971), Kotler (1972), and Smallwood (1973).

[2] For example, Dean (1950), Forrester (1959), Patton (1959), Mickwitz (1959), May (1961), Charvat & Whitman (1964), Kotler (1965A), Clifford (1965A and 1965B), Levitt (1965), Buzzell (1966), Berenson (1967), Thorelli (1967), Cunningham (1969), Scheuing (1969), Staudt & Taylor (1970), MacKenzie (1971), McCarthy (1971), Kotler (1972), and Wasson (1974).

2. Purpose

Emphasis in this paper will be on the second reason why practitioners have not widely embraced the PLC notion: lack of specificity of academicians' recommendations regarding the constitution of the marketing mix across PLC stages. Of the four Ps comprising the firm's marketing program, price will be dealt with exclusively in an attempt to operationalize academicians' suggestions for pricing across the sales cycle of a product. A modification of PLC will be presented and justified. Next, the usefulness of the modified PLC concept in price setting will be demonstrated. Finally, possible applications and limitations of this modification will be discussed.

3. Product life cycle

The product life cycle (PLC) represents the unit sales trend for a product, extending from the time it is first placed on the market until it is later removed by the firm (e.g., Buzzell, 1966; Staudt & Taylor, 1970; Kotler, 1972; Kotler & Keller, 2016). As such, the PLC "portrays the evolution of product attributes and market characteristics through time, and is used prescriptively in the selection of marketing actions and in planning" (Polli, 1968, p. 67).

The PLC may be approximated by a bell-shaped curve that is divided into several segments or stages (e.g., Scheuing, 1969; McCarthy, 1971; Kotler, 1972). Although the number of suggested phases vary between four and six in the PLC literature, a four-stage curve will be used – introduction, growth, maturity, and decline (see Figure 1 in Appendix). The major characteristics of each phase are summarized in Table 1.

Table 1. Major characteristics of each product life cycle stage

Introduction Stage	The introduction stage encompasses the time period a product initially enters the market until its unit sales start to rise at an increasing rate. This phase is characterized by losses or low profits, uncertainty of length, product is vulnerable to attack from competing items, relatively few distributors, inexperienced personnel, and product is often manufactured in pilot plants.
Growth Stage	The growth stage is epitomized by unit sales increasing at an increasing rate, substantial profits, many distributors exist, less product vulnerability from competitors, and full-scale production lines are in use or under construction.
Maturity Stage	When unit sales begin increasing at a decreasing rate, reach a peak, and decline slightly, the product is in the maturity stage. This phase is characterized by profits reaching a peak and declining rapidly, many aggressive competitors exist, a cost-price squeeze begins, and production facilities are either old and in need of heavy repair or obsolete.
Decline Stage	When unit sales decrease at an increasing rate, the product has entered the decline stage. Attributes of this phase include profits continuing to decline, firm is unable to alleviate the sales and profit declines except in the short run, and distributors as well as customers forsake the product for newer items.

Source: adapted from Berenson (1967).

It is important to note the following additional points concerning PLC. First, it is a generalized description of a product's sales cycle, not a rigid representation. The length of any stage (or the overall curve) is not fixed. In fact, different products tend to move through the phases at varying speeds (e.g., Patton, 1959; Kotler, 1972; Rink & Swan, 1979). Also, variables such as ease of competitive entry, rate of technological change, and speed of market acceptance determine the magnitude and intensity of the product's sales decline (e.g., Dean, 1950; Staudt & Taylor, 1970). Because of supplementary uses (or adoption by new customers), products can either regress to a previous stage or prolong their current PLC curve (e.g., Kotler, 1965B; Cunningham, 1969; Kotler & Keller, 2016). Finally, the sales curve for different industries will have numerous shapes as will those for various segments of a market and associated products (e.g., Berenson, 1967; Staudt & Taylor, 1970; Swan & Rink, 1982; Kotler & Keller, 2016).

4. Skim and penetration pricing strategies

A cursory examination of introductory marketing and marketing management textbooks reveals a multiplicity of pricing strategies available for executives to consider (e.g., Perreault et al., 2014; Kotler & Keller, 2016). However, the author will review only two of the basic pricing strategies commonly employed for new products – skimming and penetration.

With a skimming price strategy, the firm initially prices its product significantly above the market (or going rate). However, as time passes and the product progresses into later PLC stages, the marketing manager lowers price. This strategy is appropriate when some of these characteristics are present: little or no threat of potential competition; radical departure of product from accepted norms; inelastic demand with respect to the product's price; strong possibility of market segmentation; rapidly changing technology; high risk; diseconomies of scale; low cross-elasticity of demand; sales curve forecasted to be short; and company's short-run financial capability is bleak (e.g., Dean, 1950; Levitt, 1965; McCarthy, 1971; Kotler, 1972; Rao & Bass, 1985; Horsky, 1990; Marn & Rosiello, 1992; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Krishnan et al., 1999; Lamb et al., 2000; Urbany, 2001; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Spann et al., 2015; Kotler & Keller, 2016).

On the other hand, with a penetration pricing strategy, practitioners use "low prices as the principal instrument for penetrating mass markets early" (Dean, 1950, pp. 50-51). Having secured a

major portion of the market, executives attempt to maintain market share over time. The penetration pricing approach is recommended when several of these attributes exist: strong threat of potential competition; little or no departure of product from consumers' normal expenditure patterns; elastic demand with respect to price; inability to segment the market; relatively stable technology; little risk; economies of scale; high cross-elasticity of demand; a relatively long forecasted PLC curve; and firm has good financial capability (e.g., Dean, 1950; Levitt, 1965; McCarthy, 1971; Kotler, 1972; Farris & Reibstein, 1979; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Fleischmann et al., 2004; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016).

5. Modification of product life cycle

For the remainder of this paper, the focus will be exclusively upon the skimming price strategy. A modified PLC will be developed to facilitate discussion and subsequent illustration of the skim pricing strategy for a new product across the stages of its sales cycle. In order to derive the modified PLC, first begin with the traditional curve shown in Figure 1. Second, starting at the apex of the PLC curve, construct a straight line parallel with the x-axis, and extend it to the left until it intersects the y-axis perpendicularly. This line is labelled BB in Figure 2 of Appendix. Third, at the point where Line BB intersects the sales curve (Point Z), construct the mirror image (or reflection) of the original PLC. Fourth, extend the y-axis until it intersects the newly derived upside-down sales curve. Finally, extend the demarcation lines separating PLC phases upward in a fashion parallel with the y-axis until they intersect the upside-down unit PLC. The portion of the y-axis above Line BB in Figure 2 represents the product's unit price in dollars.

6. Justification for modified PLC

It is the author's contention the upside-down sales curve in Figure 2 epitomizes the skimming price strategy for a new product. Because the mirror image (or modified PLC) was derived from the traditional sales curve, it will concurrently vary with unit sales, but in the opposite direction. By examining each stage of the modified PLC, this assertion will be substantiated.

Most marketing academicians agree new product prices tend to be highest at the beginning of the introduction stage (e.g., Dean, 1950; Levitt, 1965; Buzzell, 1966; Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Krishnan et al., 1999; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016) for several reasons. First, high margins are required to support heavy promotion expenditures necessary to achieve growth. Second, costs are high due to relatively low output rates. Last, production problems may not yet have been fully resolved (e.g., Kotler & Keller, 2016).

During the growth phase of the PLC, the marketing manager will normally maintain a high price unless lowering price will dramatically expand market penetration; sufficient production capacity (or over-capacity) exists; and competitors are entering the market. However, if a lower price does not increase sales, this will significantly reduce profit. Regardless, there is a tendency for price to soften in this stage (e.g., Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016). Two additional reasons for this occurring are: "the greater volume of sales produces some economies of scale … (and) … fewer product modifications, with accompanying costs of shutdowns and longer production times, are being made during production runs" (Staudt & Taylor, 1970, p. 171).

In the maturity stage, "prices are considerably softer and quite uniform from competitor to competitor, except for real product differentiation" (Kotler, 1972, p. 436). Dean (1950) states "the first step for the manufacturer whose specialty is about to slip into the commodity category is to reduce real prices promptly as soon as symptoms of deterioration appear" (p. 52). Other writers also believe price will be lower in maturity because of increased price competition, availability of substitute products, less brand preference, mass entry of private-label competitors, market saturation, stabilization of production methods, introduction of annual models, and trade-in allowances (e.g., Bell, 1966; Buzzell, 1966; Dean, 1969; Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016).

While several academicians maintain price will decrease further during the decline phase of the PLC (e.g., Dean, 1950; Buzzell, 1966; Dean, 1969; Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016), others believe it

depends upon the circumstances, notably "consumers' reactions to the price change" (Staudt & Taylor, 1970, p. 181). According to Kotler (1972), "the hard-core loyalty to certain brands may remain strong enough to allow marketing the product at a greatly reduced level of promotion, and at the old or even a higher price, both of which mean good profits" (p. 437).

Some writers visualize price being used to maintain the company's market during the decline stage (e.g., Patton, 1959; Buzzell, 1966; Thorelli, 1967; Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016). Hence, price "often follows a pattern of decline, stabilization, and finally some upward movement. When the product moves into the (decline) stage, producers attempt to maintain their sales by price concessions. Such price reductions are typically short-term defensive moves by which producers of the obsolete product hope to buy time to make the necessary technological changes in their product, to provide a more lasting solution to their problems" (Staudt & Taylor, 1970, p. 181).

On the other hand, a price reduction may be difficult to implement. "As sales decrease, per unit costs of production and marketing may increase, and a vicious circle may develop in which higher costs, if they result in higher prices, result in a further decline in sales. In the latter stages of (decline), however, demand may become more inelastic. This means that lowering prices becomes less effective in maintaining sales, or that firms could raise prices and pass on increases in cost to the consumer without sales decreasing" (Staudt & Taylor, 1970, p. 181).

By the decline phase of the PLC, most practitioners are searching for another product to displace the old one, or marketing a new version. Since demand for the old item has been drastically reduced, whether by plan or accident, production will also drop. As inventories of the original product are depleted, supply-and-demand with regard to replacement will significantly increase the price of the old item and its parts (e.g., Patton, 1959; Buzzell, 1966; Thorelli, 1967; Staudt & Taylor, 1970; McCarthy, 1971; Kotler, 1972; Zikmund & d'Amico, 1996; Guiltinan et al., 1997; Lamb et al., 2000; Nagle et al., 2011; Best, 2013; Mullins & Walker, 2013; Perreault et al., 2014; Kotler & Keller, 2016). For this reason, the author supports the notion of the original product's price increasing in the decline stage (see Line ZG in Figure 3 of Appendix).

7. Illustration of usefulness of modified PLC

Having explained the rationale of the skimming price strategy being a mirror reflection of the product's sales curve, the benefits of this modification will now be demonstrated. However, before doing so, several assumptions are necessary. First, the firm has had considerable experience in the general market and industry of this new product, especially in terms of pricing. Second, the executive is able to determine the PLC stage in which the product is at any point in time. Third, the shape of the product's sales curve and associated time dimension are known. Finally, the last two assumptions also apply to situations in which the company procures goods from or competes with several others. For example, Firm A (the buyer) can approximate the general shape of the sales curve and time dimension for each of the products acquired from Firms B, C, and D (the sellers or suppliers). Further, Firm A can determine the PLC phase of each of the products purchased from Firms B, C, and D. Both assumptions are also true if the latter three companies are competitors in the same industry and general market as Firm A.

Given these assumptions, an illustration of how the modified PLC can assist the marketing manager in forecasting, planning, procurement, and selling is possible. In the bottom half of Figure 2, which contains the product's sales curve, two variables are estimated – unit sales and time – in terms of the company's operation (or that of a supplier's or competitor's). Once these variables are specified, the two axes of the PLC are scaled according to their respective values, as demonstrated in the bottom half of Figure 3 in Appendix. Next, the "mirror" image of the sales curve is derived and the relevant price range is estimated. In this particular example, the price ranges from $10 to $50 per unit (Figure 3). After scaling the extended y-axis to reflect these price values, the skimming price strategy is initially highlighted by the $50 level. Armed with this information, the practitioner – whether a buyer, seller, or competitor – can successfully utilize the modified PLC in three ways, and it can do so even if only one of the three unknown variables (i.e., time, unit price, and unit sales) is known.

First, if the time dimension is known, the firm merely has to move perpendicularly from this point to the sales curve, and then over to the unit sales axis to locate what sales level it or competitor is or should be at. By continuing the time line perpendicularly to the price skimming curve, and over to the per unit price axis, the company can determine the price it or a competitor is or should be

charging. For example, if time equaled 14 months (i.e., last part of the growth stage), then sales volume and per unit price would equal 450,000 units and $20, respectively (Figure 3).

Second, if unit sales are known, the firm can determine what per unit price and time dimension it or another is or should be at. This would be accomplished by extending a perpendicular line from the sales volume axis to the PLC curve, and dropping perpendicular lines down and up from this point. Where the descending line intersected the time axis would represent the corresponding time dimension. The respective unit price would be located by going toward the per unit price axis in a perpendicular fashion from where the ascending line crossed the price skimming curve. For example, if sales volume was 150,000 units, then time and per unit price would equal 11 months (i.e., first part of growth stage) and $40, respectively (Figure 3).

Finally, if per unit price is known, then the company can locate the unit sales and time dimension it or a competitor is or should be at. This would be attained by extending a perpendicular line from the price per unit axis to the skimming price curve, and dropping a line perpendicular to the time axis. At the point where this line crossed the time axis, the time variable would be revealed. Where this line intersected the sales curve, a line parallel to the time axis would be extended to the unit sales axis. At the point where this line crossed the sales volume axis, the unit sales variable would be unveiled. For example, if the per unit price was $13, then sales volume and time would be 565,000 units and 17 months (i.e., first part of the maturity stage), respectively (Figure 3).

8. Implications and applications of modified PLC

Concerning implications and possible applications, the modified PLC could benefit executives in at least six ways.

First, in forecasting, such a modification would assist the firm, because it needs to know only one of the three unknown variables – time, per unit price, and unit sales. With this one bit of information, the marketing manager could quickly and easily determine the other two variables for each PLC stage.

Second, by having this modified PLC and several other forecasts available in planning, practitioners would be in a better position to effectively organize such things as production, inventory, manpower, logistics, financial needs, and other requirements for each stage of the product's sales cycle.

Third, having availed themselves of the previously mentioned forecasting and planning benefits accruing from the modified PLC, executives would be better able to develop more effective and timely marketing strategies, especially pricing, across the product's entire unit sales curve. This panoramic perspective of the company's marketing program would permit managers to significantly reduce the likelihood of missing any potential opportunities with respect to a particular product.

Fourth, by knowing suppliers' sales curves for each of their products and associated unit sales (or time dimensions), the procuring firm could quickly determine whether the "asking price" was reasonable. If not, it could request an itemized break-down of the quoted price, instigate aggressive price-reduction negotiations, or locate another supplier (if time permits).

Fifth, the selling company could objectively determine how reasonable its price was in relation to the unit sales and time dimension of its product. For example, if the current selling price was $40 per unit and its product was in the maturity phase, then immediate "corrective action" would be needed, because its price would be contradicting the logic of its current marketing mix, especially the PLC stage of its product (Figure 3).

Sixth execution and control would be easier because of the associated time and unit price dimensions. Even the slightest price variance would be apparent sooner, and could be more quickly rectified than under a system without the modified PLC, thereby reducing the magnitude of lost sales, market share, and profits. As far as execution, the firm would be able to more accurately pinpoint the time frame in which it wanted to initiate a price change as well as ascertain how much.

9. Limitations of modified PLC

The modified PLC has several limitations. The most obvious and severe shortcomings are:

1. Ability of practitioner to accurately forecast unit sales of a new product. Given the dynamic nature of industries, markets, economies, etc., this is almost an impossible task, even if the firm has had considerable experience in the particular industry and market (e.g., Perreault et al., 2014; Kotler & Keller, 2016).
2. Executives can ascertain which PLC phase the product is in at any point in time. While the company may be able to determine when its product is in the middle of some stage of the sales cycle, discernment of the inflection point between two adjacent phases is nearly impossible. At best, it is an "after-the-fact" phenomenon because of the dynamism of

markets, competitors, economies, etc. (e.g., Perreault et al., 2014; Kotler & Keller, 2016).

3. Managers can acquire unit sales, price, and time data concerning suppliers' and competitors' products. This assumption does not consider the firm's market – consumer or industrial. In the latter category, price and unit sales data would not be readily obtainable, except at a very high price. Time information could be gleaned by observing suppliers and competitors over some length of time; but, this would be expensive and probably inaccurate. In the consumer goods market, price could be determined rather easily, but not the corresponding unit sales data. Time information would probably still be difficult to obtain. Only with consumer goods could practitioners use the modified PLC with some minimal degree of assurance in the results (e.g., Perreault et al., 2014; Kotler & Keller, 2016).
4. Avoidance of incorporating the penetration pricing strategy in the modified PLC. This was merely a matter of convenience as a suitable penetration pricing curve could not be easily derived, much less justified.
5. Two different time dimensions corresponding with each price level. Conceptually, this poses a difficult problem. But, it can be resolved with the presumption executives are able to determine which PLC stage the product is in at a particular point in time. The difficulty with this, however, is an assumption has been used to circumvent this original conceptual quagmire.
6. Extracting only price to investigate. The sales curve is a result of the interaction of many variables, not the least of which are the four Ps – price, product, place, and promotion. Although the three non-price variables were excluded to simplify this analysis, realism and applicability suffered.
7. Confusion as to what is the dependent and independent variable. Unit sales have traditionally been the dependent variable, and price the independent variable. With the modified PLC, however, there seems to be doubt as to the classification of these two variables. In fact, it appears there has been a reversal of roles (e.g., Perreault et al., 2014; Kotler & Keller, 2016).
8. Characteristics determining the appropriateness of using the skimming price strategy. Some examples are potential competition, inelastic demand, radically different products, volatile technology, high risk, diseconomies of scale, low cross-elasticity of demand, forecasted short PLC, poor short-run financial capability, and possibility of market segmentation. How many of these attributes need to be present before the firm embraces a skimming price strategy? How are these characteristics defined, derived, or evaluated? These are just a few of the perplexing questions surrounding these attributes.

Conclusion

Most, if not all, business and marketing academicians would probably argue the modified PLC is too simplistic and general to be of any benefit or use to managers. On the other hand, as long as practitioners recognize and accept the assumptions and limitations of the PLC concept and the author's model, this extension represents a succinct and quick procedure to arrive at a skimming price strategy for a new product across its sales curve. Although the PLC modification is not inclusive, executives now have a tool, not just a theory, to relate price in a practical fashion to their company's specific pricing objective, policies, and environment. As such, the modified PLC will enable managers to more effectively utilize the PLC concept in the development, implementation, and control of the marketing mix, particularly the price component.

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Appendix

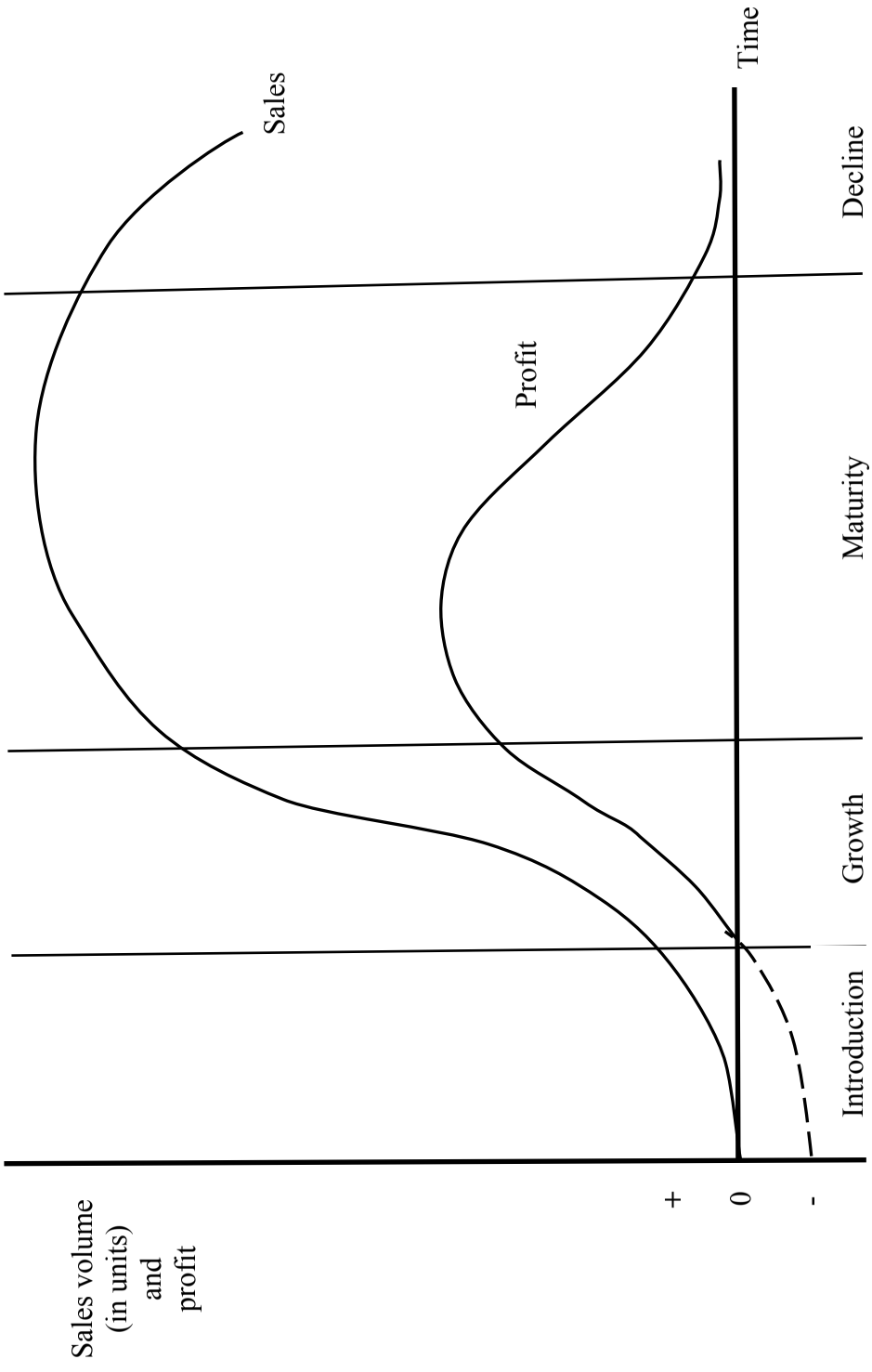

Fig. 1. Product life cycle curve

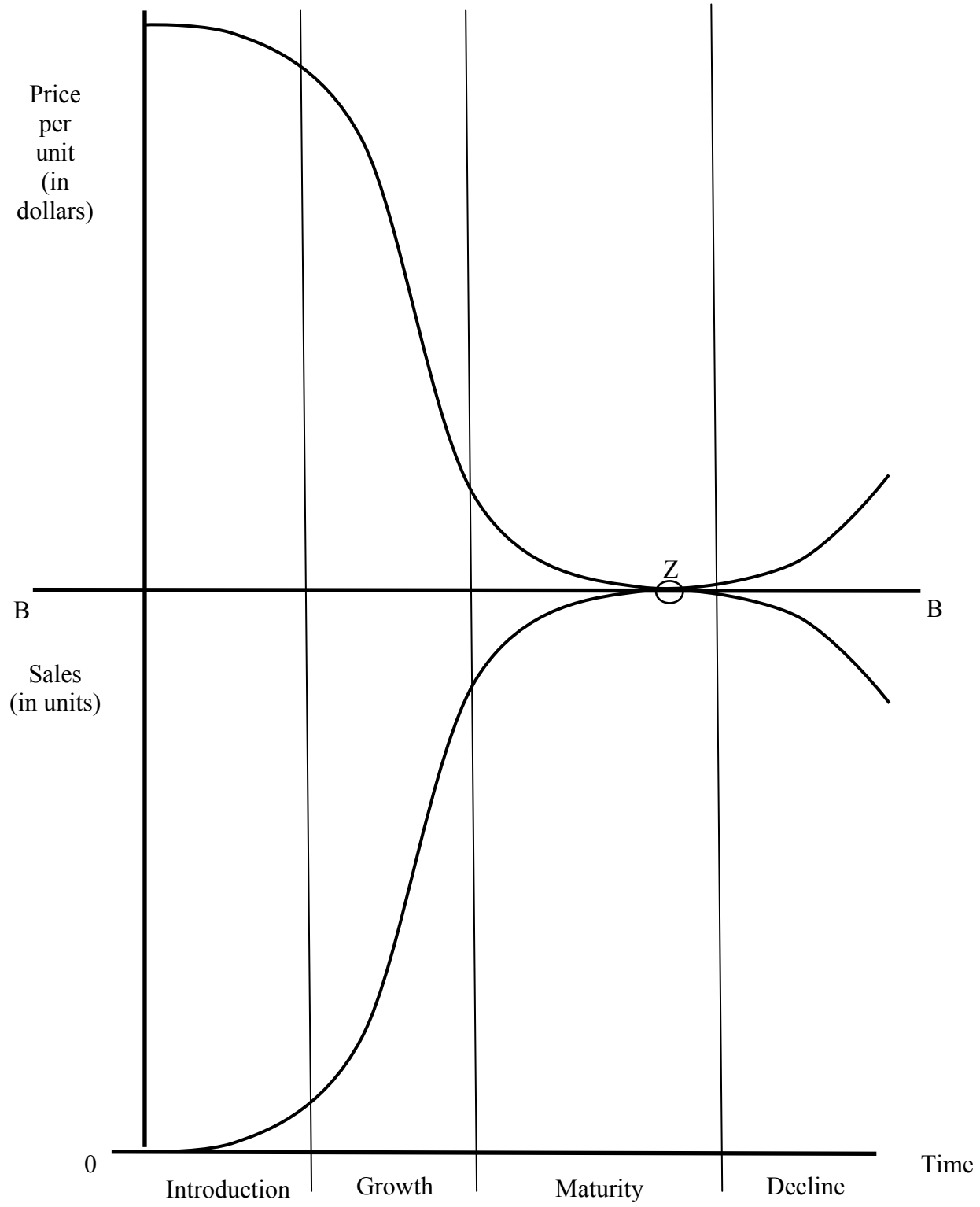

Fig. 2. Modified product life cycle

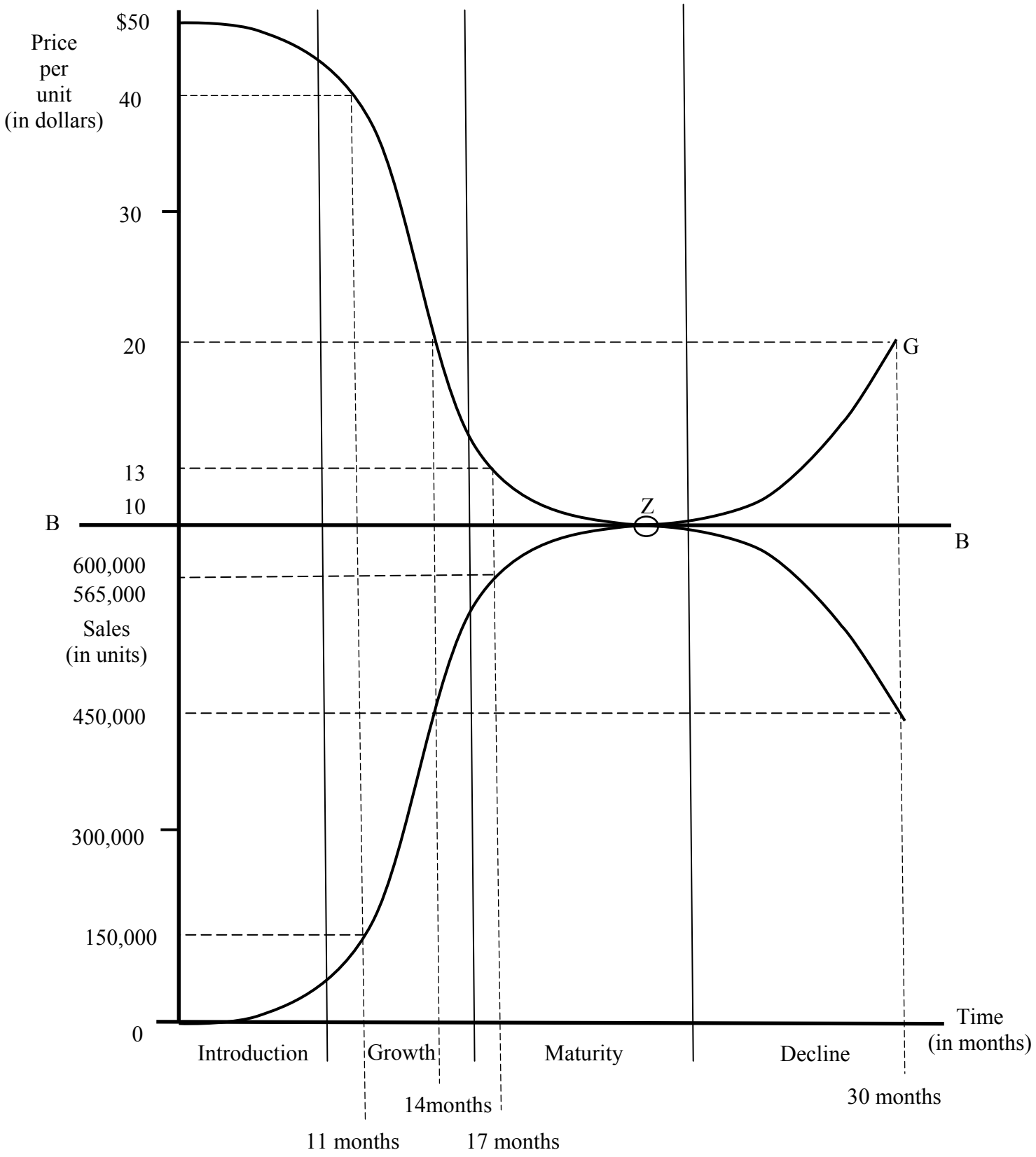

Fig. 3. Modified product life cycle and skimming price strategy