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GENERIC STRATEGY AND THE PRODUCT LIFE CYCLE

by

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The product life cycle(PLC) concept has been widely discussed in business literature since it was first introduced by Forrester in 1959. It is usually advanced in the contexts of new product planning and resource allocation as an aid to strategy formulation at both the strategic business unit(SBU) level and the corporate level. The primary reason that the PLC is utilized in strategic planning is that the stage of the PLC is a good indication of the trend in primary demand and the competition pattern. However, this proposition has not been substantiated or refuted empirically. Taking one step further, there are three sequential questions that need to be answered before one can utilize the PLC concept: (i) Is the concept valid? (ii) If it is valid, what are the characteristics of each stage of the cycle? (iii) If those characteristics are correct, what are their implications? Answers to these questions have been sought in the published literature. The PIMS data base will be used to empirically test various propositions regarding the three questions posed above.

This analysis places emphasis on the effects of the PLC on the generic strategies of SBUs. Generic strategy may be defined as the most basic decision made by an SBU in the hierarchy of its decision making. This paper seeks to identify generic strategies in the industry and to identify appropriate generic strategies for SBUs in separate stages of the PLC.

This paper is organized into five sections. The first section presents the basic concepts of the PLC and the empirical evidence related to its

validity. Since the empirical studies of the PLC almost exclusively deal with the validation of the shape of the PLC, an attempt has been made to use the PIMS data base to further explore the characteristics of the different stages of the PLC. The results are presented in the second section. The third section attempts to develop a methodology to identify generic strategies in the industry. This methodology is applied to the chemical industry and the machinery industry. Utilizing the results of the the third section, the fourth section studies the generic strategies of SBUs in different stages of the PLC. The final section examines the effects of the length of the PLC on an SBU's generic strategies.

I The Product Life Cycle

The primary focus of the PLC studies is the shape of the PLC. Once the shape of the PLC is determined, it can be used to forecast future demand which in turn, constitutes a base for strategic planning. This section will first discuss a theoretical model of the shape of the PLC and then present a literature review of the empirical studies of the PLC.

1. A Theoretical Model of the PLC.

The PLC represents the unit sales or unit demand curve of a product over time. Usually, the PLC is approximated by an S-shaped curve and is divided into four stages: introduction, growth, maturity, and decline. The only rationale underlying the shape of the PLC that can be found in the literature is the theory of innovation diffusion.[Bass,1969]

The innovation diffusion process is usually viewed as a social contagion process. The basic premise is that, over time, the information diffuses and the likelihood that the economic agent will adopt the innovation is an increasing function of the number of agents that have already adopted it. The process can be described by the equation:

$$dx/dt=ax(1-x).....(1)$$

Where x is the proportion of adopters to total potential adopters, and the parameter, a, indicates the "potency of spread." The solution of the above differential equation is an S-shaped curve.

The use of the diffusion theory as the rationale for the shape of the PLC has attracted three major criticism.

First, it does not cover the replacement demand and thus can not be employed to forecast total demand, especially for frequently purchased goods.

Second, the diffusion rate only explains the growth and the maturity stages of the PLC. The decline of a product is caused by the emergence of substitutes, which is not included in the innovation diffusion model.

Third, the demand growth of a new product is the sum of the shift of the demand curve and the movement along a given demand curve. Both Chow[1966]and Bass[1979] have pointed out that the diffusion theory only

explains the shift of the demand curve, but ignores the movement along the demand curve which results from the price decline caused by the experience curve effect in a competitive market. Thus, to understand and predict the shape of the PLC, one has to consider the experience rate, income and substitution effects of a price change, the substitute and the replacement rate, in addition to the diffusion rate.

The basic concept of the PLC must be clarified if the PLC is to be used effectively in strategic planning. The first step is to determine the level of product aggregation at which the PLC will be employed. Typically, there are three levels of product aggregation-product class (e.g. automobile), product form (large car), and brand (Buick Regal)[Polli and Cook, 1969]. Product classes include all those products that are substitutes for the same needs. Ideally, objects belonging in different product classes should have zero demand cross-elasticities. A product class thus defined can be referred to as an industry. This level is not appropriate for use in the PLC concept. Since the industry life cycle consists of the life cycles of product forms, it is usually longer than the life cycle of a product form and shows a somewhat more stable pattern. Moreover, most industries are in the maturity stage and may stay there indefinitely since their demand is highly correlated to the population[Kotler, 1980]. The brand level is also inappropriate, brands have close substitutes and their sales show an irregular pattern. Since the brand life cycle is too erratic and the industry life cycle is too steady, most marketing researchers agree that product forms are the most appropriate level of product aggregation in utilizing the PLC concept .

The second step and a major criticism of the PLC is the determination of the current stage of the PLC of the products of a business. Usually, the stage the business is in is determined by the demand growth rate. Since it is difficult to estimate future demand growth, the business is not able to locate itself exactly in anyone stage. However, the business may generally know the stage it is in by observing the market growth rate over a period of time and then, using the method suggested by Polli and Cook[1969]. By assuming that the percentage change of a product's sales is normally distributed with a zero mean, they suggest that a product is in the growth stage if its percentage change in sales is greater than 0.5 σ, and is in the decline stage if the percentage change is less than -0.5 σ, and is in the maturity stage if the percentage change is within the range of +0.5 σ.

Third, as indicated, the determinants of the shape of the PLC are the diffusion rate, the experience rate(if the market is competitive), and product substitutes. Promotion may increase the diffusion rate and the technological policy of the business may affect the emergence of substitutes. Therefore, the shape of the PLC is partially determined by the behavior of the firms in the industry.

In sum, the innovation diffusion theory is not sufficient to explain the shape of the PLC. The concept of PLC itself lacks accuracy. It is necessary then to examine empirical evidence regarding the shape of the PLC.

2. Empirical Studies of the Shape of the PLC

Research concerning the shape of the PLC covers both industrial goods and consumer goods. Studies of industrial goods usually validate the S-shaped diffusion curve of new products. [Davies 1979,Mansfield 1968,Romeo 1975]. For example, Kluyver[1977] has done a typical quantitative study of the PLC. Kluyver first specified a mathematical formulation of the shape of the PLC and then collected a set of data to test his formulation. His formulation is

$$S_t = a\,t^b e^{-(c+dt+ft^2)t}$$

where St denotes the sales in time t, e is the base of the natural logarithm , and a,b,c,d and f are constants to be estimated from the data. His study suggested that the components of heavy-duty truck and farm equipment industries have varying S-shaped sales curves. Except for the diffusion of industrial goods, even for educational innovations, the traditional S-shaped diffusion curve fits very well in five out of six cases[Lawton and Lawton, 1979].

For consumer goods, however, the classical S-shaped PLC has been a major pattern of the many patterns discovered by investigators. [Rink and Swan(1979)]. The major difference between the various patterns found in empirical studies is the behavior of sales in the maturity stage. Except in the classical S-shaped PLC, the maturity stage may exhibit innovative maturity [Buzzell 1966, Levitt 1965], or cycle-recycle [Cox 1967], or stable maturity [Buzzell,1966], which are shown in Figure 1.

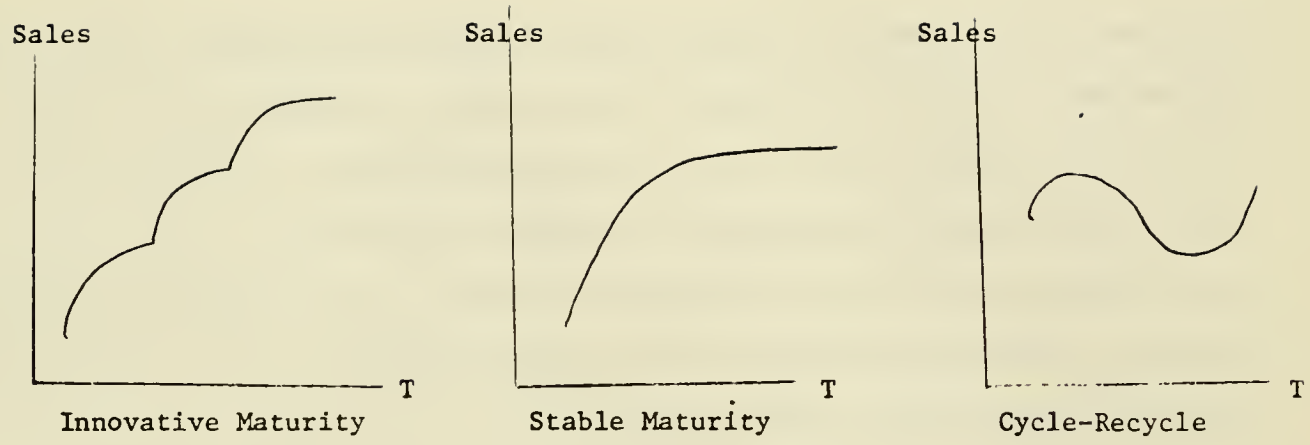

Figure 1
Types of the PLC in the Maturity Stage

For the S-shaped sales curve, Bass[1969] deveoped an S-shaped sales model for new consumer durables based on the diffusion theory. He found that his S-shaped model fits the sales history of eleven consumer durables(refrigerators, air conditioners, etc.). Nevers [1972] extended the applications of the Bass model to the retail service, agricultural, and industrial sectors. His results also validate the Bass model. But in many international settings, the predictive power of the Bass model is limited, unless some qualitative judgments are made[Heller and Hustad, 1980]. Other than the Bass model, evidence supporting the S-shaped PLCs

can also be found in Polli and Cook's study[1969] of 140 consumer nondurables. But, Cox [1967], in a study of 258 ethical-drug brands, identified six patterns of the PLC and found that the cycle-recycle model shown above best fits the data for about two-thirds of the drugs studied. He suggested that the "recycle" is due to the heavy promotion by the producer when sales decline. His finding suggests that firms' promotion policy may extend the life of a product.

Another piece of work which does not follow the S-shaped pattern is found in Buzzell[1966]. He found that some processed food products displayed continuous rapid growth (innovative maturity, e.g. cereal) either because of high rates of product innovation or because of rapid decline of raw material costs. Nylon also exhibited the same sales pattern [Levitt 1965]. Nylon was used originally in parachutes and rope. Demand would have peaked at about 50 million pounds per year in 1962 if its sales were to follow the traditional PLC model. However, demand actually approached 500 million pounds in 1962 because of the development of new uses in tires, carpet, gears and sweaters. These two studies reflect the fact that companies' effort in technology, either in process innovation or product innovation, may change the shape of the PLC.

In conclusion, from the literature review, the shape and the existence of the PLC is generally confirmed, although there are some deviations. These deviations are largely due to efforts of the firms in the areas of technology and promotion. Consequently, managers have to be aware that the PLC is not an uncontrollable variable. Because the PLC partially

depends on firms behavior, Dhalla and Yuspeh(1976) argue that managers should "forget the product life cycle concept". This is not a fair argument. As indicated, the S-shaped PLC reflects a sales curve if managers do nothing and let the contagion process proceed naturally. It is a benchmark for planning. A more beneficial approach is not to forget the PLC concept, but to use the PLC as a base for planning. Managers should take their efforts into account to modify the shape of the PLC when they utilize the PLC as a planning instrument.

As indicated, the usefulness of the PLC concept is that its phases can capture demand and competition patterns which are essential in strategy formulation. If the PLC concept is valid, then the next question is what are the possible characteristics of demand and competition in each phase that can be used as a base to formulate competitive strategy? Although a great deal has been written on this subject, very few empirical studies have been done to support the arguments presented. The following section will present some common suggestions about the characteristics of each phase. These arguments will then be tested by using the PIMS data base.

II. THE CHARACTERISTICS OF THE STAGES OF THE PLC

1. Common Suggestions of Characteristics of the Stages of the PLC

After a new product has been launched, its demand and supply conditions change across time. Porter has summarized those changes in each stage in his 1979 book. There is no reason to duplicate his work here. This

section will only briefly mention several important attributes of the four stages of the PLC. Generally speaking, some writers agree that the following phenomena characterize the four stages of the PLC[Kotler ,1980, Staudt 1976,Levitt 1965, Forrester 1959].

In the introductory stage, demand needs to be created. Promotion and R&D costs are thus substantial. As a result, profits tend to be low or even negative, and competitors are few. In the growth period, buyers are limited to those early adopters characterized by high-income, risk-taking. The buyer group is widening, the product begins to appeal to different groups and prices are relatively higher than costs which decline as a result of the experience curve. The resulting high profits attract new entrants into the field. In this stage, promotion cost will be less then that in the introductory stage. In the maturity period, the opportunities for product improvement had already been exploited, and the product tends to be standardized. The absence of entry barriers with respect to product differentiation causes competition to intensify, and profits fall.

Two kinds of industries may attract increasing international competition when they reach the maturity stage: labor intensive industries and capital intensive industries which had experienced major process innovations. In labor intensive industries, when a product becomes standardized and its associated technology becomes widely diffused, the locus of production of the product will be determined by relative factor costs [Vernon 1966]. Therefore, low labor cost countries will enter

labor intensive industries. When capital intensive industries reach maturity, they are characterized by high cost fixities resulting from past investment. These cost fixities naturally lower their marginal costs. As long as the marginal cost of using old equipment is lower than the average full cost of using new equipment, firms will not invest in new equipment. Thus, cost fixities prohibit domestic firms from adopting process innovations that would bring average cost down. (such as robots in the automobile industry, and continuous-casting method in the steel industry[Rosegger 1979]). As foreign producers produce these capital intensive goods with new equipment, the average cost of domestic mature industries tends to be higher than that of their foreign competitors. Such factors attract increasing competition from foreign countries.

Finally, at the last stage, the increasing competition as well as the decline in demand cause the profits and the number of competitors to fall.

In sum, researchers generally agree on the following hypotheses:

- .Marketing and R&D expenses will decline as the PLC proceeds
- .Products will be standardized
- .Imports from countries with low manufacturing costs will increase
- .Competition will intensify
- .Profit will be highest in the growth stage and decline after that

Two questions regarding the rationale of the above hypotheses may be

raised. The first question concerns the assumption about the relationships between profits, competition and the life cycle. The second one concerns management's attitude toward the usage of the PLC concept. First, an implicit assumption behind the above arguments is that demand growth governs the patterns of competition which, in turn, determine profits. Therefore, the competition cycle and the profit cycle are tied to the life cycle. Specifically, it is assumed that when demand grows, competition is not intense, but, when demand becomes stagnant, competition becomes fierce (maturity stage). As a result of the competition cycle, profits are low or negative in the introduction period, rise in the growth stage, and then fall in the maturity and decline stages. These relationships are shown in Figure 2.

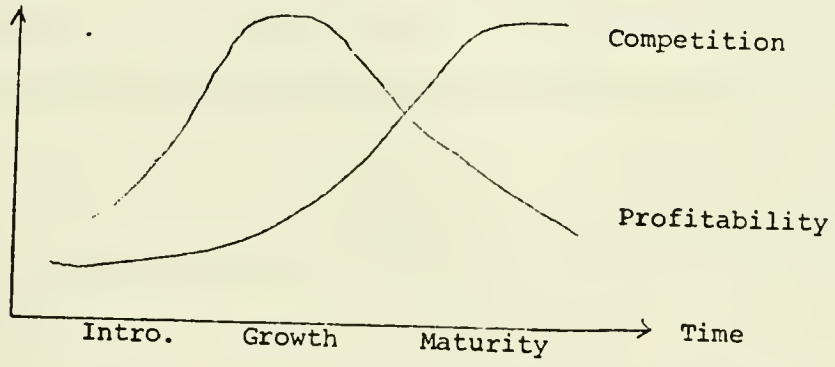

Figure 2

The Trend of Profitability and Competition in the Life Cycle

The relationship between competition and profits is well recognized, but the underlying rationale of the proposition that demand growth governs competition has not been clarified. At an extreme, Porter[1980] argues,

> "Except for the industry growth rate, there is little or no underlying rationale for why the competitive changes associated with the life cycle will happen."

However, Porter ignores an element of the PLC which relates competition and the stages of the PLC-- time. To a certain extent, demand growth and time, two components of the PLC, may affect the competition in the industry through changing the height of entry barriers.

It should be noted that whether competition becomes intensified in the maturity stage depends on the rate of entry, a function of entry barriers. Two factors may affect the height of entry barriers in the passage of time, the diffusion of technology and the growth of demand relative to the minimum efficient scale(MES). It is obvious that speed of diffusion of technology may reduce entry barriers. The second factor, the growth in demand, may allow new entrants to reach MES, and in turn, reduce the significance of economies of scale as entry barriers. However, economies of scale may increase in the passage of time as the product becomes standardized and is mass produced . If MES grows faster than the demand, the industry will become concentrated and vice versa. Therefore, the height of entry barriers depends on the demand growth relative to the MES growth, and the diffusion of technology. Consequently, whether the competition pattern changes with the stage of the PLC depends on these two factors.

For example, the U.S. passenger car industry reached some degree of maturity 25 years ago. Due to substantial economies of scale, the

competition was not strong, and the industry was very profitable in 1960's. Clearly, this is not the situation predicted by the PLC theorists. However, as the demand growth of the Japanese auto market overcame the economies of scale, and as the production technology diffused, Japan auto makers were able to enter the U.S. market and compete with the big three. Consequently, the profits of the U.S. auto makers have since declined. This example shows that entry barriers and their causes can explain the competition and profitability of the U. S. auto industry better than the PLC can explain it. In conclusion, the main reason that competition is associated with the stage of the PLC is that entry barriers are affected across time. One must look at the underlying factors affecting entry barriers to predict future competition rather than merely using the the PLC as a predictor of competition and profits.

The PLC concept is useful in that it captures primary demand and competition patterns in its stages. Therefore, the validity of the shape of the PLC is not important; the important question is how the competition pattern and demand (e.g. market structure, price competition vs quality competition) change with the stage of PLC. Since demand and competition are the primary concerns of managers, it is most important to look at the factors that affect competition and demand, such as income and price elasticities. For example, coal had been in the decline stage for a long time. As a result of the oil shock, the demand for coal increased sharply. This can not be explained by the PLC concept. Management should scrutinize the determinants of demand and competition

in order to predict future demand and competition. When information on the determinants of competition and demand is costly to obtain or is not available, the PLC may then be used as a surrogate tool in planning. The PLC concept seems to be widely used not because of its accuracy but because of its convenience in indicating somewhat the future stages of evolution.

Although there is unanimous agreement among researchers about the characteristics of each stage of the PLC, there is a lack of evidence to support these arguments. To fill this gap, the PIMS data base will be used to show the differences between stages. The results are shown in Table 1 and will be discussed in the following section.

2. Empirical Study of the Characteristics of the PLC

Before discussing the results of our analysis using the PIMS data base, some qualifications regarding the data base have to be made. First, the sample businesses in the PIMS data base are SBUs which supposedly engage in only one market. The markets served, however, are defined by their parent companies. Since each company has its own way of defining the market scope of its SBUs, the definition of the market served is not homogeneous. This heterogeneity may lead to distortion of our results. Secondly, many variables in this data base are subjectively measured, such as the stage of the PLC, product quality, relative direct cost and even market share. These measures are not as precise as objectively measured. Thus, our results are highly tenuous and one has to keep these

deficiencies in mind in interpreting our results.

In the PIMS data base, the business's stage within the PLC is reported by the sample businesses themselves. In order to use this variable as a basis for further study, one must first check the validity of the reported stages by examining the variables that, by definition, are supposed to change in different stages. By definition, new product sales as a percentage of total sales, newness of plant and equipment, and technological change should decline as the PLC proceeds. The market growth rate should be highest in the growth stage and decline after that. In Table 1, one can observe that all these variables act in the direction expected, except that the market growth rate in introductory stage is higher than that in the growth stage. But the difference is not significant (t=0.85, not significant) and this contradiction may be neglected. Therefore, the stage reported is generally correct and may be used as a basis for further study.

In the previous section, it is suggested that marketing and R&D expenses, imports, product standardization, competition, and profitability will vary in different stages of the PLC. To test these hypotheses, SBUs' profitability is shown by three measures: gross margins, ROI and ROS. The intensity of competition is measured as the inverse proportion of the largest four firms' market share. It is found that:

(i) Most of the businesses are in the maturity stage(72.1 percent) or in the growth stage.

(ii) R&D expenses as a percentage of sales is highest in the

introductory stage and decline after that.

The same is true for marketing expenses.

(iii) Imports as a percentage of total market sales increase over time.

(iv) Customization declines from the growth stage; product standardization increases across time.

(v) Gross margins are highest in the introductory stage and decline afterwards. The high gross margins may be due to the monopoly power attached to new products. But the high gross margins are eroded by high marketing and R&D expenses in the introductory stage. Therefore, ROI and ROS are the lowest among the four stages. This result is consistent with Biggidike's[1979] findings about the profitability of new entrants.

(vi) ROI and ROS decline after the growth stage . ROI in the growth stage is significantly higher than that in the maturity stage(z=2.55 significant at 0.01 level). ROS is also higher in the growth stage than in the maturity stage, but it is only significant at 0.05 level(z=1.87).

(vii) The intensity of competition increases in the maturity stage from the growth stage. T-test shows that there is significant difference in the largest four market shares between the growth stage and the maturity stage(t=2.31, p=0.01)

Table 1

Characteristics of the Stages of the PLC

	Introductory	Growth	Maturity	Decline	
No. of Obs.	32	1046	3554	231	
	Mean(S.D.)	Mean(S.D.)	Mean(S.D.)	Mean(S.D.)	F (P)
MKT GROWTH	19.84(14.55)	17.63(13.26)	10.63(10.18)	6.61(9.94)	143(0.001)
% NEW PRODT	33.68(28.10)	13.78(17.68)	6.77(13.05)	3.55(6.09)	110(0.001)
P&E NEWNESS	66.17(12.7)	59.29(16.0)	52.60(14.6)	45.21(14.7)	87.6(0.001)
TECH. CHAG.	0.75(0.433)	0.49(0.50)	0.20(0.40)	0.22(0.41)	132(0.001)
R&D/REV.	5.06(3.69)	3.08(3.25)	1.78(2.21)	1.15(1.68)	101(0.001)
MKTING/REV	16.56(9.34)	9.92(6.49)	8.73(6.73)	8.31(5.92)	23.1(0.001)
IMPORTS %	n.a.	4.16(8.17)	5.66(10.2)	12.82(15.2)	13.3(0.001)
CUSTOMZATON	0.125(0.33)	0.296(0.46)	0.21(0.41)	0.12(0.33)	17.6(0.001)
ROI	3.90(24.88)	24.89(25.53)	22.68(21.42)	15.06(19.1)	20.0(0.001)
ROS	-0.75(14.07)	10.23(11.61)	9.50(9.04)	5.69(8.43)	25.8(0.001)
GRS MRGIN	34.69(17.87)	29.99(14.09)	25.88(12.10)	19.83(11.5)	54.7(0.001)
MKT CONCEN.	62.60(21.84)	72.81(21.67)	71.05(21.71)	69.64(23.3)	3.96(0.008)

Definitions: MKT GROWTH: Served market annual growth rate
P&E NEWNESS: Net book value/gross book value
% NEW PRODUCT: Percentage of total sales accounted for by products introduced during last 3 years
TECH CHAN: Equals 1 if there have been major technological changes in the last 8 years and zero otherwise
R&D/REV: R&D expenses as a percentage of sales
MKTING/REV: Total marketing expenses as a percentage of sales
IMPORTS %: percentage of imports in served market sales
CUSTOMZATIN:Equals 1 if the SBU designed or produced to orders for individual customers and zero otherwise
ROI: Pretaxed income over invested capital
ROS: Pretaxed income over sales
GRS MARGIN: Gross margins=$\frac{\text{Sales-direct costs-depreciation}}{\text{Sales}}$
MKT CONCEN: Largest four firm market share.

F-tests show that all these variables are significantly different in the four stages. Thus, agreement among researchers on the characteristics are generally confirmed.

In conclusion, despite the fact that the PLC suffers from certain deficiencies, it does govern some of businesses' behavior and their environment. The following sections discuss how the different characteristics of the separate stages of the PLC affect generic competitive strategies.

An SBU's strategy should be formulated based on trends in the environment and its own strengths and weaknesses. As indicated, the current phase of the PLC is a good indication of the trends in an SBU's environment. Therefore, the phase of the PLC partially shapes the strategy of an SBU. In addition to the phase of PLC, the length of the PLC will also influence an SBU's strategy. For example, an SBU in an industry with short PLCs should have enough flexibility to cope with rapid product innovations introduced by the SBU and its competitors.

The following sections examine the effects of both the phase and length of the PLC on an SBU's strategy. The first section discusses the definition of generic strategy and develops a methodology to identify generic strategies in a particular industry. The second section then analyzes the appropriate generic strategies for each stage of the PLC. The third section looks at the effects of the length of the PLC on generic strategies.

III. THE DEFINITION OF GENERIC STRATEGY

1. The Definition of Generic Strategy

Two main approaches concerning generic strategy emerge from the strategy literature: the "process" approach and the "content" approach. The process approach primarily concerns generic types of organizational process. [Miles and Snow,1979; Miller and Friesen, 1978]. The content approach focuses on the components of a strategy. Since variables describing organizational processes are not available in the PIMS data base, we will adopt the content approach to study generic strategy and then compare our results with those studies using the process approach.

Since being proposed by Porter(1979), the concept of generic strategy , which uses the content approach, has seldom been discussed in management literature. Porter states that generic strategy is "internally consistent," without giving a definition of the term itself. He then describes three generic strategies-- cost leadership, differentiation, and focus-- based on two strategic dimensions:market segmentation and strategic advantages. It is not clear from this description what the term generic strategy means or how this concept relates to other concepts of strategy.

The generic strategy of an SBU reflects an integrated view of the SBU's strategic behavior. It originates from the hierarchical nature of decisions; some decisions govern other decisions. (This character has

been discussed extensively in the literature [March and Simon 1958 , Ansoff 1965, Hofer and Schendel 1978].) Generic strategy is defined as the highest decision made in the decision hierarchy. Consequently, generic strategy dominates all other strategic decisions. Cost leadership, for example, determines the result of decisions about the selection of target market(mass market), competition pattern(price competition), product design(standardized product), and focus on production(efficiency),etc. Another example is Polaroid's early generic strategy, i.e. to exploit Dr. Land's invention, the instant camera. Sears' previous generic strategy was to provide quality merchandise and good service with relatively low prices. P&G's generic strategy is based on the concept of mass marketing a relatively low-priced quality consumer product line through supermarkets.

As the choice of the SBU's generic strategy will determine the rest of the SBU's strategic decisions, it tends to integrate all of the strategic decisions of an SBU into a coherent one and in doing so, creats internal consistency among decisions. Generic strategy specifies relationships between strategic decisions and thus provides an integrated view of an SBU's strategy.

The generic strategy defined above differs from the strategy concept of Ansoff(1965) and Hofer and Schendel's(1978) in one major aspect. The latter suggest that a strategy consists of four components. However, the generic strategy of an SBU governs these components. For example, the generic strategy of cost leadership not only specifies the product-market

served, and the competitive advantage chosen(price), but also dictates the direction of resource employment (cost reduction oriented). The choice of the generic strategy is a decision made prior to the decisions regarding these components.

Three dimensions used to describe a generic strategy may be found in the literature-- market segmentation, selection of competitive advantages, and market share acquisition. The first two dimensions originate from Porter's classification of generic strategies. The three generic strategies suggested by Porter, cost leadership, product differentiation, and focus, are formulated based on market segmentation and competitive advantages. Cost leadership is a generic strategy which treats the market as an aggregate without recognizing the different market segments and which chooses low cost as its competitive advantage. The low cost position is usually achieved by a mass production method. In a product differentiation strategy, the SBU chooses quality as a competitive advantage and directs its sales to the entire market. A strategy of focus targets on a narrow market segment and chooses price or quality or both as competitive advantages. The market scope of a "focus" strategy is narrower than that of the previous two generic strategies.

These three generic strategies are not mutually exclusive. Cost leadership and the "focus" strategy, and cost leadership and differentiation can coexist;, product differentiation and the "focus" strategy are only different in the degree of market segmentation. For example, Japanese auto makers focus on the small car market and choose

both price and quality as competitive advantages. Their low prices are achieved by employing a cost leadership strategy. Thus, they adopt a strategy combining cost leadership and focus. If they gradually enter the medium car market and the large car market, their generic strategy will be best described as "product differentiation and cost leadership."

The third dimension, market share acquisition originates in the BCG approach which assumes that high market share leads to high long-term profitability and that investment is needed to increase market share. Hofer and Schendel[1979] have used these two dimensions, market share acquisition and absolute investment, to describe six generic type business strategies. Since market share increase is assumed to be positively related to absolute investment, the two dimensions can be merged into one. Thus, the six generic strategies reside on a continuum of offensive-defensive-liquidation strategies, with market share increase strategy at one extreme and liquidation(giving up market share) at the other end. This continuum is the third dimension which describes a generic strategy.

There are many combinations of these three dimensions and each combination is a unique generic strategy. For example, an SBU may acquire market share through a product differentiation strategy or through a cost leadership strategy. Thus, the next step is to conduct an exploratory study to find feasible generic strategies employed by SBUs, and then , examine the difference between "real" and "theoretical" generic strategies described above. In the next section, a methodology

is developed to identify the generic strategies used in an industry.

2. The Methodology of Identifying Generic Strategies

The generic strategy determines subsequent strategic decisions which can be measured in terms of strategic dimensions(e.g. the degree of vertical integration, R&D expenses). Assuming that there is a unique transformation from a generic strategy to subsequent strategic decisions, the generic strategy of an SBU can be inferred from its behavior along several strategic dimensions. SBUs adopting a similar generic strategy must have similar strategic dimensions. Thus, based on the similarity of strategic dimensions between SBUs, one can identify generic strategies employed by any one SBU in a way described below.

Placing each SBU in an N-dimension euclidean space in which each dimension is a strategic dimension, the distance between SBUs indicates the "similarity" of their strategies. Since these dimensions are strategic dimensions, the distance between the SBUs is a "strategic distance" which reflects their strategic similarities. The smaller the distance is, the more similar are the strategies adopted. If there are several generic strategies in a group of SBUs, there are larger distances between the SBUs adopting different generic strategies, and smaller distances between the SBUs adopting similar generic strategies.

Cluster analysis matches the idea of identifying generic strategy by inference as described above. Cluster analysis places each object in an

N-dimension euclidean space and then clusters objects into groups based on the distance between the objects. The criterion used to select clusters in this study is minimum squared error (MSE). The MSE method is to select the two clusters to be merged at each stage in such a way as to minimize the mean squared distance between an individual point and the centroid of the cluster to which it will be assigned after the merger has been affected.

The dimensions used here to describe each subject are the components of a strategy; the difference in the components of strategy between groups is assumed to be an indicator of the difference between their generic strategies. Hofer and Schendel[1978] suggest four components of strategy: product-market scope, resources deployment, competitive advantage, and synergy. Since each business in the PIMS data base is engaged in one market, the synergy component and the product-scope component are neglected. The dimensions of the remaining two components used and their definitions are the following:

A. Resource deployment: 1. Degree of vertical integration: the ratio of value added to total revenue.
2. Process R&D expenses / Revenue.
3. Product R&D expenses/Revenue.
4. Sales force expenses/Revenue.
5. Promotion expenses/Revenue.

B. Competitive advantages 6. Newness of plant and equipment: net book value P&E/ Gross book value P&E.

7. Relative product quality: percent product quality superior minus percent product quality inferior.
8. Relative price: percent relative prices vs. competitors.
9. New product% :percent of new product sales to total sales.
10. Relative direct cost : percent relative direct costs per unit vs. competitor.

Applying cluster analysis to an industry based on these dimensions results in a grouping of SBUs adopting similar generic strategy. Since the groups are identified based on strategic dimensions, these groups are called "strategic groups" [Porter 1979]. Porter postulates that the strategic groups in an industry exhibit performance differences. If this hypothesis is correct, different generic strategies will lead to different performance. However, the empirical studies validating this proposition either use size as the only strategic dimension to cluster SBUs[Porter 1979,Stonebraker 1976], or use an inappropriate statistical model[Hatten and Schendel 1976]. To correctly validate Porter's proposition, we will examine the performance differences between the strategic groups identified by cluster analysis.

The generic strategies described in the previous section clearly affect these dimensions. A strategy of cost leadership must have relatively low price and costs, two important competitive weapons. The product should

be standardized to fit mass production methods and therefore, there involve less product changes. Consequently, product R&D expenses should be low. To reduce costs, process R&D expenses should be relatively high. Vertical integration may be either high or low. SBUs adopting a cost leadership strategy may vertically integrate backward or forward to realize their economies of scale. However, SBUs using the same strategy may take advantage of their size of purchase and exercise their bargaining power to lower their purchasing prices and thus, reduce their degree of vertical integration. Therefore, the degree of vertical integration is not solely determined by the cost leadership strategy. Finally, a cost leadership strategy should lead to a higher market share.

As for the product differentiation strategy, Porter suggests that this strategy requires "strong marketing abilities" and "product engineering" or "technology leadership", which lead to high marketing expenses and high R&D expenses. By definition, this strategy should have high product quality and high prices. Whether vertical integration is affected by this strategy depends on the contribution of vertical integration to product quality. The strategy of "focus" is similar to the strategy of product differentiation, but it has a smaller market share.

Before discussing the results of our analyses, again, it is necessary to be aware of the limitations of the methodology and the PIMS data base. First, the strategic dimensions used in the present paper are not all inclusive. Second, the importance of these dimensions to the competition in the different industries should vary. However, no attempt has been

made to give weights to some dimensions to reflect their relative importance.

Based on 10 strategic dimensions, cluster analysis has been performed for the chemical industry(SIC 28). The main reason for choosing a particular industry as the unit of analysis is to avoid the heterogeneity of firms' behavior. The reason for analyzing the chemical industry is that its sample size is the largest among the 2-digit SIC industries in the PIMS data base.

3. Empirical Results

The results of the cluster analysis of the chemical industry are presented in Table 2. Five groups of SBUs in the chemical industry were chosen from the dendrogram of the cluster analysis. The number of cluster is chosen at the level where mean square error shows a substantial increase resulting from the merger of two groups. However, the number of objects in two of the groups in the chemical industry is too small and so are excluded from the discussion. As a result, only three groups are presented in the table.

In Table 2, the three major groups exhibit differences across most of the strategic dimensions. SBUs in group one adopt high vertical integration, high R&D, heavy marketing intensity,high product quality, high price and low cost strategies. The "internal consistency" of those strategies can be interpreted in the following way. The SBUs in group one focus on high

product quality and high price market. The superior product quality is achieved by high product R&D expenses, new equipment, heavy marketing, or high degree of vertical integration (an important factor in the chemical industry). Because of superior product quality, these SBUs are able to raise their prices and gain higher profits. High profits result not only from high prices, but also from low cost which is made possible by high process R&D expenses and low new product sales. High process R&D expenses and low new product sales indicate that the SBU exclusively focuses on the improvement of the production process of existing products and not new products.

This internal consistency between strategic dimensions is the result of the generic strategy adopted by the SBUs in group 1. This generic strategy may be called "high-profile" strategy, as opposed to the "low-profile" strategy adopted by group 3. SBUs in group 3 adopt completely different strategies from the SBUs in group 1, except that they also have no new product sales. SBUs in group 2 adopt an in between strategy. These three groups illustrate three internally consistent generic strategies. Both the high-profile strategy and the low-profile strategy show patterns similar to the product differentiation strategy as described before, but one strategy differentiates itself from others by its high product quality and the other by its low product quality.

Table 2

The Strategic Groups in the Chemical Industry

	Group 1	Group 2	Group 3
No. of Obs	17	66	44
STRATEGIC DIMENSIONS (STANDARDIZED)			
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)
1. REL QUALITY	0.68(1.45)	0.23(0.97)	-0.54(0.38)
2. REL PRICE	1.16(0.19)	0.18(0.90)	-0.48(0.67)
3. VERT INTEGRTN	1.14(0.20)	0.33(0.82)	-0.87(0.67)
4. PROD R&D/REV	1.97(0.61)	-0.20(0.56)	-0.59(0.44)
5. PROC R&D/REV	1.30(0.46)	-0.30(0.55)	0.15(0.24)
6. SALES FRC/REV	0.92(0.78)	0.25(0.97)	-0.87(0.39)
7. ADV&PROMO/REV	-0.07(0.08)	-0.12(0.25)	-0.29(0.02)
8. P&E NEWNESS	0.87(0.65)	0.08(0.80)	-0.57(0.38)
9. REL DIR COST	-1.45(0.19)	-0.01(0.46)	0.47(1.25)
10.% NEW PRODUCT	-0.43(0.0)	0.00(0.62)	-0.36(0.22)
PERFORMANCE			
1. ROS	27.46(8.89)	16.98(11.29)	10.15(9.98)
2. ROI	36.05(19.08)	31.66(20.44)	24.16(18.40)
3. MARKET SHARE	25.41(22.99)	29.05(20.11)	28.23(20.18)

Table 2 (CONTINUE)

The Strategic Groups in the Chemical Industry

	Group 4	Group 5		
No. of Obs	4	5		
STRATEGIC DIMENSIONS (STANDARDIZED)				
	MEAN(S.D.)	MEAN(S.D.)	F (P)	
1. REL QUALITY	-0.97(0.60)	0.07(0.78)	8.4(0.001)	
2. REL PRICE	-2.21(1.15)	-0.51(0.18)	23.2(0.001)	
3. VERT INTEGRTN	0.53(0.39)	-1.10(0.24)	34.6(0.001)	
4. PROD R&D/REV	-0.71(0.06)	1.65(0.36)	90.0(0.001)	
5. PROC R&D/REV	-1.00(0.00)	-1.00(0.00)	15.9(0.001)	
6. SALES FRC/REV	0.78(0.36)	0.44(0.46)	22.4(0.001)	
7. ADV&PROMO/REV	5.53(1.04)	-0.15(0.13)	490(0.001)	
8. P&E NEWNESS	0.50(0.71)	0.38(0.91)	9.0(0.001)	
9. REL DIR COST	1.30(0.17)	-0.17(0.18)	20.2(0.001)	
10.% NEW PRODUCT	-0.50(0.42)	4.47(0.47)	128(0.001)	
PERFORMANCE			F (P)	R^2
1. ROS	4.57(2.49)	5.66(1.07)	11.1(0.001)	0.253
2. ROI	14.52(4.24)	16.96(2.53)	2.61(0.038)	0.074
3. MARKET SHARE	5.63(2.33)	14.90(3.15)	1.8(0.113)	0.052

Interestingly enough, as observed from Table 2, these three strategic groups show performance differences in terms of return on sales (ROS) and return on investment (ROI). F-tests show that there are significant differences in ROS(at 1% level) and ROI(at 3.8% level). However, the high degree of vertical integration of SBUs in group 1 reduces their asset turnover rates, and thus, there is no significant differences in ROI between group 1 and group 2. But T-test shows that the ROI of group 2 is higher than that of group 3 at 5% significance level($t=2.16$). Therefore, the proposition that strategic groups in an industry exhibit performance differences is generally confirmed.

Due to the differences in basic conditions (economies of scale, technological progress, demand pattern) and market structure between industries, the way "internal consistency" is constructed should be different between industries. Thus, the patterns of the generic strategy will be different across industries. To test this proposition, the methodology used above is applied to the machinery industry(SIC 35). However, process R&D intensity as it accounts for less than 0.5 of total sales, is excluded from the strategic dimension used in the cluster analysis. Total R&D expenses is substituted for the product R&D intensity as a strategic dimension. The results are presented in Table 3.

Based on nine strategic dimensions, six groups were identified but only four groups are discussed; two groups contain too a small number of objects. Again, "high profile" and "low profile" generic strategies are

found. Group 1 adopts a high profile strategy and shows high degree of vertical integration, high R&D and marketing intensity and high product quality. However, group 1 only charges medium price , relative to its competitors; and thus obtains significantly high market share (47%). This high profile strategy is different from the high-profile strategy in the chemical industry. Newness of plant and equipment, and relative direct cost are not associated with the rest of strategic dimensions.

Group 2 adopts a low-profile strategy and group 3 adopts an in-between strategy. Group 4, however, shows an inconsistent strategy. Unlike group 2, group 4 is not able to lower its direct costs to match its low price, low quality strategy. Moreover, its new product sales are relatively high, and its marketing expenses are very low. As a result, new products do not have a large enough marketing budget to conduct necessary promotion. The inconsistency in strategies results in very poor performance of the SBUs in group 4. Their ROI and ROS are the lowest among the four groups.

As far as the performance is concerned, unlike SBUs in the chemical industry, SBUs in the machinery industry adopting a low-profile strategy are as profitable as SBUs adopting a high-profile strategy. Both groups' ROI are 28% and are significantly higher than the group 3's ROI at a 5% level and group 4's ROI at a 1% level.

Table 3

The Strategic Groups in the Machinery Industry

	Group 1	Group 2	Group 3	Group 4
No. of Obs	32	62	18	23
STRATEGIC DIMENSIONS (STANDARDIZED)				
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)
1. REL QUALITY	1.315(0.58)	-0.35(0.60)	0.13(0.63)	-1.13(0.40)
2. REL PRICE	0.13(0.60)	-0.10(0.62)	0.19(0.90)	-0.95(0.43)
3. VERT INTEGRTN	0.78(0.69)	0.09(0.78)	-0.08(0.74)	-1.12(0.94)
4. TOTAL R&D/REV	1.42(1.12)	-0.53(0.52)	0.13(0.59)	0.14(0.80)
5. SALES FRC/REV	0.96(1.12)	-0.22(0.78)	-0.16(0.56)	-0.55(0.26)
6. ADV&PROMO/REV	-0.07(0.45)	-0.47(0.27)	2.15(1.40)	-0.21(0.27)
7. P&E NEWNESS	-0.30(1.14)	-0.16(0.73)	0.12(0.63)	0.46(1.29)
8. REL DIR COST	-0.08(0.64)	-0.55(0.59)	-0.06(0.47)	0.57(0.93)
9.% NEW PRODUCT	-0.23(0.44)	-0.24(0.43)	-0.18(0.33)	0.37(0.87)
*10.TOTAL MKTING/REV	13.51(7.06)	8.68(4.58)	13.39(4.52)	6.13(1.65)
PERFORMANCE				
1. ROS	13.90(9.42)	11.94(10.55)	4.57(12.0)	3.37(5.14)
2. ROI	28.6(17.0)	28.9(26.3)	16.2(20.4)	8.88(10.5)
3. MARKET SHARE	46.7(20.6)	29.7(19.5)	21.5(11.3)	14.1(9.61)

*Not Standardized

Table 3 (CONTINUE)

The Strategic Groups in the Machinery Industry

	Group 5	Group 6		
No. of Obs	10	4		
STRATEGIC DIMENSIONS (STANDARDIZED)				
	MEAN(S.D.)	MEAN(S.D.)	F (P)	
1. REL QUALITY	0.19(0.94)	0.05(0.10)	44.4(0.001)	
2. REL PRICE	2.41(0.44)	-1.02(1.42)	37.9(0.001)	
3. VERT INTEGRTN	-0.86(0.59)	1.12(0.46)	20.0(0.001)	
4. TOTAL R&D/REV	0.19(0.39)	2.83(1.78)	17.5(0.001)	
5. SALES FRC/REV	-0.83(0.46)	1.35(1.33)	16.2(0.001)	
6. ADV&PROMO/REV	-0.35(0.44)	0.09(0.22)	56.3(0.001)	
7. P&E NEWNESS	0.05(1.12)	1.33(0.34)	3.57(0.005)	
8. REL DIR COST	2.51(0.16)	-0.35(0.00)	43.7(0.001)	
9. % NEW PRODUCT	-0.40(0.10)	5.00(0.55)	83.1(0.001)	
*10.TOTAL MKTING/REV	4.12(3.47)	23.5(1.57)	17.6(0.001)	
PERFORMANCE			F (P)	$\bar{R}^2$
1. ROS	8.22(2.88)	13.15(2.60)	5.11(0.001)	0.152
2. ROI	18.25(8.06)	25.72(6.69)	4.00(0.001)	0.123
3. MARKET SHARE	10.9(4.33)	46.0(22.80)	13.6(0.001)	0.322

*Not Standardized

In conclusion, four strategic groups in the machinery industry are identified. Low- profile strategy and high-profile strategy are equally profitable and their profitability is higher than that of the strategy in the middle. The strategic group with inconsistent strategies performs the worst. These results confirm the proposition that different strategic groups perform differently.

Comparing the results of these two industry studies, the high-profile generic strategy of the machinery industry is slightly different from that of the chemical industry. For example, because the chemical industry is a process manufacturing industry, vertical integration is critical in operations. Thus, vertical integration is an important strategic decision which is included in the high-profile generic strategy in the SBUs in the chemical industry, but not in those in the machinery industry. A discriminant analysis revealing the importance of vertical integration in the chemical industry has been performed by using the ten strategic dimension as right-hand side variables. The dependent variable is the strategic group of which the SBU is a member. The degree of vertical integration is the most important variable in discriminating SBUs into the strategic groups created by the cluster analysis.

The otherwise similar generic strategies in the two industries demonstrate that price, quality, R&D intensity, and marketing intensity are usually considered at the same time as and form the basis of a generic strategy. Depending upon the importance of these strategic dimensions to the competition in a particular industry, vertical

integration, relative cost, and other strategic dimensions may be added to this basis.

Strategic grouping is actually a typology of the SBUs in an industry. Many typologies can be found in the management literature. For example, Ansoff[1965] classified businesses based on their technological leadership. Rogers[1971] categorized businesses by their innovation adopting behavior. However, most of the typologies place emphasis on only one aspect of an SBU's behavior. Typologies that can provide an integrated view of an organization can be found in Miles and Snow's[1979], and Burns and Stalker's[1961] studies. Burns and Stalker found two types of organization: organic and mechanic. Based on the process of adjustment to environmental changes, Miles and Snow identified four generic types of organization: defender, prospector, analyzer and reactor. Defenders focus on improving efficiency of existing operations. Prospectors seek new products to match market opportunities. Analyzers are in the middle of the continuum with defenders and prospectors at either ends. Reactors show inconsistent and unstable behavior in adjusting processes. Miles and Snow have a detailed description of the internal consistency among organizational processes for each generic type of organizations. However, only two strategic dimensions are included in their study: new product sales and costs.

The major difference between our strategic group typology and these two studies is the kind of variables used to cluster SBUs. The strategic group typology uses the "content" of a strategy to find a typology, while

the other studies use organizational processes variables to reach a typology. Despite the difference, the findings are similar in two aspects. First, all three studies found a continuum, although different ones, to categorize SBUs. The existence of a continuum reflects the existence of internal consistency among strategic dimensions, which are measured either in terms of strategy content or strategic processes. Without internal consistency, strategic dimensions will not move in the same direction at the same time. Second, this study and M&S's studies found that a set of inconsistent strategies results in poor performance. These results indicate the importance of internal consistency. However, internal consistency per se does not lead to good performance as was observed in the chemical industry, internally consistent low-profile strategy also results in poor performance. Thus, internal consistency among strategic dimensions is only a necessary, but not a sufficient, condition for success.

IV. GENERIC STRATEGIES AND THE STAGES OF THE PLC

The discussion of the nature of marketing mix to be employed by the PLC phase is vast [Kotler, 1980;Staudt, Wasson, 1974]. Although conclusive agreement can not be found in the literature, most marketing theorists agree that marketing mix should be different in the different stages of PLC. However, the overall strategy in each stage of the PLC is seldom examined. This section attempts to derive some hypotheses regarding the generic strategy in each of the PLC stages. It begins with a brief summary of marketing theorists arguments about appropriate marketing mix

in different stages. Then, some hypotheses regarding the generic strategy and the PLC stages are postulated. Finally, by employing the methodology developed in the previous section, the generic strategies in the PLC phase are identified and discussed.

1. Introductory Stage

In the introductory stage, the SBU's primary task is to get consumers to try its product. These early adopters are usually higher-income groups [Smallwood 1973, Kotler 1980]. Hence, price is not as important as quality in winning early adopter approval of the new product. Promotion expenditures must be high to insure exposure of potential adopters to the new product. At the same time, producers must frequently modify their products to improve their quality. As a result, the production costs are thus high. Since production costs and promotion expenditures are high, Buzzell [1966] suggests that prices tend to be high. Frequent product modifications also require the SBU change its production process. As a result, the SBU has to reduce its degree of vertical integration to reduce the costs involved in changing production processes if it is possible.

This process leads to the hypothesis that SBUs in the introductory stage should adopt a high-profile strategy-- high quality, high price, high R&D and marketing intensity, and high new product sales, with a low degree of vertical integration if possible.

The number of SBUs in the introductory stage in the PIMS data base is too small to perform meaningful cluster analysis; no statistical results are available for the introductory stage.

2. Growth Stage

If the new product successfully goes through the introductory stage, its sales will climb substantially. The increase in demand attracts new competitors who will intensify competition and lower the profits in the maturity stage. At this stage, Catry[1974] suggests that an SBU should adopt an offensive strategy to acquire market share so that the SBU can mitigate the effects of the fierce competition in the maturity stage. An offensive strategy is justifiable also because (i) it is cheaper to acquire market share in the growth stage than in the mature stage, and (ii) the mature stage will be long enough to let the SBU harvest the market share gains. However, Kotler[1980] argues that the market-expanding strategies will be costly, and, thus, SBUs in the growth stage face a tradeoff between high market share and high current profits. This implies that SBUs at the growth stage have two distinct strategies: offensive and defensive. An offensive strategy leads to higher market share and lower profits and a defensive strategy results in lower market share and higher profits.

SBUs adopting an offensive strategy may increase their market share by creating product differentiation or by cutting prices and costs or both. SBUs in the growth stage would probably best acquire market share through

product differentiation. In the growth stage, there are many opportunities for SBUs to improve their product quality. The buyer group is widening and there are chances for SBUs, through product differentiation, to appeal to different groups. As stated, a product differentiation strategy is similar to a high-profile strategy. Therefore, SBUs adopting a high-profile strategy have better performance than the SBUs adopting a low-profile strategy.

Other than acquiring market share, a dominant business may enhance its market position by deterring entries. Gaskins(1971) and Spence(1977) illustrate tactics of entry deterrence. In the industries having substantial economies of scale, Gaskins suggests a limiting pricing strategy of lowering prices to the level where additional demand will be less than the minimum efficient scale should an entry occur. Spence suggests that a dominant business may keep excess capacity to the level where entries will not be profitable if the dominant business produces at full capacity after entry occurs. However, these two strategies can only be applied by a dominant SBU in industries which enjoy substantial economies of scale.

In sum,in the growth stage, a major objective is to establish solid market position. A dominant SBU may strengthen its position by deterring entry or by acquiring market share. Firms without a dominant position should adopt an offensive, product differentiation strategy.

The methodology used in the previous section is again applied to SBUs in

the growth stage. The results are presented in Table 4. Four groups are chosen from the cluster analysis using nine strategic dimensions. Since strategic groups should be in the same industry, these groups in the same stage are called "strategic clusters". Group one shows a new product oriented strategy. Because of high new product sales, SBUs in group 1 have high R&D intensity and medium marketing intensity. However, their R&D expenses are spent on developing new products and not on improving their product quality. As a result, their product quality is the worst while their prices are the lowest. Since buyers in the growth stage are in relatively high income groups, these strategies should lead to poor performance. As expected, group 1's ROI,ROS, and market share are the lowest among the four strategic groups in the growth stage. Group 2 adopts a typical low-profile strategy, low product quality, low price etc. The low-profile strategy also leads to poor performance for the same reason as with group 1. Group 3 and group 4 show significantly better performance than those of the first two groups. Group 3 focuses on high product quality, high price market with very high promotion expenses and high direct cost. It should be noted that their high direct cost does not erode their profits because their prices are high enough to cover the high cost. In short, group 3's strategy is a typical product differentiation strategy without emphasis on costs. In contrast to group 3, SBUs in group 4 are cost conscious. They choose a cost leadership strategy. They have high market shares,very low direct cost, and high marketing expenses. They also charge medium prices for their above average quality products. This strategy can be described as a strategy of mass production of quality product.

Table 4

The Strategic Clusters in the Growth Stage

	Group 1	Group 2	Group 3	Group 4	
No. of Obs	22	72	20	46	
STRATEGIC DIMENSIONS (STANDARDIZED)					
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)	F(P)
1. REL QUALITY	-0.85(0.76)	-0.39(0.82)	0.99(0.61)	0.57(0.81)	32.7(0.01)
2. REL PRICE	-0.45(0.73)	-0.34(0.70)	1.45(1.07)	0.10(0.87)	27.3(0.01)
3. VERT INTEGRTN	0.12(0.77)	-0.53(0.95)	-0.16(0.69)	0.83(0.65)	25.6(0.01)
4. TOTAL R&D/REV	0.72(0.94)	-0.44(0.45)	-0.23(0.78)	0.42(1.31)	14.2(0.01)
5. SALES FRC/REV	0.14(0.90)	-0.56(0.57)	-0.26(0.60)	0.95(0.97)	38.3(0.01)
6. ADV&PROMO/REV	0.36(1.21)	-0.38(0.64)	1.21(1.47)	-0.13(0.55)	19.0(0.01)
7. P&E NEWNESS	0.69(0.80)	-0.35(0.91)	0.62(0.83)	-0.07(0.99)	10.6(0.01)
8. REL DIR COST	0.27(0.72)	0.16(0.61)	0.93(1.41)	-0.80(0.83)	23.8(0.01)
9. % NEW PRODUCT	1.42(1.71)	-0.27(0.50)	0.08(0.70)	-0.24(0.60)	25.2(0.01)
*10.TAT MKT EXP/REV	12.93(5.47)	6.42(3.98)	12.28(7.36)	15.3(6.25)	31.4(0.01)
PERFORMANCE					
1. ROS	6.30(6.46)	7.42(10.41)	12.62(10.7)	17.2(10.2)	10.6(0.01)
2. ROI	12.88(15.12)	20.9(25.0)	30.1(25.2)	36.3(24.2)	6.26(0.01)
3. MARKET SHARE	17.35(14.14)	22.7(18.1)	24.5(16.6)	30.5(22.4)	2.75(0.05)

PERFORMANCE DIFFERENCES

	R^2
1.ROS	0.169
2.ROI	0.108
3.MARKET SHARE	0.05

*NOT STANDARDIZED

The mass production of quality product strategy enjoys the highest ROI, ROS, and market share among the four groups.

Since both successful strategies focus on the high quality market, it is clear that SBUs in the growth stage should focus on the high quality market. This conclusion is consistent with the common suggestion by marketing theorists. However, the coexistence of high market share and high profitability illustrates that there is no need for a tradeoff between market share and profits as suggested by Kotler.

Finally, F-test shows that ROI,ROS, and market share are significantly different among the four groups. This indicates that strategic clusters also exist on the PLC stage level.

3. The Maturity Stage

As more businesses enter the market and as the rate of demand growth declines, competition become fierce. At the same time, the opportunities for improving product quality had been exploited and therefore, product differentiation is less. As a result, the competition in the maturity stage is largely price competition(Levitt 1965,Staudt & Taylor 1976). Consequently, the key to profitability in this stage is cost structure. SBUs should focus on cost reduction strategies such as cost leadership rather than on product differentiation.

The intensified competition also makes it costly to acquire market share.

Thus, an SBU should adopt a defensive strategy in the maturity stage.

The cluster analysis results are presented in Table 5. Five strategic groups are identified for the SBUs in the maturity stage and three of them will be discussed. A strategy of mass production of quality product is again found to be most advantageous. That is, group 1 has high market share, low direct cost, high vertical integration, high product quality and average prices. Group 3 adopts a low-profile strategy and group 2 adopts an in-between strategy. The mass production of quality products strategy leads to the best performance among the three groups. This shows that there is still room for product differentiation in the maturity stage. Since this strategy is successful in both the growth and the maturity stages, an SBU should look at the high product quality market and at the same time, drive costs down so that it can charge an average price to gain market share without sacrificing profits.

Comparing these results to those of the SBUs in the growth stage, two points are noticed. First, in the growth stage, group 3 has high direct cost, high price and high profits. In the maturity stage, the high cost group has the poorest performance. One possible explanation is that cost is not important in the growth stage but it is critical in the maturity stage because high direct costs can be offset by high price in the growth

Table 5

The Strategic Clusters in the Maturity Stage

	Group 1	Group 2	Group 3
No. of Obs	33	49	28
STRATEGIC DIMENSIONS (STANDARDIZED)			
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)
1. REL QUALITY	1.18(0.84)	-0.46(0.69)	-0.62(0.36)
2. REL PRICE	0.25(0.98)	-0.25(0.68)	-0.45(0.52)
3. VERT INTEGRTN	0.45(0.88)	0.17(0.84)	-1.06(0.65)
4. TOTAL R&D/REV	-0.14(0.54)	-0.02(0.76)	-0.30(0.48)
5. SALES FRC/REV	0.01(0.91)	0.39(1.16)	-0.47(0.56)
6. ADV&PROMO/REV	0.09(0.64)	-0.13(0.46)	-0.27(0.22)
7. P&E NEWNESS	0.35(0.82)	-0.53(0.83)	0.49(0.62)
8. REL DIR COST	-0.49(0.64)	-0.27(0.70)	0.30(0.96)
9. % NEW PRODUCT	-0.15(0.60)	-0.18(0.50)	0.06(0.91)
*10.TOTL MKTING/REV	8.77(7.16)	9.48(6.13)	4.86(2.53)
PERFORMANCE			
1. ROS	14.6(7.63)	8.66(10.22)	3.87(7.12)
2. ROI	31.4(15.7)	23.13(26.04)	12.0(14.7)
3. MARKET SHARE	32.8(18.0)	20.3(14.7)	19.8(14.4)

*Not Standardized

Table 5 (CONTINUE)

The Strategic Clusters in the Maturity Stage

	Group 4	Group 5		
No. of Obs	4	8		
STRATEGIC DIMENSIONS (STANDARDIZED)				
	MEAN(S.D.)	MEAN(S.D.)	F (P)	
1. REL QUALITY	-0.17(0.65)	0.18(0.64)	28.1(0.001)	
2. REL PRICE	0.74(1.15)	1.91(0.99)	14.9(0.001)	
3. VERT INTEGRTN	0.45(0.98)	0.27(0.69)	12.5(0.001)	
4. TOTAL R&D/REV	3.47(2.25)	-0.01(0.92)	16.8(0.001)	
5. SALES FRC/REV	-0.71(0.19)	-0.59(0.42)	4.37(0.001)	
6. ADV&PROMO/REV	0.09(0.85)	0.21(1.40)	42.0(0.001)	
7. P&E NEWNESS	-0.91(1.21)	0.48(1.53)	7.46(0.005)	
8. REL DIR COST	0.45(0.74)	2.20(0.70)	18.2(0.001)	
9. % NEW PRODUCT	3.14(2.64)	-0.17(0.84)	12.2(0.001)	
*10.TOTAL MKTING/REV	6.05(6.06)	5.89(6.33)	8.15(0.001)	
PERFORMANCE			F (P)	R^2
1. ROS	-0.78(7.54)	10.0(8.08)	5.64(0.001)	0.194
2. ROI	3.85(14.7)	14.4(12.8)	3.64(0.001)	0.135
3. MARKET SHARE	16.3(6.11)	23.4(13.7)	3.55(0.001)	0.132

*Not Standardized

stage but not in the maturity stage. Second, the strategy of mass production of quality products in the maturity stage does incurs only average, not high, marketing and R&D expenses. This may be due to the fact that these SBUs either are preparing to retreat and are reluctant to invest in marketing and R&D or that they have established dominant positions and have no need for further investment in marketing and R&D.

In conclusion, it is found that in the maturity stage, product differentiation still exists and a strategy of mass production of quality products is the most profitable. Both cost and quality are important for a competitive strategy in the maturity stage while cost is not important for quality products in the growth stage.

4. The Decline Stage

In the decline stage, an SBU has two basic choices: (i) accept the trend and prepare to retreat,or (ii) create a situation like an innovative maturity or a cycle-recycle type PLC as described in the first section. If an SBU prepares to retreat, the SBU should cut any unnecessary expenses because the profits are already very low. This leads to a low-profile strategy characterized by low marketing and R&D expenses. If an SBU wants to fight the decline, it should adopt a new product oriented strategy by increasing R&D and marketing expenses to stimulate new demand.

The cluster results are presented in Table 6. The first three groups

target on the high quality market. Group 1 adopts a mass production of quality products strategy(high market share, low direct cost, high marketing expenses, high quality,etc.). However, unlike its performance in the growth stage and the maturity stage, this strategy leads to poor performance(6% ROI and 2.5% ROS), despite the SBU's high market share. Group 2 focuses on a small segment of the market(low market share), and supplies the segment with quality new products. Since its target market is small, the marketing expenses are less than that of the other two groups. The extremely high new product sales from these SBUs indicate that they are trying to revitalize their declined businesses and they do so successful. They have remarkably high ROI and ROS, 19% and 42% respectively. Their strategy can be interpreted as a "focus" strategy(low market share). The third group adopts a strategy similar to that of group two, but its high marketing expenses has reduced its profits.

Table 6

The Strategic Clusters in the Decline Stage

	Group 1	Group 2	Group 3
No. of Obs	15	5	14
STRATEGIC DIMENSIONS (STANDARDIZED)			
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)
1. REL QUALITY	0.65(1.16)	1.00(1.21)	0.49(1.16)
2. REL PRICE	1.00(0.35)	-0.69(0.10)	0.89(1.13)
3. VERT INTEGRTN	1.21(0.14)	1.16(0.48)	0.53(0.89)
4. TOTAL R&D/REV	0.65(0.12)	0.31(1.37)	0.10(0.69)
5. SALES FRC/REV	-0.06(0.91)	-0.36(0.68)	2.06(0.73)
6. ADV&PROMO/REV	0.70(0.39)	-0.55(0.87)	-0.30(0.67)
7. P&E NEWNESS	0.03(0.33)	-0.31(0.86)	0.38(1.16)
8. REL DIR COST	-0.65(0.15)	-0.33(0.75)	0.19(0.65)
9. % NEW PRODUCT	-0.16(0.12)	2.74(1.18)	0.26(0.98)
*10.TOTL MKTING/REV	12.1(1.94)	5.58(3.40)	18.0(7.75)
PERFORMANCE			
1. ROS	2.55(3.01)	18.9(13.28)	7.06(5.61)
2. ROI	6.35(7.17)	41.76(25.50)	15.0(11.3)
3. MARKET SHARE	30.1(7.93)	18.4(17.2)	21.0(18.5)

*Not Standardized

Table 6(Cont.)

The Strategic Clusters in the Decline Stage

	Group 4	Group 5	Group 6		
No. of Obs	13	23	18		
STRATEGIC DIMENSIONS (STANDARDIZED)					
	MEAN(S.D.)	MEAN(S.D.)	MEAN(S.D.)	F (p)	
1. REL QUALITY	-0.24(0.53)	-0.21(0.60)	-0.27(0.43)	7.84(0.001)	
2. REL PRICE	-0.52(0.47)	-0.56(0.52)	-0.47(0.39)	13.8(0.001)	
3. VERT INTEGRTN	-0.70(0.66)	-0.16(0.30)	-1.39(0.19)	58.8(0.001)	
4. TOTAL R&D/REV	-0.75(0.35)	-0.65(0.40)	-0.87(0.22)	26.2(0.001)	
5. SALES FRC/REV	-0.46(0.28)	-0.30(0.21)	-0.66(0.21)	92.2(0.001)	
6. ADV&PROMO/REV	0.03(1.11)	0.69(1.08)	-0.82(0.26)	11.0(0.001)	
7. P&E NEWNESS	0.23(0.96)	-0.09(1.00)	0.65(0.73)	6.69(0.001)	
8. REL DIR COST	-0.39(0.66)	-0.50(0.75)	-0.24(0.51)	33.5(0.001)	
9. % NEW PRODUCT	-0.23(0.70)	-0.55(0.20)	0.18(0.87)	20.7(0.001)	
*10.TOTL MKTING/REV	7.54(3.56)	9.01(2.75)	5.66(3.59)	17.4(0.001)	
PERFORMANCE				F (P)	R
1. ROS	3.76(3.46)	4.88(2.44)	2.32(3.98)	9.45(0.001)	0.365
2. ROI	14.2(12.5)	20.3(11.0)	6.33(9.57)	9.42(0.001)	0.365
3. MARKET SHARE	19.5(16.3)	24.8(18.9)	12.6(8.33)	2.29(0.053)	0.123

*Not Standardized

The remaining three groups have a varying low-profile strategy. Group 4's strategy is an inconsistent one. It adopts a low-profile strategy but has very high direct cost and high R&D expenses. As a result, it has below average ROI and ROS. Both group 5 and group 6 adopt a consistent low-profile strategy. But group 5 has lower direct cost and larger market share than group 6. Thus, group 5's performance is better than group 6's performance.

Finally, F-test shows that there are significant differences in ROS, ROI and market share among the six strategic clusters.

In sum, a strategy of mass production of quality products does not lead to superior performance in the decline stage. Instead, a new product oriented strategy focusing on high quality market is the most profitable strategy.

V. THE LENGTH OF THE PLC AND GENERIC STRATEGY

The length of the PLC is another dimension which characterizes competition in an industry. A short PLC reflects rapid technological progress and as a result, competition drives the SBUs to introduce new products frequently. This characteristic influences every strategic dimension mentioned in the previous sections.

First, the frequent product change requires the SBUs to put more effort into R&D and to increase R&D budgets. As for marketing expenses, the short lives of new products force the SBUs to reach their potential customers as soon as possible so that the SBUs can harvest profits from the new product as long as possible.

Therefore, short PLC SBUs must have higher marketing expenses than long PLC SBUs. Frequent new product introduction also requires SBUs to change their production process frequently. To reduce switch costs, SBUs have to reduce their degree of vertical integration. Thus, the degree of vertical integration is less for short PLC SBUs than for long PLC SBUs. As the objective of new products is to replace old products, the quality of new products must be higher than that of old products. Prices also should be high because production, development, and promotion costs are high. Thus, short PLC SBUs have high product quality and high price. Profits should also be high to compensate for the high risk inherent in new product introduction.

In sum, as opposed to SBUs having longer PLC, short PLC SBUs should exhibit the following characteristics: (1).high R&D expenses,(2). high marketing expenses,(3). high product quality, (4). high new product sales,(5). high costs,(6). high prices,(7) a low degree of vertical integration,and (8). high ROI.

Table 7

The Strategic Differences Between
Short and Long PLC Groups

	Short PLC	Long PLC	t values
No. of Obs	85	401	
STRATEGIC DIMENSIONS			
	MEAN(S.D.)	MEAN(S.D.)	t values(P)
1. MKTING EXP/REV	8.98(4.58)	9.74(6.95)	0.93(not sig)
2. TOTAL R&D/REV	1.76(3.00)	2.08(2.22)	1.25(not sig)
3. REL PRICE	105.8(6.16)	103.1(6.53)	3.64(0.01)
4. REL PROD QUAL	31.6(21.6)	26.21(28.2)	3.22(0.01)
5. % NEW PRODUCT	27.2(23.5)	8.80(15.2)	6.93(0.01)
6. VERT INTGRTN	42.8(15.9)	54.48(15.96)	6.17(0.01)
7. REL DIR COST	100.5(3.31)	102.6(5.86)	4.64(0.01)
8. ROI	12.7(15.5)	19.15(20.9)	3.25(0.01)

These hypotheses are tested by using the PIMS data base. Both the frequency of product changes and the technological change are used as criteria to select short PLC SBUs across industries. The SBUs which reported that they annually or seasonally change their products and that they have experienced major technological change during the last 8 years are selected as short PLC SBUs. The SBUs that change their product at least longer than one year and have no technological change in the last 8 years are chosen as long PLC SBUs. After these two groups are chosen from the PIMS data base, the t-test is performed to examine the differences in strategic dimensions between the two groups.

The t-test results are shown in Table 7. The null hypothesis is that except for the degree of vertical integration, all strategic dimensions

and ROI of short PLC SBUs are higher than those of long PLC SBUs. However, Table 7 shows no significance differences in marketing intensity and R&D expenses between short PLC and long PLC groups. This is probably due to the fact that the length of the PLC is not the only determinant of R&D and marketing expenses. For example, SBUs in the industrial goods industries may have less marketing expenses than SBUs in the consumer goods industries.

As expected, relative product quality, relative price and new products sales are significantly higher in the short PLC group. However, ROI and relative direct cost are significantly different between the two groups in the direction opposite to the hypotheses. One possible explanation for the low ROI in the short PLC group is that the ROI measure used in the PIMS data base is a short-term measure(four year average), but the hypothesis regarding ROI is concerned with long-term profitability.

Vertical integration acts in the direction as hypothesized. The group with short PLC is significantly less vertically integrated.

In conclusion, it is found that SBUs having short PLCs have a low degree of vertical integration, high prices, high product quality, high new product sales, and low ROI. Long PLC SBUs act in a directly opposite manner.

CONCLUSION

The PLC has long been used as an aid to predict future demand, to allocate resources and to determine the timing of new product development. Research has confirmed that the PLC do exhibit an S-shaped curve with some deviations. It is suggested that each stage of the PLC has its own distinct competition and demand pattern and thus SBUs' behavior is different in different stages. However, no empirical evidence directly supports this hypothesis. In the present paper, it is shown that the stages of PLC are different from each other in many aspects that are crucial in formulating strategy. Appropriate generic competitive strategies should be different in the different stages. It has been found that a strategy of mass production of quality product is profitable in the growth stage and the maturity stage, but it is not profitable in the decline stage. Cost is not critical in the growth stage but is critical in the maturity stage. A "focus" strategy leads to superior performance in the decline stage. These findings suggest that the stage of PLC is a useful tool in formulating strategies. The present research results also confirm the proposition that strategic groups(clusters) exhibit performance differences at both the industry level and the PLC stage level.

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