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Sava Ianici

Life Cycle Influence on the Policy of Product Development

It is well known that „product life on the market" is the main reason for developing and improving of product. Therefore all producers tend to provide as long as possible life cycle of their products. The author of this paper wanted to indicate the basic principles of defining of life cycle of products. The paper analyses technical lifetime, but also economical, ecological and even, fashion lifetime, because they are also, important, and in certain cases even crucial, for bringing final decision about treating the product. Besides, a review of usual possibilities of increasing life cycle of products in machine industry is presented.

Keywords*: life cycle, product development, product policy*

1. Introduction

Product life cycle usually signifies only period of time of its presence on the market (Fig. 1), from the beginning when it occurs on the market, until it is in sale, with economic conditions that provide profitable business [1]. This period is in large scale coincided with the life at manufacturer, since it directly influences to the life at manufacturer, and vice versa. It should be noticed that product life cycle is not cause yet it is a result of marketing efforts to keep the product on the market as long as possible. In order to avoid "early death of product" or "poor life of product" it is necessary to plan product life cycle.

All products do not have the same curve of life cycle. It depends on many factors, so that the curve can be "cyclical – recyclical", as an result of stimulating promotion in the phase of sale descending; or it can be "wavy", as an affect of finding out new characteristics of its application, or new users, or new markets.

Beside this, the shape of life cycle curve significantly depends on: (1) style, i.e. the way of product "expressing", (2) fashion, or influence or momentary purchasers´ desire, that changes slowly, stay popular for some time and after slowly descend, and (3) caprice (or hit), i.e. momentary fashion that easily and quickly

attracts customers, who look for some sensation and want to possess something that other do not have , and it disappears very fast.

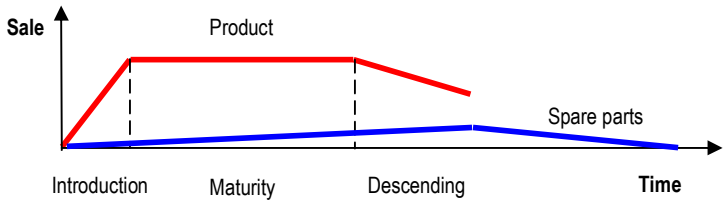

Figure 1. Product life on the market

Having in minds expected changes of placement on the market, producers should take care about future plans, updating existent products and introducing complete new products. This means that every company has to continually accommodate its production program according to the market requirements. No matter how much the company developed its product, it should know that concurrent companies do the same. Producers should never be satisfied with achieved results; they always have to insist to do some job better and faster, especially if they want to stay a leader on the market. If the company is not a leader on the market, it must also develop present product solution or even complete new product, before any mention about new product on the market. On the contrary, it will be too late for them. This is certainly hard, but only hard efforts will be rewarded. Modern products are the most powerful "weapon" of every producer.

The primary objective of all producers is to have a long product life cycle, so that they could receive back all investments in product development and obtain certain profit. However, during time every product technically gets old, i.e. sooner or later it's being pressed out of the market by the newer product or its manufacturing is being stopped because the product does not bring profit any more. Product lives on the market as so long as it is capable to reach defined objectives and motives of purchasers and sellers. Product "dies" when it can not accomplish completely these objectives. "Entropy law" is especially signified here, it says that everything that exists has natural predisposition to perish. This means that during time every product is necessarily being outdated and displaced.

Basic reasons that cause displacing one type of product with another are certainly developing of technology and fashion, and also products aging and market saturation.

Modern technologies enable more quality and cheaper manufacturing, less environment pollution etc., so that new products, by its quality and price, move out products made in classic way from the market.

Fashion in technique has also great influence on product placement. Thus, no matter of quality and technical characteristics of products, if these products are not

new fashioned, i.e. produced according to up to date style, purchasers are not interested for them and they are being pressed out by new (modern) products.

Product aging is a phenomenon in technique generated by establishing new knowledge and developing new technologies that enable performing some functions easier, more quality, more economically, faster and with less environment polluting, so that old products are not components any more and are not searched for like before.

Market saturation is a specific phenomenon for most products in machine industry, because the number of purchasers is limited. After a number of sold products, their further buying can not be expected until some of these products become worm out, or until occurring some new knowledge and technologies, that will enable producing more quality and economic products. Only then purchasers will buy new products in order to replace their present devices, but only if they find some interest for it in the case of widely used products, this problem is exceeded by continual model changing, i.e. by purposely outdating of design in order to obtain new purchasers with new (better) design and some little technical improvements.

2. Technical and moral product aging

Technical aging of product represents a condition of product when a new and modern product occurs on the market. There is technical product aging of first type, which occurs in the moment when it is possible to produce modern product due to technical and technological progress. Technical product aging of second type occurs in the moment when such new product comes on the market. Fast technical development, that will cause rapid technical product aging, should be considerate when defining technical aging of products. Technical development curve gives the best review of this process. For example, in the moment $t + \Delta t$ (Fig. 2) more economic and rational product can be manufactured than the product which could be produced earlier, in the moment t, if all technical and technological possibilities available in that moment are utilised.

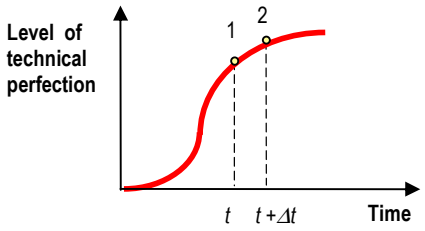

Figure 2. Schematic review of technical development curve

If it is not achieved, so if new product has worse characteristics than the older one, then it has to be redesigned and developed again, until necessary characteristics are achieved or until is developing is abandoned and another product is considered.

Product life cycle depends very much on achieved level of technical solution if solution quality is low, life cycle will be short, because those products will be technically outdated very soon. These products are not required any more on the market, and products of this technical level will be replaced with new one (this is shown on product development curve on Fig. 3)

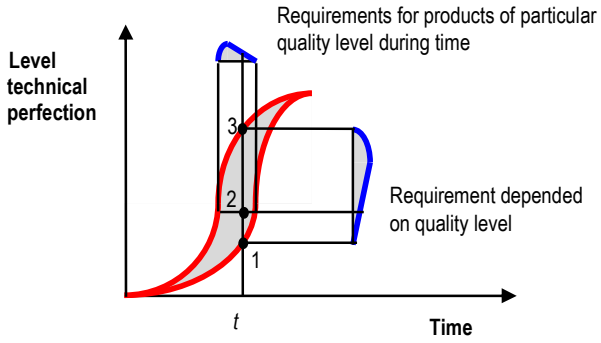

Figure 3. Curve of development and product perfection,
1 – technically outdated product; 2 – technically relatively outdated product;
3 – technically the most perfect product

In the moment t, products of quality level (1) are technically outdated and should not be produced anymore, i.e. they can have very short operating life. Products of quality level (2) are acceptable, and the products of level (3) are the most required and they can have long enough operating life. On the some diagram there is a curve of requirement for products of certain quality levels. It is obvious that requirement rapidly decreases with reducing the level of product technical perfection. However, in order to achieve selling of these products, their much lower price must compensate all their technical defects, which certainly affects negatively on successful business of the company that produce them.

Moral durability of product represents time period after which using of this product is not economically anymore and it depends on technical progress of the field where the product belongs. Moral expiration date occurs in the moment when the production costs (with using particular machine) become equal as average production costs in the country or abroad. With further usage of this machine, high production costs occurs, not only because of increasing maintenance costs, but

also because of outdates solution, which affects the production with these machines is much expensive than average.

The moment of moral expiration date is defined by intersection of average production costs curve (1) and production costs curve for machine which moral aging is observed (2), marked by point A on Fig. 4.

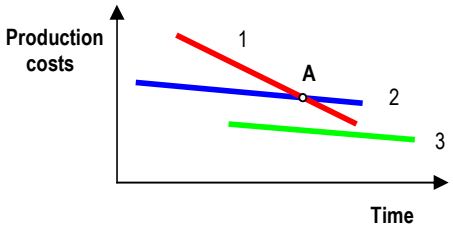

Figure 4. Schematic review of changing of production costs during time, 1 – average production costs; 2 – production costs using present machine; 3 – production costs using new modern machine

Assuming that few years after occurring of analyzed machine, new modern machine comes to the market, providing lower production costs (curve 3 on Fig. 4), it does not mean that analyzed machine will outdates in the moment it will operate with smaller efficiency for certain period of time, and will still be concurrent to new machine because of lower amortization costs, and it can be used till the point A on Fig. 4. Optimal life cycle of machine should be finished much before the moment of its moral aging.

3. Life cycle influence on the policy of products and the policy of development

Depending on life cycle phase of product, product planning is done. The concept planning, in general meaning, implies defining of objectives and predicting of possible problems during realizing these objective. In the frame of product planning, exploring the products and defining of a way of their development are carried through, as well as defining of a way of present products developing or a way of their withdrawal from the market.

Product policy is integral part of business and development policy, its mission is to explore, organize, coordinate, lead and control all activities necessary for defining of:

- optimal products offer (according to types, assortment and volume);
- name of product;
- way of product presentation (demonstration of product operating, offering technique, exhibition technique, prospects and brochures);
- way of packing and distributing;

- requisite instructions (for transport, storing, installation, activation, running, using, monitoring, service, maintenance and product repair);
- warranty conditions;
- work of maintaining service;
- way of crediting the customers etc.

Proper product policy defines offering of those products that market is looking for, i.e. the products which can completely satisfy all customers and users of product needs. Optimal production program represents products combination that ensures efficient company transactions for a long period of time.

Product success on the market can be achieved only by properly designed product policy, when selling prince must be adjusted with functional and aesthetic properties of product. Besides purchasers of product want to be sure that producer will also take care about the product after they buy it no matter it is at user now and doesn't belong to him anymore. With such treatment producer certainly can affect on bigger requirements for their products and ensures sale continuity of products.

Product policy is much more differs for existent products and for new one (Fig. 5). Defining of business policy for present products depends in a large scale of life cycle phase of particular product (low sale, low profit, weakening of business connections, problems with quality etc.). Particularly, if a product is in position just before degeneration very much different policy is lead in comparing if that product is in maturity phase or in phase on initiation to the market.

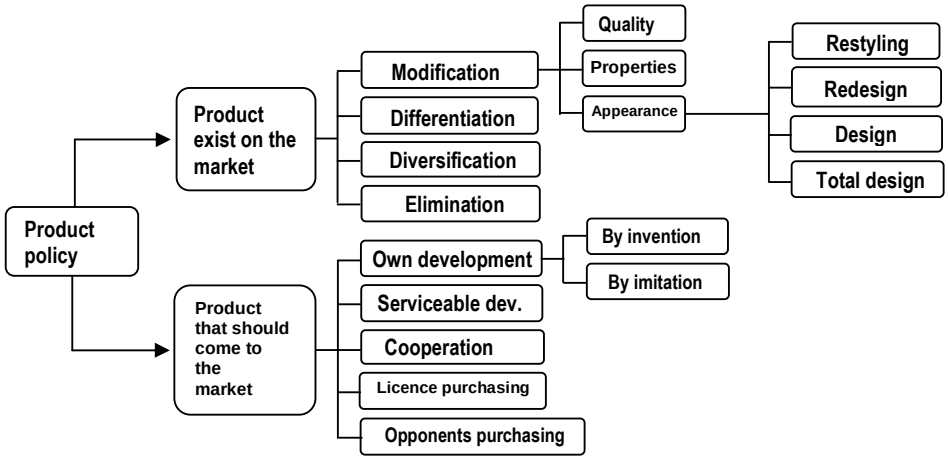

Figure 5. Schematic review of way of product policy leading

Product development policy is defined on the basis of product policy. Namely, very often there is a dilemma to produce or to buy, because it is not possible for producer (producer does not posses adequate technology, material, capacities or

labours), or it is not profitable to him to produce all types and models of products. Thus, he is refered to cooperate or buy complete (or partial) product. Product managers should find out the answers to all those questions, taking an account about satisfying all purchaser needs and requests, and realizing financial effects.

Following strategies are used when carrying through policy product which already exists on the market: modification, differentiation, diversification and elimination.

Modification represents a certain change on the product or the packaging. It is not always required or financially warranted to perform radical changes with the product. Often it is enough just to perform minor alterations with the product which can yield satisfactory financial results. It is common that improvements in quality of products are achieved with the increases it reliability and durability. This can be achieved by using the raw materials of higher quality and more modern production techniques, enhancing technical characteristics, enhancing security, efficiency and comfort of usage, and improving design of the product (by implementing new style, redesign, creating a new design or total redesign). Every modification has to be studied in detail because it can lead to a loss of part of the consumer base that was more inclined towards the old style, so the size of the potential consumer loss should be estimated. After the modification the production of the old product is discontinued.

Differentiation represents supplementing the current product offering by introducing new dimensions of the current products. Differentiation is usually a result of the altered market requirements or different consumer needs. With differentiation, the current products still remain offered in the market, with the enrichment with the newly differentiated products. This can reflect in the increase in prices and reduction in profits, so differentiation should be approached with caution. Sometimes, it can be let to the consumers that they combine required products or it is solved by cooperation with other producers.

Diversification is the increase in the product variety, offered by the producer by introducing completely new lines of products. In this case also, the new products enrich the already present palette of old products.

In order to ensure successful placement of their products, product managers often practice to combine modification, differentiation and diversification of products.

Elimination of the product represents the full discontinuation of production and offering of certain products, due to its maturity and commencement of production of the modified product. Elimination should be approached with caution, same as with introduction of the new products, because premature elimination can lead to a lot of damage to a producer. Elimination strategy should define the timing of product and market discontinuation, treatment of obsolete inventory, relationship with the product customer base etc.

During the life cycle of the product it is necessary to closely monitor the sales and implement all the warranted changes in a timely manner. It is generally con-

sidered that every product has a turning point (point A, Fig. 6) a relatively short timeframe when key strategic decisions should be made whether to support continuous sales (by more efficient cost management, technical improvements, new sales techniques) or to focus on introducing new products. It is considered that at that moment the sales of the product have peaked out and started with a declining trend.

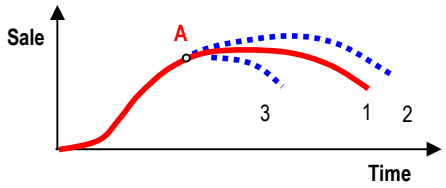

Figure 6. Graphical review of sale progress,
1 – normal course; 2 – sale enhancing; 3 – sale reducing

There are several strategies that can be employed when a newly developed product should come to the market: in-house development, outsourced development, cooperation, purchasing of a license and acquisition of the company that produces a new product.

In-house development is most complex but most efficient channel to achieve a new product. It can be established through:

- inventions, when new ideas emergence accidentally or as a result of a scientific research;
- imitation, i.e. creative copying (taking over) and improving other producers products without acquiring a license, which can constitue breaking the law. The way of avoiding this is to perform considerable alternations and improvements to the original product, so there would be a greater difference between new and old solution. However, mere copying of other producers ideas and solutions is not a strategy that can produce sustanable life and development of the company.

Outsourced development is somewhat easier way of acquiring a new product. In this case, an outside company is contracted to conduct research and development of a new product for the benefit of the contracting company. Of course, outsourced development is inherently less efficient then in house development as an outside entity is less motivated to develop new solutions for the benefit of another entity.

Cooperation is one of the least complex ways of acquiring a new product given that the company can find an adequate partner to develop a new product.

Purchasing of the license is the easiest way of obtaining conditionally speaking, a new product, because the seller of the license is usually not interested in selling the license for a newly developed product. It should also be noted that

acquiring the license usually implies a colonial dependability of the license company, if the constant development of the licensed product doesn't occur.

The acquisition of a new company is probably the most expensive, but also the safest way to acquire a new product.

Product life cycle planning is very important for intensively developed products which are subjected to strong changes of consumers taste due to influence of fashion and promotion. Monitoring of product life cycle represents the basis for timely preparation and set up the proper rate for introduction of new products on the market. Marketing strategy depends on:

- phase of life cycle in which the product is situated (introduction, incresing, maturity or descending);
- producer opponent position (leader, challenger, follower or tamponer);
- economic situation (shortage, inflation or necession).

As a criterion for choosing new products, product life cycle should be known in order to enable producer launching right product in the right time, considering two important factors:

- shape of sale curve and profit curve as function of time, for every new and all existing products;
- about what competition, attemps and how it affects on future placement of new products.

Sale descending or even product sale discontinuation, can happen if new products are not introduced in a proper time, which certainly affects business of the company.

Introduction of new products may happen in a wrong time because of:

- fault assessment of product life cycle that already exists in the market;
- wrong perceiving of opponents products occurrence;
- problems in developing new product, when new product advent is being late because of organizational technical or financiar reasons.

Also, early introduction of new product in the market, can reduce sale of existing product, and thus product life cycle is unnecessarily shorten and a company takes over direct damage.

Early introduction of new product usually comes because of:

- wrong assessment of product life cycle that already exists in the market, i.e. when the product is not expected to live so long, so new product is being sold too early;
- company impatience and ambition that new product is being placed to the market before all market possibilities of existing product are deleted;
- competition overestimating, for example when wronk assessed early advent of competition new product.

When defining ressources that will be invested in new products development, it should take in consideration that development investment amount must be adjusted with an objective that should be achieved in future.

4. Conclusion

Product life cycle, indisputable, presents important characteristics of every product, determines decision about further treatment of product. This paper gives the review of basic concepts of product life cycle, so that it can be concluded that life cycle of every product should be defined in detail. Also, product life cycle should be monitored, and not only technical life, but also economical, ecological and fashion, because they certainly have significant, sometimes even crucial, influence on marketing final decision about product treatment.

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Address:

- Prof. Dr. Eng. Sava Ianici, "Eftimie Murgu" University of Reşiţa, Piaţa Traian Vuia, nr. 1-4, 320085, Reşiţa, s.ianici@uem.ro