Review

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Comparison of the Product Life Cycle Cost System with the Traditional Cost System and its Application on a Pharmaceutical Company

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Abstract

The developments in information technologies in the world have led to developments in the technologies used in production. Labor-intensive production technology has been replaced by computer-controlled production. Enterprises are carrying out their production and sales activities in a fierce competition environment and as a result of consumers' demand of quality and reliable products and quick distribution channels from production enterprises, enterprises have started to concentrate on their products by striving for high quality low cost, automation, flexible production and use of technology and information. The heavy increase in the technological change both in the global pharmaceutical industry and in other sectors has dramatically shortened the life cycles of products and means of production. Moreover, the increasing competition has also shortened the life cycles of products, reduced the prices of products and compelled enterprises to revise new products. Thus the product life cycle cost approach has come into prominence which focuses on the management of the costs and cost-effectiveness throughout the life-cycle that starts with the pre-production of products and services and continues until the disposal of the products and recalling of the products from the market. The aim of this study is to put forth the function and importance of the product life cycle cost method, which has emerged as a method that makes up the deficiencies of the traditional cost accounting, within the scope of cost management and to underline the benefits of the said method for firms, especially with respect to cost saving. The differences between the two methods were discussed by means of the application of the product life cycle cost method on a pharmaceutical firm.

Jel Code: M41

Key Words: Life Cycle Costing, Product Life Cycle Management, Product Life Cycle Process, Kaizen Costing, Target Costing, Pharmaceutical Company

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Introduction

The concept of Product Life Cycle Cost (PLCC) was first used in in the mid-1960s as an auxiliary means to be used by the United States Department of Defense in the main defense tenders. In 1976 a project entitled "Life cycle budgeting and costing as an aid in decision making" was initiated by the United States Department of Health, Education and Welfare (1). The adoption of life cycle thinking has been very slow in the other industries (2). Public sector has also been a relevant promoter for life cycle cost calculations (3).

Later on this situation was changed with the adoption of the first chapter of the ISO 14040, a part of the international environmental protection standard. The philosophy of product life cycle includes the following issues (4):

- Life cycle valuation
- Life cycle management
- Life cycle costing
- Ecodesign.

Literature Review

In literature, about PLCC method, various academic studies has been done by diffrerent branch of sciences. The summary of these studies are given below; Dhillon study about twentythree different types of life cycle cost models. Some of the PLCC models are general and some of them are specific life cycle cost models. The models which are considered as general category are not very general. This is because of some of them consider major cost elements and some of them are based on some assumptions. In conclusion, some of these models are product specific and the other models are general to some extent. Generally, these models are imperfect because they don't have a wide life cycle perspective. (5) PLCC method is used to asist on decision making by the %66 of the companies in a Swedish building industry Study and the some analysis method is used by %40 of city administrations in a U.S Study to assess their building projects. (6-7) Hwang and Bae developed a performance model which they use to manufacture manufacturing facility design considering systems configuration, RAM system and the design life cycle cost. The life cycle cost model considers acquisition cost, maintenance cost, breakdown repair cost and logistic support cost. (8) PLCC

Model has been used only 5 % of large industrial companies in a Finnish Study by Hyvönen. (9) Sandberg and Boart performed PLCC model for the conceptual development of the hardware part of functional (total care) products. The discussed design support model can be used to assess life cycle cost and create a view of how decisions between a number of design, performance, and manufacturing and maintenance activities affect each other in conceptual design. (10)

Enparantza and Revilla studied about a life cycle cost calculation and management system for machine tools. The PLCC model considers acquisition cost, operation cost, maintenance cost and turnover/scrap cost. (11) Carpentieri and Papariello performed a PLCC calculation model for automotive production line. The model has two supporting databases which are, preventive maintenance and corrective maintenance database. (12) PLCC calculation is used Aye et al. for analyse a range of property and construction options for a building. (13) Davis and Jones performed draft to document and analyze PLCC for documenting and analyzing PLCC using a simple network based representation. The casual factors that lead to costs and the effect of each technology factor are identifies the and analyses the total cost implications to introduce a technology factor are analysed by the PLCC-NET model. (14) To quantify disposal costs, Study of Abraham and Dickinson's the disposal of a building in which Product Life Cycle Cost calculation is used. (15)

Widiyanto and Kato studied about forecasting the cost and performance of coal fired power plant with and without pollution control by PLCC model. (16) Sterner developed a model to uses PLCC methodology to calculate the total energy costs of buildings. (17) Hajj and Aouad performed a draft of the PLCC model with object oriented and VR technologies for a building which calculates the PLCC at two different levels. (18) The results of Safety, Maintainability, Availability and Reliability in Design İis performed Baaren and Smit model development phase. Their Model incorporates reliability, availability, maintainability, supportability and PLCC aspects in the design and development process of large scale complex technical systems. (19) PLCC Analysis of photovoltaic water pumping system is also performed in Foster and Hanley's study. (20)

Asiedu and Gu presented a state of the art review of product life cycle cost analysis models until 1997. The cost estimation models are divided into three groups which are analogous, parametric and detailed. In conclusion the reviewed models are restricted to simple operations or one phase of life cycle often the design and manufacturing stage. This gives us the necessity about opinion to develop models which include more parts of the product life cycle methods. (21) An analytic method to estimating reliability and life cycle cost of process safety system is presented by Bodsberg and Hokstad study. (22)

1. Definitions of the Product Life Cycle Cost System

The product life cycle cost is expressed as the total cost that include the planning, design, acquisition and maintenance costs that occur during the entire product life cycle and other costs that are directly related to the product and incurred in order to acquire or use the product (23). In other words the product life cycle cost method defines and measures all costs that occur throughout the economic life of physical assets and targets the optimization of the cost of the ownership and acquisition with the present value method (24).

The product life cycle is a process where (25);

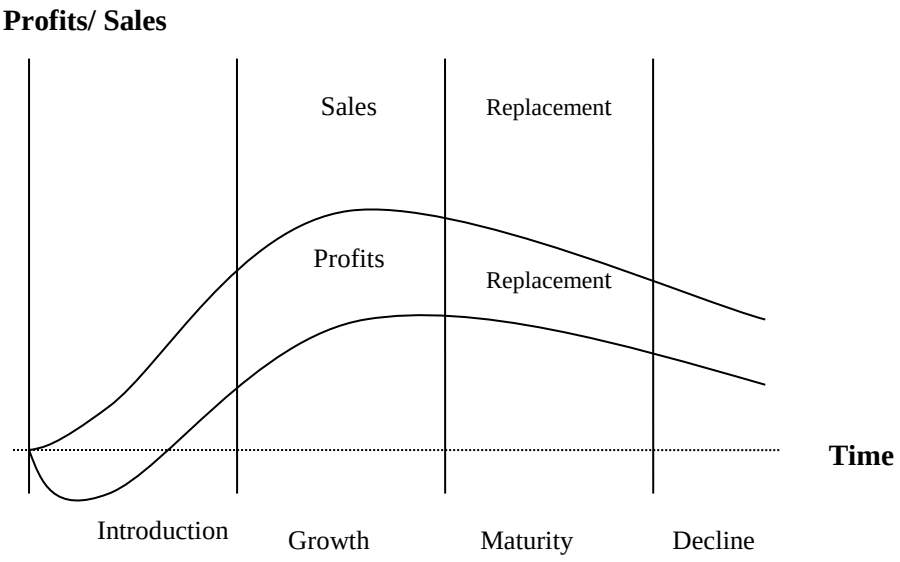
- the life of the product is limited,
- different marketing, production and financing functions are needed in each phase of the product life,
- the product, cost and profit performance of an enterprise are presented as a means of managerial control.

2. Phases of the Product Life Cycle Cost System

The product life curve begins with the introduction of the new product to the market. The product “dies” if the potential of the product in the market is destroyed due to technological deficiency or improper strategies followed in the environment of uncertainty. The product life curve defines the phases of a new product in the market. These phases are introduction, growth, maturity and abandonment and different product, price, distribution and promotion efforts are deployed in each phase. Product planning is the first step to building the life curve system.

As can be seen in the Figure 1 below, introduction phase is the phase where the product meets the target market. In this phase sales increase is slow and the profit rate is low. The unit costs are high (26). Losses are made in this phase since there is a high number of promotion activities and a low sales volume (27). The growth phase lasts from the break-even point until the maturity period and enterprises want to prolong this phase. Sales increase and profit starts to increase. The number of the competitors in the market also increases. The product enters also other sections of the market and the distribution network widens. In the maturity phase, the sales and competition are at the highest level. Enterprises strive to protect their market shares. Since enterprise runs in full capacity, unit costs are at the lowest level. The abandonment phase lasts until the transition to loss due to the decrease in sales. The decrease rate of each product is different. The decrease period may be slow. It is difficult to recognize that the product is in this phase. When sales and profitability decrease, some enterprises abandon the market. The ones that remain in the market, on the other hand, reduce the number of their products. These enterprises exit the small market sections and weak commercial channels and reduce their prices by cutting promotion budgets. In line with the developments, especially pharmaceutical companies reduce the sales of their products in the market or even recall the products from the market due to the competitive environment or an invention which is more advanced than their invention.

Figure 1. The Relationship between Product Life Cycle and Profitability (28).



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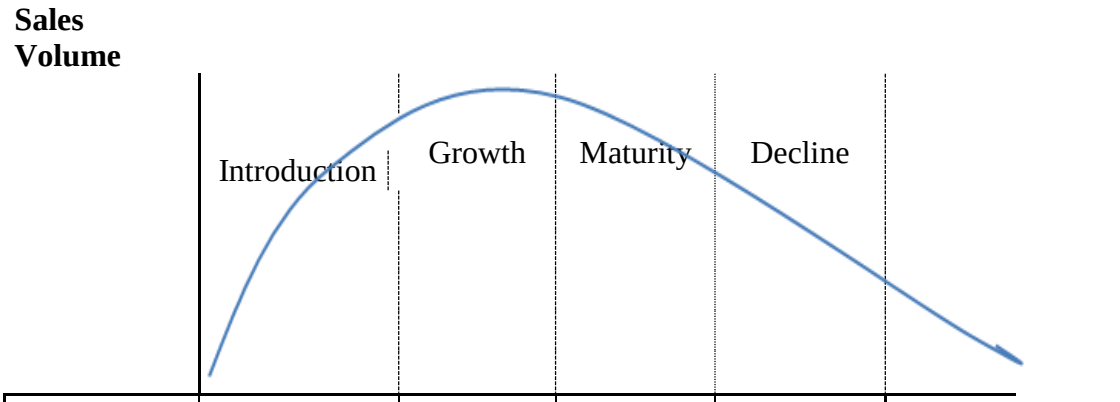
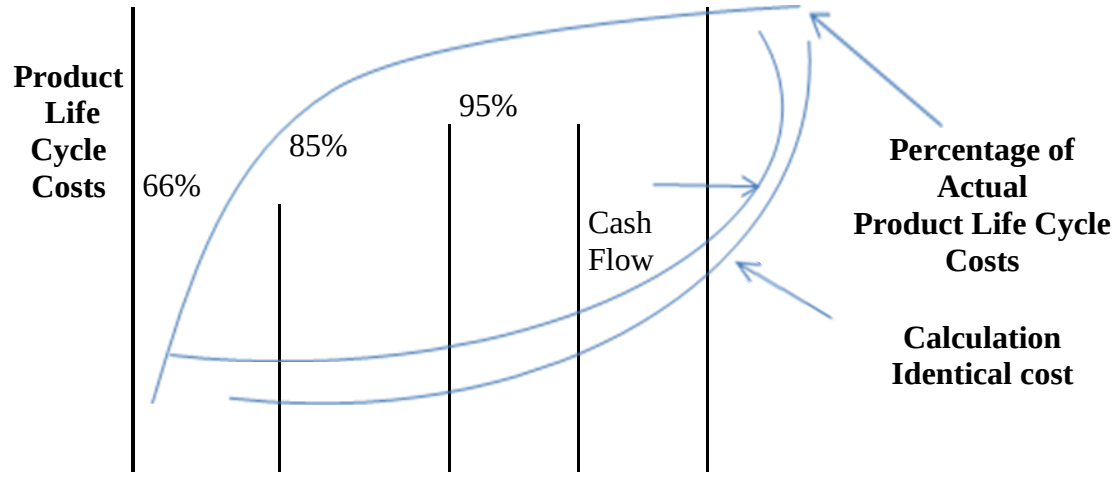
The life phases of a pharmaceutical product are demonstrated on a product life cycle curve. As can be seen in Figure 2 below, this curve shows the situation of the pharmaceutical product to be introduced to the market by taking into consideration the sales volume and profitability factors.

Figure 2. The Relationship between Product Life Cycle and Profitability Volume (29).



Growth Rate	High	High	Low	Low
Market Share	Low	High	High	Low
Cash Need	High	Low	High	Low
Profitability	Low	High	High	Low
Production	Low	High	High	Low
Cost	High	Low	Low	High

Figure 3: Product Life Cycle (30).



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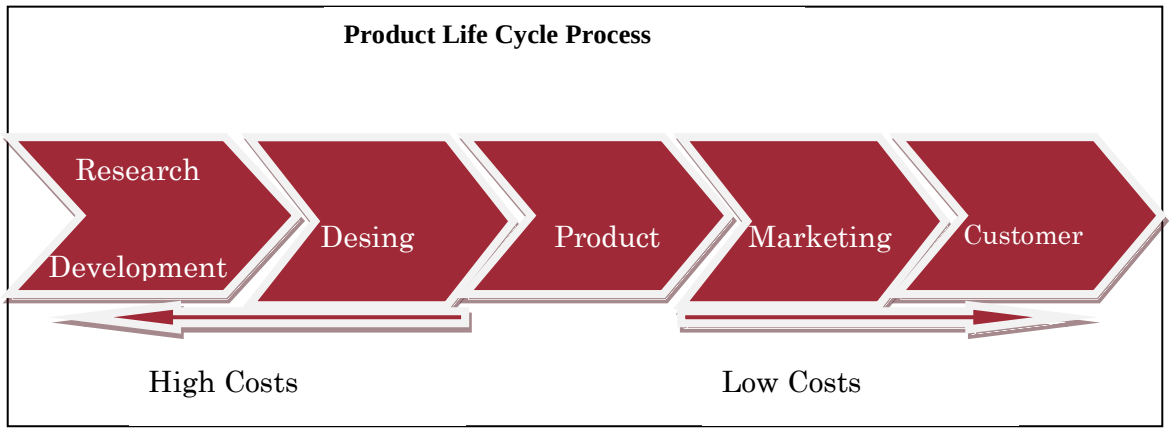
Planning Phase	Preliminary Design	Detailed Design	Product Phase	Logistic Support

As can be seen in Figure 3, according to the life cycle costing approach, an important part of the production and after sales costs are related to decisions made in the design phase. Therefore, the production and usage costs that depend on the pharmaceutical product to be produced are shaped in the design phase, before the production phase. Whether in case of drugs or in case of products, only 20% of the costs can be manipulated in the production phase and the following phases and this fact necessitates a cost approach which is not limited to the production phase (31). Figure 4 below shows the flowchart of all phases.

Figure 4. Product Life Cycle Cost Process (32).



3. The Concept of Product Life Cycle from the Viewpoint of Producer

The product life cycle cost system process is discussed through three viewpoints: consumer viewpoint, producer viewpoint and marketer viewpoint. Indeed, these different viewpoints concerning life cycle constitute a whole. The maximization of the return to be obtained from the product life or the minimization of the costs cannot be achieved without understanding the intertangled relationships between these different angles. The producer, calculations consist of the estimation of the costs of design, engineering, industrialization and production of a new product and in the analysisof these costs throughout the life cycle (33). The drug producer has to know what kind of a value is gained by the customer with the product it offers and the cost incurred by the customer in order to gain the said value (34). For instance, the cost of a car from the viewpoint of consumer (acquisition cost + usage cost + maintenance cost) is the

sales value of the car. Boeing Company paid special attention to the customer life cycle costs while designing Boeing 777. It shortened the time to be spent for routine maintenance by performing it in different areas and reduced the airplane's acquisition and maintenance costs and thus justified the high price of Boeing 777 (35).

Even though the product life cycle costs of the producer differ depending on the activities performed during the life cycle, they generally include the following phases (36);

1. The concept of product,
2. Design,
3. Development,
4. Production,
5. Logistic Support.

The product life cycle costs of the producer are obtained by adding all costs that occur in the above phases. While the product life cycle cost analysis from the viewpoint of consumer is used as a part of the market analysis conducted to find the answer to the question "how much should the features of the products cost for the consumer throughout the product life cycle?", the producer life cycle costing analysis tries to find out the cost effects of the features of the products (37). In other words, it explores the effects of a cost incurred for a feature of the product on the product profitability. Table 1 below shows the life cycle cost system that belongs to different sections.

Table 1. Formation of Costs according to the Life Cycles of Different Products (38).

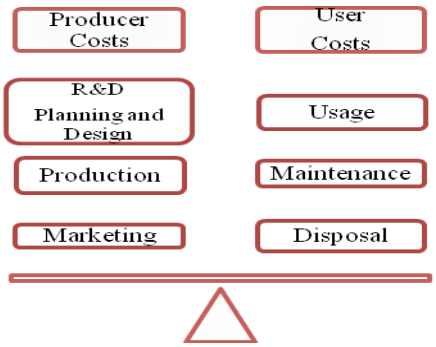
Life Types Cycle Phases / Product	Warplanes	Commercial Airplanes	Nuclear Missiles	Computer Programs
Research-Development and Design	21%	20%	20%	75%
Production	45%	40%	60%	-
Service and Disposal	34%	40%	20%	25%
Average Life Cycle Period	30 years	25 years	2-25 years	5 years

4. Comparison of the Product Life Cycle Cost System with the Traditional Cost System

Product life cycle costing is a process used throughout the total life cycle of a product. These costs are examined in the Figure below with respect to being charged on the producer and

consumer. The traditional product life cycle activities are displayed on the left side of the Figure. However, the broader definition of life cycle also includes the strengthening activities which are displayed on the right side of the Figure. Accordingly, the life of the product ends when the product is no longer useful or when the product is worn out. The producer and user costs in the real product life cycle are examined in the Figure 5 below:

Figure. 5 The Real Life Cycle and Costs of the Product (39).



The differences between the life cycle costing and the traditional costing are presented below (40).

Traditional Method	PLCC Method
Takes the product development and logistic support costs as period cost.	Charges the product development and logistic support costs on the product cost.
Takes into consideration only the costs concerning production in product costing.	Takes into consideration all costs (including period expenses) that can be related to the product in product costing.
Attaches importance to the control of the costs only in the production phase.	Attaches importance to cost management from the development phase forward.
Is based on periodical reporting.	Is based on product life cycle reporting.

5. The Relationship of the Product Life Cycle Cost Method with other Strategic Cost Methods

Generally, there are three phases in the life cycle of a product: planning, production and disposal. There are three basic means of decision-making in the said life cycle according to the product costs:

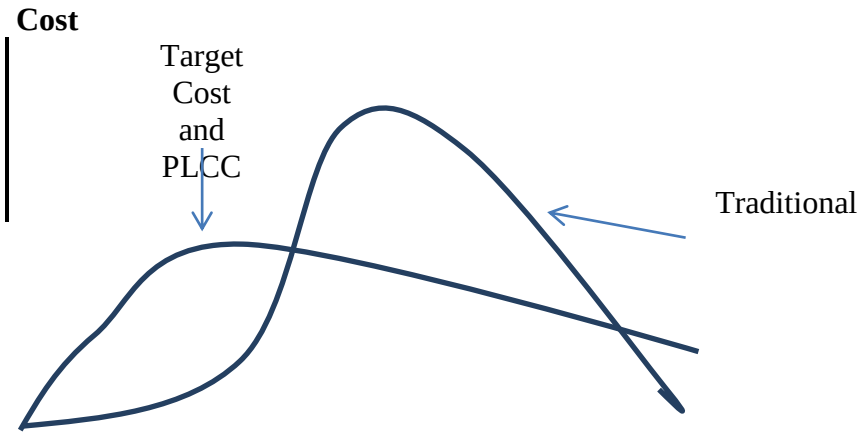
- Product life cycle costing
- Target costing
- Kaizen costing

While target costing supports the development and design phases of new models, Kaizen costing supports the existing products in the production phase.

Target costing is an approach that is closely related to the design and development of a new product. Another important issue to be considered with respect to target costing is that the bigger part of the cost of a product is determined in the product design phase. Especially, when the fact that pharmaceutical companies incur most of the costs in the R&D phase is taken into consideration, the importance of target costing comes into the picture. There is little to be done after a product is designed and started to be produced. For, most of the opportunities for reducing the cost of the product are obtained and used during the design of the product (41).The target costing method and the product life cycle costing method comply with each other precisely at this point and the two methods are intertangled.

The target costing approach determines a target cost and aims at designing the product according to the determined cost and thus to achieve the targeted cost instead of designing a product and finding out the cost of the product (42). Indeed, the target costing has emerged out of the need to attain early cost information which is required to be deduced, in the earliest possible phases (planning and design) of a product's life cycle, from the market structure and the strategies of the enterprise in order to realize the planning, management and control aims (43).

Figure 6. Formation of the Product Life Cycle Costs In Case Target Costing and Traditional Methods are Utilized (44).



Source: Ahmet Vehdi Can, "Target Costing, Theory and Practice", Sakarya Publishing House, Sakarya, 2004, p.174

Enterprises should apply target costing and product life cycle costing in an integrated way. For, target costing is meaningful within the approach of product life cycle costing. As can be understood also from the Figure above, in case the traditional method is used, the product life cycle costs acceleratingly increase in the later phases of the life cycle, slow down in the middle of the life cycle and acceleratingly decrease in the last phase of the life cycle. However, when target costing is used, while relatively more costs are incurred in the early phases of the product life cycle, great cost saving are provided in the later phases of the life cycle . Every 1 Euro deducted before the production phase provides 8-10 Euros of saving in the phases following the production phase . As an example of the firms which utilize these savings, Toyota has incurred greater costs in the concept determination and design phases of the product and obtained considerable savings in costs in the later phases of changes and additions (45). The "more with less" approach, which was developed by General Electric due to the parts deficiency during the World War II, has afterwards been transformed into an organized effort to investigate the ways of providing the needed functions in a product with minimum cost (46). American companies such as Ford and General Motors have also incurred greater costs in the product design phase and gained considerable cost advantage (47). Rolls-Royce states that 80% of the production costs of 2.000 parts occurs in the design phase (48).

Kaizen is a human-based, short-pitch, product-oriented effort that shares information and acts in line with the motto "the best is the enemy of good". Since Kaizen is a philosophy which aims to develop all factors concerning the processes where inputs turn into outputs, Kaizen costing is the use of Kaizen techniques in order to reduce the costs of parts and products at a

pre-determined rate. Kaizen costing aims at small but continuous improvements in all activities of competition-based enterprises by focusing on preventing wastes and reducing costs (49).

6. Application in Pharmaceutical Company

Cost management through the product life cycle is applied to a German pharmaceutical firm which is called as X. Firm plans to produce a new pharmaceutical product in 2012. Product life cycle is accepted as five years. During application period, inflation rate is assumed to be constant at 3 %.

In a pharmaceutical firm, items which are included to the application would be affected differently by the inflation rates. So in this study, inflation rate is taken as 3% in average for all these items included in the application. While estimating items' net present value, discount rate is accepted as 12% which is calculated by the weighted average cost of capital. For the reliability of the study, dependable data are included to the application and cash flow & cash outflow is accepted as ordinary. Items those would be a part of cost element in production of the pharmaceutical product (drug) is taken into account. Estimated data of produce and sale amounts from 2012 to 2016, are included to the application. These data are just ex-ante. Fixed Money Approach is used as a base in this study.

In this study, along the application of cost management through the product life cycle, firstly items that would be a part of cost element in production would be increased by the inflation rate. Then items which were increased by the inflation rate would be discounted by the net present value. At the last stage, unit cost, sale price, and cost amount through the life cycle of

the product would be calculated and afterwards the statement of income would be drawn according to the cost management of product life cycle.

Table 2 : Estimated Cost Data of New Drug Production in 2012

COSTS (€)	TOTAL
1.Pre production Costs	
Product Planning and Design Concept Costs	700.000
Product Design and Development Costs	400.000
Research and Development Costs	100.000
TOTAL	**1.200.000**
2.Production Costs	**2.000.000**
3.After Sales Costs	
Pharmacists- Drug Offices' Costs of Distribution	80.000
Marketing Costs	300.000
Warranty Costs	50.000
Advertisement- Presentation Costs	70.000
TOTAL	**500.000**

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Table 3 Enhancement of Predicted Costs, of The New Product According to The Inflation Coefficient Rate and Discount to The Base Year

	Costs	2012	Inflation Adjustment Coefficient Costs €	Discount Factor %12	TOTAL
Pre-Production Costs	Product Planning and Design Concept Costs	700.000x1,03	721.000	0,8929	643.781
	Product Design and Development Costs	400.000x1,03	412.000	0,8929	367.875
	Research and Development Costs	100.000x1,03	103.000	0,8929	91.969

Table 4. Enhancement of Predicted Costs, of The New Product According to The Inflation Coefficient Rate in The Application Period.

	Cost/Years	2012	2013	2014	2015	2016
Production Costs	Cost Before Inflation Coefficient Application	2.000.000				
	Inflation Coefficient	1,03	1,06	1,09	1,12	1,15
	Cost After Inflation Coefficient Application	2.060.000	2.120.000	2.180.000	2.240.000	2.300.000
Pharmacists- Drug Offices' Costs of Distribution	Cost Before Inflation Coefficient Application	80.000				
	Inflation Coefficient	1,03	1,06	1,09	1,12	1,15
	Cost After Inflation Coefficient Application	82.400	84.800	87.200	89.600	92.000
Marketing Costs	Cost Before Inflation Coefficient Application	300.000				
	Inflation Coefficient	1,03	1,06	1,09	1,12	1,15
	Cost After Inflation Coefficient Application	309.000	318.000	327.000	336.000	345.000
Warranty Costs	Cost Before Inflation Coefficient	50.000				

	Application					
	Inflation Coefficient	1,03	1,06	1,09	1,12	1,15
	Cost After Inflation Coefficient Application	51.500	53.000	54.500	56.000	57.500
Advertisement-Presentation Costs	Cost Before Inflation Coefficient Application	70.000				
	Inflation Coefficient	1,03	1,06	1,09	1,12	1,15
	Cost After Inflation Coefficient Application	72.100	74.200	76.300	78.400	80.500

Table 5. Enhanced Predicted Costs by the Inflation Coefficient Rate in the Application Period Discounting in the Base Year.

	Costs After Inflation Coefficient Application €	**Discount Factor %12**	**Inflation Coefficient Applied Estimated Costs (2012 Base Year)**
Production Costs	2.060.000	0,8929	1.839.374
	2.120.000	0,7972	1.690.064
	2.180.000	0,7118	1.551.724
	2.240.000	0,6355	1.423.520
	2.300.000	0,5674	1.305.020
Pharmacists-Drug Offices' Costs of Distribution	82.400	0,8929	73.575
	84.800	0,7972	67.603
	87.200	0,7118	62.069
	89.600	0,6355	56.941
	92.000	0,5674	52.201
Marketing Costs	309.000	0,8929	275.906
	318.000	0,7972	253.510
	327.000	0,7118	232.759
	336.000	0,6355	213.528

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	345.000	0,5674	195.753
Warranty Costs	51.500	0,8929	45.984
	53.000	0,7972	42.252
	54.500	0,7118	38.793
	56.000	0,6355	35.588
	57.500	0,5674	32.626
Advertisement- Presentation Costs	72.100	0,8929	64.378
	74.200	0,7972	59.152
	76.300	0,7118	54.310
	78.400	0,6355	49.823
	80.500	0,5674	45.676

Table 6. Cost of The New Product Life Cycle Through The Years.

Cost/Year	2012	2013	2014	2015	2016	TOTAL
Product Planning and Design Concept Costs	643.781					643.781
Product Design and Development Costs	367.875					367.875
Research and Development Costs	91.969					91.969
Production Costs	1.839.374	1.690.064	1.551.724	1.423.520	1.305.020	7.809.702
Pharmacists- Drug Offices Distribution costs	73.575	67.603	62.069	56.941	52.201	312.388
Marketing Costs	275.906	253.510	232.759	213.528	195.753	1.171.455
Warranty Costs	45.984	42.252	38.793	35.588	32.626	195.243
Advertisement-Presentation Costs	64.378	59.152	54.310	49.823	45.676	273.340
TOTAL	3.402.842	2.112.580	1.939.655	1.779.400	1.631.275	9.762.128

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Table 7. Calculation of Unit Costs by Using Both the Traditional Cost System and The Cost Of The New Product Life Cycle System

	Cost/Years	2012	2013	2014	2015	2016
With The Application Product Life Cycle Cost Method	Product Life Cycle Cost	3.402.842	2.112.580	1.939.655	1.779.400	1.631.275
	Forecast Production Output	100.000	120.000	140.000	160.000	170.000
	Product Life Cycle Unit Cost	34,03	17,6	13,85	11,12	9,6
With The Application Traditional Cost Method	Production Cost	1.839.374	1.690.064	1.551.724	1.423.520	1.305.020
	Forecast Production Output	100.000	120.000	140.000	160.000	170.000
	Product Unit Cost	18,39	14,08	11,08	8,9	7,68

Table 8. Enhancement of the Predicted Sales Revenue of The New Product According to The Inflation Coefficient Rate and Discount to the Base Year.

Sales Revenue /Years	2012	2013	2014	2015	2016	TOTAL
Before Inflation Coefficient Applied Estimated Sales Revenue	5.000.000					
Inflation Coefficient	1,03	1,06	1,09	1,12	1,15	
After Inflation Coefficient Applied Estimated Sales Revenue	5.150.000	5.300.000	5.450.000	5.600.000	5.750.000	

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Discount Factor %12	0,8929	0,7972	0,7118	0,6355	0,5674	
Inflation Coefficient and Discount Applied Sales Revenue (2012 Base Year)	4.598.435	4.225.160	3.879.310	3.558.800	3.262.550	19.524.255

X PHARMACEUTICAL MANUFACTURING BUSİNESS INC. INCOME STATEMENT UNDER PRESENT VALUES OF ACCOUNT BETWEEN 2012-2016

Sales		**19.524.255**
Production Costs		**8.913.326**
-Production Cost	7.809.702	
-Preproduction Cost	1.103.624	
Gross Margin		**10.610.929**
After Sales Costs		**1.952.426**
-Pharmacists- Drug Offices Distribution Costs	312.388	
-Marketing Costs	1.171.455	
-Warranty Costs	195.243	
-Advertisement- Presentation Costs	273.340	
Net Profit		**8.658.503**

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Profitability Ratio	44%

Table 9. Distribution of the Costs Which are Occured in the Total Product Life Cycle Period

DRUG PRODUCT LİFE CYCLE TOTAL COST		
COSTS	**AMOUNT**	**The Share of Total %**
Preproduction Cost	1.103.624	10
Production Cost	7.809.702	72
After Sales Costs	1.952.426	18
Product Life Cycle Total Cost	10.865.752	100

The results of this application can be summarized as follows ;

As it can be seen from the table, cost structure of the pharmaceutical firm X all through the product life cycle of the new product, is like that ; % 72 of total cost is production cost and % 28 of total cost is composed of before production and after sale costs. If it were analyzed by the Traditional Cost System, only the cost of production would have been focused. In that case, before production and after sale costs were going to be ignored and cost reduction would be just counted in the production cost. In conclusion, cost of product life cycle gives dependable results rather than the traditional cost system.

The other important conclusion can be drawn from this study is that unit cost. Unit cost which is calculated by the Traditional Cost System means the unit production cost. If a pharmaceutical firm ignored the other cost units which would be occurred through the product life cycle period then the financial statements of the firm wouldn't reflect the realities. The new technological developments lower the production costs but raises the non-production costs. Recent studies elucidate that % 90 of the total costs of product consists of pre-production and after production costs. By analyzing the Net Present Value of the Project which is greater than zero, it can be said that this project is realizable one.

Product's real added value for the firm can be drawn from the income statement which inludes all the costs of the product through its life cycle. By income statement, a pharmaceutical firm can realize if the product bears the costs or not. As the income statement is made up within the frame of net present value, relevant items' present values are analyzed as the sum of their present values form 2012 to 2016.

In fact, income statements which are drawn by periods in traditional accounting system does not indicate the real added value of the product to the firm. Periodical income statements reflect just the relevant periods' income and expenditure and this causes the handicap of evaluation all income and expenditure of the product all through its life cycle as a whole. In that point, to attain the profitability ratio that the firm request, the question of which cost components should be saved, plays an important role in the analyze.

Conclusion

Increasing competition and globalization force the firms to take notice of their rivals. In these competitive environment, firms should take notice of not only their production cost and but also pre-production and after production costs. Nowadays, policy of production has been changed and customer oriented production has become prominent. Customers play an important role in the production period of the firms.

In conclusion, policy of the cost oriented sales has been changed. Nowadays, in this increasing competitive environment, the viewpoint of the production technologies changes day by day within the development of information technology. Executives of the Pharmaceutical firms are obliged to focus on all the production costs instead of significant part of the production process according to cost of the product life cycle period. Within the frame of Product Life Cycle Cost System, not only the cost of production but also the other costs of non-production process. By this means, Pharmaceutical firms can obtain savings from the costs in the production process.

References

1. Langdon, Davis. Literature review of Life Cycle Costing and Life Cycle Assesmant. Draft Review June 2006:6

2. Lindholm, A. and Suomala, P. Learning by Costing: Sharpening Cost Image through Life Cycle Costing? .The 7th Manufacturing Accounting Research Conference. Tampere, Finland, May 30 - June 1, 2005

3. Woodward, D. Life Cycle Costing – Theory, İnformation Acquisition And Application. International Journal of Project Management, 1997; 15:(6):335-344

4. Petr Nemeck ve Alena Kocmanova. Integration of Life Cycle As A Business Aproach. Economics and Management, 2007:525

5. B. S. Dhillon. Life Cycle Costing: Techniques, Models and Applications. Gordon and Breach Science Publishers,1989: 46-79

6. Sterner, E. Life-Cycle Costing And Its Use İn The Swedish Building Sector. Building Research & Information, 2000;28:(5):387-393

7. Ardit, D. and Messiha H.M. Life Cycle Cost Analysis (LCCA) in Municipal Organizations. Journal of Infrastructure Systems, 1999;5:(1):1-10

8. Havang et al; H. Hwang, S. Bae and G. Cho. Performance Model for Manufacturing Facility Planning based on System Configuration, RAM and LCC. International Journal of Innovative Computing, Information and Control, ICIC International, February 2007;3:(1):199-209

9. Hyvönen, T. Management accounting and information systems: ERP versus BoB. European Accounting Review, 2003;12:(1):155-173

10. M. Sandberg, P. Boart and T. Larsson. Functional Product Life-cycle Simulation Model for Cost Estimation in Conceptual Design of Jet Engine Components. Concurrent Engineering: Research and Applications, Dec 2005;13:(4):331-342

11. R. Enparantza, O. Revilla, A. Azkarate and J. Zendoia. A Life Cycle Cost Calculation and Management System for Machine Tools. 13th CRIP International Conference on Life Cycle Engineering, 2006:711-716

12. M. Carpentieri and M. Papariello. A Life Cycle Cost Framework for Automotive Production Lines. 13th CRIP International Conference on Life Cycle Engineering, 2006:717-722

13. Aye L, Bamford N, Charters B, Robinson J. Environmentally sustainable development: a life-cycle costing approach for a commercial oKce building in Melbourne, Australia. Construction Management and Economics, 2000;18: 927-34

14. N. Davis, J. Jones and L. Warrington. A Framework for Documenting and Analyzing Life Cycle Costs using a Simple Network Based Representation. , Proceedings of Annual Reliability and Maintainability Symposium, IEEE, 2003:232-236

15. Abraham DM, Dickinson RJ. Disposal costs for environmentally regulated facilities: LCC approach. Journal of Construction Engineering and Management; 1998; 124:(2):146–54

16. A. Widiyanto, S. Kato and N. Maruyama. A LCA/LCC Optimized Selection of Power Plant System with Additional Facilities Options. Journal of Energy Resources Technology, Dec. 2002;124:290-298

17. Sterner E. Green procurement of buildings: estimation of life-cycle cost and environmental impact. Ph. D. dissertation thesis, Department of Mining Engineering, LuleXa University of Technology, 2002.

18. A. AL-Hajj and G. Aouad. The Development of an Integrated Life Cycle Costing Model using Object Oriented and VR Technologies. Construction Informatics Digital Library, 1999:78-1999-2901

19. R. J. van Baaren and K. Smit. Design for RMS/LCC - the Development of a Design Model. Proceedings of Annual Reliability and Maintainability Symposium, IEEE, 1999: 330-335

20. R. Foster and C. Hanley. Life Cycle Cost Analysis for Photovoltaic Water Pumping Systems in Mexico. 2nd World Conference on Photovoltaic Solar Energy Conversion, Vienna, Austria, July 1998.

21. Asiedu Y. Product Life Cycle Cost Analysis: State of the art review. International Journal of Production Research, April 1998;36:(4):883-908

22. L. Bodsberg and P. Hokstad. A System Approach to Reliability and Life Cycle Cost of Process Safety Systems. IEEE Transactions on Reliability, June 1995;44:(2):179-186

23. Sten, Bengt. Environmental Costs and Benefits in Life Cycle Costing. Management of Environmental Quality, 2005;16:(2):108

24. Woodward, David G. Life Cycle Costing-Theory. İnformation Acquasition and Application. İnternational Journal of Project Management, 1998;15:(6):338

25. Çelik Muhsin. Approaches to Product Life Cycle Coost Evaluation Of Environmental Impact Business Decisions. Journal Of Accounting and Auditing Overview, April 2006:130

26. Balyemez,Figen Evrim İlden Develi, D.Zeynep Bayazıt Şahinoğlu. V. National Manufacturing Research Symposium. İstanbul Commerce University, November 2005:25-27

27. Erden, Selman. A. Cost Mangement and Costing for Global Competitiveness. Journal of World of Accounting Science, December 2003;5:(4):87

28. Sevim, Adnan. A Contemporary Means in the Strategic Profit Management: Product Life Cycle Cost System. Journal of World of Accounting Science, 2002;4:(1):140

29. Karcıoğlu Reşat. Strategic Cost Management, New Approaches in Cost and Management Accounting. Aktif Publishing House, Erzurum,2000:90

30. Altunay, M.Akif. A Contemporary Costing System: Activity Based Costing System and an Application on a Textile Enterprise. Süleyman Demirel University, Institute of Social Sciences, Department of Business Management MA Thesis, 2007.

31. Altunay, M.Akif. A Contemporary Costing System: Activity Based Costing System and an Application on a Textile Enterprise. Süleyman Demirel University, Institute of Social Sciences, Department of Business Management MA Thesis, 2007.

32. Edward J.Blocher, Kung H.Chen, Thomas W.Lin Mc Graw, Hill. Cost Management A Strategic Emphasis. 2nd edition, 2000:168-169

33. Asiedu Y, Gu P. Product life cycle cost analysis: state of the art review. International Journal of Product Research, 1998;36:(4):836-908

34. Basık, Orhan. F; Türker, İpek. Strategic Cost Analysis and Management. V. National Manufacturing Research Symposium, İstanbul Commerce University, November 2005

35. Charles T.Hongren, Srikant M.Datar, George Foster, et al. Cost Accounting. Pearson International Edition,13. Edition, Mar 4, 2008:471

36. Susman, I,Gerald. Product Life Cycle Management. Practices in Cost Management Boston, 1990:226

37. Wayne J.Morse, James R.Davis, Al. L.Hartgraves. Managemen Accounting. Addısion-Wesley Publushing Company, Third Edition, 1991: 33

38. Can, Vehdi. A. Target Costing, Theory and Practice. Sakarya Publishing House, Sakarya, 2004:170

39. Köse Tunç. Decision-Making Means According to Product Costs: Product Life Cycle Costing, Target Costing and Kaizen Costing. Osmangazi University Journal of Social Sciences, December2002;3:(2):84

40. Çetinkaya, Zeynep. Strategic Cost Management. Kahramanmaraş Sütçü İmam University Institute of Social Sciences, Department of Business Management MA Thesis, 2008: 46

41. Erden, Selman. A. Relation of Cost Management Systems Production Environments and Strategic Cost Management. Türkmen Publishing House, 2002:203

42. Erden, Selman. A. Relation of Cost Management Systems Production Environments and Strategic Cost Management. Türkmen Publishing House, 2002:203

43. Can, Vehdi. A. Target Costing, Theory and Practice. Sakarya Publishing House, Sakarya, 2004:170

44. Can, Vehdi. A. Target Costing, Theory and Practice. Sakarya Publishing House, Sakarya, 2004:174

45. Doğan, Zeki. A New Approach to Cost Management: Life Cycle Costing Method. Journal of World of Accounting Science, 2000;4:98

46. Erden, Selman. A. Cost Mangement and Costing for Global Competitiveness. Journal of World of Accounting Science, December 2003;5:(4):88

47. Doğan, Zeki. A New Approach to Cost Management: Life Cycle Costing Method. Journal of World of Accounting Science, 2000;4:98

48. Doğan, Zeki; Hatipoğlu Ayşegül. A Study on the Applicability of Target Costing Method. Journal of World of Accounting and Finance, 1998:21:102

49. Acar, Durmuş; Alkan, Hasan. Kaizen Costing Reducing The Cost Of Production. Journal of World of Accounting Science, 2003;5:22