
A comparative study of the different costing techniques and their application in the pharmaceutical companies

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Abstract

After its induction in the 19th century, the pharmaceutical industry covered a long way and now it became one of the most successful and influential industries in the world, with both praise and controversy on its part. The current study is performed on the pharmaceutical firms working in the Punjab (Pakistan). Like the other profit-driven organizations, the main aim of the pharmaceutical firms is to earn the maximum profit. The profitability also depends on the costing system. The current paper evaluates the costing systems, the level of satisfaction regarding the costing system, the major problems faced during the costing process and the best method of costing in the pharmaceutical sector. The questionnaire was designed for the collection of data from 130 pharmaceutical companies working in the Punjab. For the data analysis, the descriptive statistics and the graphical method were used. The significant result of the study is that most of the organizations used the marginal costing and many managers are satisfied with the costing system which they are using.

Keywords: Pharmaceutical industry, costing system, marginal costing, ABC costing, Punjab.

JEL Classification: M41.

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Introduction

The current era is characterized by global competition. This competition forced the manufacturing and services firms to become integrated, more flexible and highly automated to increase their productivity by lowering their costs to survive on the market. It is impossible to sustain the competitive advantages without having the accurate system of cost mechanism (Özbayrak et al., 2004).

There are three major systems of costing:

- (i) Traditional methods,
- (ii) Marginal costing methods, and
- (iii) ABC costing.

The current study is about the costing system used by pharmaceutical companies.

The pharmaceutical companies play a vital role in society, by providing life-saving products to human beings. Within this perspective, this sector explores the development and discovery of new pharmaceutical products, the secure and quick development of the products and finally the production and distribution of these safe and sound products to the end user (Masood et al., 2009).

Mushtaq and Chattha (2008) argue that the scope of pharmaceutical manufacturing is three folded:

1. Research and development;
2. To convert the natural and organic substances into bulk pharmaceutical ingredients through extraction, chemical synthesis and fermentation;
3. To manufacture the final pharmaceutical product.

In Pakistan the first two functions are not performed; only the pharmaceutical products are produced here. There is a wide range of pharmaceutical products and chemical products which are produced by the pharmaceutical companies; these include disinfectants, anaesthetics, muscle relaxants, water soluble salts, antibiotics, anticlotting agents, antihypertensive diuretics, anti-infective, analgesic, vitamins and anti-depressants. The pharmaceutical sector of Pakistan devises, packs and fills a diversity of pharmaceutical products, with unique trade names in the shape of tablets, oral powders for suspension, lotions and ointments, capsules, creams, syrups, ampoules and injectable substances. Lactose, sugar etc. are also used to produce the different products by the pharmaceutical companies, along with the active raw material. Solvents

like methanol, ethyl acetate, di-chloro ethane and methylene chloride, are frequently used to manufacture the pharmaceutical products in addition to the major raw material. The materials for manufacturing the products are frequently imported (Mushtaq and Chattha, 2008).

The pharmaceutical industry is growing in Pakistan. There is a wide range of pharmaceutical products and drugs which are produced and sold by the pharmaceutical companies. Now, the pharmaceutical companies are playing an important role in the Pakistan economy. There are many pharmacy schools which provide quality education to the pharmacy students. The national profession of Pakistan pharmacists is organized as national organizations which control the pharmacy practice in Pakistan and in the Punjab. Punjab's pharmacy council is responsible for conducting the tests and examination. However, the current study is about the costing techniques prevailing in this sector.

Triest and Elshahat (2007) argue that there is scant research available generally on management practices and especially on the accounting practices in non-developed /non-western countries. The reason is the lack of knowledge. Parnell and Hatem (1999) stated that the work of the expatriate manager is well-managed and documented and it is very difficult to apply the western concept in the business environment of non-western countries. There are lots of studies conducted on the costing techniques in the developed countries, but there is scant research available on the costing techniques in Pakistan. In the current era in which costing techniques provide accurate results, it has become a significant problem because different costing techniques provide different costs and profits for the firms. Similar to the other profit driven organizations, the main purpose of pharmaceutical companies is to earn the maximum profit, while the profit can be maximum if there is a proper costing technique for accurate costing. The current paper shows and evaluates the costing system used by the pharmaceutical companies in Punjab, Pakistan. It is based on a survey conducted on the pharmaceutical companies which are working in the Punjab.

The objectives of the study are to:

1. Identify the costing systems that the pharmaceutical companies are currently using;
2. Assess the degree to which managers are satisfied with the different costing techniques;

3. Identify the problems regarding the existing costing systems;
4. Assess how indirect costs are charged to the product.

1. Literature review

First of all, we examined the following questions regarding the costing system in the pharmaceutical sector:

- (i) What is meant by cost model?
- (ii) What is the significance of this model for the pharmaceutical sector?
- (iii) What are the major costing systems?

A cost model is used by the companies to have a better understanding regarding the costs, in order to run their business effectively (Kaplan, 1984). The cost model performs the following functions:

- (i) The assessment of inventory and cost of goods sold;
- (ii) The estimation of the cost of products, services, customers and activities
- (iii) The provision of feedback to the manager about the efficiency of the process.

Hatzis et al. (2011) is of the view that the other purpose of the cost model is to provide useful information for decision making, after getting and analysing of the data. The effectiveness of data is depending on the right information for making the right decision.

Mehmood et al. (2009) stated that in the current era the pharmaceutical sector is becoming a more multifaceted and dynamic environment. There are a lot of changes in this industry, like the amplified buyer cost sensitivity, the new market, the technological advancement and the global competition, which has increased up to uncertain level. The patient's expectations are higher, the healthcare cost has also increased and the incapacity of the economy to meet the increased cost is the major challenge for the pharmaceutical industry. Like other profit driven industries the main objective of the firm is to maximize the profit, while the profit is maximum if there is a proper procedure for the costing; therefore, the costing techniques have a great importance for the pharmaceutical sector.

The main costing systems can be categorized based on the product process and the production processes as follows (Kaplan, 1984; Cooper and Kaplan, 1988).

Product cost. The costing methods concerned with product costing are:

- Variable/marginal/direct costing;
- Full/absorption costing.

Production process cost. The costing methods concerned with the production process cost are:

- Process costing;
- Job order costing.

This article is concerned with the product cost and not with the production process cost. According to Garrison, Noreen and Brewer (2004), in the manufacturing organizations two most common techniques are used for the valuation of the inventory and cost of goods sold. The absorption costing is used commonly for the external purposes and the marginal costing is used for the internal decision making by the management. The two techniques provide a different net operating profit, while the difference may be quite high. Garrison, Noreen and Brewer (2004) define the variable and absorption costing as below.

The absorption costing considers all the manufacturing overhead as part of the product cost, whether it is fixed or variable. In the absorption costing, the per unit cost consists of direct raw material, direct labour and both fixed and variable overhead. It means that in the absorption costing the fixed part of the manufacturing also becomes a part of the product cost, in addition to the variable manufacturing cost. Direct material is a primary part of the product and it can be easily traceable in the product (e.g. wood in furniture, hard drive in the computer); direct labour can be easily traceable in the product, it is called touch labour (e.g. the labour of the carpenter); the manufacturing costs include all costs which were incurred on manufacturing the product, except the direct material and the direct labour (Garrison, Noreen and Brewer, 2004). The natural and organic substances become the material for the pharmaceutical companies and the persons who are directly involved in the production of pharmaceutical product become the part of direct labour. There are the following advantages of the absorption costing (Garrison, Noreen and Brewer, 2004):

- (i) Fixed cost of manufacturing is also recovered;
- (ii) Total cost is recognized;
- (iii) It is useful for pricing decisions and perdition of profitability;
- (iv) It is used for external purposes.

In the variable costing, only that part of the cost is considered in the product which varies with the level of activity. It consists of direct material, direct labour and the variable manufacturing overhead cost. Fixed cost is not considered a part of the product cost in variable costing. The fixed manufacturing cost becomes a part of the period cost, like the administrative and selling expenses, thus in the variable costing the inventory and cost of goods sold does not consist of any fixed cost of production. Variable costing has a number of advantages (Garrison, Noreen and Brewer, 2004):

- (i) Data can be taken directly from the variable costing for Cost-Volume-Profit (CVP) analysis; however, in absorption costing it is not easily available;
- (ii) Profit is not affected by the change in inventories;
- (iii) The manager often assumes that the per unit cost is the variable cost, but in absorption costing both fixed and variable costs are treated in per unit cost;
- (iv) In the variable costing, the fixed cost is clearly shown in the income statement; in this way we can emphasize fixed costs to become truly profitable;
- (v) Variable cost profit is close to the net cash flows;

- (vi) Variable costing provides a better prediction of the profit, because there is no subjective allocation of fixed cost.

Gupta and Parmar (2001) argue that marginal costing approach should also be conceded along with the absorption costing because it represents an effective way to control the cost. They also state that with the help of marginal costing we can also observe those resources which are unproductive because the attention is invited to the fixed cost in the marginal costing.

Pong and Mitchell (2005) argue that different methods of costing provide different net profits, because of differences in the value of stocks. The effect on the profit also depends on the opening and closing stock. If the value of the opening and the closing stock is the same, then the profit is the same under marginal and absorption costing, and if there is no opening and closing stock, then there is also no difference in the marginal and absorption costing profit. How much profit is different in both costing techniques is depending on the following two things:

- The difference between the absorption and the variable cost per unit (level of fixed cost per unit).
- The value of the ending and the opening inventory.

Table 1 provides the potential effect of both costing methods on the profit. No method has a complete negative or positive effect on the profit. If we change the costing method, the profit can increase or decrease depending on the stock adjustment (Pong and Mitchell, 2005).

Table 1. Impact of absorption costing and variable costing on profit

Stock valuation method	Increase in stock	Decrease in Stock
Marginal costing	Low profit	High profit
Absorption costing	High profit	Low profit

Source: Authors' processing.

A new costing system emerged from the last decade, i.e. the ABC system. The early concept of this system emerged in the sixties and seventies in the USA (McConville, 1993) by the General electric company, and in Germany by the Schlafhorst and Siemens (Ziegler, 1992; Wäscher, 1987). However, a theoretically structured and comprehensive system of ABC was introduced for the first time in the '1980 (Kaplan and Bruns, 1987). In this technique, we established the different activities or the development of activities which show the small group of homogenous tasks in all the

department of factory. It is used for the development of cost estimation when the project can be divided into quantifiable activities, discrete or a work unit (Cooper and Kaplan, 1988; Innes, Mitchell, and Sinclair, 2000). It means that this activity can be clearly implemented when productivity can be measured in units.

For further clarification between ABC and traditional costing system we can differentiate between these two as presented in Table 2 (Karadađ, Samli, and Öztürk, 2009):

Traditional/Absorption costing	ABC costing
Only manufacturing costs are allocated to the product.	The manufacturing and non-manufacturing costs can be allocated to products (some manufacturing costs might not be included in the product cost, it varies from situation to situation).
Administrative, selling and general expenses are considered as a period cost.	Administrative, selling and general expenses can be considered as product costs if they have a direct relationship with the product cost.
The factory over head is charged to production on the basis of a single overhead rate for the entire factory. The base may be direct material cost, direct labour hour, direct labour cost and machine hour etc.	There are many factory overhead costs based on the multiple allocation basis.
Unused capacity costs can be considered as products cost.	Idle capacity costs cannot be considered as product costs.

Source: Authors' processing.

According to Garrison, Noreen and Brewer (2004), the following are the limitations of the ABC costing.

- To implement the ABC system there is need of more resources, hence it is more costly than traditional costing.
- The ABC system provides the numbers e.g. product margins and it odds with the numbers produced in the traditional costing. The managers are used to employ traditional costing to run business operations and traditional costing is frequently used for performance evaluations.
- The data based on the ABC costing can easily be misinterpreted for making decisions, therefore the manager has to care full for making decisions based on the ABC costing, by considering which cost is relevant or irrelevant.
- The ABC method is also not conforming to the generally accepted accounting principles (GAAP), therefore the organization has to prepare the statement on the basis of two methods: one for external and one for internal purposes.

2. Research methodology

The study was conducted on the pharmaceutical companies of Punjab, Pakistan. The questionnaire was used for the data collection from the pharmaceutical companies. In this study the questionnaire of Hatzis et al. (2011) was used for the data collection, after making the necessary amendments to adapt to the Pakistani culture. The questionnaire was designed in the English

language because the target population consists of well-educated people, so they can easily understand an international language. There was a total number of 15 questions in the questionnaire; it took 5-7 minutes for the respondents to complete the questionnaire. Our sample size was of 130 managers/accountants of the pharmaceutical companies which are working in the Punjab. 130 questionnaires were distributed to the respondents in the month of December 2011. A simple random sampling technique was used for distribution of the questionnaires. The data were collected through personally administrated questionnaires. Out of 130 questionnaires 96 were received back. The response rate was 74%. The descriptive and graphical analysis were used for the statistical analysis. The questionnaire was already used by the other researchers, so there is no issue of reliability. A covering letter is also forwarded to the respondents regarding the importance of the study. The most important purposes of the current survey are presented below:

1. What costing system was used and adopted by the pharmaceutical companies in Punjab?
2. Do the pharmaceutical companies have a position for the cost accountant/ manager/accountant for costing?
3. On what basis is the overhead charged to production in the pharmaceutical firms?
4. Do the pharmaceutical companies have standards for costing?
5. Do the companies use the accounting software package that supports the process of costing?

6. What is the major problem faced by the pharmaceutical companies during costing?
7. Up to what extent are the managers satisfied with their costing system?
8. Which one is best system of costing for decision making?

Participants

The participants to the survey are managers or accountants or any persons who are dealing with the costing system in the pharmaceutical sector in the Punjab, Pakistan. The demographic information of the participants is presented in **Table 3**.

Particular	Range	Frequency	Percent%	Cumulative Percent
Gender	Male	84	87.5	87.5
	Female	12	12.5	100
	Total	96	100	
Age (years)	18-24	6	6.2	6.2
	25-31	45	46.9	53.1
	30-38	26	27.1	80.2
	36-45	12	12.5	92.7
	42-52	5	5.2	97.9
	above 52	2	2.1	100
Education	Undergraduate	7	7.3	7.3
	Graduation	18	18.8	26.0
	Master	65	67.7	93.8
	M. Phil/PhD	6	6.2	100.0
Job Experience (years)	1-6	91	41.4	41.4
	7-13	51	23.2	64.5
	14-20	37	16.8	81.4
	Above 20	41	18.6	100.0

Source: Authors' processing.

Demographics are not the part of analysis in the current study. It is just included in the paper to disclose the composition of the participants/respondents. **Table 3** shows the gender discrimination. The male respondents are 88% and female are only 12%. Males are dominating in Pakistani society. The reason of the low participation of women in manufacturing is that in Pakistani culture the males are supposed to earn money, and women are supposed to look after the home affairs and not earn money themselves. However, this trend is changing with the passage of time and females are also getting education and joining the public and private sector. However, the 12% participation of females is very low as compared to USA or any Western country (Bashir and Khattak, 2008).

The majority of the respondents are in the age of 25-30, which shows that young people are involved in the pharmaceutical sector; however, **Table 3** shows that all

age groups are included in our sample. It is also clear that most respondents hold a master degree and are also experienced in the pharmaceutical sector. The different age group, both type genders, low to high qualification personal and experienced respondents show that the data is the true representation of the population involved in the costing activities in the pharmaceutical sector.

3. Costing systems

Table 4 shows the outcomes of the analysis regarding the costing system in the pharmaceutical sector, which is the main objective of this survey. **Table 4** indicates that the majority of the pharmaceutical sector is currently using the marginal costing system for the cost estimation, which is very important for the internal costing. The ABC system is used in very few firms due to its complexity. 35 out of the 96 respondents use the

absorption costing (37%), 47 respondents (49%) use marginal costing, and 14 firms are using the ABC

system, meaning 15% approximately.

Costing systems	Frequency	Percent
Absorption Costing	35	36.5
Marginal costing	47	49.0
Activity based costing	14	14.6
Total	96	100.0

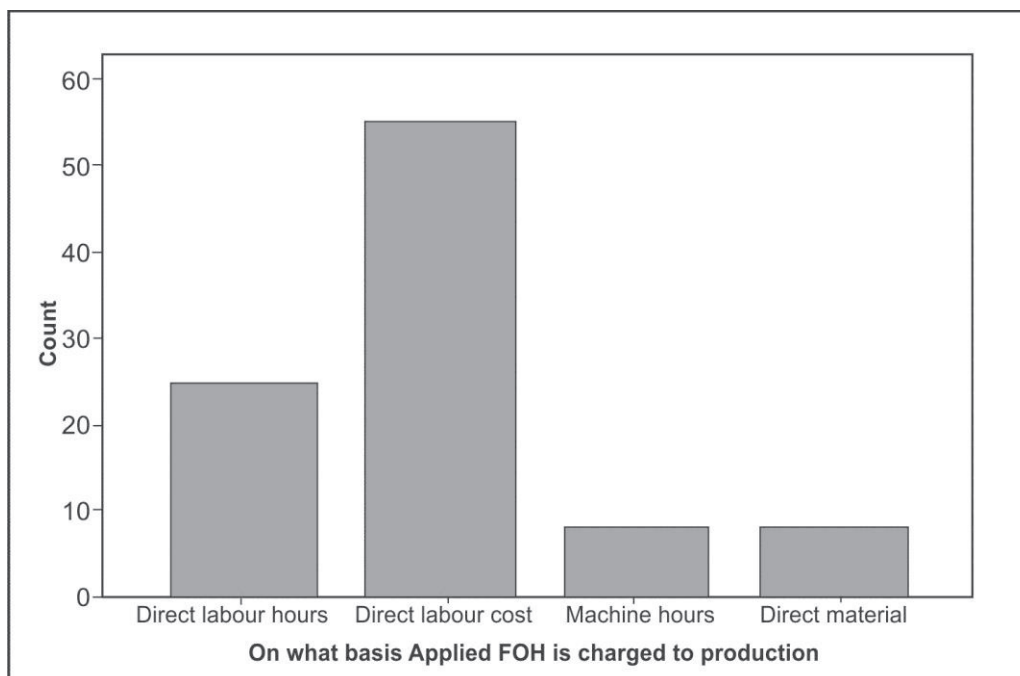
Source: Authors' processing.

Indirect costs

The manufacturing cost is charged on a different basis in each sector. The basis of absorbed manufacturing overhead may be the direct labour hours, direct labour cost, machine hours, material cost, prime cost and conversion cost, etc. However, in the pharmaceutical sector the manufacturing cost is charged on the basis of

the direct labour cost, as per the survey results, because this is a major cost element. The following graph shows that most of the pharmaceutical firms use the direct labour cost as a basis for manufacturing overhead; the machine hours and direct material are used by some firms only.

Figure 1. Indirect costs allocation bases used in the pharmaceutical industry



Source: Authors' processing.

Standard for Cost

The costing system is based on some standards or principles that dictate the manner in which the record of costing is maintained, for managerial decision making. As per the survey results, 75% of the pharmaceutical companies have a standard for costs, and the remaining 25% has no standard for costs.

Accounting Manager

Most of the pharmaceutical companies have the position of cost accounting manager, who manages the organization's costing system. 66% of the companies have the position of the accounting manager and 34% of the organizations have no proper set up of accounting manager and the costing system is managed by other categories of employees.

Accounting software

In the current era of technology, most organizations use the accounting software for keeping the accounting records. 74% of the pharmaceutical companies use a cost accounting software for the costing system, while

26% of the pharmaceutical companies use no software for the costing process.

Problems in the costing system

In the pharmaceutical sector, the following problems were examined regarding the costing system:

- Incorrect allotment of indirect costs,
- Complexities in the raw data assembly process,
- Delays in the gaining of accurate costing information.

The most important problem which the pharmaceutical companies face in terms of the costing system is the incorrect allocation of indirect costs, according to the managers' answers to the questions in the survey. 54 respondents argue that the major problem is the incorrect allocation of indirect costs, 20 respondents are of the view that the delay in gaining the accurate costing information is the major problem and 23 respondents are of the view that the main problem in costing consists in the complexities in the raw data assembly process. The following table shows the managers' responses regarding the problems faced by the pharmaceutical sector.

Table 5. Costing particularities specific to the pharmaceutical industry

Particulars	Frequency	%
Wrong allocation of indirect cost	53	55.2
Delays in acquisition of right costing system	20	20.8
Difficulties in raw data collection	23	24

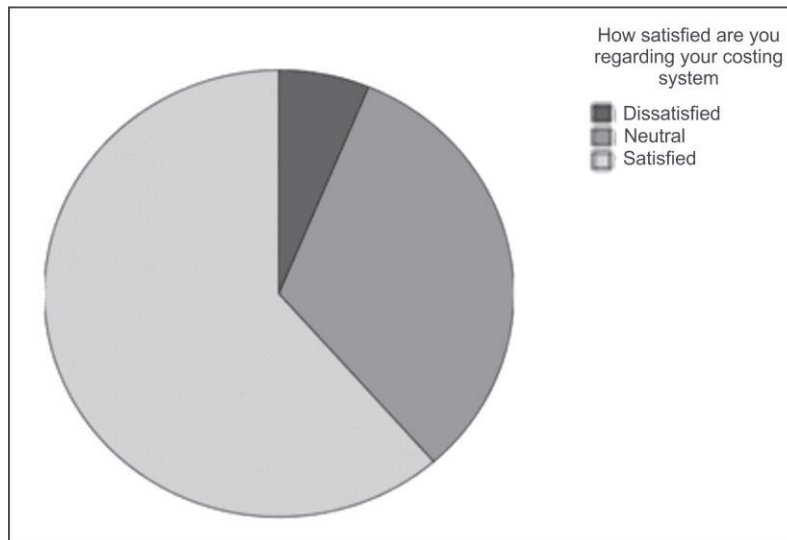
Source: Authors' processing.

Satisfaction level

The other major objective of the survey is to observe the satisfaction level of the respondents regarding the costing systems which they are using in the pharmaceutical sector. Managers may be satisfied with the costing system, or dissatisfied, or neither satisfied nor dissatisfied. The results show that 60% of respondents are satisfied with the system that they

are using, 30% are neither satisfied nor dissatisfied and 10% are not satisfied with the system. It is also observed that the firms which are using the ABC system are most satisfied as compared to those firms who are using the marginal and absorption costing, however the following graph shows the level of the respondents' satisfaction, neutral position and dissatisfaction.

Figure 2. The level of respondents' satisfaction with regard to the costing method they use



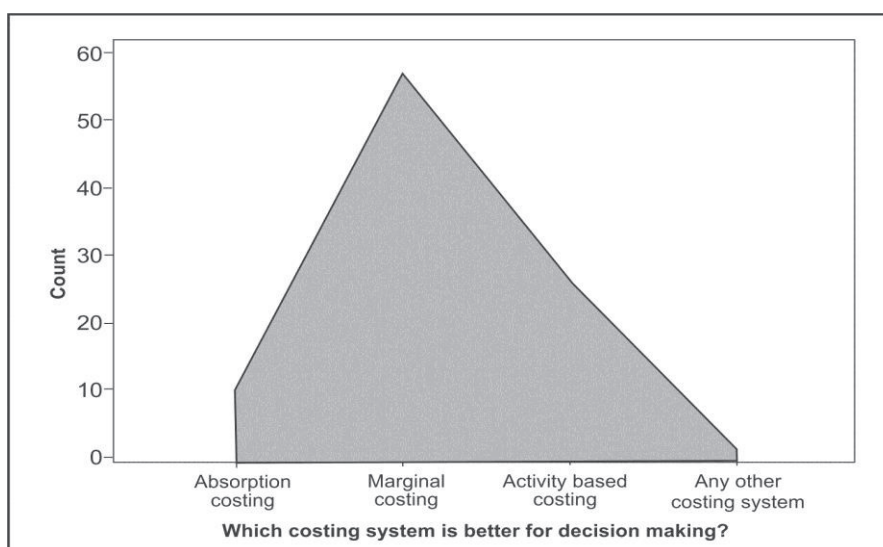
Source: Authors' processing.

Decision Making

The last and most important objective of the research was to show which costing system is better for decision making. Most managers argue that the marginal costing is better for decision making, as compared to absorption costing and ABC costing. 59% argue that

the marginal costing is better, 10% opted for the absorption costing and 28% stated that the ABC system is best suited for decision making. The following graph shows the managers' responses regarding the best suited costing system for decision making.

Figure 3. Costing methods adequate for the pharmaceutical industry



Source: Authors' processing.

Conclusions

In the current era, there is great importance of the pharmaceutical companies, because they deal with the human life. The pharmaceutical companies try to provide quality products along with minimizing the cost. The profit of the organization depends on the costing techniques which the organization uses.

The major objective of this paper was the evaluation and identification of the costing system, and other relevant issues which are of great importance for the costing system used by the pharmaceutical companies in the Punjab (Pakistan). The significant results of the survey were the following:

- Most companies in the Pakistani pharmaceutical industry use the marginal costing, instead of the absorption or ABC costing.

- The managers of the companies that are using the ABC system are more satisfied with the costing techniques, as compared to those using any other costing techniques.
- The companies have standards for costing and also use a software for costing.
- Most managers are of view that the marginal costing is better for decision making as compared to any other techniques.
- The major problem which the organization is facing in the costing system is the incorrect allocation of the indirect cost.

In the future, the study can be conducted to examine the drawbacks and plus points of using any costing techniques in the pharmaceutical companies, as well as the impact on the profit by changing the costing techniques.

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