UNIVERSITE MONTESQUIEU-BORDEAUX IV
ECOLE DOCTORALE ENTEPRISE ECONOMIE SOCIETE
(E.D.42)
DOCTORAT en SCIENCES DE GESTION

Mohammad Ali Mohammadi

L'impact de la formation sur la productivité du travail: Une étude longitudinale dans l'industrie pharmaceutique en Iran

Thèse dirigée par M. Olivier HERRBACH Professeur des universités

Soutenue le 10 Décembre 2012

Jury:

M. Benoît DEMIL
Professeur des Universités
Université Lille 3 (Rapporteur)
M. Christophe BENAVENT
Professeur des Universités
Université Paris Ouest (Rapporteur)
M. Corynne JAFFEUX
Professeur des Universités
Université Montesquieu Bordeaux IV (Suffragants)
M. Manouchehr ANSARI
Professeur des Universités
Université de Téhéran (Suffragants)
M. Olivier HERRBACH
Professeur des Universités
Université Montesquieu Bordeaux IV (Directeur de Thèse)
M. Serge EVRAERT
Professeur des Universités
Université Montesquieu Bordeaux IV (Co-Directeur de Thèse)

UNIVERSITE MONTESQUIEU-BORDEAUX IV
ECOLE DOCTORALE ENTEPRISE ECONOMIE SOCIETE
(E.D.42)
DOCTORAT en SCIENCES DE GESTION

Mohammad Ali Mohammadi

L'impact de la formation sur la productivité du travail: Une étude longitudinale dans l'industrie pharmaceutique en Iran

The relationship between training and labor productivity
A longitudinal study in Iranian pharmaceutical companies

Thèse dirigée par M. Olivier HERRBACH Professeur des universités

Soutenue le 10 Décembre 2012

Jury:

M. Benoît DEMIL
Professeur des Universités
Université Lille 3 (Rapporteur)
M. Christophe BENAVENT
Professeur des Universités
Université Paris Ouest (Rapporteur)
M. Corynne JAFFEUX
Professeur des Universités
Université Montesquieu Bordeaux IV (Suffragants)
M. Manouchehr ANSARI
Professeur des Universités
Université de Téhéran (Suffragants)
M. Olivier HERRBACH
Professeur des Universités
Université Montesquieu Bordeaux IV (Directeur de Thèse)
M. Serge EVRAERT
Professeur des Universités
Université Montesquieu Bordeaux IV (Co-Directeur de Thèse)

L'impact de la formation sur la productivité du travail. Une étude longitudinale dans l'industrie pharmaceutique en Iran

Résumé

Dans la mesure où les ressources humaines et la productivité du personnel sont un facteur-clé de la production de l'organisation et de son fonctionnement économique, disposer d'un personnel compétent et motivé, susceptible de mettre en œuvre les responsabilités qu'on lui confie, est un atout précieux qui apporte des avantages économiques considérables à toute les organisation. C'est pour cette raison que celles-ci investissement dans le développement professionnel et dans les compétences de leurs salariés et consacrent des sommes importantes à la mise en place de démarches de formation. Pourtant, les responsables d'entreprise se sont toujours demandés si les ressources utilisées pour la formation ont l'efficacité souhaitée ou non.

Le choix d'un modèle d'évaluation de l'impact de la formation, aussi bien la formation spécifique que la formation générale, sur la productivité des ressources humaines est donc important et constitue le fondement de cette recherche. Pour étudier cette question et déterminer l'effet de la formation, la présente recherche a mobilisé une approche quantitative basée sur des résultats de panel. Dans la mesure où deux types de modélisation ont été utilisés dans la littérature, les douze hypothèses de cette recherche ont fait l'objet de l'étude de 24 modèles destinés à relier les variables de l'étude.

Les résultats montrent que le coût total de la formation et le coût par personne ont un impact significatif sur la productivité des ressources humaines dans les entreprises pharmaceutiques iraniennes. Sur la base du travail réalisé dans cette recherche, il est apparu que la formation générale a en général un impact non significatif sur la productivité, alors que la formation spécifique a en général un impact positif sur la productivité. Ces résultats sont présentés et discutés.

Mots Clés : Formation. Formation générale, Formation spécifique, Productivité du travail.

The relationship between training and labor productivity
A longitudinal study in Iranian pharmaceutical companies

Abstract

Since human resources and its productivity is the main and key factor in productivity of the whole organization and its economic operation, possessing effective human resources who bear appropriate and adequate knowledge, skill and attitude to perform the delegated responsibilities in appropriate quality and quantity, is considered as a valuable capital and will bring considerable economic benefits for the organization. For this reason, various organizations invest on developing their labors capabilities and expend considerable financial resources in addition to the lost working opportunities related to the staffs involved in the training process which have its own special costs. The organization managers always have questioned whether the expended resources and investments to train the staffs (which include various costs especially the lost opportunity cost and separating from the staffs in different job levels) have had the required and expected effectiveness or not.

For this reason, selecting appropriate model and approach to evaluate the effect of implemented trainings, including specific and general trainings, on the labor productivity in an organization is very important and essential which is the purpose of this research.

To research on this issue and to determine the relation and effect of training on labor productivity, this research was performed in quantitative method using panel data technique. Since two types of production function has been utilized to evaluate the effect of training on labor productivity, the research 12 hypotheses have been analyzed two times and for this reason, 24 models and relations between the variables have been defined, examined and analyzed.

The findings showed that **total training cost variable** and per-capita capital variable have **significant effect** on **labor productivity** in Iran pharmaceutical corporations.

According to the research results regarding the effect of various trainings on the labor productivity in different pharmaceutical corporations and in case of selecting **linear model** to explain the relation between training and productivity, the following issues are notable:

- **General trainings** have **mainly** and **insignificant effect** on the **labor productivity** in different corporations. This result is identical to the results derived using panel model for all corporations.
- **Specific trainings** in general have **positive** and **significant effect** on the **labor productivity** in different corporations. This result is identical to the results derived for all corporations

If the **Cobb-Douglas production function** is used to explain the relation between various trainings and labor productivity, the following results can be presented:

- **General trainings** have **insignificant effect** on the **labor productivity** in corporations under study, and even this relation in some corporation is estimated **negative**.
- The relation between **specific trainings** and **labor productivity** has been estimated **positive** and **significant** in all corporations under study.
-

Key words: training, specific training, general training, labor productivity.

Acknowledgement

I feel this is my duty to appreciate all my professors in Bordeaux University that I learn many valuable scientific and ethical lessons from them during my educational period, specifically from my advisory professor Olivier Herrbach, the person who guided me continuously in all way during PhD thesis and helped me patiently. More over I appreciate from Bordeaux university heads, especially professor Evraert and IMI which gave me and my other classmates this opportunity.

Also I would like to thank Dr. Ansari for his help always and all IMI colleagues for their support in every step of my progress especially to Mr. Kheirkhah for his encouragement and support at most of the time.

And also I am grateful to my wife and my sons that morally and mentally supported me.

Table of content

List of tables and figures

Tables

Figures

CHAPTER 1

The Research Generalities

Introduction

In this chapter, the research generalities, general framework, different pillars and the research organizing method is explained as the following.

Considering the unlimited innovations and variations we face in the universe, successful organizations have adopted specific measures to utilize all their staffs' capacities and in current world, attention to human resources, as the evolution axis and basic element in any organization which acts under influence of information and communications, is felt more and more and the idea of enabling, stimulating and associating this factor is one of strategic and vital plans of managing any organization; since it is human resources which leads to productivity of other production factors and driving engine of productivity in an organization.

The most important and unique help and good effect of management in 20th century, becoming 50 fold the productivity of hand-working labors in industrial manufacturing. And still the most important share and role which the management should play in 21st century is to increase the labor productivity. As we know, the manufacturing equipments were the most valuable stocks and capitals of a corporation in 20th century, but the most valuable capital of a 21st century institution commercial and non-commercial will be knowledgeable and productive labors (Draker,1999). To increase the productivity of the working labors, managers should know their skills and abilities very well and try to utilize these abilities toward the organizational targets. Wages and salaries, job security, promotion, personal advance, working conditions, job attraction, … are of factors which have higher priority form labors point of view. Having enabling and effective labor which is assumed the pillar for national wealth and an organization vital capitals, will lead to many benefits for organizations, corporations and economic agents. The final target of labor enabling is to increase productivity and competition power of organizations.

Due to severe dependency to oil revenues and changes in world oil market and also due to the low labor productivity, Iran economy has

always faced different challenges and hence, increasing productivity, especially labor productivity is the only solution to the problem of economic conditions of Iran.

In various corporations and organizations, the profitability factor represents the operational condition in the past and productivity represents its condition in the past and future. So an organization or a corporation can hope in continuous profitability when it considers the productivity issue, since in long-term, increase in productivity will lead to decrease in costs and increase in production and consequently leads to increase in profitability.

1.1. Problem definition and introducing the research question

Due to daily increase of competition between economic agents in domestic and international markets and also due to necessity of developing competitiveness power of agents, it is essential for corporations to invest continuously on developing their capabilities and abilities and to be confident about effectiveness of their investments.

Hence, since human resources productivity is assumed as one of the most important factors in a firm's policy making, the attention of organizations to their labor productivity and effort to develop the personal capabilities to upgrade the productivity level is of much importance because today, human in organizations is not considered as a production factor such as other production factors, but it is considered as a potential source of expandable to improve productivity and return in organizations and is the axis of all strategies and plans which the mature and aware managers of the organizations want to ensure and secure the existence and development of the organizations through performing them. For an organization to develop in all fields, it should utilize healthy, thoughtful, innovative, skillful and knowledgeable labors to increase considerably the labor productivity level.

From the other side, the philosophy which considers the human resources development as the most important factor of productivity, it

should considers the job standards and norms as an instrument and framework to more develop in productivity improvement closed set. So if the productivity movement and its goals enter in a suitable manner in whole organization and its strategies, much potential ability will be created to improve the job life quality and develop human resources.

Labor training is one of most important factors in labor productivity improvement process. The training goals and the plans and methods to be effective should have close relationship with long-term strategic goals and also with the firm's operational purposes, but in the same time be flexible and result-oriented. Training should be considered as an important investment, only if it has a close relation to the firm's economic goals and plans and its productivity. The new orientation in training is higher emphasis on the result-orientation and its effectiveness and the approach of separate and formal sectors of training, independent from result-orientation is not acceptable.

Hence, selecting appropriate approach and model to evaluate the effect of performed trainings on the trained labors productivity and operation is a necessity in our society and especially in Iran industrial units which has been ignored and is the purpose of this research. In other words, the industrial units managers have been always in doubt and uncertainty about this issue whether the costs and resources which is spent on labor training (and includes various costs specially the opportunity cost lost and labor separation from the work in all job levels) has been effective and suitable task has been performed and they can't judge and conclude appropriately and accurately and then make decision. So in many firms when the issue of cost reduction is proposed, decline of labor training cost is between the primary costs which are decided about it in most firms.

So the real cases addressed above, has faced the researcher with this basic question that which model and pattern is appropriate to study the effect and relation of labor training and labor productivity in Iran industrial corporation?

1.2. The research necessity

The necessity of performing this research is addressed from both theoretical and applied aspect. In other words, by performing this research, the researcher has participated both theoretically in science development and in developing the application and presenting a pattern to use in economic firms.

1.2.1. The research necessity from theoretical basics view

Studying the research background shows that although there are much rich subjects and contents on the labor productivity and training independently around the world and many researches have been performed regarding the factors effecting on labor productivity and specially regarding the training and its effectiveness but in performed researches, there was not an acceptable and scientific research in regard with the relation between labor productivity and training in an industry or an economic sector level, so as by using real data on the considered society operation, one can come to a trustable conclusion. In addition, the important and noteworthy point is the separation of two types of technical and general training from each other and assessing their relation with labor productivity.

This defect combined with sporadic views in this regard has led us to have a scientific and methodological view and attention to the issue of the effect of various trainings on the labor productivity. In other words, despite the knowledge generation and performing studies and researches regarding productivity and training, two main fields which are of important priority has been less deliberated and scientifically researched. First, the factors effecting labor productivity and assessing the effect of each factor on labor productivity charges and second, studying and assessing trainings effectiveness, specifically as two independent groups including technical and general using one method and one quantitative model based on real data which have the required validity.

1.2.2. The research necessity from application view in economic firms

Due to daily increase in competition between different economic firms in domestic and international markets and the necessity of developing firms' competitiveness power, it is essential that the firms continuously invest on expanding their capabilities and ensure these investments effectiveness. One of main and basic fields in firm development to increase its competitiveness power is to invest on human resource development in order to modify the attitude and increase the knowledge and skills and specialty level of firm's labors in different levels. The most important and effective way to improve the labors' power level is to train them and of course this training should be performed effective and result-oriented and becoming confident about this is important and vital. Selecting appropriate model and approach to evaluate the level of effectiveness and result-orientation of performed trainings and tracing the effects of these trainings on the operation and productivity of firm's labors is a mandate and necessity which is the purpose of this research.

The reason for selecting Iran pharmaceutical industry for this research is the important effects of this industry on improving the level of health and hygienic of the society which has significant effect on the labor productivity in macroeconomic level. Also according to the trend of Iran membership in World Trade Organization and urgency of gradual decline of import tariffs, improving the productivity of active firms in pharmaceutical industry, in order to maintain their survival in the market and develop the export of their products, is of important priority. The other reason for this choice is the existence of information data required to this research in a regular and documented manner compared to most other industries of the country and finally, enough attention and emphasizing on the labor training in Iran pharmaceutical industries compared to other industries in the country. The important hypothesis of this research is that labor training (including technical and general trainings) has had positive and significant effect on labor productivity improvement in Iran pharmaceutical industry.

1.3. The research Method

This research is based on quantitative method in which quantitative data are used. From data type viewpoint, is retrospective because the data used is related to selected firms' operation during past few years. Also this research is conclusion oriented (from viewpoint of conclusion- orientation or decision orientation) because the purpose of researcher is to find the problem solution which is not necessarily used in decision making immediately.

This research is a fundamental research, the base of which is testing hypotheses and explaining the relations between training and labor productivity variables and finally adding to the existing knowledge and scientific principles in this regard and hopes to help to the cognition source and methodology.

The research is descriptive research in type of survey research (from viewpoint of finding required information data) and from method viewpoint is of longitudinal method and from longitudinal assessment type viewpoint is surveying a panel study under title of the relation between training and labor productivity in selected firms of Iran pharmaceutical industry.

So, according to research methodology, the purpose of performing this research is to determine the appropriate model and pattern to more scientifically understand the relation between training and labor productivity in economic firms (especially industrial ones). Hence this research is going to find answers for the following questions:

1- How is the relation between training and labor productivity?
2- How is the relation between specific training and labor productivity?
3- How is the relation between general training and labor productivity?
4- Which pattern is most suitable to assess and analyze the relation between training and labor productivity?

1.4. The Research Purpose

Based on the importance, question and necessity of the research which was previously explained, the research purposes are of two types of purpose as follows:

1.4.1. Main Purposes

1- Determining and presenting appropriate model to assess and analyze the relation between training and labor-productivity
2- Explaining the role and importance of training in labor productivity increase
3- Explaining the role and importance of specific trainings in labor productivity increase
4- Explaining the role and importance of general training in labor productivity increase

1.4.2. Secondary purposes

1- To develop theoretical and empirical knowledge in labor productivity field
2- To develop theoretical and empirical knowledge in the field of evaluating coordination and effect of various trainings

1.5. The research Questions

Based on the necessity and purposes of the research, the following main and secondary questions are proposed:

1.5.1. Main Question

How is the relation between various trainings and labor productivity?

1.5.2. Secondary Questions

1- How is the training role in changing the firm's labor productivity in general?
2- Which one of specific and general trainings has more powerful relation with labor productivity?

1.6. The Research Hypothesis

After finding appropriate answers to main and secondary questions and during review of the literature and studying the performed researches and also after examining the documents resulting from operation results records in various firms, 12 hypotheses were

determined, the detailed explanation of which is presented in chapter 4. The general hypothesis of the research is: "Labor training is effective on labor productivity of Iran pharmaceutical industries".

1.7. The research Scope

The topical scope of this research includes two fields of labor training and labor productivity and the relation between these fields and is classified under the topical scope of two sub-fields of Management branch, i.e. human resources management and productivity management. The time scope of the research is the time period of year 2003-2009.

This research is performed in economic firms of Iran pharmaceutical industries sector which have been active in stock exchange market and had several years of presence.

1.8. Statistical Society and Sample

The statistical society of this research includes all Iran pharmaceutical firms which have been active since 2003 and are still active and producing and they are in stock exchange market now

The required information data in total operation level of each pharmaceutical firm is collected and finally the operation of Iran pharmaceutical industry has been considered.

1.9. The instruments to gather information data

The required data are collected in five methods:

1- The archive studies
2- The information worksheets
3- The database of stock Exchange Organization
4- The database of Iran National Productivity Festival
5- The Expert interviews to some human resources and training managers of the firms and the experts in the field of human resources management

1.10. The methods of data analysis

In this study, the econometrics methods are used to analyze the data

related to training and productivity in selected Iranian pharmaceutical firms. Since the data related to each firm is analyzed in 2003-2009 time period, the study data is panel data type and in this regard, the panel data econometrics methods was used. Also due to the importance of stationary issue in econometric method, the panel data unit root tests are utilized to test the stationary.

1.11. The Research Innovation Aspects

The research background was examined both inside and outside Iran. Inside Iran. Inside Iran, similar research was not found. Outside Iran, limited studies have been performed in this regard which are mainly in firm level and they have less performed for an industry.

This research is innovative in regard with topical aspects, pervasive level and research method. As topical aspect, the relation between and effect of training (including specific and general training) on labor productivity was not addressed comprehensively and in an appropriate model format. As of research methodology, using real data on the firms operation and using panel data econometrics method to test the hypotheses, was a new look in this research. And as of pervasive level, this research was not performed in an industry level which in Iran, such research was not performed in this wide level by this precision and method. So performing this research leads to scientific cooperation form viewpoint of theory making, concept making and subject methodology.

1.12. The using of the research results

According to the type and nature of this research and presented model, and in the same time, the analysis results, following organizations can utilize the research results:

- Scientific and academic centers
- Economic Firms, specially industrial and mineral firms
- Governmental educational organizations and institutions such as Iran technical and occupational organization
- Non-governmental educational and consulting organizations and institutions active in the field of consulting management and labor training of firms.

1.13. The Research Restrictions

To perform this research, there were some restrictions, the most important of which are as following:

The main restriction was providing the required information data about operation of firms under study which there was not found comprehensively and inevitably needed spending much time and referring to diverse information sources and controlling the received data to ensure their validity and accuracy.

1-14-Definition of key terms

Productivity is the efficient and effective use of Resources – Labor, capital, land, materials, energy, time, information, etc. – in the production of goods and services that meet users' needs and requirements. As an efficiency measure, high productivity implies that production inputs are fully utilized and that waste in minimized. Effectiveness, on the other hand, means that outputs (and activities and processes) contribute to the attainment of the organization's specific goals, whether these are meeting customers' needs and giving them satisfaction, the achievement of business aims or a contribution to attaining the social, economic and ecological objectives of society. Productivity therefore means creating more value for consumers, workers, employers, enterprise owners and society at large from the processes and resources employed in the production activities of the organization.

Labor productivity is the efficient and effective use of labor in the production of goods and services that meet customers' needs and requirements.

Education is a formal learning process which helps people to acquire and develop mainly basic or advanced knowledge and to a lesser degree skills for a wide range of jobs

Training is a formal learning process which helps people to acquire and develop mainly practical skills and abilities to work, and to a lesser degree knowledge and attitudes under well – defined training needs.

Human resource development is a planned integral, comprehensive and ongoing process of developing peoples' abilities and organization environment at all levels in order to improve organizational performance.

Specific training is a training process that stress and focus on technical skills and abilities of every job.

General training is a training process that stress and focus on general skills and abilities of organizational employees.

Pharmaceutical industries is a group of firms that to produce medicine and related products in Iran.

1-15- Research structure

The figure 1-1- shows the structure of this research.

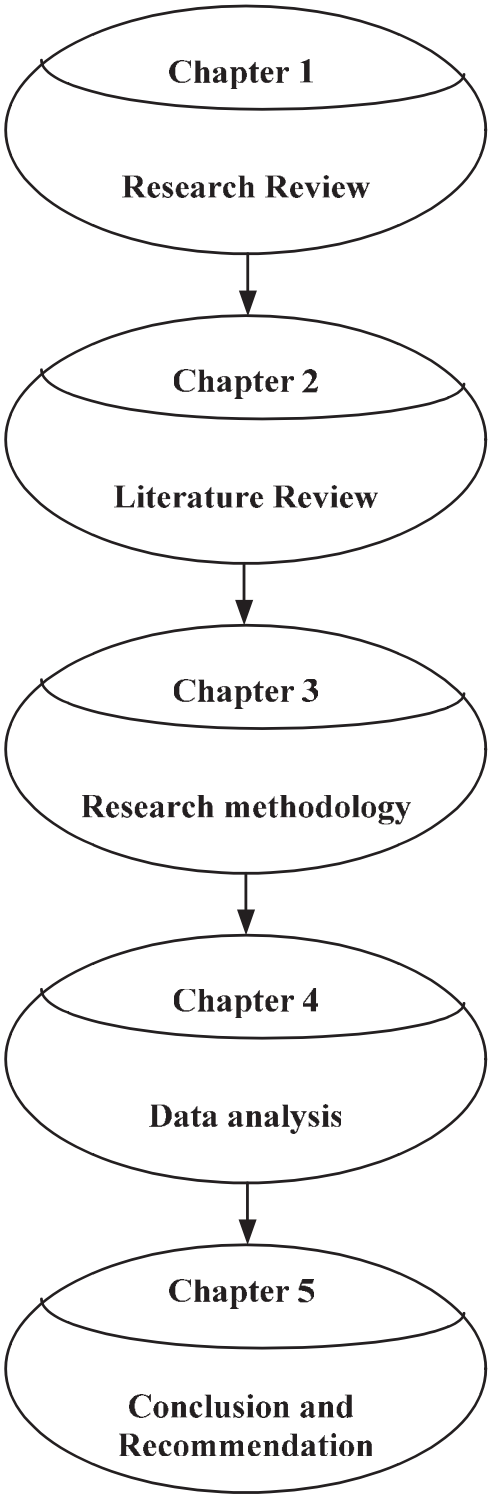


Figure 1-1: Research structure

Chapter 2

Literature Review

Introduction

In a period of timid economic growth achieving productivity gains has acquired a new sense of urgency. This is particularly felt in developing countries where rapid population growth, reduction in export prices of raw materials, growing indebtedness and inflation could the future. Raising productivity can offset the impact of some of these problems and at the same time help the cause of social development. (Joseph prokopenko-1995)

Over the years interest in productivity has taken various forms. At the macro level, productivity measurement has been a useful guide to policy – makers in setting wage policies or in combating inflation. At the enterprise level, it has helped in ascertaining performance. More important, perhaps, has been the interest in methods and techniques for raising productivity. Recently, considerable gains in productivity have been achieved through advances in process technology. But her interest has focused more on the technology itself than on the rational management of productivity.

This research approach productivity issues from a total and main factor (human resource and capital) productivity angle.

In addition in this research, the emphasis is on labor productivity in enterprise level.

2.1. Productivity

2.1.1. Productivity definition

The word "productivity" has become such a buzz word these days that it is almost rare not to find it mentioned in some context or other – in trade magazines, newspapers, management briefs, shareholders, reports, political speeches, TV news, consultants, advertisements, conference proceedings, just to name a few.

In a formal sense, probably, the first time the word "productivity" was mentioned was in an article by "Quesnay" in the year 1766. More than a century later, in 1883, ″Littre″ defined productivity as the "faculty to produce", that is, the desire to produce. It was not until the early twentieth century, however, that the term acquired a more precise meaning as a relationship between output and the means employed to produce that output.

In 1950, the Organization for European Economic Cooperation (OEEC) offered a more formal definition of productivity:

Productivity is the quotient obtained by one of the factors of production. In this way it is possible to speak of the productivity of capital investment or raw materials, according to whether output is being considered in relation to capital investment or raw materials, etc.

For the most part, economists have been concerned with productivity at the international, national , and industrial levels, although some well – known economists* have addressed the measurement of productivity at the company level.(David J.Sumanthe [3-4])

Productivity is the efficient and effective use of resource – labor, capital, land, materials, energy, time, information, etc. – in the production of goods and services that meet users' needs and requirements. As an efficiency measure, high productivity implies that production inputs are fully utilized and that waste is minimized. Effectiveness, on the other hand, means that outputs (and activities and processes) contribute to the attainment of the organization's specific goals, whether these be meeting customers' needs and giving them satisfaction, the achievement of business aims or a contribution to attaining the social, economic and ecological objectives of consumers, workers, employers, enterprise owners and society at large from the processes and resource employed in the production activities of the organization. (Prokopenko and north -1995).

Being the ratio of output to input, productivity is the comparison of the physical outputs from transformation process with the physical inputs into that process (Rao and Miller, 2004; singh et al, 2000). According to Helms (1996), every person who performs a job is a producer in the economy. When we compare the resources that go into a job with what is produced, we have a productivity measure. Tangen (2005) has provided a useful description of the terms productivity, profitability, performance, efficiency and effectiveness, which are often interchangeable but are quite distinct from each other. According to Tangen (2005), productivity is closely related to the use of resources meaning that a company's productivity is reduced if its resources are not properly used. Second, productivity is also strongly connected to the creation of value. Thus, high productivity is achieved when activities and resources in the manufacturing transformation process add value to the produced goods. Since productivity is the productive capability of the

*-see fabricant [1962] and Kendrick and Creamer [1965]

resources consumed in the organization, it can be measured for each production resource separately i.e. single factor productivity; as well as for all resources jointly i.e. total factor productivity. The productivity is a relative concept: it cannot be said to increases or decrease unless a comparison is made, either of variation from a "standard" at a certain point in time (which can be based on, for example, a competitor or another department) or of changes over time.

The two related concepts of efficiency and effectiveness are also sometimes confused with the productivity. Efficiency, in the organizational context, is related with the utilization of inputs during the transformation process. On the other hand, the effectiveness is concerned with the correctness and enhancement of the output i.e. more quantity or quality of output. Thus the two terms reflect the nominator and denominator side of the productivity ratio i.e. output/input (see figure2-1).

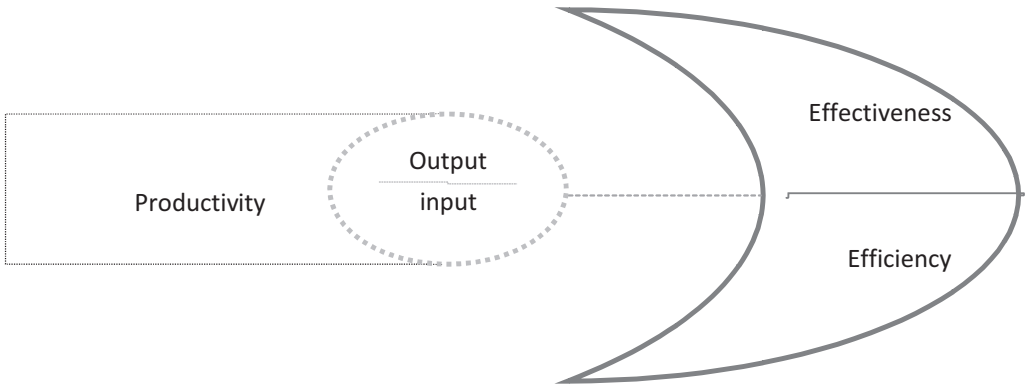


Figure2-1; The relationship between efficiency, effectiveness and productivity (Source: Tangen , 2005)

Many factors for example attitude, perception, knowledge and experience affect on viewpoint and definition about productivity. Experts in different field such as economists, accountant, engineer, manager and psychologist explain and define productivity in various and different approach. Each of

them has its own guidelines, view and perceptions of how humans, organization and machines function in different environment. The common goal of being competitive and maintaining value added and profit need to continuous monitoring of yield of human and organizational efforts (productivity measurement).

Depending upon who is defining productivity – whether it is an economist, accountant, manager, politician, or industrial engineer – you will get a slightly different definition of this term.

However, if we closely examine the various definitions and interpretations of this term, three basic types of productivity appear to be emerging these basic forms as follows.

- Total productivity (TP) that is the ratio of total output to the sum of all input factors. Thus, a total productivity measure reflects the joint impact of all the inputs in producing the output.
- Total Factor Productivity (TFP) that is the ratio of net output (Value added) to the sum of associated labor and capital (Factors) inputs. By "net output" we mean total output minus intermediate goods and services purchased. Notice that the denominator of this ratio is made up of only the labor and capital input factors.
- Partial Productivity that is the ratio of (total or net) output to one class of input. For example, labor productivity (the ratio of output to labor input) is a partial productivity measure. Similarly, capital productivity (the ratio of output to capital input) and material productivity (the ratio of output to materials input) are examples of partial productivity. (David Sumanth [7]).

The productivity of employees and organizations fluctuate. For example, level of labor productivity depended to kind of job, believes an attitude, capabilities, interests and motivation. Most attempts to define and calculate productivity focus on outputs like value added and number or amount of production. Of course, productivity is more and larger than outputs and approaches that evaluate efforts combine quantitative and qualitative methods. Both approaches are used in a relative sense, and definitions are containing both quantitative and qualitative elements.

A comprehensive definition is "… the ratio of valuable output to inputs, i.e. the efficiency and effectiveness with which resources – personnel, machines, materials, facilities, capital, time – are utilized to produce a valuable output" (Ranftl, 1978).

Beliefs and general statements about productivity based on experience and knowledge are also useful. Of the written responses from 563 chief executive officers and 950 industrial relations officers to questionnaires about productivity (katzell et al, 1975):

- 90% included quality, quantity of output, output per man – hour, and overall efficiency and effectiveness.
- 70% cited disruptions to normal work flow such as "shrinkage", sabotage, rate of absenteeism, and turnover.
- 60% referred to customer or client satisfaction, job satisfaction, employee loyalty, or morale.

2.1.2. The importance and role of productivity

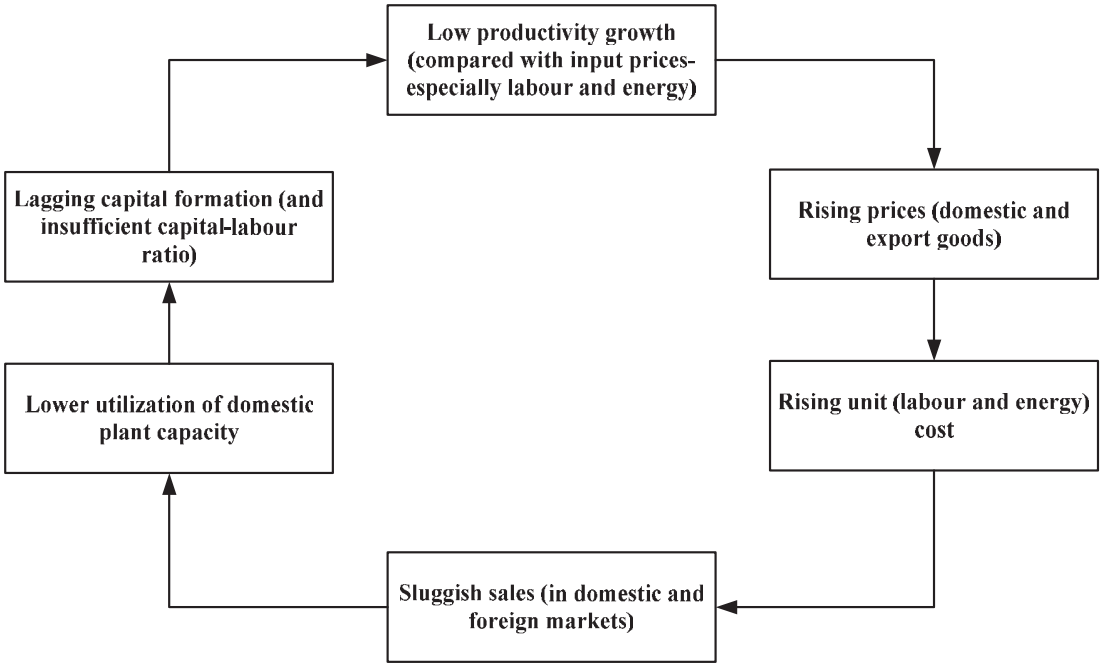
The importance of productivity in national economical development and increasing welfare is now universally recognized. There is no human activity that does not benefit from improved productivity. This is important because more of the increase in gross national income, or GNP, is produced by improving the effectiveness and quality of manpower than by using additional labor and capital. In other words, national income, or GNP, grows faster than the input factors when productivity is improved.

Productivity improvement, therefore, results in direct increases in the standard of living under conditions of distribution of productivity gains according to contribution. At present, it would not be wrong to state that productivity is the only important world-wide source of real economic growth, social progress and improved standard of living.

Productivity also largely determines how competitive a country's products are internationally. If labor productivity in one country declines in relation to productivity in other countries producing the same goods, a competitive imbalance is created. If the higher costs of production are passed on, the country's industries will lose sales as customer turn to the lower cost suppliers. But if the higher costs are absorbed by industries, their profit will decrease. This means that they have to decrease production or keep production costs stable by lowering real wages.

Thus, low productivity results in inflation, an adverse balance of trade, poor growth rate and unemployment. Figure 2-2 presents a simplified causal relationship between many variables and factors affecting productivity. (Sink 1985).

Figure 2-2- Model for a low-productivity trap



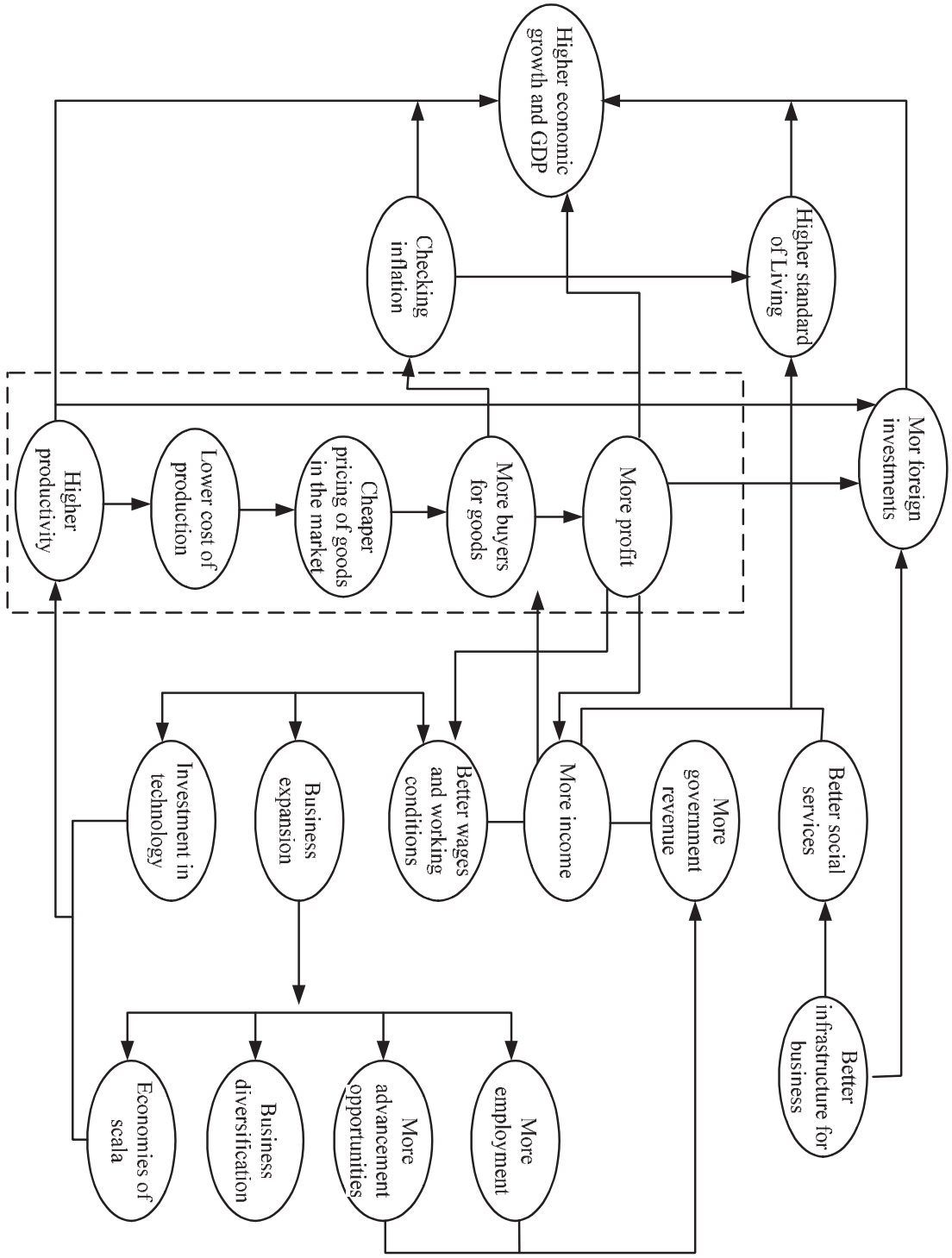
It is clear that the vicious circle of poverty, unemployment and low productivity can be broken only by increasing productivity.

2.1.3. The Productivity Effects

The effects of productivity in increasing GDP and social welfare and finally higher economic growth is now universally recognized and accepted. In every country (developed and developing), the main and basic source of economic development is an increase in productivity. Inversely, decrease of development, stagnation and decay are accompanied by a slow – down in productivity growth. This complexity is demonstrated by figure 2.1, which shows productivity effects.

Based on the results of analysis in many studies have done, the decrease in productivity is the result of a combination of various and many factors, that one of the most important factors is decrease the labor productivity. In many countries are increasingly faced with lacking and shortage of skilled and qualified human resources and have found it necessary to substitute capital – intensive technologies in some cases. Although, the development of new technologies entail the development of human resources. (See figure 2-3)

Figure 2-3- Productivity effects in the society



Based on many people believes, efficient and effective use of resources is depended on development of technology and organization, but it is often more important for total factor productivity improvement to contribute to human resource development in its extensive and widest perspective. Productivity movement and improvement is the process that human skills and interests, technology, management, and the political, social and economical environment all come together and meet.

At the macro level, it is very important to analyses the effects of all the main factors which help to or put barriers against productivity improvement. These factors include government policy, economic and social policies, strategies and decisions, national and international competition, the natural resources and demographic changes. In spite of that, the area where productivity develops or growth is actually created is the organization or company. The efficiency and effectiveness of their combined functioning is thrown back in productivity.

Therefore, the main stress of most books, articles and studies is on the organization and company (micro) level. They surrey the environment of the organization from this view that how it could contribute to or prevent productivity growth.

Many of studies and researches are intended for people practicing productivity increasing include managers, human resource development professionals, consultants, and advisers in productivity improvement.

An efficient and effective human resource policy and plan is one of the most important factors in productivity improvement. Therefore, any country need to a proper and strong human resource planning system and an executive mechanism to follow progressive changes. This system and mechanism has two major duties:

1- To develop and employ human resources as fully as possible
2- To adopt and fit the human resource structure (occupational, skill, sex, age, etc) to the requirements of modern and various changes, using institutions for planning, training, legislation and taxation.

2.1.4. The productivity cycle

Figure 2-4 shows the productivity cycle schematically. At any given time, an organization that is in the midst of an on-going "productivity program" may be involved in one of the four stages or phases: Productivity Measurement, Productivity Evaluation, Productivity Planning, and Productivity Improvement.

We abbreviate these four phases MEPI, where, M, E, P, I stand, respectively, for Measurement, Evaluation, Planning, and Improvement.

An organization that begins a formal productivity program for the first time can begin with productivity measurement. Once the productivity levels are measured, they have to be evaluated or compared against planned values. Based on this evaluation, target levels of productivity are planned on both short- and/or long-term bases. To achieve the planned targets, productivity improvement takes place in a formal manner. In order to assess the degree to which the improvement will take place next period, productivity levels must be measured again. This cycle thus continues for as long as the productivity program operates in the organization.

The productivity cycle concept shows us that productivity improvement must be preceded by measurement, evaluation, and planning. All four phases are important, not just productivity measurement or just productivity improvement. Also, this cycle emphasizes the "Process" nature of the productivity issue. A productivity program is not a one-time project, but rather a continuous, on-going process. [David J. Sumanth-1985]

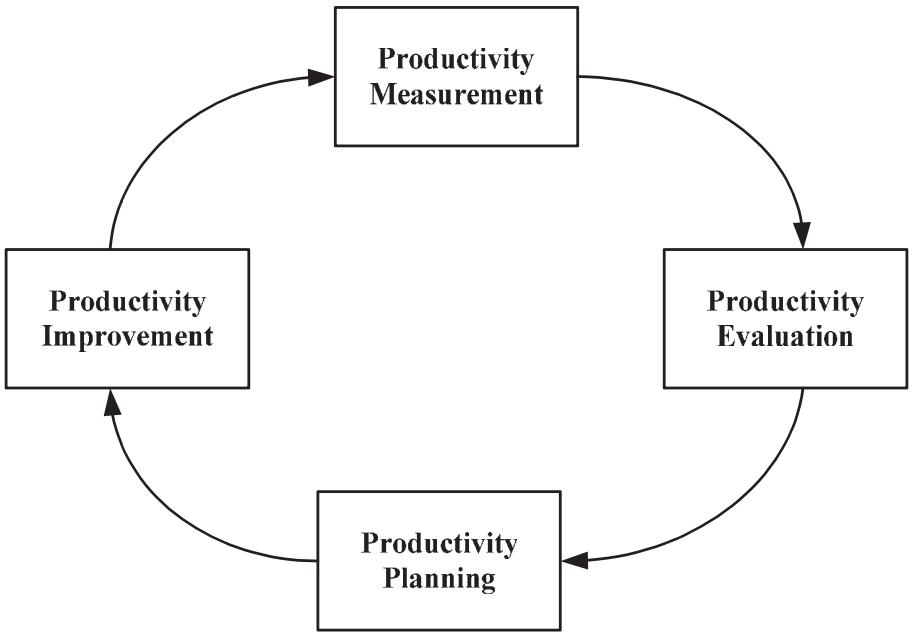


Figure 2-4- The Productivity cycle; abbreviated MEPI

In attention to this approach, productivity management is a formal management process involving all levels of management and employees with the ultimate objective of reducing the cost of the manufacturing, distributing,

and selling of a product or service through an integration of the four phases of the productivity cycle.

2.1.5. The productivity Factors

The production process is a complex, adaptive, on-going social system. The inter-relationships between labor, capital and the socio-organizational environment are important in the way they are balanced and co-ordinate into an integrated whole. Productivity improvement depends upon how successfully we identify and use the main factors of the socio-production system. It is important, in connection with this, to distinguish three main productivity factor groups:

- Job – related;
- Resource – related;
- Environment-related.

One of the good classification that suggested by "Joseph Prokopenko" (1987) is based on a paper by Mukherjee and singh (1975).

There are two major categories of productivity factor:

- External (not controllable).
- Internal (controllable).

The external factors are those which are beyond the control of the individual enterprise and the internal factors are those within its control.

To deal with all these factors we require different institutions, people, techniques and methods. Thus it can be clearly seen that the first step towards improving productivity is to identify problem areas within these factor groups. The next step is to distinguish those factors which are controllable.

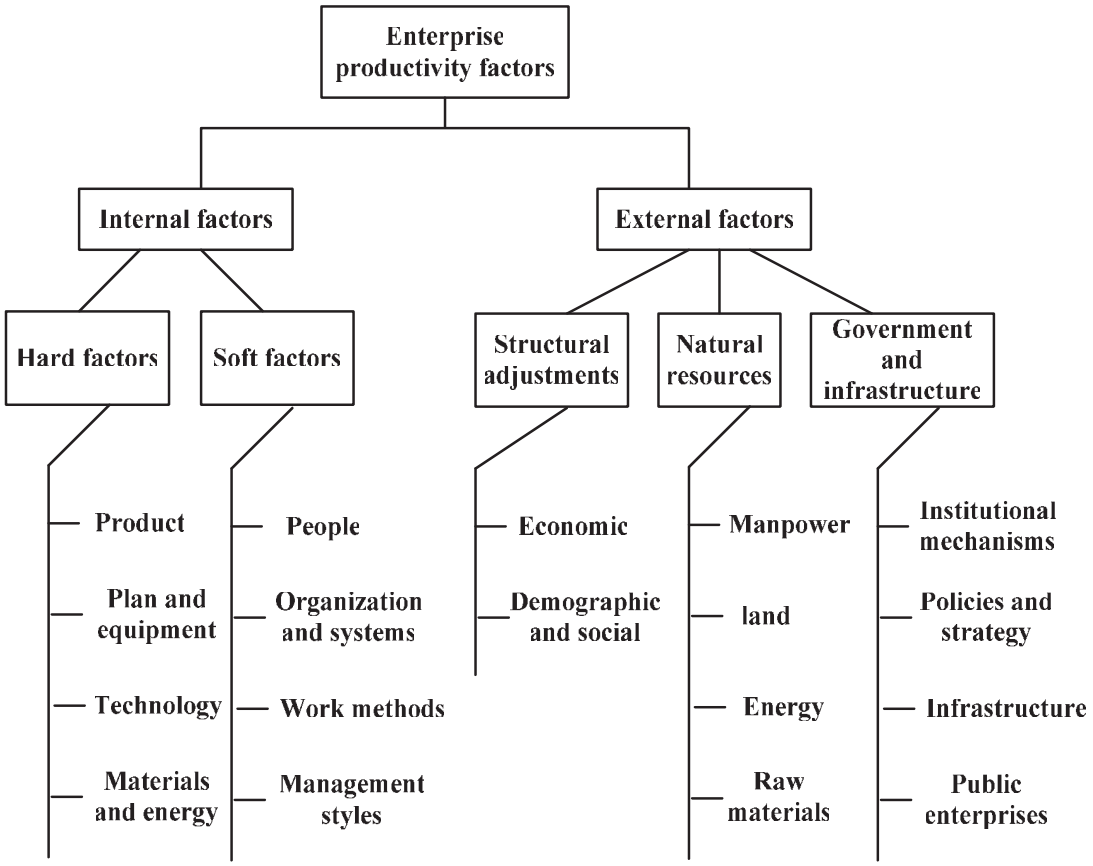
Factors which are external and not controllable for one institution are often internal to another. Factors external to an enterprise, for example, could be internal to governments, national or regional institutions, associations and pressure groups. Governments can improve tax policy, develop better labor legislation, provide better access to natural resources, improve social infrastructure, price policy, and so on, but individual organizations cannot.

Factors external to an enterprise are of interest to that enterprise because an understanding of them can motivate certain actions which might change an enterprise's behavior and its productivity in the long run. "Prokopenko"

suggest the following integrated scheme of factors constituting a major source of productivity improvement.

External factors should be understood and taken into consideration by management when planning and implementing productivity programs. (See figure 2-5)

Figure 2-5- An integrated model of enterprise productivity factors



Since some internal factors are more easily changed than others, it is useful to classify them into two groups: hard (not easily changed) and soft (easily changed). The hard factors include products, technology, equipment and raw materials, while the soft factors include the labor force, organizational systems and procedures, management styles and work methods. This classification helps us build priorities-which factors can easily be dealt with and which factors require stronger financial and organizational interventions.

A brief description of people aspect of internal factors follows. As the principal resource and the central factor in productivity improvement drives, the people is an organization all have a role to play-as workers, engineers, managers, entrepreneurs and trade union members. Each role has two aspects: application and effectiveness.

Application is the degree to which people apply themselves to their work. People differ not only in their ability but also in their will to work. This is explained by a law of behavior: motivation decreases if it is either satisfied or blocked from satisfaction.

The "will to do" is affected by job satisfaction which managers can enhance by making jobs interesting, challenging and bigger, more worthwhile and self-contained. Job enrichment and job enlargement can influence job satisfaction and motivate higher productivity.

The second factor in the role played by the people involved in a productivity drive is effectiveness. Effectiveness is the extent to which the application of human effort brings the desired results in output. It is a function of method, technique, personal skill, knowledge, attitude and aptitude-the "ability to do". The ability to do a productive job can be improved through training and development.

Therefore, the following key approaches, methods and techniques can be used to improve labor productivity: wages and rewards; training; organization development; career planning. (Joseph prokopenko-1987)

2.1.6. Productivity measurement and analyses

International and intersectional productivity comparisons help nations or sectors learn from each other. Central governments, for example, are interested in the level and rate of change of per capita income compared with that of other countries. In designing a national economic plan it is important to consider the background of such comparisons (i.e. the structural situation of industrial productivity for each industry).

In this connection it is useful to point out some of the main sources of productivity variations in comparisons. The most obvious elements to analyze are the volume and composition of the output, the variety of products and the degree of vertical integration in processing; the availability and nature of raw materials and components and their sources; the availability and use of

energy; the volume and composition of labor input; the state of technology; the volume and composition of capital output; the impact of scale of production; the nature and location of markets, impact of tariffs, taxation, ownership, standards and government regulations.

The most significant characteristics of labor input are the number of white – collar and production workers, production work-hours, basic average hourly earnings and salaries, total compensation including overtime and the composition of the labor force, i.e. skilled, semi-skilled and professional workers, their age and turnover. The education and training of the workforce, both blue and white – collar, is of obvious importance as well.

There are many approaches to productivity measurement and analysis in enterprises. This is because different groups of people are concerned with the enterprise (managers, workers, investors, customers, trade unions) and these groups have different goals. Some simple and practical approaches to productivity analysis are:

- measurement of workers' productivity:
- measurement systems for planning and analyzing unit labor requirements;
- measurement systems of labor productivity aimed at the structure of labor resource use;

Value added productivity at the enterprise level.

Normally the method of measurement is determined by the purpose of the productivity analysis. Three of the most common purposes are:

- Comparing and enterprise with its competitors;
- Determining the relative performance of departments and workers;
- Comparing relative benefits of various types of input for collective bargaining and gains sharing.

For example, if and organization's goal at a particular time is to maximize the return on invested capital and to expand its operations, the company should measure its cost and profit structures.

A worker's productivity (Pw) is defined as follows:

$$P = \frac{\text{Out put}}{\text{Input of worker s effort}}$$

There are many different productivity measures. The choice between them depends on the purpose of productivity measurement and, in many instances, on the availability of data. Broadly, productivity measures can be classified as single factor productivity measures (relating a measure of output to a single measure of input) or multifactor productivity measures (relating a measure of output to a bundle of inputs). Another distinction, of particular output to a bundle of inputs). Another distinction, of particular relevance at the industry or firm level is between productivity measures that relate some measure of gross output to one or several inputs and those which use a value – added concept to capture movement of output.

Table 2-1 uses these criteria to enumerate the main productivity measures. The list is incomplete in so far as single productivity measures can also be defined over intermediate inputs and labor–capital multifactor productivity can, in principle, be evaluated on the basis of gross output. These are measures of labor and capital productivity, and multifactor productivity measures (MFP), either in the form of capital – labor MFP, based on a value – added concept of output, or in the form of capital-labor-energy-materials MFP (KLEMS), based on a concept of gross output. Among those measures, value–added based labor productivity is the single most frequently computed productivity statistic, followed by capital – labor MFP and KLEMS MFP. (Measuring Productivity OECD* Manual)

Table 2-1- Overview of main productivity measures

Types of output measure		Type of input	Measure	
	Labor	Capital	Capital and labor	Capital, labor and intermediate inputs (energy, materials, services)
Gross Output	Labor productivity (based on gross output)	Capital productivity (based on gross output)	Capital – labor MFP (based on gross output)	KLEMS multifactor productivity
Value added	Labor productivity (based on value added)	Capital productivity (based on value added)	Capital – labor MFP (based on value added)	
	Single factor productivity measures		Multifactor productivity (MFP) measures	

* -Organization for Economic Co – Operation and Development

These measures are not independent of each other. For example, it is possible to identify various driving forces behind labor productivity growth, one of which is the rate of MFP change. This and other links between productivity measures can be established with the help of the economic theory of production.

Once productivity measures are conceptualized on the basis of economic theory, there are several ways to go about their empirical implementation. From a broad methodological viewpoint, parametric approaches can be distinguished from non – parametric ones. In the first case, econometric techniques are applied to estimate parameters of a production function and so obtain direct measures of productivity growth. In the second case, properties of a production function and results from the economic theory of production are used to identify empirical measures that provide a satisfactory approximation to the unknown "true" and economically defined index number. The growth accounting approach to productivity measurement is a prominent example for non – parametric techniques.

Labor productivity, based on gross output	
Definition	**Quantity index of gross output** **Quantity index of labor input**
Interpretation	Shows the time profile of how productively labor is used to generate gross output. Labor productivity changes reflect the joint influence of changes in capital, intermediate inputs, as well as technical, organizational and efficiency change within and between firms, the influence of economies of scale, varying degrees of capacity utilization and measurement errors. Labor productivity only partially reflects the productivity of labor in terms of the personal capacities of workers or the intensity of their effort. When measured as gross output per unit of labor input, labor productivity growth also depends on how the ratio of intermediate inputs to labor changes. A process of outsourcing, for example, implies substitution of primary factors of production, including labor, for intermediate input. Gross – output based labor productivity rises as a consequence of outsourcing and falls when in – house production replaces purchases of intermediate inputs. Obviously, this does not reflect a change in the individual characteristics of the workforce, nor does it necessarily reflect a shift in technology or efficiency. Although some efficiency gain should be expected as a consequence of input substitution, it cannot be captured by the measured change in labor productivity. MFP measures are required for this purpose.
Purpose	Gross-output based labor productivity traces the labor requirements per unit of (physical) output. It reflects the change in the input coefficient of labor by induct industry and can help in the analysis of labor requirements by industry.

Advantages	Ease of measurement and readability. In particular, the gross – output measure requires only prices indices on gross output, not on intermediate inputs as is the case for the value – added based measure.
Drawbacks and limitations	Labor productivity is a partial productivity measure and reflects the joint influence of a host of factors. It is easily misinterpreted as technical change or as the productivity of the individuals in the labor force.

Labor productivity, based on value added	
Definition	**Quantity index of value added** **Quantity index of labor input**
Interpretation	Shows the time profile of how productivity labor is used to generate value added. Labor productivity changes reflect the joint influence of changes in capital, as well as technical, organizational and efficiency change within and between firms, the influence of economies of scale, varying degrees of capacity utilization and measurement errors. Labor productivity only partially reflects the productivity of labor in terms of the personal capacities of workers or the intensity of their effort.The ratio between output and labor input depends to a large degree on the presence of their input, as mentioned above. In comparison with labor productivity based gross output; the growth rate of value-added productivity is less dependent on any change in the ratio between intermediate input and labor, or the degree of vertical integration. For example, when outsourcing takes place, labor is replaced by intermediate inputs. This leads to a fall in value – added as well as a fall in labor input. The first effect raises measured labor productivity, the second effect reduces it. Thus, value- added based labor productivity measures tend to be less sensitive to processes of substitution between materials plus services and labor than gross – output based measures.
Purpose	Analysis of micro-macro links, such as the industry contribution to economy – wide labor productivity and economic growth. At the aggregate level, value – added based labor productivity forms a direct link to a widely used measure of living standards, income per capita. Productivity translates directly into living standards, by adjusting for changing working hours, unemployment, labor force participation rates and demographic changes. From a policy perspective, value-added based labor productivity is important as a reference statistic in wage bargaining.
Advantages	Ease of measurement and readability
Drawbacks and limitations	Labor productivity is a partial productivity measure and reflects the joint influence of a host of factors. It is easily misinterpreted as technical change or as the productivity of the individuals in the labor force. Also, value – added measures based on a double-deflation procedure with fixed – weight Laspeyres indices suffer from several theoretical and practical drawbacks

The trend exhibited by total productivity indicates the overall performance of an organization. Whether the trend is improving or deteriorating, it is necessary to discover the reason (see figure 2-6).

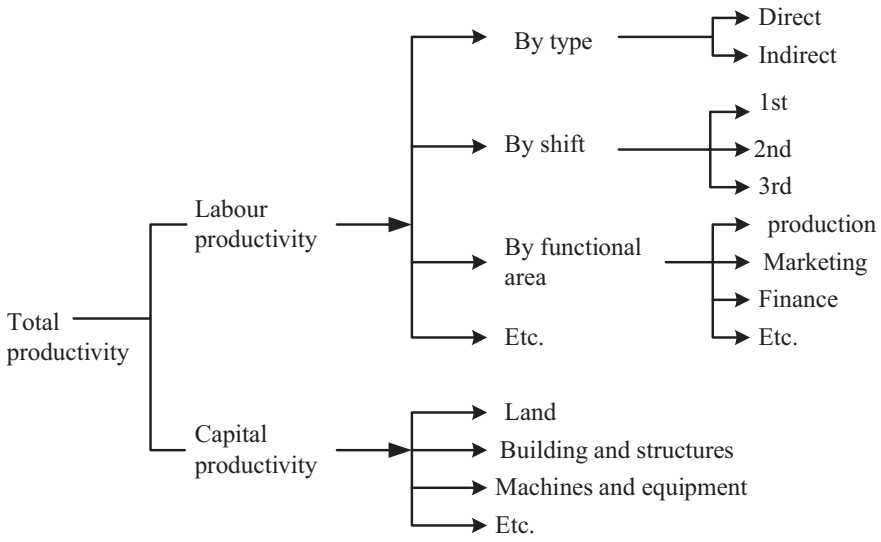
Labor productivity shows how well the labor force has been used. If the trend is decreasing, then this becomes a priority area for improvement. To trend is decreasing, and then this becomes a priority area for improvement. To understand this deterioration in behavior, it is important to look into the secondary labor productivity ratios. For example, pin – pointing the specific type of worker who is contributing to an unprogressive labor productivity trend will greatly help in identifying problems and analyzing causes.

Dividing the organization into functional areas (production, marketing, and finance) can be helpful in locating the source of the problem.

Capital productivity evaluation shows how well available capital is allocated and managed. Whenever capital productivity shows a decreasing trend, the secondary capital productivity ratios must be scrutinized. A decreasing capital productivity trend may be traced to any or a combination of the components of fixed capital.

However, increasing labor productivity may not necessarily mean that workers are more productive; it may be due to new equipment. Studying the relationship of capital to labor by evaluating the trend of capital / labor (C/L) ratios may explain the behavior of labor productivity and capital productivity.

Figure 2-6- Evaluation of productivity trends



An increasing trend in C/l ratios indicates the use of more and more capital goods per labor unit. A decreasing trend indicates the use of more and more manpower resources per capital good.

Figure 2-6 will help to evaluate what is happening within an organization and indicates what should be done to correct the situation.

Thus, the internal components of Quick Productivity Appraisal provide management with a step-by-step approach to productivity measurement that will yield the necessary information for decision – making.

For analyses, inter–firm comparison (IFC) is organized by an external organization or consultant. It is an exchange of information regarding costs, performance, efficiency and other relevant data between firms engaged in similar activities. Firms in the same industry make their data available on a voluntary and confidential basis to other organizations (industrial departments, national productivity centers, consultants, etc). Firms engage in IFC in order to improve their productivity and profitability.

Table 2-2- Capital / labor relationships

Case	IF			THEN	
	Labor productivity	Capital productivity	C/L ratios	What happens	What should be done
1				Good productivity performance	Maintain or increase productivity further
2				Good productivity performance	Maintain or increase productivity further
3				Unfavorable productivity performance	Increase capital productivity
4				Satisfactory productivity performance	Increase labor productivity by: (a): developing/ identifying other jobs for displaced labor; (b) retraining displaced labor for other jobs
5				Poor productivity performance	First, increase capital productivity, then increase labor productivity. Adapt available manpower to machines
6				Satisfactory productivity performance	Increase capital productivity
7				Unfavorable productivity performance	Increase labor productivity
8				Poor productivity performance	First, increase labor productivity, then increase capital productivity

Among the main objectives of IFC the following are the most important:

- To show management how its firm's performance compares with that of similar enterprises;
- To draw management's attention to areas of comparative weakness and strength within the business;
- To give management an objective basis for judging progress and effectiveness.

IFC is a very powerful tool for comparative performance analysis and normally uses the same basic statistics and ratios as conventional productivity measurement.

2.2. Labor productivity

During the last years, the Human Resources (HR) function experienced radical change in its duty status and influence (De Cieri & Kramar, 2005; Grugulis, 2006 et al). Several factors, such as theoretical developments, societal and workforce demographic changes, increasing importance of management strategy, and decline in trade union pressure and economic influences contributed to the rise of HRM as an organizational function (Roger & Wright, 1998; Yeung& Berman, 1997).

HRM recognizes the importance of people in relation to financial and physical resources. Since human resource represents a significant cost to organization, the effectiveness of function can influence the overall success or failure of organization. Indeed, some organizations have failed because of ineffective HR policies.

Today human resource management has a unique and timely opportunity to improve productivity. Increasingly, however, improving productivity does not mean just increasing output. In addition, evaluation ensures that programs are accountable and are meeting the particular needs of employees in a cost – effective manner. This is especially important today, as organizations attempt to cut costs and improve quality in their firms. Without evaluation it is very difficult to show that training was the reason for any improvements. Human resource training may safeguard productivity as well as supporting it, insulating firms from skills shortages by preparing employees for current and future jobs.

Study, conducted by Hewitt Associates, human resources consulting firms, shows the impact of the HR function in both financial and productivity performance. As the table 2-3 show significant gains in productivity and financial performance were realized. The study examined the effect of programs that focus on worker performance .It compared 205 companies with performance management programs to 232 companies without programs. Table I shows results of this study. The companies with these programs posted higher profits, better cash flows, stronger stock market performance and higher stock values. These results show us the importance of human resource development evaluation importance and necessity. While most companies recognize the importance of evaluation, few actually evaluate their training programs.

Table 2-3- The impact of Human Recourse on financial performance

Font	Companies without performance management	Companies with performance management
Financial performance: Return on Equity	4.4%	10.2%
Return on Assets	4.5%	8.0%
Productivity and Sales per Employee	$126,100	&169,900
Income Per Employee	$1,900	$5,700

Source: 'Effective People Management Helps the Bottom line", Personnel Journal, December 1994, p.17.

When evaluating the HR performance it is important to appraise how companies enable the labor to develop its full potential. In doing so, it is important to ask companies to explain their approach and evidence positive results in five categories:

1. HR planning and management:
2. Employee involvement:
3. Employee training and development:

4. Employee performance and recognition:
5. Employee well- being and satisfaction.

In this research we will pay attention to one of these categories – human resource training evaluation aspects.

Organization with easy access to a large enough supply of low cost labor might have little motive to increase productivity. And even those that do want to raise productivity may try to do this simply by work usually hard, cutting jobs and piling extra hours or more workloads on staff.

The challenge to all organization is to compete on the basis of quality and efficiency. This means being responsive to customer needs and innovative in product development to keep a head of the competition. Qualities of products are usually rich in design specification and customization and delivered in a personalized manner. They normally require high investment in technology and make particular use of information and communication technology. But of greatest importance is the contribution of the people who produce or provide them, the knowledge they input and / or the personal contact they bring to delivery.

In a situation where people are essential to increasing the value of products, organizations must switch from managing workers simply as costs to managing them as valuable capital assets. The people contribution is based in part on investment in knowledge and skill to maximum result.

2-2-1-The importance of labor productivity

People are the most important and promising area of productivity improvement. In economic and social development, few things are more important than improving productivity. Since all organizations combine two subsystems, technical and human, these subsystems must be balanced and co-ordinated in order to function effectively. In trying to realize this, decision-makers commonly make three errors:

- Too much energy is spent on measuring, collecting, and reporting data and not enough is left for practical action to improve performance.
- Too much reliance is placed on straightforward solutions such as new technology, incentive schemes, QCs, etc., which are effective techniques if

properly applied but which divert resources in counterproductive ways if they are inappropriate or adopt without commitment.

- For many people, productivity is still synonymous with traditional cost-cutting, or working harder, but not necessarily with a more intelligent approach. This attitude often creates difficult work relationships, drives away the best people, compromises quality, delivery and services, and can compromise future opportunities for the sake of short-term profit improvement.

These and other "technocratic" mistakes lead to situations where the human side of productivity has somehow been left out of the total picture.

After all, equipment and technology is the product of the human mind and can be made productive only by people. The success of any productivity programme depends on human innovative ideas and creativity.

Thus, there is an urgent need to look more closely into the human factor and consider its contribution to the improvement of productivity. Formal analysis of basic productivity factors such as output, input, labor, capital, technology and managerial motivation reveals at once that more than half of these factors are concerned with the quality of the labor force. With deeper insight into other technical factors, we see that their quality is also an integral part of the quality of human input.

Many attempts have been made to define the characteristics of high-quality manpower. Among the qualities most often cited are: a sense of commitment, dedication and loyalty to the organization; achievement orientation; good communication skills; participatory abilities; social commitment; professional skills; and receptiveness to change.

Skills and abilities can be upgraded through proper manpower planning, selection, job placement and rotation, training and development. These are all good management practice and strategy. Finally, opportunities to use manpower resources effectively depend upon sound management of organizational structure and culture, equipment and technology.

Good management, which is responsible for the development and realization of the three main components of human resources, is crucial to the effective use of available manpower. However, the term "management" in this context is not restricted to professional managers. Productivity improvement programmes are successful only if they are established and implemented by the joint efforts of workers, technical staff, managers and

trade unions. In this connection, it is important to consider the following factors in the effective development and use of manpower as the key to productivity improvement. They are:

- The role of management;
- Motivation;
- Participation;
- Training;
- Work organization, working conditions and productivity improvement Techniques at the shop-floor level.

2-2-2-The purpose of Human Resource Development evaluation

Training and development has positive impact for the individual, the organization and the nation (Smith, 1992). Human resource evaluation is defined as "systematic collection of descriptive and judgmental information necessary to make effective training decisions related to the selection , adoption , value, and modification of various instructional activities ″ (DeSimone et al , 2003).This definition makes several important points:

- First, when conducting an evaluation, both descriptive and judgmental information may be collected. And these both are needed in an human resource development (HRD) evaluation. Some of the judgments are made by those involved in the program, and others are made by those not involved in the program.
- Second, evaluation also involves the systematic collection of information according to a predetermined plan or method to ensure that the information is appropriate and useful.
- Finally, evaluation is conducted to help managers, employees, and HRD professionals make informed decisions about particular programs and methods. For example, if part or a program is ineffective, it may need to be changed or discarded. Or, if a certain program valuable, it may be replicated in other parts of the organization.

Evaluation begins with a clear identification of the purpose or results expected from the training programs. By focusing on the purpose and results evaluators are guides to the reasons that the training program has been developed and the changes and improvements in learner performance that should result from training. It would be expected that training programs are

based on important organizational goals and improvement efforts. However, that connection must be directly guiding training efforts if training results are to be linked to organizational measures (Burrow& Berardinelli, 2003).

Evaluation can serve a number of purposes within the organization. According to Philips (1983) evaluation can help to do following:

- Determine whether a program is accomplishing its objectives;
- Identify the strengths and weaknesses of HRD programs;
- Determine the cost- benefit ratio of an HRD program;
- Decide who should participate in future HRD programs;
- Identify which participants benefited the most or least from the program;
- Reinforce major points to be made to the participants;
- Cather data to assist in marketing future programs;
- Determine if the program was appropriate;
- Establish a database to assist management in making decisions.

A model of evaluation outlines the criteria for and focuses of the evaluation effort. Because an HRD program can be examined from a number of perspectives, it is important to specify which perspectives will be considered.

Table 2-4 lists nine frameworks of HRD evaluation that have been suggested by DeSimone et al (2003). By far, the most widely used evaluation approach to date has been the framework laid out by Kirkpatrick (1994) (DeSimone et al, 2003; Elwood 1996).

Table 2-4- Human resource development evaluation models/ frameworks (DeSimone et al.2003)

Model/ framework	Training evaluation criteria
1. Kirkpatrick (1994)	Four levels: Reaction, Learning. Job Behavior and Results
2. CIPP(Galvin, 1993)	Four levels: Context, Input, Process , and Product
3. CIRO (Warr et al., 1970)	Context, Input , Reaction , and outcome
4. Brinkerhoff(1987)	Six stages: Goal Setting, Program Design,

	Program Implementation, Immediate Outcomes , Intermediate or Usage Outcomes , and Impacts and Worth
5. Systems approach (Bushnell.1990)	Four sets of activities: Inputs, Process, Outputs, and Outcomes.
6. Kraiger.Ford & salas (1993)	A classification scheme that specifies three categories of learning outcomes (cognitive, skill- based, affective) suggested by the literature and proposes evaluation measures appropriate for each category of outcomes.
7. Kaufman & keller (1994)	Five levels: Enabling and Reaction, Acquisition, Application, Organizational Outputs, and societal Outcomes.
8. Holton (1996)	Identifies five categories of variables and the relationships among them: secondary influences, Motivation Elements, Environmental Elements, Outcomes , Ability / Enabling Elements
9. Phillips (1996)	Five levels: Reaction and planned Action, Learning, Applied Learning on the Job, Business Results, Return on Investment.

In the human resource department we try to be productive while designing and delivering quality products and services. Total HR programs are designed to improve productivity or performance. Training that is one of the HR program focus on performance improvement. Of course a combined strategy must coordinate all the elements of human resource management.

One of the more important issues to examine is the effect of the training program on the organization's effectiveness. This assessment can be done using a variety of performance indexes, such as productivity and timeliness, but money is the most common language understood by managers in most functional areas of an organization. It is important to demonstrate

effectiveness on the reaction, learning, and job behavior levels, but HR managers and HRD professionals may be at a disadvantage when their results are compared to those of other divisions that are able to express their results on monetary terms.

One of the goals of translating the effects of training into monetary terms is to make clear that the programs are investments and as such will lead to payoffs for the organization in the future. Although many managers and supervisors pay lip service to this idea, they often see training and other HR interventions primarily as costs- exemplified by the fact that HR programs are often the first programs to be cut when financial and economic pressures force the organization to reduce its expenses.

It has been always argued that HR programs are difficult to assess in financial terms, but the evaluation of training costs and utility analysis are two practical option to help the HRD professional determine the financial impact of various programs.

Evaluation of training costs compares the costs incurred in conducting and HRD program to the benefits received by the organization, and can involve two categories of activities: cost – benefit evaluation and cost- effectiveness evaluation. Cost - benefit analysis involves comparing the monetary costs of training to the benefits received in nonmonetary terms, like improvements in attitudes, Safety, and health. Cost- effectiveness analysis focuses on the financial benefits accrued from training, such as increases in quality and profits, and reduction in waste and processing time. (DeSimone et al. 2003).

Modern financial methods (Usry, Hammer, Matz, 1988; Williams, 1994; Ganske, 1996) require very high work input, which is unjustifiable with respect of expediency. The model of cost effectiveness offered by Cullen et al. (1978), can be very helpful in evaluating the costs of training. This model distinguishes between structured and unstructured training, and it lists possible training costs (e.g., the cost of developing the training, materials, time, and production losses) and benefits (improvements in time to reach job competency, job performance, and work attitudes).

Robinson and Robinson (1989) have developed a similar model, dividing training costs into five categories: direct costs, indirect costs, developments costs, overhead costs, and compensation for participants. Direct costs include salaries and benefits for all employees involved in training, including,

trainees, instructors, consultants, and employees who design the program; program material and suppliers; equipment or classroom rentals or purchases; and travel costs. Indirect costs are not related directly to the design, development, or delivery of the training program. They include general office supplies, facilities, equipment, and related expenses; travel and expenses not directly billed to one program; training department management and staff salaries not related to any one program; and administrative and staff support salaries (Noe, 2005). All these training costs are then compared to benefits as measured by improvements in operational indicators, such as job performance, quality, and quantity. Benefits are the value that the company gains from the training program.

Therefore the general strategy for evaluating training costs is to measure cost and benefit indicators in monetary terms and then compare them. For example the return on investment (ROI) is calculated using the program benefits and costs, where the benefit/cost ratio is the program benefits divided by the cost (chmieliveski & Phillips, 2002; DeSimone et al, 2003). In formula from (1), it is:

ROI= Program Benefits/Program costs (1)

The return-on-investment uses the net benefits divided by program costs. The net benefits are the program benefits minus the costs. In formula from (2), the ROI becomes:

ROI (%) = Net program benefits /program costs X 100 (2)

This is the same basic formula used in evaluating other investment where the ROI is traditionally reported as earnings divided by investment.

Usually the greater the ratio of results to costs shows the greater the benefit the organization received by conducting the training program. Many people think that training of any sort will benefit the company. This assumption is just not true (Blanchard & Thacker, 2004). If ratio is less than 100 percent, than the program costs more than it returns to the organization. Such programs either need to be modified or dropped. When a training program is developed without using the training process, disaster usually follows. Such a program is likely to be unrelated to the needs of the company he employee being trained, or both. When training is not designed to address a specific performance improvement opportunity, employees tend to discount its

relevance and few changes will be seen in their performance. Likewise, companies quickly tire of training that cannot demonstrate its incremental value over its cost.

Therefore it should be noted here that the ROI from some programs can be quite high. For example, in many training scenarios, the ROI can be quite large, frequently more than 100 percent, while the ROI value for personnel systems may be lower. Positive benefits that cannot be quantified are referred to as intangible benefits. At times there may be some noneconomic or legally mandated reason to continue a certain training program; even here, however ,if the ROI for this program is negative, some rethinking or reworking of the program is likely in order. (Chmielieski & Phillips, 2002; Desimone et al, 2003). Figure 2-7provides ROI process model according to Chmielewski & Phillips (2002).

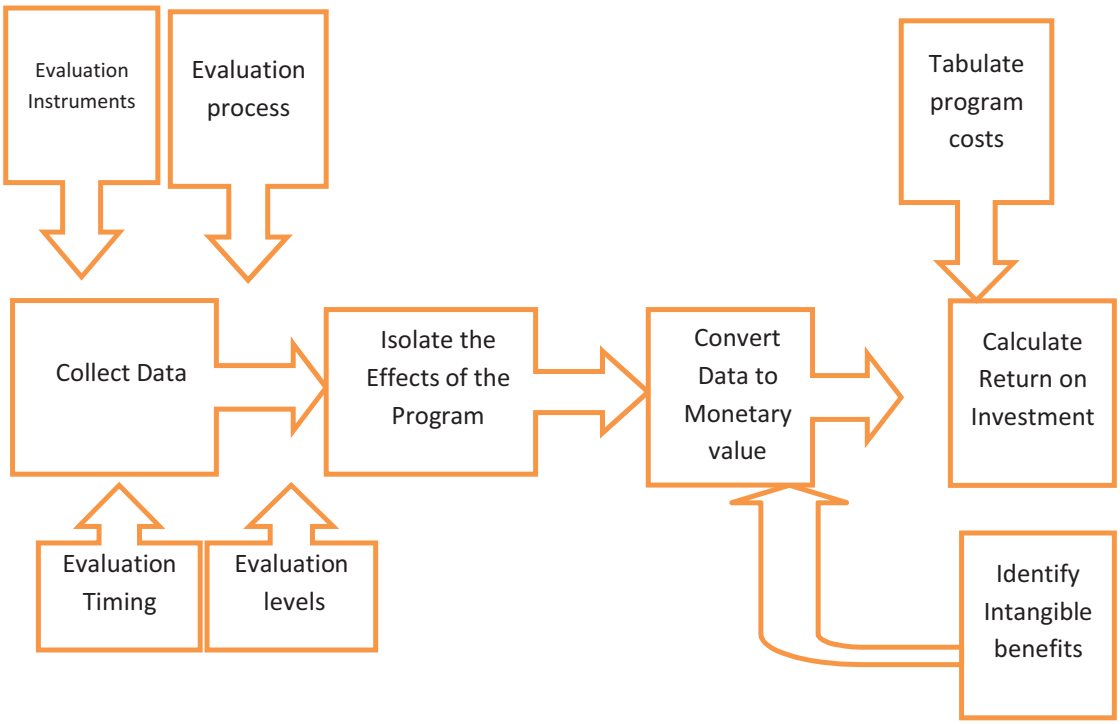


Figure2-7- ROI process Model (according to Chmielewski & Phillips, 2002)

In addition to tangible, monetary benefits, most HR programs will have intangible nonmonetary benefits. The ROI calculation is based on converting

hard and soft monetary values. Traditionally, business people talk about two types of data: hard and soft. Hard data deal with objective, quantifiable factors. Soft data deal with subjective, qualitative factors. Businesses tend to values hard data because they are less equivocal. In contrast, soft data can mean about what anyone wants them to mean.

Phillips (1996) and Fitz-enz (1990) provide some examples of hard and soft data which we can see in Table 2-5. If we look closely, we can see the basic difference between them. Whereas the so-called hard terms are very specific, the soft terms are more general. Businesses run on specific information. So it is very important to collect hard data as much as possible.

Table 2-5- Hard and soft data

Output: • Unites produced • Items assembled or sold • Forms processed • Tasks completed	Work habits: • Employee absenteeism • Tardiness • Visits to the dispensary • Safety- rule violations
Quality: • Scrap • Waste • Rework • Product defects or rejects	Work Climate: • Employee grievances • Employee turnover • Discrimination charges • Job satisfaction
Time: • Equipment downtime • Employee overtime • Time to complete projects • Training time	Feeling / Attitudes: • Employee loyalty • Employee' self- confidence • Employee' perceptions of job responsibilities • Perceived changes in performance
Cost: • Overhead • Variable costs • Accident costs • Sales expenses • Program costs	New Skills: • Decisions made • Problems solved • Conflicts avoided • Frequency in use of new skills
	Development and Advancement

	• Number of promotions or pay increases • Number of training programs attended • Requests for transfer • Performance-appraisal ratings
	Initiative: • Implementation of new idea • Successful completion of projects • Number of employee suggestions

All hard data such as output, quality, and time are easily converted. Chmielewski& Phillips (2002) provide strategies to convert data to monetary values in a ROI evaluation (Table 2-6). It is noted, that it is not very difficult to analyse HR development works, but their performance results, efficiency are expressed more heavily. It is quite difficult to assess them by quantitative indicators (time minutes, quantity units). HR development undoubtedly influences general financial results, however its effect is more expressed not through economical but through social efficiency, in which two main measures are distinguished: work focus and focus on the relations with other people (Hentze, Kammel, Lindert 1997; Witte 1995).

The conversion of soft data is attempted for each data item. However, if the process used for conversion is too subjective or inaccurate, and the resulting values lose credibility in the process, the data are listed as an intangible benefit with the appropriate explanation. Human resource has no choice but to also emphasize hard data.

Other data items are identified which are not converted to monetary values. These intangible benefits include items, such as increased job satisfaction, increased organizational commitment, improved team work, improved customer service, reduced complaints, and reduced conflicts. During data analysis, every attempt is trying to convert all data to monetary values.

Table2-6- Strategies to convert data to monetary values in a ROI evaluation

Unit of data	Type of conversion
Output data	• Data is converted to profit contribution or cost savings; • Output increases are converted to monetary value based on their contribution to profit or cost reduction
Quality data	• The cost of quality is calculated and quality improvements are directly converted to cost savings.
Time data	• For programs where employee time is saved, wages and benefits are used for the value of time: • Since many programs focus on improving the time required to complete projects, processes , or daily activities , the value of time is important to consider
Organizational cost data	• Historical costs and current records are used when available for a specific variable. • Organizational cost data are utilized to establish the specific value of an improvement.
Estimate of value	• When available , internal and external experts may be used to estimate a value for an improvement; • The credibility of the estimate hinges on the expertise and reputation of the individual
Estimate of costs	• External databases are sometimes available to estimate the value or cost of data items. • Government, industry, and research databases can provide important information for these values.

For some programs, intangible, nonmonetary benefits are extremely valuable, often carrying as much influence as the hard data items. This held particularly true in the government system, which for years was not responsible for accountability. Now, the old way of doing business has been replaced with accountability. Thus, although intangible benefits may be extremely important it is often difficult to use only intangible benefits as justification for a program. Since intangible benefits are subjective, they are

often jeopardized by different interpretations. In these cases, ROI analysis provides objective data that is far more impenetrable to criticism.

Through the two focuses the fluctuations defined by individual factors are expressed. This precludes evaluating of benefit created by HR development. In addition the reform going in the world and the country changes values priorities, forms and distributes new orientations, forms new needs and new possibilities for their meeting , this even more impede reliable forecast of the expected activity results , and this in its turn affects evaluation of HR development (Kumpikaite , Sakalas, 2005).

Traditional and modern financial methods of efficiency evaluation are difficult applicable in the field of HR development evaluation to evaluate soft data, they require very high labor costs, which are unjustifiable with respect of expediency. They can be used as auxiliary dimension, when evaluating HR maintenance of training results etc. It is stated that financial methods, therefore the most attention should be paid to the soft data and qualitative evaluation methods.

Conclusions

- The human resource management and its function, however defines value in both human and financial terms. It cares about people and profitability , and it talk about human , production, and financial values in two ways: quantitatively and qualitatively
- Human resource development assessment can be done by evaluating training costs using cost- benefit or cost – effectiveness analysis or by translating a trained employee's productivity into monetary terms through utility analysis.
- Human resource development benefits can be tangible and intangible getting from hard and soft data. Financial methods in the field of the HRD evaluation are difficult applicable to soft data and therefore much more attention should be paid to qualitative evaluation methods.
- The important point is that ROI calculations can be developed reliably and accurately for almost any type of HR program. To do so, the ROI process must be approached with careful planning, methodological procedures, as well as logical and practical analyses.

2.2.3. The measurement of labor productivity

At the national level, human resource productivity is computed by taking the entire economically active population as the input and the total value of goods and services produced as the output.

$$\text{National labor productivity} = \frac{\qquad}{\qquad}$$

Also at the national level, or at the sectoral level, labor productivity is often measured in terms of physical output per work-hour. However, this measure is generally unsatisfactory because the amount of work required to produce a unit of output varies for different products. For this reason, labor-time methods of measurement (hour, day or year) are better. Here, output is converted into "units of work", which are commonly defined as the amount of work that can be performed in one hour by a qualified worker working at standard performance.

However, labor is only one input and comparing the value of output only to the value of labor obscures the relative efficiency with which other factors of production are used. For example, the results of a poor investment policy in capital equipment could, in productivity figures, appear as deterioration in the quality of labor. Using the number of paid work-hours to measure labor input at the national level masks the economy-wide inefficiency caused by unemployment, because unemployed workers simply drop out of sight in the productivity equation. Also unused resources in enterprises reduce productivity but the decline would not be apparent in calculations that divided output by paid hours of work only.

Thus, a more useful way of measuring national labor productivity is to divide output by "hours potentially workable" in order to take account of labor wasted by unemployment.

Total productivity and the profit/total investment index seem to be the most appropriate approaches to measuring the productivity of the manufacturing sector. Using the total productivity approach, two measures of output are normally adopted: total production and gross value added. The first is defined as the sum of producers' shipments and net inventory stock changes; the second is the difference between total production and intermediate input. Capital input is measured in terms of gross capital stock for which no adjustment is made. For labor input, the number of workers is taken as basic

information. Average annual cash earnings and hours worked are taken from the sectored statistics. The relative share of labor can be derived from the ratio of annual cash earnings to gross value added at constant prices and capital. To calculate total factor productivity, labor input is measured in two ways: number of employed persons and work-hours.

The total factor productivity index is defined as:

$$Pt = \frac{Vt}{It}$$

Where V_t and I_t are total output and total input indices respectively.

It is very important in manufacturing industries to measure the productivity of indirect labor. For example, the productivity of materials handlers or maintenance men may be measured by the equation:

$$\text{Productivity index} = \frac{\qquad\qquad}{\qquad\qquad}$$

The basic difficulty of productivity measurement for services and office work lies measuring output, and in reducing various types of output to one common denominator. Revenue generated per work-day may be a more suitable and goal-oriented measure for any service industry. In financial terms, this might be the volume of services sold and input costs; in time terms it might be work measurement time standard. The financial method of calculating can be introduced using a common costing system; the labor – time method through applying clerical work measurement.

The daily output of an administrative office can be counted in terms of letters answered, persons interviewed, pages typed, forms field, and so on. The time spent on each activity can be measured with work-sampling techniques. The most appropriate measure may be the percentage of time spent by each person on useful and desirable activities. [Joseph prokopenko 1987].

$$\text{Labour productivity(a)} \quad \frac{\text{Value added}}{\text{Total work} - \text{hours worked}}$$

$$\text{Labour productivity(b)} \quad \frac{\text{Value added}}{\text{Number of workers}}$$

$$\text{Labour productivity(a)} \quad \frac{\text{Total production}}{\text{Total work} - \text{hours worked}}$$

Labour productivity(b) $\frac{\text{Total production}}{\text{Number of workers}}$

(a) by type of worker: $\frac{\text{Total production or Value added}}{\text{Number of direct workers}}$

Example : $\frac{\text{Total production or Value added}}{\text{Number of indirect workers}}$

(b) By shift: $\frac{\text{Total production or Value added}}{\text{Number of hours worked on irst shift}}$

Example : $\frac{\text{Total production or Value added}}{\text{Number of hours worked on second shift}}$

(c) By functional area: $\frac{\text{Total production or Value added}}{\text{Salaries and wages of production department}}$

Example : $\frac{\text{Total production or Value added}}{\text{Salaries and wages of inance department}}$

Productivity measurement ratios (PMR) are based on the structure of work – hours given in figure 2-8 (opposite).

Thus, the ratio system is devised as follows:

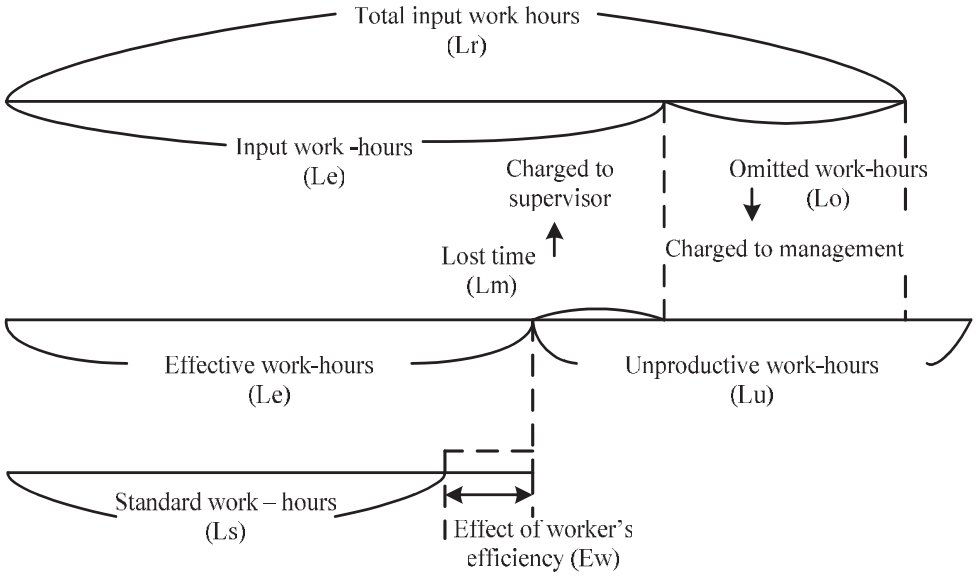
$$\pi r = Ew \times le(1) \times le(2)$$

$$\frac{Ls}{Lr} = \frac{Ls}{Le} \times \frac{Le}{Lr} \times \frac{Lr}{Lr}$$

$$" = \text{—}$$

Where Ls = standard work – hours (quantity produced × standard time)
Lr = total input work-hours (number of workers on payroll × duty hours)

Figure 2-8- Structure of work – hours



Le = effective work – hours

Lr = Lr' + Lo

Lr' = Le + Lm

Lr' = input work – hours

Lo = work – hours omitted from this account such as work – breaks, mealtimes, cleaning and maintenance time, transport time

Lm = lost time due to supervisor or management such as breakdown and repair, shortage or defects of materials or parts, last- minute assignment to another task

Le (1) = ratio of effective work – hours to input work – hours

Le (2) = ratio of input work – hours to total input work hours

$\pi''r = \frac{}{}$: Process efficiency

$\pi r =$ Overall efficiency of labor

Ew = Worker efficiency.

Then the meaning of the above equation is as follows:

Overall efficiency of labor = worker's efficiency ×ratio of effective Work – hours × ratio of input work – hours = process efficiency × ratio of input work - hours

A simpler and more practical system could be reduced from the following expression:

$$\pi r = Ew \times le$$

$$\frac{Ls}{Lr} = \frac{Ls}{Le} \times \frac{Le}{Lr}$$

Where le = ratio of effective work – hours to total input work – hours. The report sheet used for this system is given in table 2-7.

Table2-7-Monthly productivity report for shop "x"

Crew	Standard Work Hours Ls (1)	Total input work Hours LR (2)	Input Work Hours LR' (3)	Omitted Work Hours LO (4)	Lost Time LM (5)	Effective Work Hours LE (6)	Worker's Efficiency = — (1)/(6) (7)	Ratio of Effective Work Hours ( ) = — (6)/(3) (8)	Process Efficiency = — (7)×(8) (9)	Ratio of input Work - Hours ( ) = — (3)/(2) (10)	Overall Efficiency of Labor ' = — (9)×(10) (11)	Standard Productivity = — (12)	Overall Labor Productivity = — (11)×(12) (13)
1													
2													
3													
. . . .													

The most important thing is to use or design measures that reflect on the performance of people or that reflect on how the performance of people relates to that of the business. After all, that is what you are concerned with demonstrating and that is what you will focus on managing in order to improve the performance of both your people and your business. Therefore you should approach measuring human resource productivity by considering 3 different types of measures :(Rob Urquhart-2010)

›› Input measures: these consider what it is that you put in to applying your human resources/ people for productive use, and how you structure your human resource input. So for example typical input measures might include your investment in training (because you are investing in your input thereby

seeking to achieve more productive use of it), remuneration (because it is a direct measure of the cost of your input and you want to be able to see that you are getting a return from that investment), and mix of staffing (e.g. mix of professional/sales/labor staff because this will impact on how your human resources are structured to perform in the business).

›› Output measures: these describe the outputs attributable to your human resources and should therefore always reflect people as a variable in the measure (for example profit per employee). Output measures can be considered in two ways. Firstly, in relation to actual goods and services produced (for example number of clients serviced per employee or number of units produced per employee), and secondly by considering people relative to key financial performance areas (for example profit per employee, revenue per employee). This is a very useful technique; it immediately focuses attention on human resource productivity by considering the relationship between key financial performance variables and people (for example profit per employee looks at the amount of profit generated per employee).

›› Outcome measures: these aren't the same as output measures. Human resources aren't simply inputs that when applied produce outputs. Human resources interact and respond to what they are required to do, how they do it, and how they are managed. Therefore outcomes measures consider how people respond. The resignation rate (number of employees who voluntarily leave the organization) is a good example of an outcome measure: it describes a response of human resources to a set of conditions that may be internal to the company (example dissatisfaction with working conditions) or external to the company (example higher remuneration elsewhere).

2.3. Training

The education and training of the labor in the industry requires the involvement of the entire organization, not just a training department; if training is to be effective in improving the performance and profitability of our organizations. Effective training uses an instructional systems design process and operates as a high performance work team in partnership with the rest of the organization.

Learning is a process of gaining knowledge, skills, or attitudes through formal or informal means. Education is a process involving others as facilitators of learning. These others may be subject matter experts, instructional designers, or deliverers of instruction. Training is a learning process directly tied to specific situational results. In the case of training, the focus is usually based on improving individual and group behavior and performance, and on results to the organization. (Rouda and Kusy- 1996).

Beginning with the end in mind, let's examine the results desired from training. Kirkpatrick classifies these outcomes into four categories:

1- Reaction- evaluates the training program itself (are the trainees satisfied?).
2- Learning – focuses on changes in the participants as a result of the training (have skills, knowledge, or attitudes changed as a result of the training?).
3- Behavior or performance- deals with the transfer of the learning to the job or organization (are the results of the training being applied?).
4- Outcomes or results- is the impact of the training on the productivity and profitability of the organization. While education tends to focus on the first two of these, training should be evaluated by the last two – on the transfer of learning to the success of the organization.

To insure that training is delivered effectively and efficiently, a process of instructional systems design should be implemented as a planned process for the assessment, design, development, implementation and evaluation of training. This approach starts with an assessment of the needs of the organization, which may include surveying, identifying and prioritizing mill training needs, analyzing the causes of performance problems and opportunities, and identifying possible solutions. It is imperative to determine if training is the appropriate solution, and if it will be cost- effective.

Developing training should include analyses of the characteristics of the learners, the setting in which the work will be performed, and the tasks and duties which the trainees will be expected to perform. A complete review of the subject matter (and subject matter experts) is also necessary. Goals and performance objectives must be set, and a plan to evaluate the training should be developed. Instructional materials and strategies must be acquired, prepared, and pre-tested.

The implementation of training includes the preparation of mill workers and others to be trainers and subject matter experts. The training process itself must be managed and evaluated.

2.3.1. The importance and necessity of training

Nearly everyone who has worked has attended a training program. Training is a planned effort by a company to help employees learn job-related knowledge, skills, and attitudes (Goldstein and Ford 2001). The vast majority of companies offer training programs, and they come in many shapes and sizes: large group lectures given by an expert; on- the-job training delivered by a supervisor; simulations guided by a computer program; small- group projects coordinated by an executive; or online discussions with colleagues from around the country. The common element that defines training is that employees go through a structured experience that helps them to learn something they can use to improve their performance at work.

We usually equate learning with being in school. For example, when we were younger and in primary school, we gained knowledge, which includes facts and principles of all kinds. We gained skills, which allow us to perform tasks like throwing a ball, using computers, and solving geometry problems. We also developed new attitudes, such as (hopefully) the belief that school is both fun and beneficial. When our experiences change our knowledge, skills, or attitudes, we call it learning. Learning, then, is a change in what we know, what we can do, or what we believe that occurs because of experience. (Stewart and Brown -2009).

Of course, the truth is that we don’t just learn in school, nor do we ever stop learning. We learn all the time in and out of classes, and we continue to learn throughout our lives. When we start a new job, we must learn about the industry, the company, and the day- to-day details of the position. To add to this challenge, companies and the jobs in them change over time. A company

will get a new computer system, people will quit and new people will join and products and services will be modified to meet changing customer demands. Most changes require that employees learn something new. So every job requires not only some learning to get started but also continued learning to avoid falling behind.

Most organizations, regardless of size and industry, offer at least some formal training to help employees learn. In a manufacturing setting, for instance, new employees can receive training on how to operate their equipment safely and effectively. Employees can learn in other, less formal ways, such as by watching others, asking for help, experimenting, or studying on their own. These informal methods can be effective and inexpensive, so some firms rely heavily on informal learning. Small firms, in particular, often expect their employee to learn informally.

While informal learning methods can work, they are not always appropriate. What if new employees at an automotive parts manufacturing facility were asked to learn all about metal stamping on their own? This process involves using large and dangerous equipment to shape metal products such as pipes. If an employee were injured because the company had not prepared him to use the equipment, then the company could be held liable for the injury. Formal training is also useful because it ensures that everyone learns the same thing, such as the most efficient way to perform a task.

Training, when designed and delivered properly, can improve the overall effectiveness of an organization in three ways (Tharenou 2006). First, it can boost employees' commitment and motivation. Opportunities to learn new skills are important in today's economy, so employees appreciate learning opportunities offered by training. As a result, companies those offer more training foster employee commitment. To be more precise, organizations that offer employees opportunities to learn and grow are seen as having employees' best interests at heart, and as a result, employees feel more committed to the organizations. Employee commitment can benefit an organization by increasing retention of high –performing employees.

Second, training helps employees perform their work more effectively and efficiently, so the organization is able to function better on a day-to-day basis. If you've ever been to a grocery store where the cashier had not been trained

to use the cash register efficiently, then you've been a victim of poor training (or, if you were really unlucky, it might have been a combination of poor employee selection and poor training). Research is very clear on this point-employees who receive training know more and are able to do more than employees who do not receive training (Arthur, Bennett, Edens, and Bell 2003).

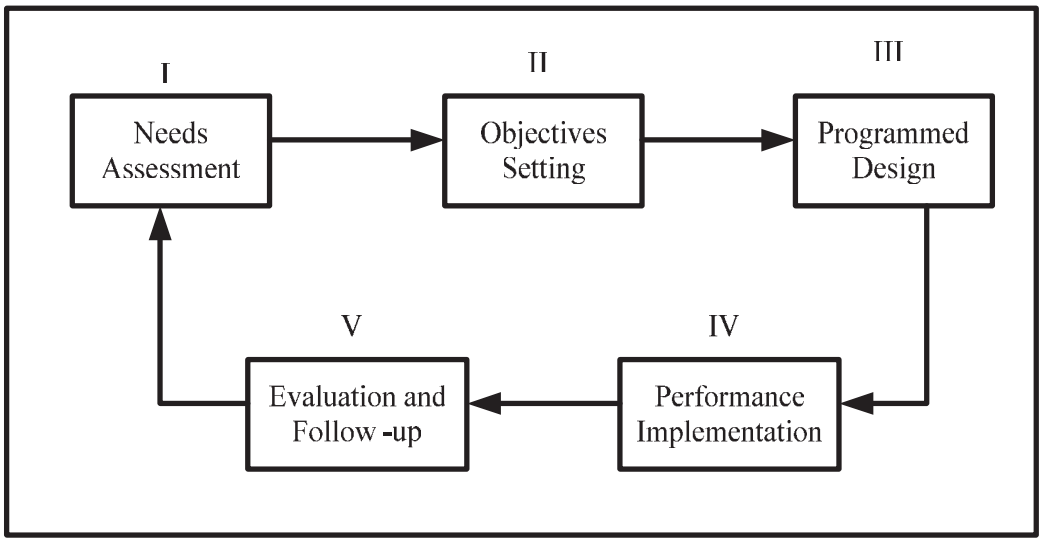
These first two benefits should come as no surprise given research findings about the commitment HR strategy. Providing employees with formal training is a key element of commitment-based HR .Furthermore, providing training adds value on top of that provided by other HR practices. All other things being equal, providing training to a larger percentage of a company's workforce will increase that company's overall productivity (Zwick 2006). Employees who are trained are more likely to be committed to the organization and have higher levels of knowledge and skill. As a result, they are better Individual performers, and this helps the organization to be more productive.

The third way in which training benefits organizations is by helping them to meet their strategic objectives. It does so by providing employees with the specific knowledge, skills, and attitudes necessary to make strategic initiatives a reality. In other words, by making effective decisions regarding training, companies ensure that the right people have the right skills for achieving the competitive advantage sought by the strategy.

2.3.2. The training objectives and process

The People Development Cycle (PDC) is include the five main activities that illustrated in figure 2.9, Only the completion of the whole cycle will make it possible to verify every activity was correct, and if it directed all subsequent activities in the PDC to desired results in a meaningful way.

Figure 2-9- Model of the PDC



This model to describe the system approach to the PDC. Needs assessment is the first stage. In principle, needs assessment ought to be completed before defining training and development objectives. Training needs should be shown separately from non – training needs, but non – training measures that are conditions of efficient learning and application of results ought to be pointed out at this stage.

Objective setting is the second stage. There may be valid reasons for certain differences between the needs that were identified and the training objectives that can be approved. The objective setting stages starts to shape the programme and course design and provides essential data for choosing both programme content and methods, and deciding on organization and resources.

Objectives set a baseline for comparing the intermediate and final programme results with what was planned to be achieved. Even if interesting data are collected in evaluating the programme, without comparing results to objectives it will be impossible to assess overall effectiveness and efficiency.

The objectives to be achieved can be defined in qualitative and/or quantitative terms. An objective of improving the organizational climate is qualitative. To determine whether such a result has been achieved will be a rather complex task. An objective of reducing from 20 to 12 the number of consumer complaints received per month is quantitative, very specific and easily controllable.

Programme design is the third block. It determines the technical content, outline, sequence and detailed scheduling of the actual training and development events that are envisaged. Appropriate methodology and organization is chosen in harmony with the content to be covered, bearing in mind objectives, resources, and the actual possibilities and working and learning styles of the people for whom the programme is intended.

Programme implementation is the fourth block. If the design was correct, implementation should be smooth and on schedule. However, the more complex and longer the programme, the greater the need for adjustment, during implementation, to changed conditions and demands. Figure 2-10 shows the training process in other way with stress on training measurement.

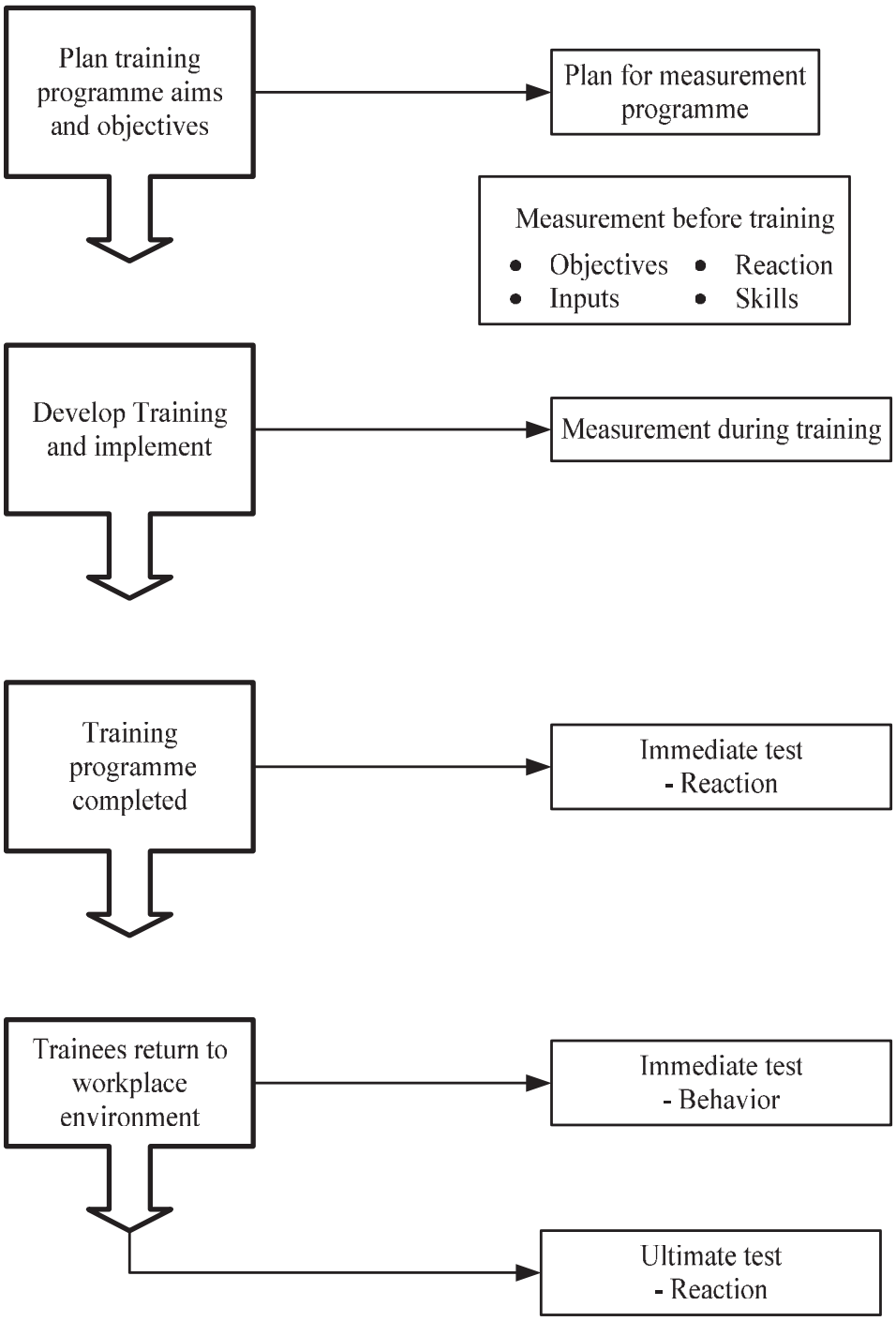


Figure 2-10-Training programme measurement model – Carles Tennant, Mahitborn Boonkrong, Paul A.B. Roberts 2002 – Journal of European Industrial Training

Let's consider how training efforts should be aligned with the cost and differentiation strategies. A cost leadership strategy, including both the Bargain Laborer and Loyal Soldier strategies, requires that employees have knowledge, skills, and attitudes that help reduce costs and improve efficiency. For example, a local restaurant that is trying to compete based on low-cost menu items must have employees who know how to do their work efficiently with little waste. In other words, they must have the knowledge and skill needed to prepare and serve food quickly. Employees should also believe in efficiency and cost reduction and have a positive attitude toward working quickly. As a result, training for employees at this restaurant should not only build knowledge and skill so employees can work quickly without creating waste, it should also convince employees It is important to do so. The efforts of this small restaurant are, on a much larger scale, what companies like Motorola, General Electric, and Samsung Electronics are trying to accomplish with training programs designed to measure and improve quality. By training their employees on quality control principles and practices, these companies have been able to become more efficient, thereby reducing costs and increasing profits (Snee and Hoerl 2003).(see figure 2-11)

Labor Orientation			
	External	**Bargain laborer** External/cost HR strategy More emphasis on hiring new employees with desired skills than on training existing employees Training focuses on reducing costs and improving efficiency	**Free Agent** External /Differentiation HR strategy More emphasis on hiring new employees with desired skills than on training existing employees Training focuses on providing superior service, innovation
	Internal	**Loyal Soldier** Internal/cost HR Strategy Emphasis on training existing employees Training focuses on reducing costs and improving efficiency	**Committed Expert** Internal/ Differentiation HR Strategy Emphasis on training existing employees Training focuses on providing superior service, innovation
	Cost Leadership		Differentiation
Strategic Direction			

Figure 2-11-Strategic framework for Employee Training.

A differentiation strategy, including, both Free Agent and Committed Expert strategies, requires that employees be able to deliver services or make products that are superior to the services or products offered by competitors. For example, consider a different local restaurant that is trying to compete based on excellent service. This restaurant will train its employees to impress customers by being considerate, friendly, and prompt. The efforts of this restaurant are similar to the efforts of companies like Nordstrom, Disney, and Ritz-Carlton. These companies provide training on how to offer high-quality service. Of course, customer service is not the only way that companies differentiate themselves. Another way is through innovation. With this type of differentiation, teamwork training is a useful way to help employees share knowledge and build creative products. Apple, 3M, Coach, and General Mills are examples of companies that pursue this type of differentiation strategy. As illustrated in the "Building Strength Thorough HR" feature, these companies train employees in collaboration and creativity (Stewart and Brown-2009).

Training efforts must also be aligned with the relative emphasis the organization places on internal versus external labor orientations. As you know, a company with an internal labor orientation seeks to make its own talent, whereas a company with an external labor orientation seeks to buy talent that is already developed. These different orientations clearly influence how much time and money a company will spend on training. Companies with an internal labor orientation are willing to spend time and money to train current employees, while companies with an external orientation tend instead to hire new employees to fill their needs.

For example, consider a company with an internal labor orientation that discovers managers are not following appropriate labor laws in their recruiting and hiring. With an internal labor orientation, the company is likely to see this as a knowledge deficit that should be addressed by training managers on these laws. An alternative approach, and one that might be adopted by a company with an external labor orientation, would be to centralize employee selection and hire a labor attorney to coordinate processes and enforce compliance with laws. Do companies with external labor orientations skip training altogether? The answer is clearly no. In such companies, training programs are still offered for a variety of reasons, particularly to help employees learn company- specific knowledge and skills.

However, in such firms, HR management must find ways to keep training costs low. One way to do this is to purchase a training course that has already been designed. HR management first should verify that the course is relevant to their organization and potential trainees. If the material is relevant, then purchasing an existing program can be dramatically less expensive than developing a program from scratch.

Three benefits an organization can gain form training its employees: training can increase employees' commitment and motivation, it can enable them to perform better, and it can help the organization to meet its strategic objectives. To achieve these three benefits, training must result not only in learning but also in transfer of training. Transfer of training occurs when trainees apply what they have learned in training to their jobs (Broad and Newstrom 1992). For transfer to happen, employees must first remember what they learned. For example, if a trainer shows a new employee the steps involved in using a piece of manufacturing equipment, the employee must remember those steps after training is complete. Moreover, the employee must actually use those steps back on the job.

Transfer is more complicated than it sounds, and there is considerable evidence that many training program get employees to learn but not to transfer (Tracey, Tannenbaum and Kavanagh 1995). In other words, employees seem to understand the training material, but they do not change their behavior on the job. When this happens, investments in training are essentially wasted.

How can training be designed to encourage learning and transfer? Two fundamental practices will help human resource professionals to meet this goal? (1) Managers, employees, and HR professionals must work in partnership and (2) Organization must use a systematic process for designing and developing training (Stewart and Brown 2009).

The first fundamental practice for ensuring learning and transfer is to operate training as a partnership among employees, their managers, and human resource professionals. A partnership between HR professionals and employees is critical because these professionals cannot determine employees' knowledge and skill levels without their help. In addition, without the support of management, HR professionals are unlikely to be able to change the actual behavior of employees on the job. For example , if

managers do not want employees to take the time to work on cost-cutting and quality-control projects, then training employees in how to run these projects is unlikely to change how the employees do their work and even less likely to improve the organization's bottom line.

Another way to think about the need for partnership is to consider that employee performance is determined by many factors that are not under the direct control of a human resource department. Table 2-8 lists six factors that are commonly considered to have a powerful influence on job performance.

The first four are primarily the responsibility of the employees' manager. First, managers must set clear expectations about what employees should and should not do on the job. Second, managers must provide necessary support in the form of equipment, supplies, and other resources. Third, managers must provide useful feedback indicating whether employees are exceeding, meeting, or failing to meet expectations. The feedback must also guide employees toward better performance. Fourth, managers must set appropriate consequences, which means rewarding effective performance and, if necessary, punishing ineffective performance. The fifth and sixth factors, individual capacity and required knowledge and skill, are the only two factors that human resource professionals have much control over. Ineffective performance on the part of any one employee, then, may be largely a function of a manager's failure to ensure that one or more of these factors are in place.

Table2-8-Factors Affecting Job Performance with Responsible Stakeholders	
Factor	**Stakeholder**
1. Clear Expectations	Manager
2. Necessary Support	Manager
3. Useful feedback	Manager
4. Appropriate Consequences	Manager
5. Individual capacity	Manager and HR professional
6. Required knowledge and skill	Manager and HR professional

Source: Information from Geary A. Rummler and Alan p. Brache, Improving performance: How to Manage the White Space on the Organization Chart, 2nd ed. (San Francisco: Jossey-Bass, 1995).

HR professionals can influence employees' job performance by working with managers to ensure that employees have the individual capacity (generally through selection) and the required knowledge and skill (generally through training) to do the job. So the human resource function does play an important role, but even in this role, there must be a partnership. If what human resource professionals offer as training seems worthless to managers, they will tell their employees so and will tell employees how things should "really be done".

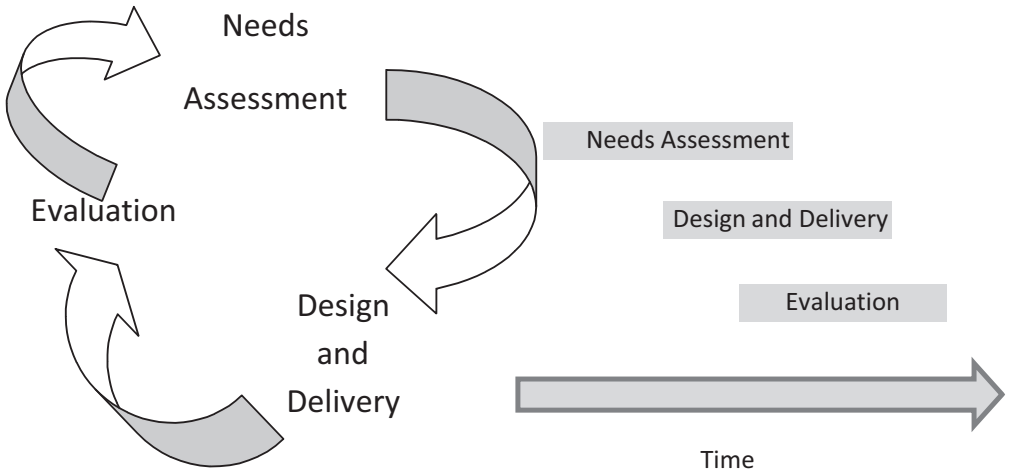
The second fundamental element in ensuring learning and transfer is to develop training systematically. There are many possible ways to develop training, but almost all have three fundamental components :(Goldstein and Ford 2001)

1. Needs assessment to determine who should be trained and what the training should include.
2. Design and delivery to ensure that training maximizes learning and transfer.
3. Evaluation to determine how training can be improved, whether it worked as intended, and whether it should be continued.

Two different forms of this three- component process are diagrammed in Figure 2-12 Part (a) depicts a circular process. This is the traditional model of instructional design, and it suggests beginning whit a needs assessment that is followed by design and delivery and then by evaluation. Of course, the process is never complete because training needs are always changing, so after evolution there is another needs assessment.

Part b of the figure shows the rapid model of instructional design. Organizations may use this version of the process when they need to speed up the time from identified need to delivery of training. In the rapid model, training design begins while the needs assessment continues, as indicated by the overlap in the bars. Just as important, training begins before the program design is completely finished, and evaluation is used to modify the training as it is developed.

Whether the traditional or rapid model is appropriate depends on the nature of the training being developed. Training that must be right the first Time – either because there is only one opportunity to train particular employees



(a)Traditional Model of Instructional Design (b) Rapid Model of Instructional Design

Figure 2-12- Two processes for Designing Training Programs.

or because the cost of employees doing the wrong thing is too high- should not use the rapid model. For example, training for employees who operate expensive and dangerous equipment (airplanes, cranes, bulldozers, and tanks, for example) should not be delivered to trainees unless it has been examined

in great detail for accuracy and safety. Product training for retail sales employees, in contrast, could be delivered before it was perfected, and this would ensure that employees had at least some knowledge of new products as they arrived.

2.3.3. The Training Methods and Types

The various ways of organizing content and encouraging trainees to learn are referred to as training methods**.** Training methods vary in terms of how active the learner is during training. More passive methods can be useful, but they should seldom be used without the addition of at least one more active method.

Methods should be selected primarily based on their usefulness in helping achieve the training program's objectives. Table 2-9 provides a summary of which training methods are generally suited to which training objectives, along with the relative costs of the methods. (Stewart and Brown -2009). The table also indicates whether transfer of training is likely based simply on the nature of the method. These factors, along with preferences of the instructor and of trainees, should all be considered when selecting the training method for a particular program. Methods that actually help to stimulate transfer are discussed later.

Table 2-9- Characteristics of various Training Methods

Method	Training objective			Costs		Likelihood of Transfer
	Knowledge	Skill	Attitude	Development	Administration	
Presentation	Yes	NO	NO	low	low	Low
Discussion	Maybe	Yes	Yes	low	low	Low
Case study	Maybe	Yes	Maybe	Medium	low	Medium
Discovery	NO	Yes	Maybe	Medium	Medium	Medium
Role play	NO	Yes	Yes	Medium	Medium	High

Simulation	Yes	Yes	Maybe	High	Medium	High
Behavior	NO	Yes	No	High	High	High
Modeling						

Source: Adapted from Alan M. Saks and Robert R. Haccoun Managing Performance through Training and Development, 3 rd ed. (Ontario, Canada: Nelson, 2004), p. 162

Presentation

Presentation is the primary passive method of instruction. A presentation involves providing content directly to learners in a non interactive fashion. It is a passive method because learners do little other than read or listen and (hopefully) make sense of the material. The most common type of presentation is a lecture given by an instructor. Lectures have a bad reputation, but research suggests that people can and do learn from them. Lectures are an efficient way for many learners to receive the same content and gain the same knowledge. This means that presentation can be useful when the learning objective of training is for trainees to gain knowledge, such as an understanding product features. A disadvantage of presentations is that learners are not given any formal opportunity to test or apply what they are learning. For this reason, presentations seldom help trainees gain skills.

Presentations can include various types of information. Some presentations include only verbal information (words), but others also include auditory information (sounds), static visual information (pictures), and dynamic visual information (animation). Presentations can be made more interesting with the addition of these other types of information, but the additional information should complement rather than distract from the verbal information being conveyed. Trainees can be overwhelmed or confused if confronted with too much information (Clark and Mayer 2003).

To avoid the problem of presenting too much information at once, companies may break training into several units. For example, to prepare its employees for the General Securities Representative Exam (seies7), Merrill Lynch has a course that combines written text is offered in a series of specially prepared booklets that present information in short paragraphs and

use bold print for key concepts. Breaking down material in this way helps to ensure that trainees can learn without being overwhelmed.

Presentation can help employees learn even more if they are combined with active methods. You have probably experienced this in school. Listening to a lecture may help you learn a fact or two, but without an opportunity to do something with that knowledge, you forget it. Given an opportunity to do something, trainees learn more.

Discussions

Discussions represent a more active training method. Discussions increase trainees' involvement by allowing for two-way communication between trainer and trainees and among trainees. Discussion can help trainees to accomplish several things (Zander 1994):

- Recognize what they do not know but should know.
- Get their questions answered.
- Get advice on matters of concern to them.
- Share ideas and develop a common perspective.
- Learn about one another as people.

Discussions can be used to build knowledge and critical – thinking skills, but they are best used to help improve motivation and change attitudes. Discussions must be facilitated by a trainer in order to allow everyone an opportunity to participate. With larger audiences, discussions often do not work well because not everyone has a chance to contribute.

Case study

Case analysis is an active training method in which trainees discuss, analyze, and solve problems based on real or hypothetical situations. Cases can be used to help teach basic principles and to improve motivation and change attitudes. Generally, however, the primary objective is to develop skill in analysis, communication, and problem solving. Cases vary in length and complexity. Although long, complex cases are often used in business schools, trainers in businesses shy away from them, preferring to use shorter cases.

Discovery

Discovery is an active method that involves presenting trainees with a task that offers rich opportunities to learn new skills. For example, employees might be given access to a new computer program and asked to figure out for themselves how to do their work tasks using the program. Although this method may sound more like learning by experimentation than training, discovery can be structured so that skills needed for job performance are available to be learned. In effect, discovery is experimentation in a controlled training environment.

Discovery can be highly motivating for trainees, but it has serious drawbacks. Without any guidance from the instructor, it is highly inefficient and can result in people learning the wrong things. A more efficient approach is discovery coupled with guidance, where the instructor is more active in asking questions and providing hints that help learners while they explore. Appropriate guidance can help motivate trainees and ensure that they learn the best way to perform the task (Debowski, Wood and Bandura 2001).

Role play

When trainees engage in role playing, each participant acts out a part in a simulated situation. This active method offers an opportunity for trainees to practice new skills in the training environment. It is most often used to help trainees acquire interpersonal and human relations skills. Role playing typically has three phases (Saks and Haccoun 1997):

1. Development involves preparing and explaining the roles and the situation that will be used in role playing.

2. Enactment involves the time that trainees take to become familiar with the details of the role and then act them out. Enactment can be done in small groups, with two actors and an observer, or with large groups, with a small set of actors and the rest of the audience serving as observers. Of course, for skill building to occur, all trainees must have an opportunity to serve as an actor at some point.

3. Debriefing, in which trainees discuss their experiences, is considered the most important phase of role playing .Discussions should address the connections among the role-playing experience, the desired learning out comes, and the desired organizational outcomes. Trainers must provide

feedback to ensure that trainees learn from the role –playing experience. In order words, trainers must offer constructive criticism to trainees, explaining what they did well and were they need more practice.

Simulation

Simulations are active methods that reproduce events, processes, and circumstances that occur in the trainee's job. Participating in a simulation gives trainees the opportunity to experience at least some aspects of their job in a safe and controlled environment and build skills relevant to those aspects of the job. For example, pilots can be trained with mechanical flight simulators. Simulations can also involve role playing with many actors or interactive computer technology. To achieve the greatest benefits, simulations should be designed to replicate as closely as possible both the physical and psychological conditions that exist on the job. For instance, to simulate a manager's daily experience, trainees could work on multiple tasks simultaneously and coordinate their efforts with those of other people in order to get their tasks completed. After all, these are the conditions under which managers typically accomplish their work.

Behavior modeling

Behavior modeling is a powerful method that draws together principles of learning from many different areas. As described in the ″How Do We Now? ″ feature, research has repeatedly found that this method is effective for improving skills. The basic process is simple(Stewart and Brown 2009):

1. The trainer explains key learning points.
2. The trainer or another model performs a task while trainees observe.
3. Trainees practice performance while the trainer observes.
4. The trainer provides feedback to the trainees.

Behavior modeling works particularly well when the model is someone whom the trainees see as credible and when that model shows both positive and negative examples of the task performance.

On – the – job Methods

In these methods, trainees work off the job in a training setting. Training can also occur on the job. One common approach to on-the-job training is also among the least likely to help employees learn. Some companies pair up inexperienced employees with experienced employees and ask the inexperienced employees to watch and learn. This approach can be a useful way to help employees become familiar with the job, but it is not always effective because experienced employees may not do the work properly or may not know how to teach. In fact, because this type of on-the-job training is often poorly planned and ill structured, it seldom fits the definition of training provided at the start of this chapter.

Effective on-the-job training is structured and systematic. Structured on-the-job training is an application of behavior modeling that is carried out in small – group situations on the job. The process is the same as that described in the discussion of behavior modeling: the trainer explains key learning points and then performs the task while trainees observe. The trainees then practice performance while the trainer observes, and the trainer provides feedback.

Becker (1962) in the US argued that on- the- job training can be divided into "specific" and " general" components. It makes sense for firms to pay for specific training, because they expect to reap the benefits. General skills, which are useful to all employers, should in principle be paid for by employees who become more productive and earn higher wages.

The higher wage effect of generic as opposed to specific training appears to be supported by the literature. For example, Blundell et al (1999) found that managerial training shows the most significant impact on wages, followed by professional and technical training and semi- skilled training.

Training is designed to provide Learners with the knowledge and skills needed for their present job (Fitzgerald 1992) because few people come to the job with the complete knowledge and experience necessary to perform their assigned job. Becker (1962) provides a systematic explanation of investment in human capital and associated productivity, wages, and mobility of workers. Such investment not only creates competitive advantages for an organization (Salas & Cannon- BOWERS2001), but also provides innovations and opportunities to learn new technologies and improve

employee skills, Knowledge and firm performance. In fact, there is an increasing awareness in organizations that the investment in training could improve organizational performance in terms of increased sales and productivity, enhanced quality and market share, reduced turnover, absence and conflict, (e.g., Huselid 1995, Martocchio & Baldwin 1997,Salas & cannon – Bowers 2000). In contrast, training has been criticized as faddish, or too expensive (Salas & cannon – Bowers 2000, Kraiger, McLinden & Casper 2004) , and there is an increasing scepticism about the practice and theoretical underpinning of linking training with firm performance (Alliger, et al. 1997, Wright& Geroy 2001)

The importance of general and specific training is recognized by everyone. Chapman (1993) has pointed out that a major development in the theory of training is the distinction between training relevant to a wide variety of tasks and training which is more specific to the job and firm- general training and specific training. General training raises a worker's future productivity not only in the firm providing it, but also in other firms in the Labor market. Becker (1962) argued that workers rather than firms should pay the cost of general training because the employers would not be able to capture any future return on their investment. Therefore, general training may be arranged in a formal education group because it is valuable to a wide range of employers and can be obtained in other ways than training in the firms. The firm should only pay for the firm specific component of training which does not help the worker receive higher wages elsewhere. In contrast, specific training raises the worker's productivity only in the firm providing it either because they have special methods or because they use equipment with which workers must become familiar. The returns on specific training might be lost when the relationship between employer and worker dissolves. Thus, specific training is clearly associated with turnover. When employers expect workers to be with the firm for a long time, they will offer training for workers since there is a longer period in which the firm can receive returns from their investment.

Bishop (1991) has questioned Becker's human capital theory whereby the worker pays the full costs of and receives all the benefits of general training that is useful at another firm. His research shows that there are some reasons for the employer to share the costs of general training with the worker. The most important reason why firms share general training costs is government

regulation. Workers can pay for general training by receiving reduced wages during the training period. However, wage reduction during the general training would probably be forbidden by wage and hours regulations because of minimum wage constraints. When undergoing technological change and pressured by competitors a firm must decide whether to provide general training under minimum wage constraints and predetermined wage structure. Besides the existence of a Liquidity constraint, employers may voluntarily pay for general training because of the unwillingness of most workers to pay large amounts of general training. Therefore, firms will offer an optimal to induce workers to undertake general training by sharing the costs of training.

Firm training depends on job characteristics, firm characteristics and worker characteristics. Black and Lynch (1996) summarized the differences between workers who receive formal training and those who do not. Workers are more likely to receive training if their jobs have the following characteristics: high value added jobs where the individual has great responsibility, cognitively, complex jobs (e.g., professional, technical and managerial jobs), sales jobs for complicated, changing and customized products, use expensive machinery on their job, regular, non temporary jobs, full time jobs, and jobs where the skills learned are not useful at many other firms in the community. Holding other worker characteristics constant, the likelihood and the amount of formal training in a given year for workers depend on the characteristics of the jobs they hold. The firms for whom they work, as well as the characteristics of the workers themselves. Therefore, firms usually analyze the training needs to determine where training is needed and who needs to be trained.

2.3.4. Training effectiveness

Evaluation and follow–up is the final block of training process. Results achieved are assessed in the light of objectives were not achieved are thoroughly examined. With so much resources being spent on training, it may seem surprising that there is small and limited systematic attempt to evaluate the business benefits. How can an organization find out whether the training it spends resources on is worthwhile? Are there defined objectives which are being met? What are the measurable effects of training, and how can the measurement be made?

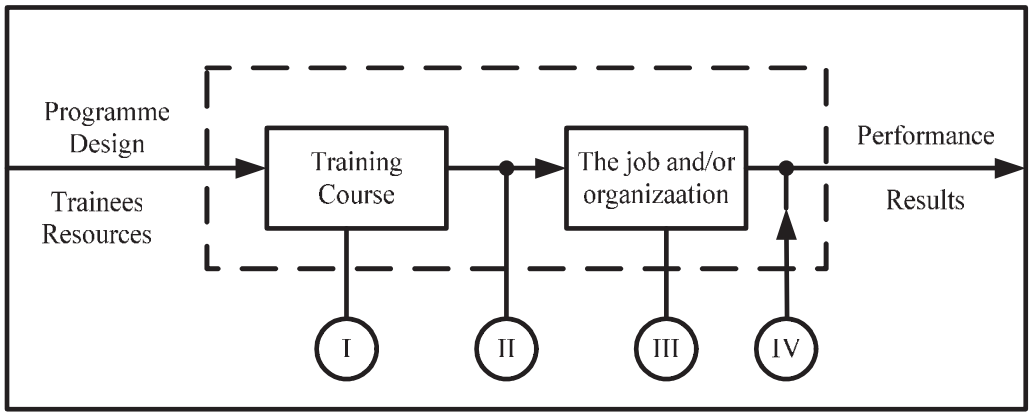
The argument in the IRAN has increasingly included whether resources is being spent wisely. Increasingly, employers are concerned to maximize returns on investments. However, there is still apparently poor and limited systematic attempt to ensure that spending on training is money well spent. Many studies have found that evaluation of training is, in the most of organizations, fairly rudimentary and that where it does exist, it tends to stress and focus on costs of training rather than actual positive effects.

Various research in IRAN shows that about 20% of employers are satisfied with the methods being used to evaluate training. The result is a rather unspecific perception of the value of training programmes and a dependence and trust on acts of confidence rather than on any clear analysis. This fact can in the end lead to an unwillingness to allocate resources to training. There are some indications that there is a special and power tendency in the IRAN with regard to evaluate the effectiveness of training.

Measuring the effectiveness of training should not be considered to be a static event, but rather a process that information on the effectiveness of training is an important and essential part of the overall training process. It is useful to think of this as a cyclic process within which such information is feedback into the design and doing of later training programmes.

Evaluation is normally broken down into levels or steps (figure 2.13).

Figure 2-13-A multi – Level model of programme evaluation



Levels I of evaluation answers the questions:

- Are the participants happy with the course?
- Do they like the learning process and environment, teaching methods and programme content, the trainer and the other trainees?

This feedback is useful for correcting teaching methods, course content and organization and the learning environment. If carried out during implementation of the programme, it permits immediate correction.

Level II answers the question:

- How well did the participants learn the knowledge and skills taught?

At this stage it is too late to correct errors in programme design. However, this information will be useful for the next group of participants and for the design of new programmes.

Level III deals with the question:

- Are the new knowledge and skills used back on the job, and if not, why not and what should be done about it? It Provide information for improving the organizational climate and dealing with non–training problems and needs. It helps to evaluate how realistic the development objectives were and to assess the balance between the training and non-training of aspects of the programme. Even after the end of the programme it may be possible to intervene to create a better organizational climate and other conditions for using new skills. This activity is sometimes called a follow-up of training.

Finally, level IV of programme evaluation deals with the measurement of performance results of the individuals and / or the organization. It answers the question:

- How did the management development programme contribute to meeting organization objectives and what was achieved in practice?

  This is the most critical and delicate point of programme evaluation. It gives an integrated assessment of overall training and development efforts, as well as of the quality of the other blocks of the management development cycle-needs analysis, objectives setting, programme design and programme implementation. It shows the needs were met and, at the same time, uncovers new needs. Often it will be impossible to discriminate between results obtained thanks to the training and development of people, and improvement that will be the result of non – training interventions.

In programmes that are oriented to the future rather than aimed at immediate results, it will be difficult to use levels III and IV of programme evaluation in the short–term. In future–oriented staff development programmes there is a time lag between training and learning, on the one hand, and application and results, on the other. Only the future will show

whether all currently provided training was actually necessary and geared to results.

A training cycle include a series of stages which lead to a training event being undertaken, evaluation prepares feedback which links back to the initial stages of training design. Training cycle emphasizes the point that in order to measure the effectiveness of training, evaluation has to be considered before the training event takes place.

The training cycle explained here has been synthesized from various different types of cycle and takes account of all the major steps:

- Stage 1: Definition of training needs: examining what knowledge, skills and attributes are necessary for the job to be undertaken, the knowledge, skills and attributes of the job holder and the extent of the gap.
- Stage 2: Design, arrangement and delivery of training
- Stage 3: Finding the trainees attitude to training and whether the training has been learnt. Reaction involves the participant's feelings toward the training content, the trainer and the training methods used.
- Training is the extent to which the content of the training event has actually been absorbed by the trainee.
- Stage 4: Finding whether the lessons learnt during training have been transferred to the job and are being used completely and effectively in doing the task.
- Stage 5: Evaluating the effects of the training on the firm. This is the stage and area in which there is perhaps most perplexity, and subsequently weak and real action in the workplace.
- Stage 6: Reinforcement of positive behavior. It is ideal that every positive result is maintained for as long as possible.

Within this, the manager will still need to use suitable techniques to be able to evaluate the impact.

To measure the impact of a training programme, a comparison must be made between the outcomes have happened following the programme, with the outcomes would have happened in the lack of the training. There are several methods which can be used to do this. These techniques are including:

- Control groups. These groups could be either an individual, few of individuals, parts of an organization who are chosen and then do not receive training, so that the groups behavior remains constant. After training, the performance of other groups who have been trained must then be compared with the performance of the original control group.
- Matching groups. These groups are accessible individuals or groups with same characteristics, which have not yet received the benefits of the training, and so can be used as comparable measures. The main difference between matching and control groups is the manner of selecting them. While a control group is selected before the event, matching groups are chosen after the event.
- Before–and–after studies. These studies include notification and observation of the behavior or characteristics of groups benefiting from training, both before and after the event, and then evaluating changes in the variables that the training was supposed to effect.
- Hypothetical questioning. This technique requires asking trainee what their actions would have been in the lack of the training. A comparison between this hypothetical behavior and their actual behavior will therefore show the impacts of the training.

The training impact evaluation literature includes a wide variety of approaches, which range from highly theoretical methods and techniques to practical manuals and texts. Whilst the adoption of a well thought out method can avoid money being wasted in training, it is clear that time, resources and money for evaluation are limited. In addition, it is clear that there remain a good many obstacles facing an evaluation of training.

Training outcomes can be roughly divided into four categories – reactions, learning, transfer, and organizational results. These outcomes provide different type of information about training that are more or less useful, depending on the purpose of the evaluation (Stewart and Brown-2009).

Reactions

Trainee reactions capture how the trainees felt about training: did they like it? Did they think it was interesting and useful? Reaction measures are similar to the end-of-semester teacher evaluation forms that most colleges have students complete. Evaluations of this sort are not good measures of learning.

Research shows that reactions do not always relate to how much trainees actually learned. Still, reactions can help evaluators gauge what went well and what did not which can be useful for providing feedback to training designers and trainers. Reaction can also be useful as overall measures of satisfaction with training courses. High levels of dissatisfaction suggest that something is wrong and that trainers may need to alter the program in some way.

Companies should be careful about making decisions to discontinue courses or to fire trainers based on reaction data alone. Research suggests that there are many determinants of reactions, including factors that are not under the trainer's control. For example, trainees' general tendency to be positive or negative can sway their reactions. If a trainer happens to get a particularly negative set of trainees, then reactions to that course may be lower regardless of what the trainer does. In sum, reaction data should be interpreted cautiously and are probably better used to provide feedback to improve training than to make decisions about discontinuing training.

Learning

Learning is a change that occurs from experience. Learning can involve knowledge, skills, or attitudes, and each of these can be assessed. Knowledge can be assessed with traditional tests, such as multiple-choice, fill-in-the-blank or open-ended tests. It can also be measured with other techniques, such as asking trainees to explain relationships among key concepts and testing whether trainees 'beliefs about relationships are similar to experts' beliefs. Skills can be measured by scoring role-plays, simulations, and behavior-modeling exercises for the use of the desired skills. Attitudes can be assessed by asking trainees about their beliefs and their motivation, as well as by watching trainees' behavior for evidence of the desired attitude. If an objective of training is to have employees believe that promptness is important to customers, for example, and then trainees could be scored for their promptness in end-of-training activities.

Transfer

Transfer refers to applying learning acquired in training to behavior on the job. To assess transfer, evaluators can ask employees about their own post-training behavior, or they can ask trainees' peers and managers about the trainees' behavior. In some cases, existing records can be used to examine

transfer. For example, if sales training encourages trainees to sell items with both high-and low-profit margins, the records of employees‘ sales can indicate whether their actual sales move in that direction.

Organizational Results

Organizational results are, of course, outcomes that accrue to a group or the organization as a whole. To assess organizational results, we can use basic measures of effectiveness, such as an increase in sales for the whole company or a decrease in turnover, or we can use efficiency measures, which balance benefits with costs.

Organizational results can be made even more informative by taking into account the resources required to achieve those results. When we analyze the costs of training along with the benefits, we are examining training efficiency*. An increasingly popular efficiency measure is return on investment (ROI)**.

Return on investment (ROI) is a measure of the monetary benefits obtained by an organization over a specified time period in return for a given investment in a training programme. Looking at it another way, ROI is the extent to which the benefits (outputs) of training exceed the costs (inputs).

ROI Can be used both to justify a planned investment and to evaluate the extent to which the desired return was achieved. However, it cannot measure all aspects of training success:

- Whether students liked the training or not
- The numbers of students participating in the training
- The extent to which students’ personal objectives were achieved

The effect of firm-size on training effectiveness

Three different firm- size effects have been identified on the returns to firm-provided training: the HRM effect, the selection effect and the scale effect. Researcher found no empirical support for the selection and scale effects.

* The extent to which the benefits of training exceed the costs of developing and delivering training.

** An efficiency measure created by dividing the monetary value of training benefits by the costs of delivering training and multiplying the result by 100.

There is evidence of a positive relation between firm size and the amount of training per working day (hypothesis 2b), but without selection effect this has no impact on the returns to training. Note, however, that the available dataset only includes 11 firms with less than 100 employees. It therefore remains an open question whether selection and scale effects exist between firms with more and less than 100 employees, and within the (large) group of smaller firms.(De kok 2000)

The estimation results suggest that there is an indirect firm-size effect, which is the combined effect of the HRM effect (hypothesis 1a) and the positive relation between training support (per working day) and firm size (hypothesis 1b). If firms increase their relative amount of training support, they are likely to benefit more from the courses those employees take. This conclusion is in line with Gelderblom and De Koning (1996) and Lynch and Black (1995), who find that it is necessary to take account of some aspects of the complexity of the training process, in order to measure the returns to training.

With only the HRM effect present, it is possible to calculate the production elasticity of training days for different values of training support per working day. For the average large firm in the sample this elasticity is more than 4 times that of the average small firm (0.17 compared to 0.037 for gross production, and 0.53 to 0.12 for value added). The estimates for the effects on value added are higher than the elasticity of 0.07 reported by Boon and Van der Eijken (1997)*. These results must not be taken as an indication that small firms do not provide enough training support (or training days): without information on the costs of training programs and turnover levels of employees, nothing can be said on the optimal level of training support and training days for firms of different size classes.

.Specific and general training effectiveness

Kopelman believed that, **job- specific training programs** are generally more effective than **general educational programs**. One highly successful training intervention, for example, involved step-by-step instruction and practice in handling specific problems connected with the work of tax

* Boon and van der Eijken have calculated the elasticity of human capital, which is not the same as the elasticity of training.

auditors for the Indiana Department of Revenue. Training showed a 39 percent drop in required supplemental audits per auditor. In contrast, consider the some examples of diffusive, non- job- specific training. The case involved an attempt to build participatory management in an engineering organization (Richard E. Kopelman 1986)

2.4. The relationship between training and labor productivity

Introduction

Human resources development means the skilful provision and organization of learning experiences in order that business goals can be achieved, so that, through enhancing the skills, knowledge, competence, learning ability and enthusiasm of people at every level, there will be continuous organizational as well as individual growth.

The human resource practitioner needs to have a thorough knowledge of the business of the organization in order to produce relevant and effective HRD plans with a potential impact on productivity. No development activity aimed at improving productivity can have any meaning unless it derives ultimately from a strategy based upon a thorough knowledge and understanding of all the factors that affect productivity.

We need a series of steps for ensuring that HRD objectives, policy and plans will meet the needs of the business. No technique and productivity movement and improvement plan can be introduced and applied effectively and efficiently without well–trained and educated labor at macro and micro levels of economy. Therefore a proper and strong training plan should be among the first priorities that should promote balance and coordination between general, professional and specialist training in various subjects.

2.4.1. The linkage between education and productivity

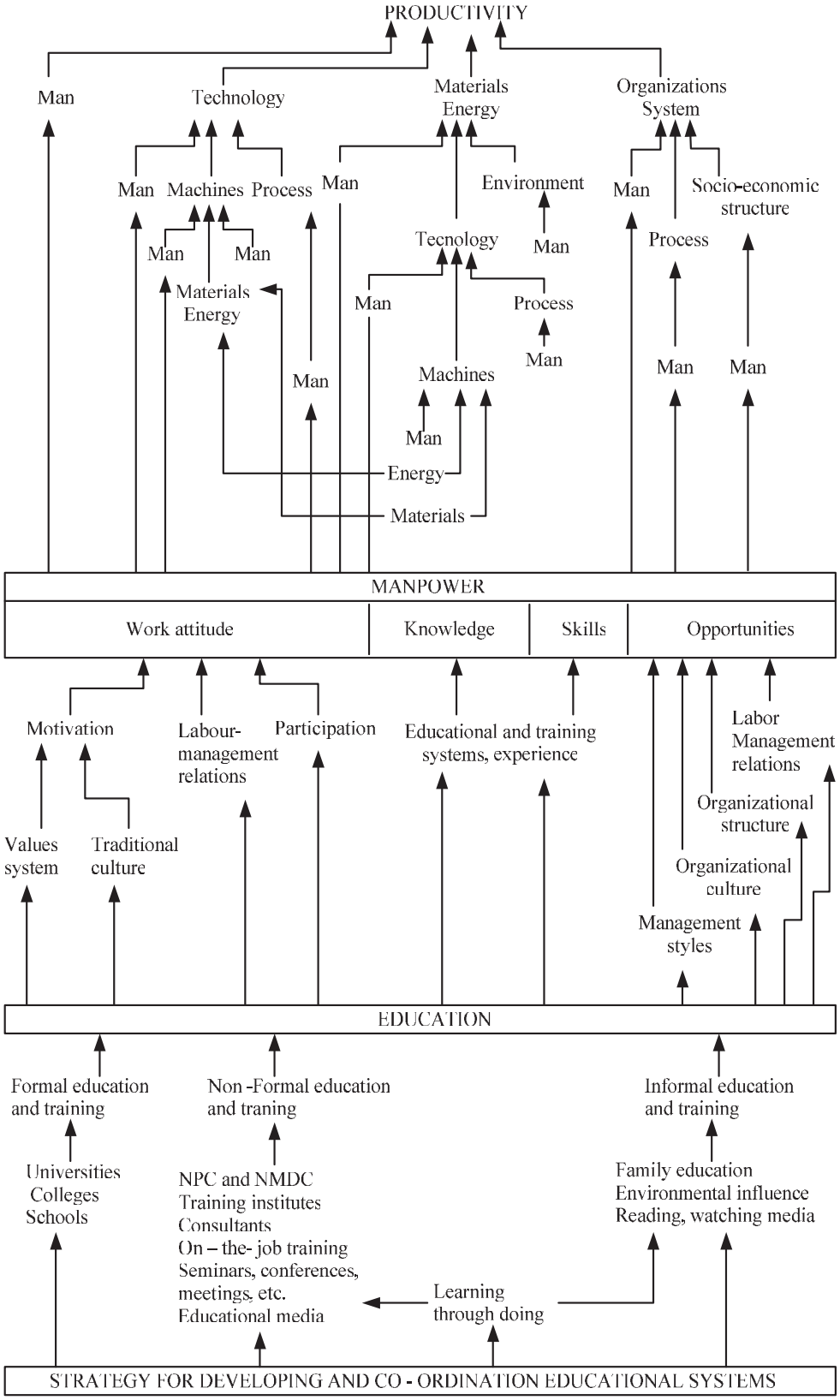
An effective employment policy is one of the important factors in productivity improvement since the productivity of the national economy must be assessed from the point of view of the utilization of all available manpower. Unemployment reduces national economic and social performance independently of the effectiveness of some industries or individual enterprises. Thus any government needs a strong manpower planning system and an executive mechanism to pursue progressive structural changes. It has two main tasks:

- To develop and use human resources as fully as possible.
- To fit the labor force structure (occupational, skill, sex, age, etc.) to the requirements of modern industrial and sectoral change, using government institutions for planning, education, training, legislation and taxation.

No new technique or modern productivity improvement scheme can be introduced and used effectively without well–trained and educated personnel at all levels of the national economy. Therefore a strong and long-term government education and training policy should be among the first priorities. This policy should promote balance and co–ordination between primary, secondary and higher education, between general and professional education, between specialist training in social and scientific subjects, and so on. Special attention should be given to training managers and supervisors both for industry and for government bodies. These people will be responsible for productivity improvement at all economic levels.

Certainly, knowledge and technology is a output of education and training, creativity, motivation and of organizational systems and processes. Thus, education and training can be counted as main factors of development of the labor and its competencies Figure 2.14 shows the multi – layer links between productivity and education. It can be clearly seen that labor are the major productivity factor and resource in the long term and therefore is the most important resource. Human resource has unlimited potential for development.

Figure 2-14- Links between productivity and education



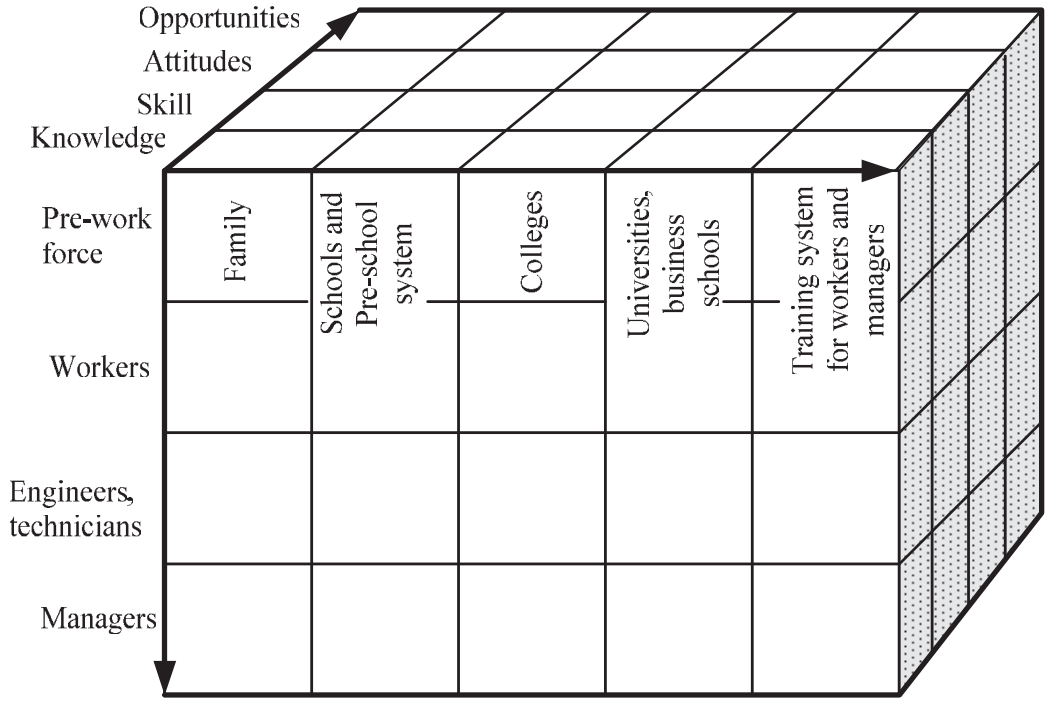
In vast perception, education and training include all types of learning processes in human beings, both formal and informal education and training:

- Family education and upbringing;
- Formal education in different establishments;
- Practical experience;
- Experiencing various social and cultural environmental influences.

The effectiveness of the educational process or system can greatly affect the efficiency and effectiveness of social and economic development efforts and productivity growth.A numbers of studies have revealed a significant positive correlation between education and productivity. Even a basic comparison of economic performance between different countries demonstrates that the best results, both as regards level of productivity and rate of economic growth, are found in those countries where manpower is better educated and trained.(Prokopenko and North 1995)

Study and analysis of four main characteristics of the labor – attitude, knowledge, skills and organizational opportunities – shows that education and training in the wide sense plays a significant role in their development. The figure 2-15 shows the three – dimensional human resource development matrix that illustrates and helps to analyze requirements and plan systematic developmental activities for all labors in different organizational level in the productivity movement.

Figure 2-15-Three- dimensional human resource development matrix



Of Course, only after effective education and training do Labor become a useful and valuable resource and most important productivity factor. Therefore, the effectiveness of productivity movement and plan depends on the capability and competency of the Labor and their motivation and willingness to contribute to increasing productivity.

2.4.2. Theoretical models linking training to firm performance

The knowledge and skills of workers acquired through training have become important in the face of the increasingly rapid changes in technology, products, and systems. Most organizations invest in training because they believe that higher performance will result (Alliger, et al. 1997, Kozlowski, et al. 2000). However, the theoretical framework for the relationship between training and firm performance has been subject to considerable debate. Devanna, Formbrun and Tichy (1984) proposed a model which emphasizes the interrelatedness and coherence of human resource management (HRM) policies and performance .According to their model, training and other HRM activities aim to increase individual performance , which is believed to lead to higher firm performance.

Guest (1987) developed a theoretical framework to show how HRM policies can affect human resources and organizational outcomes. The strength of Guest's model is it is a valuable analytical framework for studying the relationship between HRM policies and organizational performance, because it is expresses pathways for more careful, clear and ease of empirical testing. He saw commitment as a vital outcome, concerned with the goals linking employees with firm performance as the goal of quality is important to ensure the high quality of products and services. Therefore, training and development policy play an importance role in HRM and contribute to improved strategic integration, employee commitment, flexibility and quality. HRM outcomes can then lead to high job performance, high problem solving activity, high cost effectiveness, and low turnover, reduced absences and fewer grievances.

Another theoretical framework which emphasizes the interrelatedness and the coherence of HR practices, firm strategy and firm level outcomes is presented by Wright and McMahan (1992). They present six theoretical models from the fields of organizational theory, finance and economics. Three of them (resource based view of the firm, cybernetic systems, and behavioral perspective) consider the relationship between training and firm performance.

First, is the resource based view. Firm resources include physical capital, human capital and organizational capital that enable the firm to improve its efficiency and effectiveness. Its resources determine the strength of a firm in the long term. In order for a firm's resources to provide sustained competitive advantages, however, they must have four attributes: 1) valuable, 2) rare, 3) imperfectly imitable, and 4) cannot be replaced with another resource by competing companies (Barney 1991). Therefore, human capital is a primary source of sustained competitive advantage to a firm because apart from the four listed criteria it cannot be duplicated or bought in the market by competitors. Applying the resource based view to training suggests that training can provide knowledge and skills for employees and in turn this may lead to high firm performance.

Second, are the behavioral perspective models. Employee behavior plays an important role as a mediator between strategy and firm performance (Schuler& Jackson 1987, Schuler 1989). The models do not focus on knowledge, skills or abilities of employees, but focus only on employee role

behaviors because the employee's attitudes, behaviors and commitments could affect the firm performance. Thus, the employee role behavior can be instrumental in the creation of a competitive advantage.HRM practices can be considered as an option to promote the role behavior more efficiently and effectively, especially HR training policy.

Third, a popular theoretical model applied to HRM literature is a cybernetic model of HR systems. It is based on the general systems models and includes input from the environment (i.e., inputs of HR knowledge, skills, and abilities), throughput (HR behavior) and output systems (productivity, sale, job satisfaction and turnover). When the model is applied to strategic HRM, Wright and Snell (1991) focus on two major responsibilities: competence management (deals with individual skills required to implement a given organizational strategy) and behavior management (activities that seek to agree and coordinate attitude and behavior of individuals for organizational strategy and goals). Therefore, training will improve knowledge, skills, abilities and the behavior of employees. This in turn leads to positive organizational outcome.

Recently, an excellent analytical framework, Which uses a multi level approach to training, has been offered by Kozlowski and Klein (2000).The multi-level model bridges the gap between theoretical models of training needs assessment, design, and evaluation, and the higher levels at which training must have an impact if it is to contribute to organizational effectiveness (Kozlowski & Salas 1997). The model is focused on training transfer and is embedded in two distinct transfer types: horizontal and vertical transfer. Horizontal transfer concentrates on traditional models of training effectiveness. Kozlowski and Klein (2000) proposed 'top down contextual effects' which they described as a group and organizational factors, that can have direct and moderating effects on learning and transfer. These effects have been the source of recent theory and research addressing the influence of organizational factors on motivation to learn, transfer, and training effectiveness at the individual level of analysis. Vertical transfer examines the link between individual training outcomes and organizational outcomes. There are two distinctive forms of vertical transfer processes-composition and compilation. Composition concentrates on individual contribution at the same content, while compilation focuses on individual contribution at the different or diverse content.

To summarize, first, it is obvious that similarities exist between the normative models of HRM, whether it is the united State of America (U.S.) perspective (Devanna, et al. 1984), or the British model (Guest 1987). These authors have put training on a set of HRM policies and consider training as an important and vital policy for improving knowledge, skills, attitude and motivation of employees. Second, the HR system is a complex set of policies designed to manage labor in the organization and integrate into organizational strategy in order to create high performance for an organization. Third, this review of theoretical models linking training to firm performance also suggests that it is explicitly recognized that no organization can attain its goals or organizational strategy without labor that has the right knowledge, skills, abilities, behavior, and attitudes. Therefore, training plays an important role in improving the quality of employees directly and effecting on firm performance through HR outcomes. Finally, organizational researchers studying training and firm performance need to consider the impact of various dimensions of employee training programmes , the type of training methods and design , the type of employees trained , and time spent by employees in training on the topic of firm performance.

Kozlowski, et al. (2000) suggests an approach to organization improvement and development based on enhancing the knowledge, skills and attitudes or abilities of the workforce. This paradigm may be accomplished through training activities. From this perspective, training is effective to the extent that it directly contributes to the strategy, objectives, or outcomes central to organizational effectiveness.

Thang, Quang and Buyens (2010) developed and proposed theoretical framework to fulfill the requirement for analyzing training and firm performance issues. This framework is shown in Figure 1 and Figure 2. Figure 1 is based on the fundamental premises of training processes, HR outcomes and firm performance. Training is predicated on contributing to higher level group and organizational objectives, results and performance. A number of HR outcomes and firm performance, which are important in analyzing the relationship, are enumerated in the second and third box. Attention is drawn to some of the critical variables. Figure 2-16 shows that training affects the overall knowledge, skills, abilities, attitudes, behavior, and motivation of employees. HR outcomes have a direct impact on firm performance. In Figure 2-17 this framework is more complex than that in

figure 2-16, because it implies interactions between training and organizational strategies, and how these strategies relate to training and firm performance relationships.

Figure 2-16- A framework for analyzing training and firm performance issues

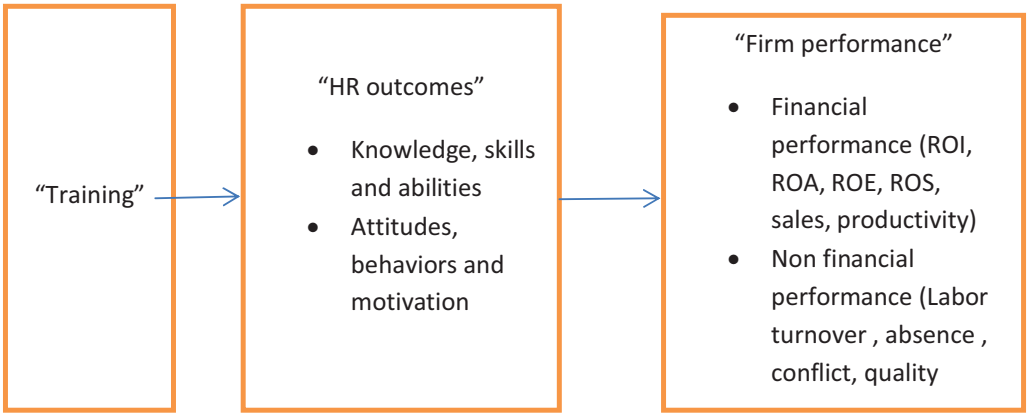


Figure 2-17-Training, organizational strategy, and firm performance

In the long run, striving to enhance HR outcomes will lead to favorable consequences for firm performance (i.e., financial and non financial performance). Therefore, to determine whether training enhances the performance of the organization, financial performance, or non financial

performance, a process of HR outcomes and firm performance assessment must be considered together in real situations in order to reach a consensus on its meaning. With respect to the performance being used in this model a distinction can be made between financial and non financial performance. Financial performance in this context is linked to indicators like return on investment (ROI), return on assets (ROA), return on equity (ROE), return on sales (ROS), Tobin's q, sales, market share and productivity. Non financial performance includes labor turnover, absence of employees, conflict, quality of product, service and innovation.

In review presented in this section the focus is mainly on research published in many different journals across a number of disciplines from 1991 , that have assessed the relationship between training and firm performance . Major psychological, managerial, or business journals and books were scanned for articles containing related information and data. All of the identified studies are presented in Table 2-10.

Table 2-10-The studies of the relationship between training and firm performance

NO	Author/ study	Sample size	Response rate (%)	Firm Performance
A. Data from a large sample of heterogeneous firms				
1	Ahmad &Schroeder (2003)	107	60	Training has positive effects on employee's commitment (r=.52**)and perceived Operational performance(r=.37**)
2	Aragon – Sanchez, et al. (2003)	457	9	Training has positive effects on quality (5 items, a= .73).
3	Ballot, Fakhfakh & Taymaz (2001)	290	Archival data	Training led to increase ROI (288% for France and 441% for Sweden)
4	Ballot , et al. (2006)	350	Archival data	Training has positive effects on value added per worker (17.3% for France and 7.3% for Sweden).

5	Barrett &O'Connell (2001)	215	33.5	General training has a significant positive effect on productivity growth (r=.14**)
6	Bartel (1994)	495	Archival data	Implementation of formal training raised productivity by 6% per year
7	Barling , Weber & Kelloway (1996)	20	N/A	Training led to increase on credit card sales (r=.30) and personal loan sales (r=.40*)
8	Bernthal & Westhead (1990)	127	Convenience sample	Training has positive effects on operating cash flow/ net sales, operating cash flow/total assets, profit margin, ROA, ROE (global benchmarking study)
9	Birley & Westhead (1990)	249	Archival data	Training raised sales(r=.27**) of the companies
10	Bishop (1991)	2.594	75	100 hours of formal training for new hire led to increased ROI ranged from 11% to 38% and has positive effect on turnover.
11	Black & lynch (1996)	2.945	64	10% increase in average education will lead to an 8.5% increase in productivity in manufacturing and a 12.7% in non-manufacturing.
12	Boon &Van der Eijken (1998)	173	N/A	Training raised value added per employee and gross output
13	Backer& Cohen (1992)	73	45	Training led to increase on sales, income, And firm present value.
14	Cappelli & Neumark (2001)	1.304	72	Training has positive effects on sales per worker, productivity, labor efficiency.
15	Cho , et al. (2006)	78	36	Training has positive effects on turnover, labor productivity, and ROA.

16	Delaney & Huselid (1996)	590	65	Training has positive effects on firm performance (r=.60*) and market share (r=.19**).
17	Deng , Menguc & Benson (2003)	97	54	Training raised export intensity and average export sale growth over three years (r=.17**)
18	Ely (2004)	486	100	Training has positive effects on new sales revenue (r=.16*) , productivity (r=.21*) , customer satisfaction , quality and speed (r=.27*)
19	Faems , et al . (2005)	416	28	Training has positive effects on net profitability (r=.10) , voluntary turnover (r=.3) , and productivity (r=.15**)
20	Fey & Bjorkman (2001)	101	28	Technical and non-technical training has positive effects on overall firm performance (r= .44** , non managerial and r=.48** . managerial)
21	Fey , et al . (2000)	101	28	Technical and non-technical training has positive effects on HR outcome (r=.23* to .51*) & overall firm performance (r=.22* to .26*)
22	Garcia (2005)	78	19	Training led to sales per employee, employee satisfaction (a=.79) , client satisfaction (a=.70),owner/shareholder satisfaction (a=.71).
23	Gelade & Ivery (2003)	137	49	Training has positive effects on sales (r=.19**) , clerical accuracy (r=.18**) , and customer satisfaction (r=.37**)
24	Ghebregiorgis & Karsten (2007)	82	42	Training has positive effects on sales per employee (r=.-01), grievances (r=.05), voluntary turnover (r=.25*) , and absenteeism (r=-.01)

25	Guerrero & Barraud- Didier (2004)	180	12	Training has positive effects on productivity (r= -.02) , objective profitability (r=-.04) , and product & services quality (r=.10*)
26	Harel & Tzafrir (1999)	76	35	Training raised market share (r=.53**)
27	Horgan & Muhlu (2006)	392	5	Training has positive effects on work performance, cooperation, and discipline.
28	Huang (2000)	315	36	Training has positive effects on sale growth. Profit growth, ROI, ROS, turnover, and market share.
29	Ichniowski, et al. (1997)	36	60	Training has positive effects on production line uptime and overall customer satisfaction (r=.44**).
30	Kalleberg & Moody (1994)	688	Archival data	Training has positive effects on market share (r=.22**) , product quality (r=.18**) , customer satisfaction (r=-.01), and employee relations (r= -.010**)
31	Katou & Budhwar (2007)	178	30	Training has positive effects on perceived effectiveness (r=.56**), efficiency (r=.57**), innovation (r=.53**) , and product quality (r=.46**)
32	Khatri (2000)	194	24	Training has positive effects on sales growth (r=.08), profit margin (r=.17**) , and perceived performance (r=.18**)
33	Kintana, Alonso & Olaverri (2006)	956	17	Training has positive effects on productivity (r=.04)
34	Koch & McGrath (1996)	319	7	Training has positive effects on sales per employee

35	Lawler, et al. (1998)	491	26	Training has positive effects on productivity, customer satisfaction, quality and speed (r= .13* to .28*), profitability and competitiveness (r= .16* to.33*).
36	Lyau & pucel (1995)	131	55	Training led to increase value added per employee and sales per employee.
37	Mabey & Ramirez (2005)	179	N/A	Varies by training type led to increase operating revenue per employee and reduce cost of employee (r=.05 to .19*)
38	Martell & Carroll	115	26	Training has positive effects on perceived business until performance (r=.15**)
39	Meschi & Metais (1998)	102	44	Training led to increase return on investment.
40	Newkirk – Moore& Bracker (1998)	152	49	Training led to raise ROA, ROE , overhead , spread , and mixed results
41	Ng & Siu (2004)	485	62	1 percent increase in managerial training induced increase in sales from 0.13 to 0.32 percent
42	Ngo, et al. (1998)	253	20	Training has positive effects on perceived competitive sales (r=.21**) , new product development (r=.35**), competitive net profit (r=.31**) employee satisfaction (r=.32**)
43	Paul & Anantharaman (2003)	34	76	Training has positive effects on ROI (r= .20**) , net profit , sale, productivity , quality (r=.29**) , speed of delivery (r=.12**), operating cost (r=.22**), competence (r=.58**) , and employee commitment (r=.43**)

44	Rodriguez& Ventura (2003)	120	5.4	Training has positive effects on ROA, total sales growth, sales per employee, and turnover.
45	Shaw , et al. (1998)	227	36	Training has positive effects on voluntary turnover (r= .19**).
46	Storey (2002)	314	22	Training led to raise GRATE (R=.01 to .15*), cash flow (r=.06 to .14*), and profitability.
47	Thang & Quang (2005)	137	9	There is a positive association of training and development with perceived market (r=.33**) and firm performance (r=.45**).
48	Tzafrir (2005)	104	38	There is a positive association of training and development with perceived market (r=.47**) and firm performance (r=.66**).
49	Vandenberg , Richardson& Eastman (1999)	49	100	Training has positive effects on ROE(r=.02) and turnover (r=-.30*)
50	Wiley (1991)	200	100	Training has positive effects on store net sales (r=-.40**) and customer satisfaction (r= .31**)
51	Zheng, Morrison & O' Neill (2006)	74	22	Training has positive effects on competency, turnover , and employee commitment
52	(2006)	2.079	Archiva l data	1 percent increase in training in 1997 could increase average productivity in the period 1998-2001 by more than 0.7 percent.

B. Data from a specific company survey				
53	Bartel (1995)	1	1	Training was found to have a positive and significant effect on ROI (49.7%) , job performance , and productivity
54	Krueger & Rouse (1998)	2	2	Reading, writing , and math has positive effect on ROI (7%) in manufacturing company, turnover , absenteeism , and job performance in both manufacturing and service company.
55	Pine & Judith (1993)/The Garrett Engine	1	1	Team work training led to increase ROI (125%) and have positive effects to equipment downtime.
56	Phillips (1994) / Information Serv. Inc	1	1	Interpersonal skills training led to increase ROI (336%) and have positive effects to behaviors.
57	Phillips (1994)/ financial Serv. Co	1	1	Selection training led to increase ROI (2.140%) and reduction in turnover of branch manager trainees.
58	Phillips (1994)/ U.S government	1	1	Supervisory skills training led to increase ROI (150%) and have positive effects on the skills .
59	Phillips (1994) /Midwest Banking	1	1	Customer lending training led to increase ROI (1.988%) and net profit per loan.
60	Phillips (1994) /Multi- Marques	1	1	Time management training led to increase ROI (215%)
61	Phillips (1994) /Coca Cola bottling Co.in San Antonio	1	1	Motivation, perform , and appraisal training led to increase ROI (1.447%) and sales, reduced waste and absenteeism

62	Carnevale & Schulz (1990) / Vulcan Materials	1	1	Supervisory skills training led to increase ROI (400%) and have positive effects on production worker turnover.
63	Phillips(1994)/ Yellow Freight System	1	1	Performance appraisal training led to increase ROI (1.115%)
64	Phillips (1994) / International Oil CO.	1	1	Customer services training led to increase ROI (501%) and have positive effects on tracked pullout costs and customer complaints.
65	Phillips (1994) /Magnavox Electronic Systems	1	1	Literacy skills training led to increase ROI (741%) and have positive effects on tracked average monthly efficiency.
66	Phillips (1994) /Arthur Andersen & CO	1	1	Tax professionals training led to increase ROI (100%) , and have positive effects on tracked fees and chargeable hours.

The measurement of training and firm performance varied across the studies .Some studies use a single item to measure training or performance, whereas others use multiple training and firm performance measures. For example, Zwick (2006) used data on 2079 establishments from the Germany Institute for Employment Research to analyze of the impact of training intensity on establishment productivity, whereas Krueger and Rouse (1998) used data on two companies, a manufacturing company and a service company, to estimate the effect of reading, writing and mathematics training on ROI, turnover , absenteeism and job performance. Therefore, there are a number of challenges in reviewing the results of these studies because of a lack of consistency in their calculation and measurements.

To develop an integrated view on empirical evidence for the effects of training on firm performance, Thang (and others -2010) used selective and

descriptive analysis .This action followed opportunity to reanalyze the data from the previous studies. For comparative reasons, they divided previous studies into two groups: 1) previous studies using data from a large sample of heterogeneous firms, and 2) previous studies using data from a specific company survey .In the first group, there are 52 studies for the study review. The studies of this group have estimated the impact on training on firm performance by using firm level data collected through mail, phone surveys or archival data. In the second group, 14 were found to assess the relationship between training and firm performance. All these studies collected primary data from the company's personnel files or human resource departments. Some of these studies held face to face interviews with managers to understand what type of training the companies conducted and how the companies are measured, analyzed or evaluated training results.

With respect to firm performance the article aimed to extract clear empirical evidence and discussions on the unique effects of training on firm performance. Firm performance in the studies was reduced into two categories: 1) financial firm performance (ROI, sales, productivity, profit, market share), and 2) non financial firm performance (turnover, absenteeism, job satisfaction, motivation). However, some studies measured both financial and non financial indicates at the same time. Clarifying the understanding training and financial performance (or non financial performance) from the current literature and proposed directions for future research on this topic was undertaken.

2.4.3. Classified results

2.4.3.1. Results from the studies of large sample of firms

In the previous section, 52 studies that have estimated the impact of training on firm performance by using firm level data from a large sample of firms are reported. The advantage of the previous studies is that it could be generalized to other companies, whereas a case study could not express the problem in general. The statistics in part A of Table 1 show that most studies frequently estimated the effects of training on financial performance (47 studies or 90% of the total studies used a large sample of firms), followed by both financial performance and non financial performance (25 studies or 48% of the total studies used a large sample of firms) and non financial

performance (five studies or 10% of the total studies used a large sample of firms).

With respect to performance measurement methods some researchers (Bishop 1991, Bassi & Van Buren 1998, Fey, et al. 2000), who estimated the effects of training, on firm performance, have used a subjective measure of performance. The disadvantage of a subjective measure is that research results are not comparable across companies over time and depend on many assumptions. For example, Bishop (1991) used data on 2594 employers for his study, and then generated tentative estimates of both the opportunity costs and the productivity effects of training. Thus, the reliability of these estimates depends on the accuracy of the assumption regarding the cost of training, as well as the accuracy of the subjective estimates of firm performance (Bartel 2000).

In order to overcome the limitations of subjective measures of performance other researchers (Black& Lynch, 1996, Boon & Van der Eijken 1998. Faems , et al. 2005. Zwick 2006) have used a firm level data set in a regression standard Cobb-Douglas production function to estimate the impact of training on firm performance. They have measured firm performance by net sales or value added. More specifically, Black and Lynch (1996) used data from the National Center on the Educational Quality of the workforce (EQW) National Employers' Survey and measured productivity by net sales, estimating a production function in which the dependent variable was sales, receipts or shipments. In contrast Fames, et al. (2005) studied the effect of individual HR domains on financial performance by using survey data from 416 small and medium companies and measured productivity by value added.

The kinds of training used for estimation differ throughout the studies. For instance, Barrett and O'Connell (2001) estimated the productivity effects of general training, specific training, and all types of training combined. They found that general training was more related to sales growth when the firms had greater investment in capital than less. Alternatively, Ahmad and Schroeder (2003) estimated the effects of training, in job skills and cross training on operational firm performance. Their results showed that training was only related to operational performance through its effect on organizational commitment within the plants, Whereas Fey , et al. (2000) concentrated on the influence of technical and non technical training on overall firm performance.

As regards the kinds of establishment assessed in the previously reported studies, Black and Lynch (1996) divided companies into two groups: manufacturing companies and non manufacturing companies. Ng and Siu (2004) collected data from 800 state owned manufacturing enterprises and non state owned manufacturing enterprises from a survey in Shanghai to assess the effects of training on firm performance. Faems, et al. (2005) estimated the impacts of training on firm performance of small and medium companies. Other authors used data from companies in a specific industry for their estimation. For instance, Ichniowski , Shaw and Prennushi (1997) collected data from 41 steel production lines in Japan and the U.S., whereas Paul and Anantharaman (2003) collected data from 34 companies in the Indian software industry.

To summaries, the review of previous studies of large samples of firms provides an interesting picture of the relationship between training and firm performance. The authors of this article tried to capture the effect of training on firm performance by distinguishing kinds of training, companies, firm performance, using firm level data from one or several sectors and different ways to measure performance. They might not, however, accurately control for data, complex production processes, and other factors (e.g., new technology, a change in products, or labor market conditions) besides training.

2.4.3.2. Results from the case studies

A total of 14 case studies, that estimated the influence of training on firm performance, were collected for review purposes. The types of training differ across the studies. For example, Krueger and Rouse (1998) examined the effects of reading, writing, and mathematics training on ROI, turnover, absenteeism and job performance, whereas Phillips (1994), in the case of the Coca Cola bottling company of San Antonio, estimated the impact of motivation, Performance and appraisal training on ROI, sales, reduced waste and absenteeism. ROI is one of the firm financial indicators and appears in 100 percent of the case studies in this section. It could also mean that training decisions depend a lot on a return to this form of human capital investment. A summary of training types and firm performance indicators of the fourteen case studies and major findings are presented in part B of table 1.

All these case studies collected direct data from company records. The estimation methods of the impact of training on firm performance vary, however, among these case studies. For instance, Bartel (1995), and Krueger and Rouse (1998) estimated the influence of training on firm performance by applying an econometric framework to data from these companies. Other researchers, such as Phillips (1994), in the International Oil case, and pine and Judith (1993) have used the experimental design method to measured actual firm performance (productivity).Experimental design is an intelligent method and suitable for these cases because it could be used to successfully quantify the outcomes of training programmes from company's files. Another ten studies used a subjective method to measure trainees' performance.

In summary, the firm case study approach overcomes the problems of the large sample and a lack of insufficient data for estimation. In addition , the approach considers training and measures firm performance in more detail as well as accurately controlling other factors besides training (e.g., firm characteristics , new technology) that influence firm performance . Another advantage of the case study approach (except the case studies of Bartel 1995, and Krueger and Rouse 1998) is that it tracks the performance measures over a sufficient time period to reach an exact and reliable assessment. However, these case studies could not avoid some problems such as companies not wanting weak results publicized, the use of subjective evaluation of trainees' performance or sample selection of trainees for measurement and estimation and design assumptions.

2-4-4- The return to training

De kok(2000) find that the estimation results become more robust if training is measured by training days instead of training expenditures, and the HRM effect is included: the HRM effect is significant for gross output and value added, according to both the RE and (robust) FE estimator , irrespective of the capital measure . The results must however be interpreted with some caution. Contrary to the significance of the HRM effect, the F-test for returns to training cannot reject the hypothesis of no returns to training. Finally, one might even argue that nothing can be said on the significance of parameters because the disturbances are not normally distributed.

Groot (1999b) discusses the possibility that the incidence of firm- provided training is correlated with changes in production techniques. If this were the

case, then the reported effects of training on production would in fact be indicators of the returns to production technique improvements. Although De kok cannot control for this possibility empirically , he does not think that this source of bias is relevant here: he assume that changes in production technique are not correlated with training support per working day, which is the most significant training – related variable in his study.

Ichniwski et al. (1997) note that there is a potential danger of overestimating the returns to training, if no information on complementary HRM practices is available. This danger would however disappear, if the training variables used were not correlated with the (unmeasured) incidence of other HRM practices. He argues that this is the case in this study. All three training – related variables in the production function (td, TS/LD td and TD/LD td) are correlated with the (log of the) total number of training days, which in turn is strongly correlated with firm size. He assume that, if he assumes that in the current sample firm size is uncorrelated with the incidence of HRM practices, it follows that the training- related variables are not (or only weakly) correlated with the incidence of other HRM measures. And as far as the general state of the HRM policy is constant over a period of three years, this is treated as a firm- specific effect.

In the human capital literature, many studies have analyzed the effects of training on workers' wages. Several studies found considerable returns on workers' participation in training (e.g. Lynch, 1994). However, after controlling for selectivity, Goux & Maurin (2000) found that training has no real effect on workers' wages. It should be noted, however, that studies analyzing the effects of training on wages could underestimate the effect of training on productivity. As human capital theory has shown, the productivity effects of training are only fully reflected in workers' wages when the training is general, and assuming a perfectly competitive labor market. The relationship between wage increases and productivity increases varies based on whether the firm or the worker pays the costs of training, which is related to the structure of the labor market. If the labor market is characterized by imperfect competition, bargaining and rent – sharing may occur (cf. Stevens. 1994; Acemoglu & Pischke, 1999). Moreover, apart from their wages, workers may receive some kind of non-financial remuneration, and part of

the returns to their human capital may be ‘back loaded’ towards the end of their careers to ensure their loyalty to the firm (Lazear 1979).

In the human capital literature, it is broadly recognized that apart from workers’ participation in training, workers acquire many work- related skills by means of informal on-the-job training or ‘experience’ (cf.Mincer, 1974). In empirical analyses this informal human resource development is measured by proxies such as a worker′s tenure (an indicator of the firm-specific skills a worker has acquired on the job)and a worker′s age (an indicator of the general skills a worker has acquired on the job)(e.g. Brown, 1989; Acemoglu & Pischke, 1998). These empirical studies generally show that workers′ experience contributes to their productivity; in as far as this is indicted by the wages they earn. One might, however, wonder whether workers’ experience really contributes to their productivity. This question was already posed in the early human capital literature (Mincer, 1974). Workers’ life- cycle earnings growth might reflect institutional arrangements in salary- scales rather than productivity gains, and need not necessarily reflect the productivity enhancing effects of the various skills workers have (cf.Medoff& Abraham, 1980 1991;Brown, 1989).

2-4-5- The effects of training on financial firm Performance

Based on framework for analyzing training and firm performance issues in table 2.10, there are 61 previous studies that estimated the effects of training on financial performance (or 94% of the total of 65 studies). A number of researchers (Black & Lynch 1996, Boon &Van der Eijken 1998 , Ballot, Fakhfkh & Taymaz 2001 , Barrett & O′ Connell 2001 , Faems, et al . 2005 , Zwick 2006) have tried to estimate the impact of training on productivity , whereas other researchers have studied the effect of training on sales (Bassi& Van Buren 1998 , Ahmad & Schoreder 2003 , Rodriguez & Ventura 2003 , Garcia 2005). For instance, whereas Ballot, et al. (2001) found that training can have positive effects on productivity (value added per worker), Bassi and Van Buren (1998) demonstrated that training led to an increase in sales, quality and customer satisfaction.

Other previous studies have examined the influence of training on financial performance indicators such as ROI, ROA, ROE or market shares (Bishop 1991, Bartel 1995, Huang 2000, paul & Anantharaman 2003 , Bernthal&

Wellins 2006) . For example, Bartel (1995) found that training had a positive and signigicant effect on ROI, whereas Bernthal and Wellins (2006) estimated impact of training on both ROA and ROE , indicators . Most of these studies estimated the effects of training not only on financial performance. But also on non financial performance, concurrently. These observations may mean that the estimation result of each study depend on the research purpose of the outhors or research project, performance measure method, and data collected. To summaries, the review results indicated that there was a significant difference between types of training, types of financial performance indicators and impacts of training on financial performance indicators in these studies. In 61 studies (94% of the total studies) related to financial performance indicators, these authors seem to concentrate on measuring firm performance by financial indicators and most of them demonstrate that training has a positive and significant influence on financial indicators.

Return on investment tells you the percentage return you have made over a specified period as a result of investing in a training programme. On the assumption that benefits will continue to accrue some time after the training, then the period that you specify is critical to the ROI figure you will obtain. You may like to specify a period that fits in well with your organization‘s planning cycle perhaps a year or two years. On the other hand, you may wish to calculate the period to correspond to the life time of the benefit, in which case you will need to know how long the average student stays in a position in which they can continue to apply the knowledge and skills being taught.

It is relatively simple to calculate return on investment:

$$\%ROI = (benefits/\ costs) \times 100$$

Another way at looking at ROI is to calculate how many months it will take before the benefits of the training match the costs and the training pays for itself. This is called the payback period:

$$Payback\ period = costs/\ monthly\ benefits$$

Payback period is a powerful measure. If the figure is relatively low-perhaps only a few months- then management will be that much more encouraged to make the training investment. As a measure, it also has the advantage of not requiring an arbitrary benefit period to be specified.

2.4.6. The effects of training on nonfinancial firm performance

According to the frame work in Figure1, 36 studies examined the impact of training on non financial performance (or 55% of the total of 65 studies) such as turnover, quality, absenteeism and customer satisfaction. With respect to turnover, Bishop (1991), in his study on newly hires showed that formal training led to lower labor turnover , whereas Krueger and Rouse (1998) reported that reading ,writing and mathematics training had a positive effect on turnover. A majority of other studies also found that training had a positive effect on labor turnover. These results suggest that turnover has a powerful effect on employer decisions to provide training to employees. High turnover implies that investment in training for their employees is inefficient because many of those trained moved to other companies. Thus, companies may pay quite a high price for this turnover in terms of lower sales.

Other studies have estimated the impact of training on quality, absenteeism and customer satisfaction. One possible explanation why these non financial performance indicators were more popular is that when considering the competitive advantages that a firm is thought to possess people usually think about high quality or justifying the customer′s needs.

Thus, many studies have tried to measure firm performance by these indicators. For instance, Ghebregiorgis and Karsten (2007), and Krueger and Rouse (1998) demonstrated that training had a strong effect on absenteeism rate reduction . Aragon-Sanchez,Barba-Aragon and Sanz –Valle (2003) , and Katou and Budhwar (2007) found that training has a positive effect on quality , whereas Ely (2004) and Lawler, Mohrman and Ledford (1998) reported that training has a significant and positive effect on customer satisfaction.

To summaries, it is not surprising that firms invest in training in order to improve non financial performance. It may mean that some non financial performance indicators also play an important role in organizational strategy. Therefore, some studies have estimated and measured the influence of training on non financial performance. However, when these studies measure the impact of training on non financial performance by a subjective method (e.g., workers ‘reactions to the training, impact of training on workers′ behavior), the results of these studies may not be totally accurate.

2.4.7. The impact of training on productivity

A limited number of studies consider the impact of training on productivity. These studies focus on labor productivity at firm level. Estimating the effects of training at firm level requires information on firm production. Only few studies are known that follow this approach.

The results of a study by schemenner and Rho (1990) demonstrate that three factors significantly affect the productivity: improved flow of materials; investment in new technology; and human resource initiatives. Helms (1996) also points out the training of workers, better technology and re-engineering of workflow and systems to improve productivity. To sum up, productivity improvements result from the growth in workers' abilities, the adoption of new technology, the number and quality of product and process inventions. Figure 2-18 below depicts these determinants and elaborates the role of training in productivity improvement and competitive advantage.

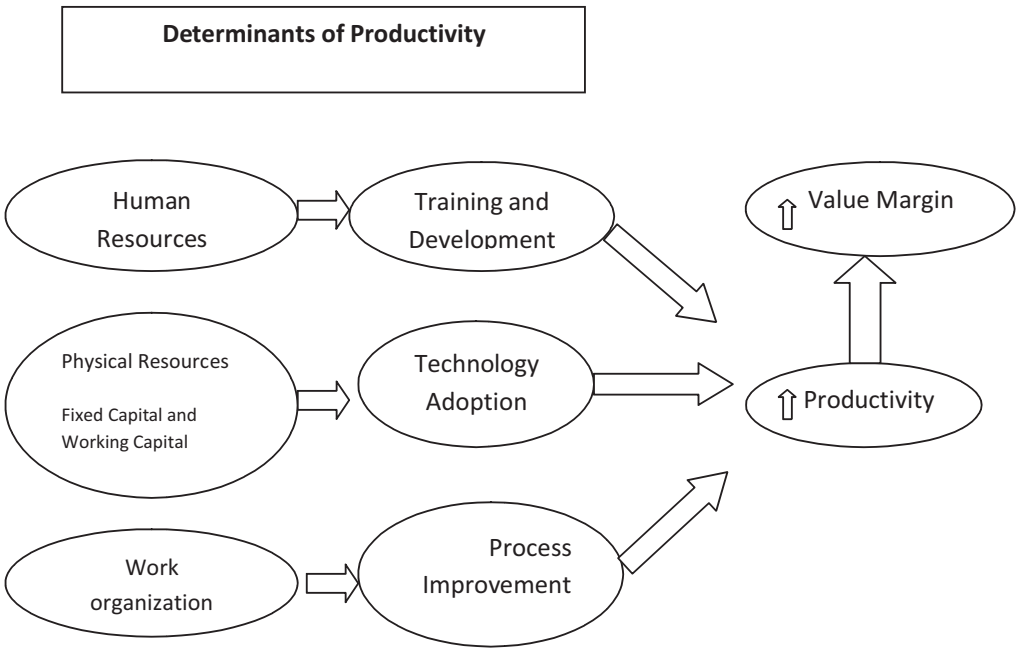


Figure2-18- determinants of productivity and the role of training

This implies that the organizations seeking to improve their productivity must probe into their human and physical resources, and work organization to get insight about the possible ways by which these can contribute more efficiently and/ or effectively to the transformation process.

However, the first one i.e. investment in training of workforce for the improvement of their knowledge, skills and attitudes is the surest path to the productivity improvement and other performance outcomes. Whereas the success of the other two ways i.e. technology adoption and process improvement is dependent on the knowledge , skills and attitudes of the workforce in order to use the modern equipment or work in the new processes and work formats. Reenen et al (2005) have also examined the interaction between skills, technology and the organizational changes brought in by innovative human resource management practices. His data suggest that a lower level of employee skills holds organizational and technological changes back. Training and educational improvements can have a significant effect on productivity because they encourage the adoption of better technologies and changes in work place practices, such as decentralization and team working etc. In the same study, they have also demonstrated dramatic results regarding training impact on productivity. Quality of labor inputs stands out to be the major reason for differences in productivity among countries and organization and training stands out to be the major reason for differences in quality of labor inputs (Kurosawa, Ohtake and Ariga, 2005). Another study by Savery and Luks (2004) to quantify the impact of training on organizational outcomes has regarded training as "an important precursor for firms who wish to improve their productivity". Conclusively, human element in the organizations must be the starting point for any productivity and performance improvement efforts.

Bartel (1994) employs a panel with observations for 1983 and 1986, to estimate the effect of formal employee training programs on labor productivity. She finds that firms that implemented new training programs for specific groups of employees between 1983 and 1986 , experienced significant productivity gains (of on average 19%) whether changes in the training program (for example the amount of training) also influence labor productivity can however not be investigated.

Lynch and Black (1995) estimate a production function to test whether labor productivity depends on the number of workers who received training. Only if they include other dimensions of the training programs[*] do they find significant positive effects. In particular, computer training increases labor

[*] The proportion of time spent in formal off- the- job training, the content of training programs, and a distinction between manufacturing and non- manufacturing companies.

productivity by more than 20%.In addition, for manufacturing the proportion of time spent in formal off – the – job training has a significant positive effect on firm productivity.*

Boon and Van der Eijken (1997) use panel data for 1990 and 1993, which contains detailed information on the amount of training provided by individual firms, including the costs of training and total time spent in training. Information on training costs is used to construct a measurement for the stock of human capital within a firm. The current stock of human capital is a combination of the stock of last year (minus depreciation) and a human capital increase resulting from firm- provided training. They estimate the impact of the human capital stock on gross production and value added, using two different estimation methods (fixed effects and random effects estimators). Only the random effect estimator on value added results in a significantly positive elasticity of human capital of 0.07.†

Firm- provided training is just one of many human resource management (HRM) practices. The studies discussed so far all focus on the relevance of training. In contrast, Ichniowski et al. (1997) look into the combined effects of various HRM practices on productivity. To investigate the complementarities of these practices, they classify observations into four different HRM systems, ranging from 'traditional′ to 'innovative'. Their findings are that adopting a system of more innovative HRM practices has large effects on productivity, while changes in individual work practices have little or no effect. This conclusion also holds for the incidence of off-the-job training.

The primary outcome of a training course is that something must be learned, for example specific knowledge, skills and/or different attitudes‡ . If an employee has learned something, this can result in improved individual production. The transition from learning to improving individual production is however very complicated, and success is not guaranteed. It not only

* In Black and Lynch (1996) they show that these conclusions also hold if production instead of labor productivity is being explained.

† Because of the construction of the human capital stock (HC), this elasticity is not necessarily identical to the elasticity of training (T). If training is assumed to have a constant (pre- sample) annual growth rate g, it can be shown that $HC_t = T_t/(g+d)$, with d the depreciation rate of human capital . The human capital elasticity of training then equals 1, and the elasticities of human capital and of training are the same. If g is not constant, this equality doesn't hold.

‡ No distinction is made between general and specific human capital. This distinction is important if one studies the distribution of costs and benefits of training, but is less relevant for the returns to training.

depends on what has been learned, but also on the motivation to actually apply the learning outcomes at the workplace. Both the design of the training program and the motivation of employers and employees are important in this respect. Finally, individual production should increase production and productivity at firm level (Holton,1996).

An increase in knowledge or human capital can affect both level and growth of productivity. For different mechanisms can be distinguished by which human capital may affect productivity (Corvers, 1997):

- The worker effect: workers with more human capital make a more efficient use of available resources in producing a certain output. The more complex the production technique is, the larger the worker effect can be.
- The allocation effect: workers with more human capital can make a more efficient allocation of the various input factors between the alternative uses available.
- The diffusion effect states that employees with more human capital are more able to adapt to technological change, and will introduce new production techniques more quickly.
- The R&D effect refers to the role of human capital as an important input in R&D activities. A higher share of highly educated employees is beneficial to R&D activities, resulting in a faster introduction of technological progress and productivity growth.

The worker and allocation effect refer to the level of productivity, whereas the diffusion and R&D effects influence the growth rate of productivity. The diffusion effect follows technological progress, whilst the R&D effect (partially) causes technological progress. This implies that only the R&D effect can result in embodied progress.

If the effects of training depend on various influences, then a firm must control for all these influences if it wants to obtain a maximal return to training. Setting up a training program with maximal efficiency requires a firm to follow certain steps.

1. Identify the knowledge gap (what must be learned?).
2. Formulate the goals of training, and the criteria to evaluate it by. This is beneficial to the transition from learning outcomes to individual productivity, but can also stimulate the motivation to learn and apply.

3. Choose the evaluation system.
4. Determine the training design (training method, materials used, time and place, etc).
5. Perform the training course.
6. Evaluate to which extent the training has reached the formulated goals; not only to learn more about the effects of this specific training course, but also to stimulate the motivation of employees to apply their newly gained knowledge in practice.

Carrying out these steps takes time, and requires specific knowledge on (the effects of) training and available training course.

Most studies on the returns to training are limited to the employee's share of these returns: the impact of training on wages. The general outcome of these studies is that training has a positive impact on wages. (Groot, 1999b). Barron et al. (1999) make a distinction between the impact on the level of starting wages, and on subsequent wage growth. Human capital theory predicts a negative relation between (expected) time spent in training and starting wages, but they do not find robust support for this prediction. They do find a positive impact of training on both wage growth and productivity[*].

The some studies analyze the effects of training and human resource development on workers' wages. Far fewer studies exist that analyze the effects of these factors on the productivity of the firm. Moreover, the results of these studies were highly dependent on the estimation technique, the definition of training and the measure of productivity (c.f.Ballot, fakhfkh &Taymaz, 2001). Some authors have found positive effects of training on the productivity of the firm. Holzer, Block, Cheatham &Knott (1993),Baatel (1994) and Dearden, Reed & Van Reenen (2000). Blake & Lynch (2001) , however , did not find an effect of the number of employees trained on the productivity of the firm, whereas Barrett& O'Connell (2001) found that general training has a positive effect on productivity growth whereas specific training has no effect. Dearden, et al(2000). Meanwhile, found that the effects of training on wages are about half the size of the effects on industrial

[*] They measure training by total hours of training provided during the first three months, and use subjective measurements of individual productivity.

productivity. However, they did not focus on the productivity of individual firms, but on the productivity of the sector of industry. (cf. lynch.1998).

Conclusion

Despite the diversity in methodologies and variables used, it is possible to extract some general conclusions from these studies. As expected, training has a variety of positive effects on the financial and nonfinancial firm performance. These effects might be much broader than the results of many previous studies suggest. It means that these effects are of considerable importance in terms of both theory and managerial implications. Therefore, it is necessary to identify and develop potential ideas for discussion and provide suggestions and directions for other research on this topic.

The reviews see a first opportunity for future research in the theoretical explanation of why training might help to increase firm and labor productivity. As presented in the theoretical framework for analyzing training and firm productivity issues, training has directly improved HR outcomes (e.g., knowledge, skills, abilities, attitudes, behaviors and motivation of employees).

By directly linking training with firm performance and productivity, however, almost studies have ignored the potential mediating role of these HR outcomes on the relationship. Thus, an important question is whether training clearly affects labor productivity, which in turn impacts on firm productivity level. Highlighting this feature provides a point of departure for other research namely, to test the mediating effects of HR outcomes, and productivity, which could be useful in clearing the relationship between training and firm productivity. In addition, although training activities are acknowledged to play an important role in linking employees with firm performance, the specific form (universal perspective or contingency perspective) of the relationship between training and firm performance is still doubtful.

Second , although the presented review shows that training can have positive and significant effects on firm performance and productivity in specific sectors , there are only few studies which follow this approach (e.g., Ichniowski . et al. 1997,Paul & Anantharaman 2003) .

Third, the previous studies (presented some of them in this chapter) have estimated the effects of training on firm performance and productivity in many specific jobs, companies, industries and countries. However, most of these studies have been implemented in developed countries (e.g., Bishop 1991, Barrerr & O Connell 2001 , Aragon- Sanchez, et al . 2003, Faems, et al. 2005) whereas the relationship between training and organizational performance is not adequately addressed and studied in developing countries. In addition, the impact of training for different types of employees (e.g., worker, Supervisor, office staff, manager) and their performance might vary according to job characteristics and locations.

Fourth, a number of researchers (e.g., Bishop 1991, Fey, et al. 2000)have used a subjective method for their studies, whereas other studies (e.g., Bassi &Van Buren 1998 , Aragon-Sanchez, et al. 2003, Rodriguez &Ventura 2003,Rodriguez Ventura 2003) have a low response rate in terms of questionnaires or lack reliable data for estimation. The results of estimates depend on the accuracy of the assumptions, while low response rates and a lack of data may lead to incorrect results. Thus, the methodological limitations of these studies present opportunities for new research.

Finally, this research may be important for researchers and managers dealing with training and firm productivity in the workplace. Training is a valuable way to follow when an organization would like to improve its productivity, and in the light of the presented review together with the framework for analyzing training and firm productivity issues , managers could find some interesting clues and subjects to the advantages of training For instance, a company could measure types of training for their employees (workers, supervisors, managers) in order to gain a better understanding of how different types of training influence performance indicators . Managers could then decide when and how to provide training programmes for their employees in order to obtain their higher productivity. (e.g., research design, measurement of variables and firm performance or estimation method), to suggest direction for future research. And improve the accuracy of the research results in the future on the same topics. The research reviewed the important theoretical models and proposed a framework for analyzing training and firm performance and productivity. Issues data from previous studies were used to assess the effects of training on firm performance. There were two approaches to gauge the impact of training on firm performance,

namely the studies that use firm level data from a large sample of firms and the case study approach. Based on the firm performance measures used in previous studies firm performance was classified into financial firm performance and non financial firm performance.

Therefore:

- The human resource management and its function, however defines value in both human and financial terms. It cars about people and profitability , and it talk about human , production, and financial values in two ways: quantitatively and qualitatively
- Human resource development assessment can be done by evaluating training costs using cost- benefit or cost – effectiveness analysis or by translating a trained employee's productivity into monetary terms through utility analysis.
- Training benefits can be tangible and intangible getting from hard and soft data. Financial methods in the field of the HRD evaluation are difficult applicable to soft data and therefore much more attention should be paid to qualitative evaluation methods.
- The important point is that ROI calculations can be developed reliably and accurately for almost training program. To do so, the ROI process must be approached with careful planning, methodological procedures, as well as logical and practical analyses.

- It is important to note that, with respect to the human capital embedded in the workforce of a firm, studies of the effects of human resource development (HRD) on firms' productivity merely focus on participation in training, and do not include aggregate measures of workers' stock of training investments nor the level of the relevant skills of the workers.

- There were two approaches to gauge the impact of training on firm performance, namely the studies that use firm level data from a large sample of firms and the case study approach. Based on the firm performance measures used in previous studies firm performance was classified into financial firm performance and nonfinancial firm performance. Training has a variety of positive effects on the financial and nonfinancial firm performance.

- There is an opportunity for future research to examine the influence of training on firm productivity relative to features of job characteristics, as well as a specific country.
- New researches will present challenges for carefully defined research model, well chosen sample sizes, correct and suitable data collection techniques and measurement of variable, and a well chosen estimation framework.

According to research in many sectors (e.g., steel, food and tobacco, textiles and clothing, chemicals and petroleum, banking and finance) will probably have different effects or views on the relationship between training and firm performance. Therefore, this research will estimate the relationship between training and labor productivity in IRAN Pharmaceutical Industry sector in order to provide another potentially interesting result on the relationship and contribute to the current literature within the field.

CHAPTER 3

The Research Methodology

Abstract

In this study, the relation and effect of technical and general training of the staff on the labor productivity was examined in 31 selected pharmaceutical corporations of Iran during 2003-2009.

The labor productivity has been calculated based on both total output (production) and value–added and the effect of various trainings on the productivity was examined using "Panel data".

According to economic theory of endogenous growth, the factors effecting on the labor productivity in estimated model are staff training (including training costs (total, technical and general)) and capital factor (including capital accumulation).

The research results generally represent the positive and significant effect of training factor on the labor productivity in Iran pharmaceutical industry during 2003—2009. So the general and technical trainings have been effective in different ways (such as improving the attitude, increasing the knowledge and upgrading the level of skills) on the labor productivity improvement.

To perform the calculations in this research, all value (Real) data are first deflated based on the base year and then are used in calculations. So the effects of market price fluctuations are neutralized both for inputs (the used resources) and outputs (products) to provide the possibility of true comparison of the firms' operation during various time periods.

First, the labor productivity in selected corporations of Iran pharmaceutical industry has been calculated during 2003-2009 using Kendric – Krimer, Sumanth and Solow methods and then by presenting the model, the effective factors on the productivity are analyzed with emphasis on the labor training (total, technical and general training) and finally, the effect of training (as total and as of each one of general and technical training) on the productivity is estimated.

To find an index for pharmaceutical industry, the data from 31 active corporations in Iran pharmaceutical industry which are also members of Iran stock exchange organization are used.

3.1. Theoretical Basics

In the framework of economic growth theories, the total factors productivity is related to that part of growth which is explained by labor and capital changes, which is known as the "Solo" residue. The labour productivity as the partial productivity can be also explained by changes in the labour and capital.

So to know the effective factors on the productivity growth (both total and partial productivity) it's necessary to use the economic growth theories. The growth theories are generally divided into two categories: endogenous and exogenous growth theories. In endogenous growth theories, the interference of technical advance is considered as exogenous, Due to inability of neoclassic models in explaining the most basic growth realities. The endogenous growth models were presented which in contrary to neoclassic growth models, they have entered the technology factor in growth models endogenously. Endogenous growth models are mainly classified in two sub–categories, one of which is based on the Research and Development (R&D) and the other one is based on human resources and relates the stable long – term growth to human capital accumulation.

So recent years studies have emphasized on the importance of human capital in economic growth of the industries and various studies was performed, such as "Lucas" model which introduces the human capital just as an input in production function and consequently relates the production growth rate to human capital growth, and the higher this input, the more is production, or such as "Rumer" which assumes the level of human capital effective on the production growth rate. In "Nelson and Phelps" model, the human capital is not known as just an input, but is introduced as the origin of innovation and so the production growth rate is dependent to innovation rate and eventually to the level of human capital.

So according to the endogenous growth theories, the variables effective on the productivity of total production factors include two main factors namely human and capital which each one have their own specific dimensions.

$$TP = f(L, K)$$

According to the explanations presented in this section, the human resources productivity, like the total production factors, is under impact of

two basic factors namely human and capital which can be shown as the following relation

$$PL = f(L, K)$$

L is the labour and K is the capital symbol.

3.2. The theory framework

Based on what stated in previous section (the theoretical fundamentals of the research), the factor, effecting the human resource productivity include two human and capital factors. In human factor, two important dimensions include training and motivation, however because during the study years and according to the collected data, no significant change has happened in management systems and compensation mechanisms for services and reward and appreciation for the personnel in the examined industry and the senior managerial stability of this industry was also high and there was little change in CEO and middle managers of the studied industrial units or there was no major change in their management or leadership method.

So the effect of motivation factor has been considered as a minor and secondary factor and human resource productivity in this industry was assumed to be mostly under influence of training and capital as two main and important factors.

$$PL = f(\text{Training, Capital})$$

Since the purpose of performing this research was to examine the effect of training on the human resource productivity in Iran pharmaceutical industry, the training factor has been examined and assessed in training cost format which shows the quality and quantity of training courses and various trainings has been separately taken in to account.

It means in addition to total training, a separate and classified training was also entered independently into the research equations as two types of technical and general trainings.

The capital factor was also entered into the equations as the capital accumulation based on the labour hours for each one of staffs.

Considering the previous explanations, the general shape of human resource productivity function is as follows:

$$PL = f(K, L)$$

In which PL is human resource productivity, K is the capital accumulation and L is the staff training costs. Followingly we introduce how the above variables influence the human capital productivity. The capital accumulation as the substitute Variable for capital represents the amount of investment for each staffs per hour, increase of which is considered as the presence of enough physical resources, equipments and instruments for human resources to work. The targeted increase in staffs' training with approach of improving labour quality and human resource operation will lead to increase in human resource productivity and consequently generates more production and value-added.

Of course, staff training includes two categories of technical and general trainings which technical trainings are the specific trainings related to each job group or each job and general trainings are the required trainings for most staffs in different job groups and both these trainings can be effective in improving the attitude and increasing the knowledge level and human resources skills and consequently show their impacts on the labor operation. (Figure 3-1)

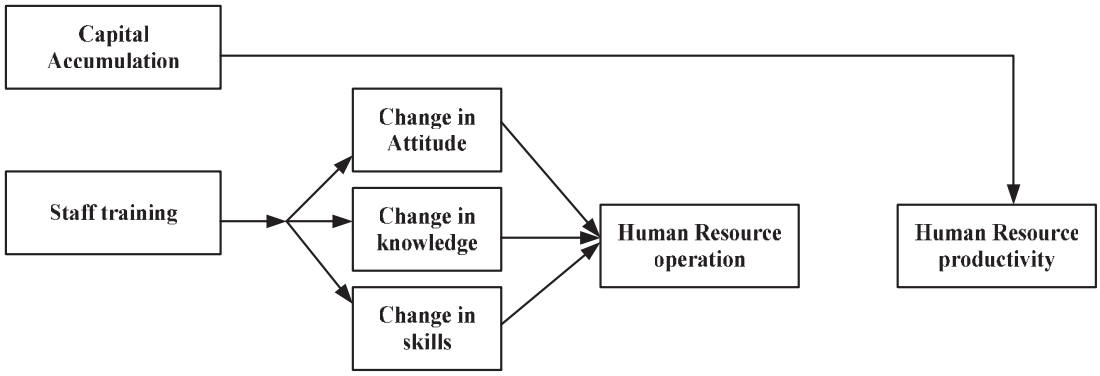


Figure 3-1- The relationship between training and productivity

This relation is summarized as following and considered in this research

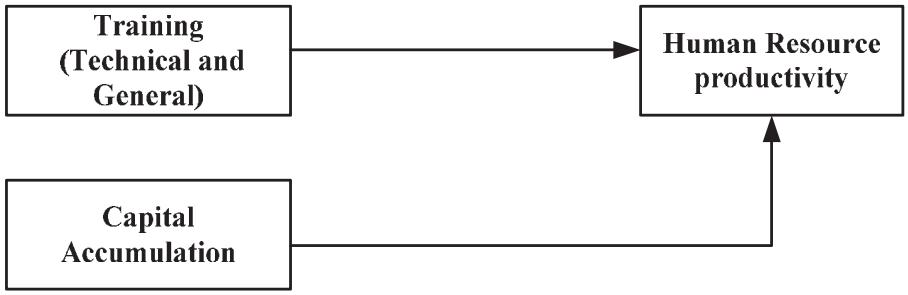


Figure 3-2- The relationship between training, capital, and productivity

and according to two main types of training, the relation between training and human resources productivity has been considered as following:

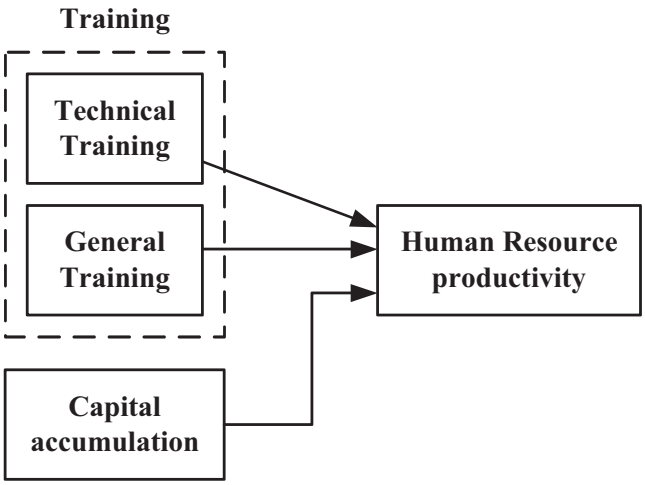


Figure 3-3- The relationship between technical training, general training, capital, and productivity

3.3. Determination of Model Estimation Method

To estimate the model and test the hypotheses, in this study the panel data method is used which is a method of data combination. This is because the number of sectional observations (number of firms) or time series (number of years) to estimate regression equation is not adequate and so it's essential to combine the sectional and time series data.

3.3.1. The Research Hypotheses

The research hypotheses are as follow:

1. Increase in the staffs' training cost is effective on increase in the firms' human resources productivity (TPL_t)
2. Increase in the staffs' training cost is effective on the increase in human factor productivity, based on the value – added (VPL_t)
3. Increase in the staff's technical training cost is effective on the increase in the firms' human resources productivity, based on total production (VPL_t)
4. Increase in the staffs' technical training cost is effective on the increase in the firms' human resources productivity, based on the value–added (VPL_t)
5. Increase in the staff's general training cost is effective on the increase in the firms' human resources productivity based on total production (TPL_t)

6. Increase in the staffs' general training cost is effective on the increase in the firms' human factor productivity based on the value – added (VPL_t).

3.3.2. Definition of variables*

The model variables include:

1. Total productivity of human resources in time period of t per labour working hours ($TPLH_t$). This variable shows the status of total productivity of human resources in different job levels (total) of a firm during a one year time period. The calculation of this variable is as the following:

$$TPLHt = \frac{(\quad)}{(\quad)}$$

- The value of firms' total production in year t (To_t) this variable is sum of the value of firms' total production in year t (and after deflation) which is calculated as follow:

$$TO = O + O + \cdots + O$$

$$TO = (QO \times PO) + (QO + PO) + \cdots + (QO \times PO)$$

O_{it}: Total value of the i^{th} manufactured product (output) in period t (at the base year price)

QO_{it}: Total amount of the i^{th} manufactured product (output) in period t

PO_{io}: The price of each unit of the i^{th} product (output) based on the base year price

- The sum of staffs' working hours of the firm in year t (LHt) this variable is the sum of ordinary and over time working hours of staffs in different job level of the firm during one year

* All value data (at dollar) is presented after deflation and at the base year price of 1383

2. Total productivity of human resources in time period of t based on the total staffs' cost ($TPLC_t$)

This variable represents the status of human resources productivity in different job levels (total) of a firm in a one–year period and according to the total costs of the staffs during a year. The calculation of this variable is as follows:

$$TPLC_t = \frac{\text{'} \qquad (\quad)}{\text{'} \qquad (\quad)}$$

- The total value of the firms' production in year t (To_t) was explained in previous section
- Sum of the firm's staff costs in year t (LC_t) these costs include the sum of following costs which is entered into calculations after deflation:

* Wage and Salary cost
* The cost of attraction right
* The mission cost
* Overtime working cost
* Insurance cost (the employer's fee)
* Training cost
* Reward cost
* Cash aids cost
* Non – cash aids cost
* Health and treatment cost
* Food cost

3. Human resource productivity index of the firm in period t (per labour hour) ($VPLH_t$)

This variable shows the status of a firm's labour productivity in one year time period based on total labour hours. The calculation of this variable is as follows:

$$VPLHt = \frac{(\quad) \qquad \text{'} \qquad (\qquad)}{(\quad) \qquad \text{'}}$$

- The firm's value–added in year t (after deflation) (VP_t)

This variable represents the amount of added value a firm has generated in year t using two key factors, namely human resources and capital resources. This variable is calculated as follows:

a. The Minus method

$$\text{Value–added} = \text{Net Sale Vale (after de lation)} - \text{value of intermediate items (after de lation)} \pm \text{Closing Inventory} - \text{Opening Inventory}$$

b. The Sum method

VA_t = Personnel Expenses + Depreciation + Rent + Financial Cost + Tax + Net Profit

4. Human factor productivity index (labour Competitiveness) of the firm in period t (based on total staffs) ($VPLC_t$)

This variable shows the labour competitiveness status of a firm during a one -year time period based on the sum of staffs' working hours. This variable is calculated as follows:

$$VPLC_t = \frac{(\quad)'}{(\quad)'}$$

The numerator and denomination variables was previously explained

5. The firm's capital accumulation in period t ($TKLH_t$)

This variable represents the amount of the firm's fixed assets based on the book value in year t per labour hour of the staffs and is calculated as follows:

$$TKLH_t = \frac{(\quad)}{(\quad)'}$$

- The sum of fixed assets book value in year t (FA_t)

This variable includes the finished price of purchasing fixed assets minus depreciation reserve of fixed assets in year t.

- The sum of staffs' labour hours of the firm was explained in previous sections

6. Total labour training cost per total staffs' labour hours of the firm in period t ($ToTLH_t$)

This variable represents the sum of direct and indirect costs of staffs' training in year t compared to the sum of staffs' labour hours of the firm in year t. This variable is calculated as follows :

$$\frac{(TOT)\quad \text{The sum of staffs training costs in year t}}{(LH)\quad \text{the sum of staffs}' \text{ labour hours of the irmin year t}}$$

- The sum of staffs' training costs in year t (TOT_t)

This variable includes following direct and indirect costs:

* The cost trainer
* The cost of lost labour hours of the staffs due to presentation in training process
* The cost of training resources including CDs, books , booklets, films and stationeries
* The cost of training administrative department
* The training – related costs including the cost of place of holding the training course outside the firm, the staffs' transportation costs (transfer), reception and food costs, hotel and residence costs.

7. Total labour training costs compared to the sum of staffs' costs in year t ($TOTLC_t$)

This variable represents the sum of direct and indirect costs of staffs' training in year t compared to firms' sum of staffs' costs in year t.

$$\frac{(TOT)\quad \text{The sum of staffs}' \text{ training costs in year t}}{(LC)\quad \text{the sum of staffs}' \text{ costs of the irmin year t}}$$

8. Total costs of staffs' technical training

This variable represents the sum of direct and indirect costs of staffs' technical training in year t compared to the sum of staffs' labour hours of the firm in year t. This variable is calculated as follows :

$$\frac{(\text{TE}) \quad \text{The sum of staff}'\text{s technical training costs in year t}}{(\text{LC}) \quad \text{The sum of staffs}' \text{ labour hours of the irmin year t}}$$

TE_t is the sum of staffs' training costs spent on technical (cnstom – built) trainings

9. Total staffs' technical training costs in year t compared to staffs' costs ($TELC_t$)

This variable represents the sum of direct and indirect costs of staffs' technical trainings in year t compared to the sum of firm's staff costs in year t.

$$\frac{(\text{TE}) \quad \text{The sum of staffs}' \text{ technical training costs in year t}}{(\text{LC}) \quad \text{The sum of irm}'\text{s staff costs in year t}}$$

The numerator and denominator variables were previously explained.

10. Total staffs' general training costs in year t compared to staffs' labour hour in year t ($GELH_t$)

This variable represents the sum of direct and indirect costs of staffs' general trainings in year t compared to the firm's sum of staff labour hours in year t which is calculated as follows:

$$\frac{(\text{GE}) \quad \text{The sum of staffs}' \text{ general training costs in year t}}{(\text{LH}) \quad \text{The irm}'\text{ssum of staff labour hours in year t}}$$

GE_t is the sum of direct and indirect costs of staffs' trainings spent on general (non – custom built) trainings of all staffs in period t.

11. Total cost of staffs' general training in year t compared to total staffs' costs ($GELC_t$)

This variable represents the sum of direct and indirect costs of staffs' general training in year t compared to the firm's sum of staffs' costs in year t. This variable is calculated as follows:

$$\frac{(GE)\ \text{The sum of staffs}' \text{ general training costs in year t}}{(LC)\ \text{The firm's sum of staffs costs in year t}}$$

The numerator and denominator variables were previously explained.

3.4. Data Analysis Method

3.4.1. Panel Data Models Estimation

The general form of panel data is as the following:

$$Y = \propto + X'\beta + \delta + \gamma + \varepsilon$$

In which Y_{it} is endogenous variable and X_{it} is explanatory variable. is the error term of the model. In above model, i=1,2, …. Represents the number of observations and t=1, 2, .. , T represents the observation period. The α coefficient is the general constant term of the model. While and are respectively cross section constant and period constant or are called fixed effects and random effects and β is coefficient matrix of the effect of training costs on the labour productivity.

One method to estimate the fixed effect models is definition of dummy variables for each group and each time period. These types of fixed effect models which are of high popularity are called least Squares Dummy Variable (LSDV) models.

The fixed effects models have various types among which the followings can be mentioned:

a. Fixed coefficient models in which the constant term changes for various sections. In other words, for each present section in regression, a dummy variable is defined in these models that for observations of that section, unit value and for other sections, zero value is chosen.

b. Fixed effects model in which the constant is different for each year (period effect model).
c. Fixed effects model in which the constant is different for each section and each time period. It means that the defined dummy variables affect both on constant and on coefficient (combination of period and section effects).

The assumptions of fixed effects model are:

$$E(\varepsilon) = E(U) = \sigma$$
$$E\ \varepsilon = \sigma_{\varepsilon}$$
$$E\ U = \sigma$$
$$E(\varepsilon, U) = 0$$
$$E\ \varepsilon, \varepsilon = 0$$
$$E\ U, U = 0$$

3.4.2. Stationarity and Panel Unit Root Test

Definition of stationarity: A random process is called stable when its mean and variance is fixed during the time and its covariance value between two time periods does not depend on time.

If a random process has the following characteristics, it is called static.

$$E(y) = \mu$$
$$\text{var}(y) = \sigma$$
$$\text{cov}(y, y + k) = \gamma$$

3.4.2.1. Spurious Regression

If the regression data are not static, R^2 is high and t_s are significant and hence the researcher mistakenly assesses the model as a good model. So before doing any regression analysis, it's essential to be assured about the data stationarity

3.4.2.2. The stationarity Tests

To test the variables stationarity, various tests have been modeled. The most important test in this regard is Dicky – Fuller (DF) and Augmented Dicky – Fuller (ADF) test.

Suppose that U_t is the white noise term, i.e has all classic assumptions.

$$y = Py + U$$

If P=1, the y_t time series is of unit root. If y_t has unit root, it is called Random walk process. Y_t is called a first order integrated time series and is shown as I (1).

* Generally if a time series becomes static after d times of differencing, it is called a d^{th} level (I (d)) integrated.

3.4.2.3. Augmented Dicky-Fuller Test (ADF)

If it is assumed that error terms (U_t) in DF test have autocorrelation, the ADF is used.

$$\Delta y = \beta + \beta + \delta y + \alpha \Delta y + \varepsilon$$

According to the nature of panel data, various tests such as Levin, Lin and Chu (LLC), Hadri test, Im, Pesaran and shin test and … have been developed to test the presence of unit root in panel data.

3.4.3. Hypothesis testing for model coefficients

After estimation of regression relation, it's necessary to perform the required test for significancy of each coefficient. For significancy test, **t** test is used. Using **t** test requires that the value of standard deviation for each coefficient to be determined. The value of coefficients standard deviation in a simple linear regression is as follows:

$$S_\beta = S \frac{1}{\sum x}$$

$$S_\propto = S \frac{1}{n} + \frac{x}{\sum x}$$

Empirical studies show that :

$$\propto \sim N(\propto, \sigma_\alpha)$$

$$\beta \sim N \beta, \sigma_\beta$$

Since the $\sigma_{\propto}$ and σ_{β} are unknown, $S_{\propto}$ and S_{β} are substitued.
It is proved that:

$$\frac{\propto - \propto}{S_{\propto}} \sim t$$

$$\frac{\beta - \beta}{S_{\beta}} \sim t$$

So if the value of calculated **t** lies outside confidence interval, the null hypothesis of non significance of the coefficient would be rejected. Consequently, the related coefficient will be significant.

3.4.4. Goodness of fit criteria

Determinant coefficient shows the goodness of fit in a regression. It means this criteria shows that to what extent the estimated model fits on the real data. To calculate the goodness of fit criteria, the real value of the variable is divided into two parts. The estimated part and residual part , which is shown by hat sign.

$$Y = \hat{Y} + \varepsilon$$

$$(Y - \bar{Y}) = (\hat{Y} - \bar{Y}) + \varepsilon$$

In this equation, the left side term is known as total sum of squares (SSt) and two right side terms are respectively estimation sum of squares (SSR) and residual sum of squares (SSE)

So:

SST = SSR + SSE

Dividing both sides by SST will result in:

$$R = 1 - \frac{SSE}{SST}$$

Substituting SSE and SST in pervious equation and simplifying it:

$$R = \frac{(\sum x\, y)}{\sum x \sum y}$$

Since the correlation coefficient was defined as:

$$r = \frac{\sum x\, y}{\sqrt{(\sum x)(\sum y)}}$$

3.4.5. Noise terms Auto correlation and recognizing it

One of main regression hypotheses regarding noise term is that the covariance between the noise terms is zero. If this hypothesis is violated and there be a kind of regular movement in noise terms, the autocorrelation problem will be detected.

3.4.6. Durbin – Watson method to diagnose the noise terms Autocorrelation

The Durbin method is used to diagnose the presence of first order autocorrelation. It is assumed in this method that the correlation pattern of noise terms are as following:

$$\varepsilon = \rho\varepsilon + u$$

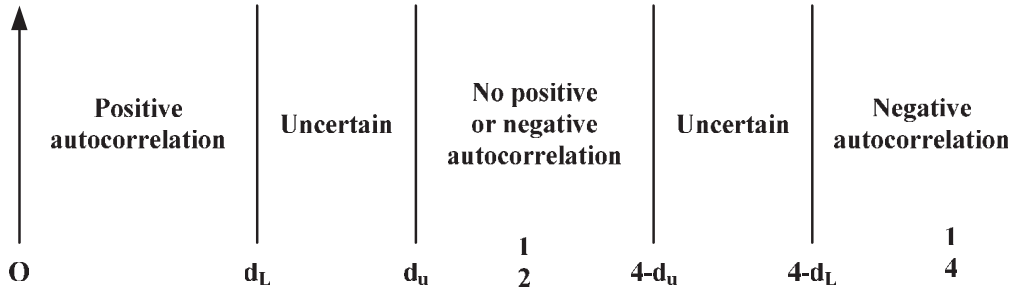
The null hypothesis of this test is : $= 0$
The statistic of this test is :

$$d = \frac{(\hat{} - \hat{})}{\hat{}}$$

It is proved that if the sample volume tends to infinity, the d statistic value is calculated as following:

$$\approx 2(1 -)$$

Durbin and Watson have calculated the critical values of the above statistic and these values are accessible in related tables, in general, the decision making rule regarding presence or non presence of autocorrelation using D.W statistic is as following:



Chapter 4

Results and Analysis

Introduction

In this chapter, the relationship, between the staff training and productivity is examined. To assess this relationship, two types of Linear production function and cobb- Douglas production function have been utilized. Also in order to measure the level of effect of general training and technical training and the combination of these two types of training in each one of the above production function, the effect of each type of training is assessed separately. On the other hand, to calculate the productivity, two criteria are used to measure the output levels of the firms: Total production and value – added. The analysis method in this chapter is regression analysis based on panel data. In this regard, the required diagnostic tests on data is firstly performed and then by selecting the type of panel data model, the effect of training on the productivity is estimated and the estimated relation is analyzed.

4.1. Research variables

In this chapter, the dependent variable and explanatory variables are used in regression analyses as shown in table 1-4.

Table4.1. Dependents and explanatory Variables

Variables	**Description**
TPLH	Total production divided by labor hours
TPLC	Total production divided by labor costs
VPLH	Value added divided by labor hours
VPLC	Value added divided by labor costs
TKLH	Total capital divided by labor hours
TOTLH	Total training costs divided by labor hours
TOTLC	Total training costs divided by labor costs
TELH	Technical training costs divided by labor hours
TELC	Technical training costs divided by labor costs
GELH	General training costs divided by labor hours
GELC	General training costs divided by labor costs

As you see in table 4.2. The 219 information data related to 33 companies in pharmaceutical industry show that:

Table 4.2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total production divided by labor hours	219	8,956.30	694,285.29	74,123.24	57,743.86
Total capital divided by labor hours	215	911.49	254,357.54	45,925.36	34,854.69
Total training costs divided by labor hours	219	0.00	0.02	0.01	0.00
Total production divided by labor costs	219	1.56	59.57	8.91	6.48
Total training costs divided by labor costs	219	0.00	0.12	0.03	0.02
Technical training costs divided by labor hours	219	0.00	0.02	0.01	0.00
Technical training costs divided by labor costs	218	0.00	0.20	0.03	0.02
General training costs divided by labor hours	219	0.00	0.00	0.00	0.00
General training costs divided by labor costs	216	0.00	0.20	0.01	0.02
Value added divided by labor hours	217	-27,272.33	77,326.88	15,696.74	14,428.96
Value added divided by labor costs	217	-10.72	9.29	1.78	2.11

- Total production divided by labor hours index in minimally $ 0.895 and maximally $69.4 and in average $7.4 and the standard deviation amount is 5.77
- Total capital divided by labour hours is minimally $ 0.091 and maximally $ 25.4 and in average $4.6 which its standard deviation amount is 3.48
- Total training cost divided by labor hours index is minimally close to zero and maximally 0.02 and in average 0.01
- Total production divided by labour cost index is minimally 1.56 and maximally 59.57 and in average 8.91 which its standard deviation is 6.48
- Total training cost divided by labour costs is minimally close to zero and maximally 0.12 and in average 0.03 which its standard deviation amount is 0.02
- Specific training costs divided by labour hours index is minimally close to zero and maximally 0.02 and in average 0.01
- Specific training costs divided by labour costs index is minimally close to zero and maximally 0.20 and in average 0.03 which its standard deviation amount is 0.02
- General training costs divided by labour hours index is too small and close to zero
- General training costs divided by labour costs index is minimally close to zero and maximally 0.20 and in average 0.01 which its standard deviation is 0.02.
- Value added divided by labour hours index is minimally $-2.72 and maximally $7.73 and in average $ 1.57 which its standard deviation amount is 1.44

- Value added divided by labour costs index is minimally -10.72 and maximally 9.9 and in average 1.78 which its standard deviation amount is 2.11

The averages of above indices are shown in figures 4.1, 4.2, 4.3, 4.4.

Figure4.1. Total production and value added divided by labor hours

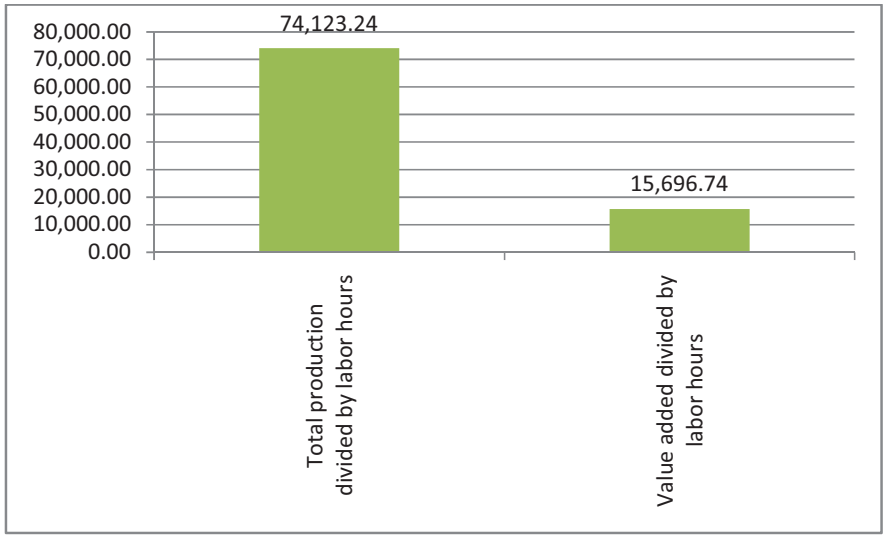


Figure4.2. Total production and value added divided by labor costs

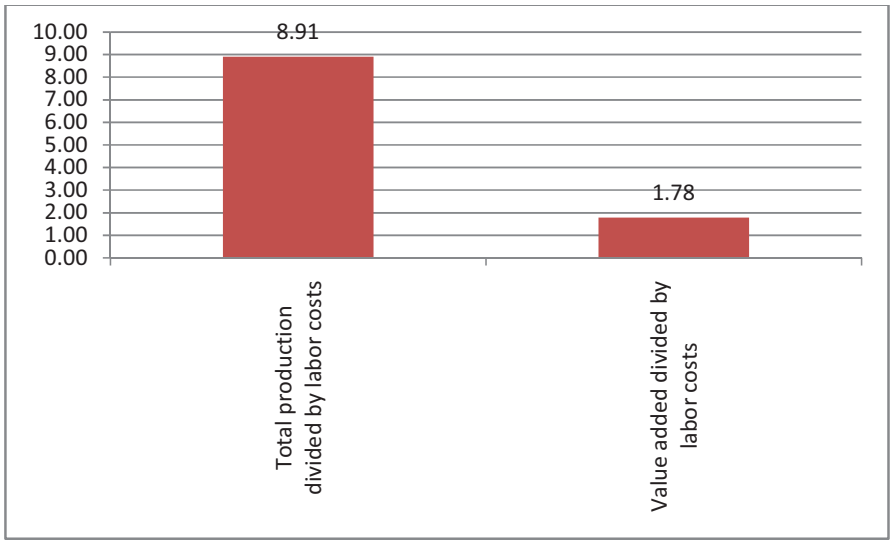


Figure4.3. Total, specific, and general training costs divided by labor hours

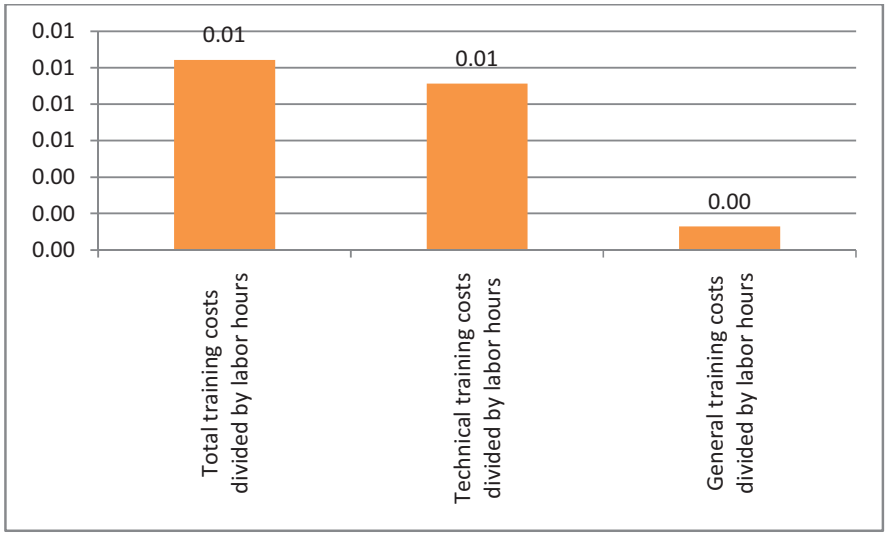
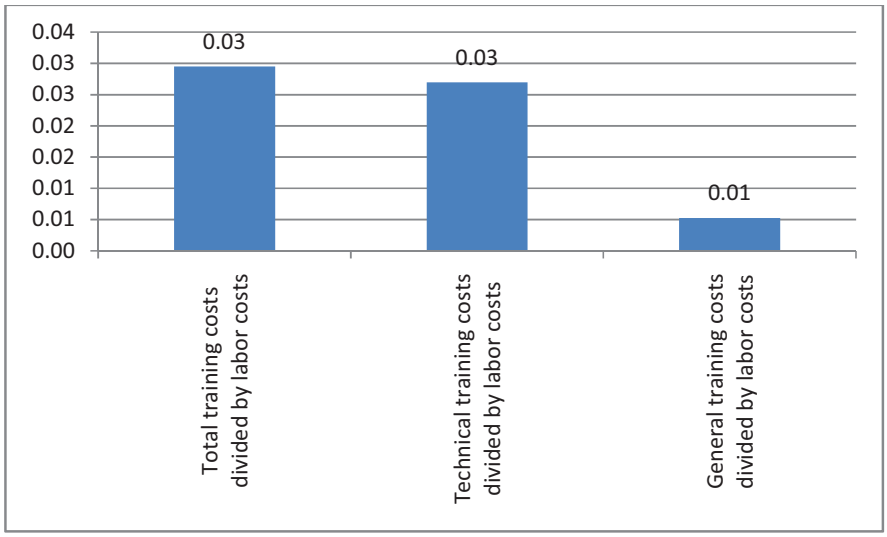


Figure4.4. Total, specific, and general training costs divided by labor costs



4.2. Stationarity test

Before estimating the relation between staff training and productivity it is essential to test the stationarity of all the variables used in estimation. According to the econometrics theories, using non – stationary data in regression analysis leads to the problem of spurious regression. It means that in case of entering non-stationary data in the regression, the estimated coefficients will not be valid. As was mentioned in chapter 3, in econometric literature, the Dikky–fuller and augmented Dikky–Fuller tests are mainly used for stationarity test.

But in cast of panel data, it is necessary to use the panel unit roots tests of variables. Among the aggregated stationarity tests, two tests named Levin, Lin & Chu T-test and Im, Pesaran and Shin W-tests are more general and the possibility of performing them using Eviews software is provided.

Table4.3. Results of panel unit root tests

Variables	Im, Pesaran and Shin W-test		Levin, Lin & Chu t-Test	
	Value	Prob.	Value	Prob.
TPLH	7.72	0.045	-6.29	0.038
TPLC	9.52	0.043	-5.72	0.041
VPLH	11.05	0.021	-9.92	0.009
VPLC	13.87	0.016	-8.61	0.025
TKLH	19.16	0.001	-9.14	0.021
TOTLH	17.09	0.003	-11.25	0.015
TOTLC	25.23	0.000	-14.45	0.001
TELH	39.63	0.000	-43.18	0.000
TELC	7.83	0.040	-1.71	0.043
GELH	31.54	0.008	-32.22	0.000
GELC	21.45	0.019	-21.54	0.001

The above table shows the results of doing these two tests on all the variables including dependent variables and explanatory variables. Based on the fact that the null hypothesis of these tests is the cumulative stationarity of the variables (presence of unit root), if the value of calculated statistic of these tests is larger than the critical values correspondent to the conventional confidence level, the null hypothesis of nonstationarity is rejected. Table (4.3) shows that the null hypothesis of nonstationarity of all variables is rejected in confidence level of 95%. So it can be concluded that all variables used in estimation, is not of unit root and has the stationarity specification.

4.3. Estimation Results

4.3.1. Linear production function

Because in this study two types of linear production function and cobb – Dauglas production function is used for assessing the effect of training on the productivity, in this section, the results of estimating the models related to linear production function is presented. Models of this section are divided into two main categories. Models of first category in which the total production is used as the index for measuring the firms output and models in which the index of measuring the firms output is value added.

First the results of the models in which the productivity is calculated using total production is presented

4.3.1.1. The effect of "total training costs" on the productivity

To assess the effect of total training costs (including costs of general and technical training) on the productivity, the following models are estimated.

Model 1: = + + +

Model 2: = + + +

In model (1) to calculate the productivity, total production of the firm is divided by total labour hours and on the other hand, total training costs is also divided by labour working hours. In model (2) the productivity calculation is performed through dividing the firms, total production by the calculated total costs of labour and in this way, total training costs is also divided by total cost of labour. Tables (4-4) and (4-5) shows the results of estimation these two models.

Table4.4. Model 1 estimation results

Model 1: Dependent Variable: TPLH		
Explanatory Variables	Coefficient	Std. error
C	30953.54	17164.51 *
TKLH	0.357	0.170 **
TOTLH	2605774	1447868 *
R-squared:	0.44	
D.W:	2.12	
F-stat:	3.473 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.5. Model 2 estimation results

Model 2: Dependent Variable: TPLC		
Explanatory Variables	Coefficient	Std. error
C	4.845	3.935 ***
TKLH	0.249	0.111 **
TOTLC	85.811	33.715 **
R-squared:	0.56	
D.W:	2.06	
F-stat:	6.823 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results show that both To TLH and To TLC variables have significant effect on the productivity. On the other hand, the per capita capital variable in both above models has also significant relation to the productivity.

The value of determination coefficient (R2) which shows the models goodness of fit are equal to 0.44 and 0.56 for models (1) and (2) respectively. Whatever this criteria is closer to 1, the model goodness of fit is better. The F statistic mentioned at the bottom of the table, shows the simultaneous confidency of all variables of the model, i.e shows to what extent the selected model is effective in productivity determination. The null hypothesis of this test is the simultaneous non – significancy of all the model coefficients and so if the value of this statistic is in the critical area, the null hypothesis is rejected and the model will be significant. As the above results show, the non – significancy hypothesis of the coefficients is rejected in both models and so the model is significant in general. Ultimately, the Durbin – Watson (D.W)

statistic is one of important regression statistics which by utilizing it, the presence of autocorrelation in disturbance terms is assessed. If the value of this statistic is between 1.8 and 2.2, the problem of autocorrelation in disturbance terms does not present. Because the value of this statistic in models (1) and (2) is 2.12 and 2.06 respectively, it can be ascertained that the problem of disturbance terms autocorrelation does not present.

Models (3) and (4) are designed to assess the effect of total training costs on the productivity when the productivity is determined using the value added.

Again have the total value added and consequently the total training costs are divided once to total labour hour (model 3) and once to total human resource cost (model 4). The estimation results of these two models are presented in tables (4-6) and (4-7).

Model 3: = + + +

Model 4: = + + +

Table4.6. Model 3 estimation results

Model 3: Dependent Variable: VPLH		
Explanatory Variables	Coefficient	Std. error
C	1549.743	4933.415
TKLH	-0.040	0.052
TOTLH	1468043	472393 ***
R-squared:	0.59	
D.W:	2.13	
F-stat:	5.891 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.7. Model 4 estimation results

Model 4: Dependent Variable: VPLC		
Explanatory Variables	Coefficient	Std. error
C	0.483	0.522
TKLH	0.0004	0.0005
TOTLC	44.766	15.215 ***
R-squared:	0.45	
D.W:	2.06	
F-stat:	3.035 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The estimation results of models (3) and (4) are too similar to each other. Although in these two models, there is significant relation between total training costs and productivity, the per– capita capital does not have significant relation to productivity. According to the values of D.W statistic, in none of two models, there is no disturbance term autocorrelation problem and the null hypothesis of non – significancy of total regression is rejected in both models.

4.3.1.2. The .effect of "general training cost" on the productivity

In this section, the effect of general training costs on the productivity is assessed. In model (5) the total production and total general training costs are devided to total labour hours and in model (6) two mentioned variables are devided to total labour costs. The results of estimating these models are presented in tables (4-8) and (4-9).

Model 5: = + + +

Model 6: = + + +

Table4.8. Model 5 estimation results

Model 5: Dependent Variable: TPLH		
Explanatory Variables	Coefficient	Std. error
C	51399.10	16534.85 ***
TKLH	0.548	0.285 *
GTLH	-1060319	10412284
R-squared:	0.41	
D.W:	2.44	
F-stat:	2.837 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.9. Model 6 estimation results

Model 6: Dependent Variable: TPLC		
Explanatory Variables	Coefficient	Std. error
C	9.418	0.585 ***
TKLH	0.0001	0.0002
GTLC	-27.765	11.800 **
R-squared:	0.55	
D.W:	2.49	
F-stat:	5.003 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The interesting point about the estimation results of models (5) and (6) is that in these models, the relation between general training costs and productivity is negative. In model (5) the general trainings not only have negative effect on the productivity, but also this relation is insignificant. In model (6) there is negative and significant relation between general training costs and productivity. The relation between per – capita capital variable and productivity is also positive in model (5) and positive and insignificant in model (6). The values of D.W statistic in both models are higher than 2.2 based on which, the probability of autocorrelation presence between disturbance terms is not canceled. The total significancy of autocorrelation coefficients is approved in both models.

The effect of general training costs on productivity is reassessed in models (7) and (8). The difference is that in these models, the human resource productivity is calculated based on productivity instead of total production. In model (7) both total value-added and total general training an divided to total labour hours and in model (8) both mentioned variables are divided by total labour costs. The results of estimating these models are presented in tables (4.10) and (4.11)

Model 7: = + + +
Model 8: = + + +

Table4.10. Model 7 estimation results

Model 7: Dependent Variable: VPLH		
Explanatory Variables	Coefficient	Std. error
C	14030.22	3015.3 ***
TKLH	-0.001	0.047
GTLH	408135.9	2755105
R-squared:	0.56	
D.W:	2.11	
F-stat:	5.272 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.11. Model 8 estimation results

Model 8: Dependent Variable: VPLC		
Explanatory Variables	Coefficient	Std. error
C	0.858	0.134 ***
TKLH	0.0004	0.0003 ***
GTLC	-4.964	2.278
R-squared:	0.23	
D.W:	2.08	
F-stat:	15.395 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

In none of two models (7) and (8) there is not significant relation between general training and productivity. The coefficient sign of general training is positive in model (7) and negative in model (8) .The coefficient sign of per-capita capital and significancy of this variable in both models is also in contrary to each other. Based on the value of D.W statistic, two models do not have autocorrelation in disturbance terms and finally, the total significancy of both models is approved based on the f-statistic.

4.3.1.3. The effect of "technical training costs" on the productivity

The effect of technical training on the productivity is assessed using two models (9) and (10). The difference between these two models is that in model (9) total production and total technical training costs are divided by total labour hours and in model (10) two mentioned variables are divided by total labour costs.

Model 9: = + + +

Model 10: = + + +

Table4.12. Model 9 estimation results

Model 9: Dependent Variable: TPLH		
Explanatory Variables	Coefficient	Std. error
C	30768.25	6510.469 ***
TKLH	0.477	0.159 ***
TTLH	2410445	997100.2 **
R-squared:	0.44	
D.W:	2.12	
F-stat:	3.473 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.13. Model 10 estimation results

Model 10: Dependent Variable: TPLC		
Explanatory Variables	Coefficient	Std. error
C	6.377	1.239 ***
TKLH	0.0002	0.0003
GTLC	52.364	26.432 **
R-squared:	0.56	
D.W:	1.82	
F-stat:	4.496 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The estimation results of both model show that technical trainings have positive and significant effect on the productivity. In the same time, although in model (9) the per capita capital has also positive and significant relation to productivity; in model (10) this relation is not significant. The values of D.W statistic in both models show the non – presence of autocorrelation and the F statistic significancy in 99% significant level shows that the total significancy of regression model is approved.

The effect of technical training on the productivity is reassessed in models (11) and (12) using value–added as the productivity index. The difference between two models is that in model (11), total value–added and total technical training are divided by total labour hours and in model (12), two mentioned variables are divided by total labour hours.

Model 11: = + + +

Model 12: = + + +

Table4.14. Model 11 estimation results

Model 11: Dependent Variable: VPLH		
Explanatory Variables	Coefficient	Std. error
C	-7487.861	3937.803
TKLH	-0.050	0.034
TTLH	2782131	417740.2 ***
R-squared:	0.64	
D.W:	1.99	
F-stat:	7.296 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.15. Model 12 estimation results

Model 12: Dependent Variable: VPLC		
Explanatory Variables	Coefficient	Std. error
C	1.441	0.446
TKLH	0.0002	0.0007
TTLC	14.331	7.665 *
R-squared:	0.40	
D.W:	2.05	
F-stat:	2.444 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results of estimating two models (11) and (12) show that there is positive and significant relation between technical training costs and two variable VPLH and VPLC. The values of D.W and F statistic accordingly represent the non–presence of autocorrelation between disturbance terms and simultaneous significancy of all regression variables.

4.3.2. Cobb – Douglas production function

Using Cobb-Douglas model is more general for modeling the firms´ production and productivity. One of prominent characteristics of these models is that their coefficients have the elasticity implication and due to the non-dimentionality of the elasticity, there is the possibility of comparing the value of estimated coefficients between two models. Such as the section 4.4.1, in this section the models are divided to three types based on the training method including total training costs, general training costs and technical training costs.

4.3.2.1. The effect of "total training costs" on the productivity

Models (13) and (14) are designed to assess the effect of total training cost on the productivity. Again the difference between two models is that in model (13) the total production and training costs are divided by labour hours and in model (14) these two variables are divided by labour costs. The models coefficients show the elasticity of productivity to per capita capital and elasticity of productivity to training.

Model 13: ( ) = + ( ) + ( ) +

Model 14: ( ) = + ( ) + ( ) +

Table4.16. Model 13 estimation results

Model 13: Dependent Variable: Log(TPLH)		
Explanatory Variables	Coefficient	Std. error
C	10.179	1.129 ***
Log(TKLH)	0.248	0.066 ***
Log(TOTLH)	0.373	0.173 **
R-squared:	0.78	
D.W:	2.18	
F-stat:	14.831 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.17. Model 14 estimation results

Model 14: Dependent Variable: Log(TPLC)		
Explanatory Variables	Coefficient	Std. error
C	2.517	3.935 ***
Log(TKLH)	0.237	0.077 ***
Log (TOTLC)	0.240	0.090 ***
R-squared:	0.80	
D.W:	2.21	
F-stat:	16.228 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

As tables (4.16) and (4.17) show, there is significant and positive relation between total training costs and per capita capital and productivity in both models. The value of productivity elasticity to total training costs in model (13) and (14) is 0.37 and 0.24 respectively. This means if the ratio of total training cost to total labour hours in firms increases by one percent, the labour productivity will increase 0.37 percent in these firms and if the ratio of total training to labour costs increases by one percent, the labour productivity will increase by 0.24 percent. The value of the productivity elasticity in relation to per capita capital is very close together in two models.

The notable point is that the value of determination coefficient (R^2) in these models is higher compared to models based on linear production function. Considering the fact that whatever the value of determination coefficient is closer to one shows the better fitness of the model, it can be concluded that Cobb-Douglas production function has more adaptation and fitness to production pattern in the studied firms. The values of D.W and F statistics

show that the model has no problem regarding the disturbance terms autocorrelation and simultaneous significancy of the variables.

The relationship between total training costs and productivity is re–assessed in models (15) and (16). In these two models the value–added is utilized to measure the productivity. So the coefficients of two models show the productivity elasticity (the ratio of value added to total labour hours and total labour costs) to total training costs and per capita costs. The results of these two models are presented in tables (4.18) and (4.19).

Model 15: ( ) = + ( ) + ( ) +

Model 16: ( ) = + ( ) + ( ) +

Table4.18. Model 15 estimation results

Model 15: Dependent Variable: Log(VPLH)		
Explanatory Variables	Coefficient	Std. error
C	11.631	2.185 ***
Log(TKLH)	0.20	0.095 **
Log(TOTLH)	0.94	0.40 **
R-squared:	0.61	
D.W:	2.01	
F-stat:	5.336 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.19. Model 16 estimation results

Model 16: Dependent Variable: Log(VPLC)		
Explanatory Variables	Coefficient	Std. error
C	0.153	1.020
Log(TKLH)	0.183	0.064 ***
Log(TOTLC)	0.511	0.089 ***
R-squared:	0.32	
D.W:	2.07	
F-stat:	24.43 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results presented in the above tables represent the significancy of relation between total training costs and productivity. The values of productivity elasticity compared to training costs in models (15) and (16) are in average higher than the elasticity derived in models (13) and (14) and this

means that increase in total costs of labour training influences the firms' value added more than their total production.

However, the value of determination coefficient in models (15) and (16) is less than the value of these indices in models (13) and (14) meaning that using total production index to calculate the productivity increases the explanatory power of the model.

4.3.2.2. The effect of "general training costs" on the productivity

The effect of general trainings on the productivity when the production function is of Cobb- Douglas type has been assessed using models (17) and (18). So these two models measure the productivity elasticity to general trainings cost.

Model 17: ( ) = + ( ) + ( ) +

Model 18: ( ) = + ( ) + ( ) +

Table4.20. Model 17 estimation results

Model 17: Dependent Variable: Log(TPLH)		
Explanatory Variables	Coefficient	Std. error
C	3.703	0.186 ***
Log(TKLH)	0.262	0.050 ***
Log(GTLH)	0.034	0.062
R-squared:	0.77	
D.W:	2.17	
F-stat:	14.026 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.21. Model 18 estimation results

Model 18: Dependent Variable: Log(TPLC)		
Explanatory Variables	Coefficient	Std. error
C	0.200	0.207
Log(TKLH)	0.075	0.037 **
Log (GTLC)	- 0.125	0.048 **
R-squared:	0.65	
D.W:	2.28	
F-stat:	113.573 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results of estimating model (17) show that although the productivity elasticity to general trainings cost is positive, these trainings do not have significant relation to productivity. But conversely in model (18), there is negative and significant relation between general training costs and productivity. It means that one percent increase in the ratio of general training costs to total labour costs decreases the productivity for 0.125 percent.

The values of determination coefficient of these two models are higher compared to models estimated based on linear production function which again represents more adaptation of Cobb-Douglas production function to production pattern in the studied firms.

The relation between general training costs and productivity has been measured using models (19) and (20). In these models the value–added is used to calculate the productivity.

Model 19: ( ) = + ( ) + ( ) +

Model 20: ( ) = + ( ) + ( ) +

Table4.22. Model 19 estimation results

Model 19: Dependent Variable: Log(VPLH)		
Explanatory Variables	Coefficient	Std. error
C	7.85	2.06 ***
Log(TKLH)	0.22	0.11 **
Log(GTLH)	0.10	0.21
R-squared:	0.61	
D.W:	1.81	
F-stat:	2.89 **	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.23. Model 20 estimation results

Model 20: Dependent Variable: Log(VPLC)		
Explanatory Variables	Coefficient	Std. error
C	-0.472	0.878 ***
Log(TKLH)	0.190	0.070 ***
Log(GTLC)	0.199	0.106 *
R-squared:	0.33	
D.W:	1.87	
F-stat:	3.99 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results of estimating two above models are presented in tables (4.22) and (4.23).

The results of estimating model (19) represents that there is not a significant relation between general trainings cost and productivity. In model (20) the relation between these two variables is significant in 90 percent confidence level. So it can be concluded generally that in 95 percent confidence level, in none of two models (19) and (20) there is not a significant relation between general trainings cost and productivity variables. Again in these two models, the per capita factor has significant relation to productivity.

4.3.2.3. The effect of "technical training costs" on the productivity

The relation between general training costs and productivity and the calculation of the productivity elasticity to general trainings has been measured using models (21) and (22).

Model 21 ( ) = + ( ) + ( ) +

Model 22: ( ) = + ( ) + ( ) +

Table4.24. Model 21 estimation results

Model 21: Dependent Variable: Log(TPLH)		
Explanatory Variables	Coefficient	Std. error
C	4.374	0.446 ***
Log(TKLH)	0.258	0.067 ***
Log(TTLH)	0.361	0.150 **
R-squared:	0.78	
D.W:	2.18	
F-stat:	14.950 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.25. Model 22 estimation results

Model 22: Dependent Variable: Log(TPLC)		
Explanatory Variables	Coefficient	Std. error
C	0.842	0.300 ***
Log(TKLH)	0.133	0.059 **
Log (TTLC)	0.359	0.100 ***
R-squared:	0.78	
D.W:	2.12	
F-stat:	14.993 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

As was expected, in both estimated models, there is positive and significant relation between technical training costs and productivity. So one percent increase in technical training costs to total labour hours and total labour costs increases the productivity for about the same value amounting 0.36 percent. The relation between per capita capital and productivity is also positive and significant in both indicated models. The determination coefficient in both models is higher than the models based on linear production function which shows more adaptation of Cobb-Douglas model with the firms' production pattern. The value of D.W and F statistic is in expected level.

In models (23) and (24) the relation between general training costs productivity has been again measured by calculating the productivity through the value added:

Model 23: ( ) = + ( ) + ( ) +

Model 24: ( ) = + ( ) + ( ) +

Table4.26. Model 23 estimation results

Model 23: Dependent Variable: Log(VPLH)		
Explanatory Variables	Coefficient	Std. error
C	13.818	1.414 ***
Log(TKLH)	0.178	0.063 ***
Log(TTLH)	1.331	0.235 ***
R-squared:	0.65	
D.W:	1.89	
F-stat:	16.134 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.27. Model 24 estimation results

Model 24: Dependent Variable: Log(VPLC)		
Explanatory Variables	Coefficient	Std. error
C	0.744	0.997
Log(TKLH)	0.164	0.069 **
Log(TTLC)	0.556	0.214 **
R-squared:	0.45	
D.W:	1.84	
F-stat:	11.01 ***	

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

The results derived from estimating models (23) and (24) are similar to the results of models (21) and (22). It means that there is a positive and significant relation between technical trainings cost and productivity in these models. The difference is that the explanatory power of two models (23) and (24) is less than these criteria in models (21) and (22). The values of D.w statistic in both models represents the non-presence of autocorrelation between disturbance terms and based on the values of F statistic, it can be concluded that the total significancy of regression models is verified.

4.4. Summarizing the estimation results and conclusion

To provide the possibility of comparing the results derived from different models, in this section the results from estimating the models based on linear production function and models based on Cobb- Douglas production function has been summarized in tables (4.28) and (4.29).

Table4.28. Summarizing the results of linear models

Dependent Variables / Explanatory variables	TPLH			TPLC			VPLH			VPLC		
	Model 1	Model 5	Model 9	Model 2	Model 6	Model 10	Model 3	Model 7	Model 11	Model 4	Model 8	Model12
TKLH	0.357 **	0.548 *	0.477 ***	0.249 **	0.0001	0.0002	-0.040	-0.001	-0.050	0.0004	0.0004 ***	0.0002
TOTLH	2605774 *						1468043 ***					
TOTLC				85.811 **						44.766 ***		
GTLH		-1060319						408135.9				
GTLC					-27.765 **						-4.964	
TTLH			2410445 **						2782131 ***			
TTLC						52.364 **						14.331 *
R^2	0.44	0.41	0.44	0.56	0.55	0.56	0.59	0.56	0.64	0.45	0.23	0.40
F-stat	3.473 ***	2.837 ***	3.473 ***	6.823 ***	5.003 ***	4.496 ***	5.891 ***	5.272 ***	7.296 ***	3.035 ***	15.395 ***	2.444 ***

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

Table4.29. Summarizing the results of Cobb-douglas models

Dependent Variables / Explanatory variables	Log(TPLH)			Log(TPLC)			Log(VPLH)			Log(VPLC)		
	Model 13	Model 17	Model 21	Model 14	Model 18	Model 22	Model 15	Model 19	Model 23	Model 16	Model 20	Model 24
Log(TKLH)	0.248***	0.262***	0.258***	0.237***	0.075**	0.133**	0.20**	0.22**	0.178***	0.183***	0.190***	0.164**
Log(TOTLH)	0.373**						0.94**					
Log(TOTLC)				0.240***						0.511***		
Log(GTLH)		0.034						0.10				
Log(GTLC)					- 0.125**						0.199*	
Log(TTLH)			0.361**						1.331***			
Log(TTLC)						0.359***						0.556**
R^2	0.78	0.77	0.78	0.80	0.65	0.78	0.61	0.61	0.65	0.32	0.33	0.45
F-stat	14.831 ***	14.026 ***	14.950 ***	16.228 ***	113.573 ***	14.993 ***	5.336 ***	2.89 **	16.134 ***	24.43 ***	3.99 ***	11.01 ***

* Significant under 90% level of confidence
**Significant under 95% level of confidence
***Significant under 99% level of confidence

According to the results presented in tables (4.28) and (4.29), the following results can be concluded:

- In models based on linear production function, the per capita capital variable has mainly no significant relation to productivity. In the other word, the linear effect of per capita capital on the labour productivity in the studied firms is not statistically verified.
- In linear models, the total training cost variable divided by total labour hours and total labour cost variable have a positive and significant effect on labour productivity.
- In linear models, the technical trainings cost variable divided by total labour hours and total labour cost variable have a positive and significant on the labour productivity.
- In linear models, general trainings cots variable divided by total labour hours and total labour cost variable do not have aggregately a significant effect on the labour productivity and in some cases, the relation between the cost of these types of trainings and productivity is negative.
- In Cobb-Douglas models, the per capita capital variable has a significant effect on the labour productivity but technical training costs are total training costs have a significant relation to labour productivity. So the non-linear effect of per capita capital variable on the productivity is verified in the studied firms.
- In Cobb-Douglas models, the general training costs do not have a significant relation on the labour productivity.
- The highest determination coefficient (the goodness of fit criteria) among the research models is related to models based on the Cobb-Douglass production function in which the productivity is calculated based on the total production of the firm.

4.5. Estimating corporation Specific Effect

After assessing the effect of different types of training on the labour productivity in whole industry using linear production function and Cobb-Douglas production function, in this section the effect of various types of training is examined for the studied corporations.

The models structure and the used signs to introduce the variables is similar to previous section. Since in tables (4.28) and (4.29) 24 estimated models are classified according to linear or logarithmic type and also according to

dependent variable, in order to present the results in this section, the same classification is used in these tables. So tables (4.30) to (4.33) show the results of estimating linear models and tables (4.34) to (4.37) represent the results of estimating logarithmic models.

4.5.1. Effects of training programs on corporation's productivity based on linear models

Tables (4.30) to (4.33) show the results of estimating the relation between general and technical training and the sum of these trainings on the labour productivity in pharmaceutical corporations under study, using linear model. Due to the variety of extracted coefficients, the summary of derived results from estimating the relation between various trainings and productivity are presented as following:

- General training has mainly a meaningless effect on the labour productivity in different corporations. Also in some corporations such as Iran transfusion products co, Niroucolor, Tehran shimi, Herbicide Toxins Manufacturing, Daroupakhsh Ingredients production and Toolipers, this effect has been estimated negative. So like the results derived in previous section, the effect of general training on the labor productivity in each corporation is also estimated meaningless or negative.
- Technical trainings have aggregately a positive and meaningfull relation to labor productivity in the studied corporations. Of course this norm was not valid for Herbicide Toxins Manufacturing co. because the relation between technical trainings and productivity for this corporation was estimated meaningless.

Regarding the extent of effect various trainings have on the labor productivity indicators in different corporations, the following results can be presented by considering linear functions:

- The highest effect of technical trainings on TPLH is related to chimi Daroo Co. and the lowest effect is related to Iran transfusion products co
- The highest and lowest effect of total training on TPLH is related to Chimi Darou and Iran Transfusion products corporations accordingly.
- The highest and lowest effect of technical trainings on TPLC is related to Farabi Co. and Herbicide Toxins Manufacturing Co. respectively.

- The highest and lowest effect of total training on TPLC is respectively related to EXIR2 co. and Niroucolor Co.
- The highest effect of technical trainings on VPLH is respectively related to Loghman Co. and Tehran Chimi Co.
- The highest and lowest effect of total trainings on VPLH is respectively related to Tolid Darou and Tehran Chimi Co.
- The highest and lowest effect of technical trainings on VPLC is respectively related to Loghman Co. Daroupakhsh ingredients Production Co.
- The highest and lowest effect of total trainings on VPLC is respectively related to Tolid Darou Co. and Tehran Chimi Co.

Table4.30. the effects of training programs on corporations TPLH

Model / Corporations	Dependent Variable: TPLH		
	Model 1 (Total training)	**Model 5 (General training)**	**Model 9 (Technical training)**
Abidi	5532151.	36261557	5390578.
Abou reihan	1619209.	10275467	1894649.
Alborz darou	6339856.	29110024	6593663.
Amin	3528395.	28237932	4599419.
chemical pharameciutical of daruopakhsh	5191117.	51050490	7281562.
Damloran	6411435.	43312946	6310186.
Darou pakhsh	5172490.	41336316	6285231.
Exir	7650737.	43061953	8597243.
Exir2	10571434	1.02E+08	11184112
Farabi	11773072	91904902	11089884
Faravardehaye tazrighi iran	315310.3	-4285008.	362915.6
Hakim	2515595.	17642186	2929624.
Iran darou	4277049.	36617986	5248025.
jaber ebne hayan	9168380.	67309101	8559223.
Karkhanejat darou pakhsh	2607382.	24680383	3441567.
Kimi darou	12535323	1.18E+08	13966844
Kosar	6609772.	44095208	7777598.
Labratoarhaye darouie razak	4407784.	43354188	5078366.
Loghman	2991036.	16102498	4277402.
Nirou colour	1419811.	-14000260	1500047.
Osveh	1642157.	9715956.	1597177.
Paksan	4116619.	51131764	5494017.
Pars darou	3741641.	22036811	4138117.
Rouz darou	1531061.	9935727.	1939748.
Shirin darou	579882.2	3586300.	693700.2
Sina darou	3207728.	24101300	3298791.
Tehran darou	2705175.	15094738	3384022.
Tehran shimi	659450.4	-7008849.	1377074.
Tolid darou	1378255.	13464450	1584414.
Tolide mavade avalie darou pakhsh	7223658.	53029106	7141070.

Tolide somoume alafkosh	3650875.	16936899	4950194.
Tolipers	9272256.	92626856	9365712.
Zahravi	6082087.	47152787	5288993.
R-squared	0.40	0.36	0.38

Table4.31. the effects of training programs on corporations TPLC

Model	**Dependent Variable: TPLC**		
Corporations	**Model 2 (Total training)**	**Model 6 (General training)**	**Model 10 (Technical training)**
Abidi	253.7915	1687.792	4219.48
Abou reihan	105.1921	320.0655	800.1638
Alborz darou	216.5379	941.8384	2354.596
Amin	181.4201	1262.378	3155.945
chemical pharameciutical of daruopakhsh	322.6164	2622.392	6555.98
Damloran	165.8230	1506.007	3765.018
Darou pakhsh	227.6466	2058.610	5146.525
Exir	348.0548	1684.063	4210.158
Exir2	482.5653	3058.618	7646.545
farabi	452.1691	3892.121	9730.303
Faravardehaye tazrighi iran	12.71472	-238.7917	596.979
Hakim	143.2177	1076.860	2692.15
Iran darou	218.4650	1739.665	4349.163
jaber ebne hayan	281.2735	1772.226	4430.565
Karkhanejat darou pakhsh	127.2431	547.2286	1368.072
Kimi darou	296.8972	1626.222	4065.555
Kosar	296.8418	3024.463	7561.158
Labratoarhaye darouie razak	196.7259	2014.662	5036.655
Loghman	418.3805	2068.303	5170.758
Nirou colour	2.166633	-685.1075	1712.77
Osveh	51.66485	336.8094	842.0235
Paksan	236.0954	2098.451	5246.128
Pars darou	180.7608	1175.034	2937.585
Rouz darou	113.9653	632.5741	1581.435
Shirin darou	57.95080	203.2571	508.1428
Sina darou	156.5578	1408.823	3522.058
Tehran darou	129.4597	438.5648	1096.412
Tehran shimi	264.2612	1318.956	3297.39
Tolid darou	59.73956	455.8453	1139.613
Tolide mavade avalie darou pakhsh	308.9068	2182.963	5457.408
Tolide somoume alafkosh	159.2662	-34.74203	86.8551
Tolipers	306.8322	3167.346	7918.365
Zahravi	233.9381	2323.243	5808.108
R-squared	0.51	0.38	0.38

Table4.32. the effects of training programs on corporations VPLH

Model / Corporations	Dependent Variable: VPLH		
	Model 3 (Total training)	**Model 7 (General training)**	**Model 11 (Technical training)**
Abidi	3101291.	17812025	3187973.
Abou reihan	1438025.	3716573.	1867552.
Alborz darou	3146636.	12356118	3543692.
Amin	920743.1	4785920.	1284984.
chemical pharameciutical of daruopakhsh	1816152.	9036260.	2299887.
Damloran	2270572.	13645133	2300330.
Darou pakhsh	1163900.	8452060.	1422552.
Exir	2176745.	8596460.	2594860.
Exir2	2913495.	18644144	3492170.
farabi	2523123.	16522789	2486402.
Faravardehaye tazrighi iran	1581245.	6867524.	1682314.
Hakim	1079079.	5991891.	1374596.
Iran darou	1076192.	5905136.	1436628.
jaber ebne hayan	3147907.	17665900	3508115.
Karkhanejat darou pakhsh	1158555.	6069183.	1620792.
Kimi darou	1562025.	11373410	1988248.
Kosar	1181524.	5232057.	1279406.
Labratoarhaye darouie razak	1659437.	13572426	2056314.
Loghman	1859778.	2417687.	5106799.
Nirou colour	2345876.	7621550.	3068338.
Osveh	1478192.	6464895.	1497343.
Paksan	762723.2	3701508.	1098654.
Pars darou	1453043.	5696227.	1868402.
Rouz darou	988858.0	4051567.	1337733.
Shirin darou	859290.6	3060142.	1024572.
Sina darou	1981561.	12137098	2164688.
Tehran darou	838645.2	3338101.	1067582.
Tehran shimi	456134.2	3570274.	599677.6
Tolid darou	4263049.	24860792	4461642.
Tolide mavade avalie darou pakhsh	1103550.	-4188289.	1766911.
Tolide somoume alafkosh	2051586.	15325147	2281091.
Tolipers	902571.6	-717980.9	911767.4
Zahravi	3101291.	17812025	3187973.
R-squared	0.42	0.32	0.53

Table4.33. the effects of training programs on corporations VPLC

Model Corporations	Dependent Variable: VPLC		
	Model 4 (Total training)	**Model 8 (General training)**	**Model 12 (Technical training)**
Abidi	116.1807	817.5865	127.4815
Abou reihan	78.57982	212.9713	64.11048
Alborz darou	111.6958	512.0301	116.8281
Amin	42.02114	208.5172	42.34048
chemical pharameciutical of daruopakhsh	80.06345	636.0406	69.65512
Damloran	73.26504	656.8487	67.14023
Darou pakhsh	56.38614	446.2685	84.27122
Exir	81.20948	333.1751	87.67237
Exir2	131.9232	652.3771	116.3125
Farabi	95.22839	734.4383	98.40828
Faravardehaye tazrighi iran	52.37454	365.3725	57.17574
Hakim	52.56760	323.9786	58.68941
Iran darou	51.93527	340.5875	48.05740
jaber ebne hayan	127.0270	743.3043	122.2310
Karkhanejat darou pakhsh	63.69833	321.8572	52.71282
Kimi darou	50.94939	222.0595	52.90294
Kosar	37.42121	390.2022	38.56867
Labratoarhaye darouie razak	79.68254	765.6192	93.13231
Loghman	142.3787	1375.167	229.2737
Nirou colour	110.6604	626.6988	115.4004
Osveh	23.33737	135.7867	26.26541
Paksan	40.88539	223.5427	36.50678
Pars darou	67.75680	372.3626	76.54063
Rouz darou	51.66399	272.0719	52.69638
Shirin darou	37.12295	216.9738	38.08491
Sina darou	84.06925	762.5770	87.01429
Tehran darou	36.71815	40.99998	35.71330
Tehran shimi	21.52083	160.7254	22.15045
Tolid darou	181.0538	1380.087	182.9275
Tolide mavade avalie darou pakhsh	67.53232	-5.797546	6.101024
Tolide somoume alafkosh	86.34773	659.6766	85.78652
Tolipers	24.76346	147.9429	18.40711
Zahravi	116.1807	817.5865	127.4815
R-squared	0.52	0.30	0.48

4.5.2. Effects of Training programs on corporation's productivity based on Cobb-Douglas models

Tables (4.34) to (4.37) show the estimation results of relation between general and technical trainings and total trainings on labour productivity variables using logarithmic models or in the other word, Cobb-Douglass models. Comparing the following tables with the tables related to the results of linear models show that the values of determination coefficient of logarithmic models are generally higher than linear models. Based on this, the explanatory power of the following models is more than linear models. Also regarding the relation between different types of training and productivity, the following results has been obtained:

* General trainings in whole have had insignificant effect on the labour productivity in the studied corporations. In some corporations such as Zahravi, Abidi, Daroupakhsh, Exir, Exir2, Iran Transfusion Products, Jaber – Ibn-Hayyan, Loghman, Paksan, …. , this relation was estimated negative.
* The relation between technical trainings and labour productivity in all the studied corporations was estimated positive and significant.

Regarding the value of labour productivity elasticity to training, the following results was obtained :

* The highest elasticity of Log (TPLH) to technical trainings was related to Daroupakhsh Co. amounting 2.058 and the lowest elasticity was related to Nirouclear Co. amounting 0.45.
* The highest and lowest elasticity of log (TPLH) to total training was respectively related to Daroupakhsh co. amounting 1.29 and Niroucolor amounting 0.71.
* The highest and lowest elasticity of Log (TPLH) to technical trainings was respectively related to Iran Transfusion Products Co. amounting 0.64 and Farabi Co. amounting 0.05.
* The highest and lowest elasticity of Log (TPLC) to total trainings was respectively related to Razak Pharmaceutical Laboratory amounting 1.12 and Abidi Co. amounting 0.02
* The highest and lowest elasticity of log (VPLH) to technical trainings was respectively related to Daroupakhsh Co. amounting 1.14 and Loghman Co. amounting 0.08

* The highest and lowest elasticity of Log (VPLH) to total trainings was respectively related to Daroupakhsh Co. amounting 1.12 and Tolid Darou Co. amounting 0.42
* The highest and lowest elasticity of Log(TVPLC) to technical trainings was respectively related to TooliPers Co. amounting 2.35 and Loghman co. amounting 1.15
* The highest and lowest elasticity of Log (VPLC) to total trainings was respectively related to Toolipers Co. amounting 1.12 and Zahravi Co. amounting 0.60.

Table4.34. the effects of training programs on corporations Log (TPLH)

Model / **Corporations**	**Dependent Variable: Log(TPLH)**		
	Model 13 (Total training)	**Model 17 (General training)**	**Model 21 (Technical training)**
Abidi	1.009435	0.603981	1.201972
Abou reihan	0.871655	0.518420	0.822413
Alborz darou	1.025601	0.676187	1.227495
Amin	1.002636	0.590077	1.199970
chemical pharameciutical of daruopakhsh	0.994262	0.545813	1.006353
Damloran	1.128560	0.712031	1.575289
Darou pakhsh	1.294477	0.870970	2.058150
Exir	1.060534	0.668104	1.271853
Exir2	1.086122	0.640987	1.312750
farabi	1.205942	0.741253	1.743974
Faravardehaye tazrighi iran	0.735697	0.412696	0.566305
Hakim	0.946225	0.564964	1.101445
Iran darou	1.014346	0.614270	1.214332
jaber ebne hayan	1.055322	0.614614	1.254820
Karkhanejat darou pakhsh	0.919887	0.515522	0.946235
Kimi darou	1.027309	0.592088	1.232853
Kosar	1.046313	0.656301	1.231873
Labratoarhaye darouie razak	1.083174	0.634335	1.372598
Loghman	1.011201	0.471674	0.741992
Nirou colour	0.716778	0.419091	0.454030
Osveh	0.842155	0.496783	0.886182
Paksan	1.097234	0.638969	1.323024
Pars darou	1.020110	0.639173	1.261352
Rouz darou	1.027982	0.597257	1.076920
Shirin darou	0.795104	0.440710	0.719938
Sina darou	0.958073	0.550858	1.097804
Tehran darou	0.944189	0.562733	1.005815
Tehran shimi	0.838933	0.456090	0.653445
Tolid darou	0.919033	0.528073	1.135197
Tolide mavade avalie darou pakhsh	1.021696	0.595959	1.181045
Tolide somoume alafkosh	0.977002	0.561260	0.936025

Tolipers	1.143918	0.668954	1.538335
Zahravi	0.971397	0.591988	1.111775
R-squared	0.66	0.7	0.59

Table4.35. the effects of training programs on corporations Log (TPLC)

Model	**Dependent Variable: Log(TPLC)**		
Corporations	**Model 14 (Total training)**	**Model 18 (General training)**	**Model 22 (Technical training)**
Abidi	0.022112	0.148188	0.301064
Abou reihan	0.729959	0.185102	0.427908
Alborz darou	0.554164	0.105940	0.316608
Amin	0.218946	0.135059	0.339943
chemical pharameciutical of daruopakhsh	0.317229	0.062475	0.245072
Damloran	0.068861	0.210186	0.405536
Darou pakhsh	0.552518	0.073724	0.256564
Exir	0.794087	0.015693	0.179649
Exir2	0.119855	0.027207	0.188139
farabi	0.216550	-0.051526	0.055652
Faravardehaye tazrighi iran	0.281948	0.262169	0.617103
Hakim	1.005976	0.125957	0.375047
Iran darou	0.448925	0.119192	0.326948
jaber ebne hayan	0.133752	0.068672	0.255991
Karkhanejat darou pakhsh	0.075016	0.195526	0.427736
Kimi darou	0.292202	0.015964	0.271707
Kosar	0.856406	0.088516	0.226648
Labratoarhaye darouie razak	1.120450	0.129342	0.327505
Loghman	0.231864	0.029896	0.187134
Nirou colour	0.059736	0.230006	0.555469
Osveh	0.193679	0.166255	0.498118
Paksan	0.144997	0.070978	0.285676
Pars darou	0.486210	0.041456	0.242606
Rouz darou	0.064954	0.129200	0.385194
Shirin darou	0.392732	0.277390	0.553215
Sina darou	0.504180	0.127233	0.359090
Tehran darou	0.197577	0.140528	0.348772
Tehran shimi	0.235969	0.056967	0.244260
Tolid darou	0.818658	0.250507	0.503525
Tolide mavade avalie darou pakhsh	0.081029	0.096292	0.281025
Tolide somoume alafkosh	0.313481	0.107611	0.322381
Tolipers	0.154764	0.074831	0.253933
Zahravi	0.352995	-0.004160	0.264375
R-squared	0.85	0.75	0.75

Table4.36. the effects of training programs on corporations Log (VPLH)

Model / Corporations	Dependent Variable: Log(VPLH)		
	Model 15 (Total training)	**Model 19 (General training)**	**Model 23 (Technical training)**
Abidi	0.773536	0.542324	0.651274
Abou reihan	0.542147	0.386955	0.188346
Alborz darou	0.846536	0.637005	0.590210
Amin	0.603986	0.423956	0.289168
chemical pharameciutical of daruopakhsh	0.712600	0.471281	0.375181
Damloran	0.923817	0.652971	1.007234
Darou pakhsh	1.125681	0.780779	1.142467
Exir	0.707565	0.517460	0.474944
Exir2	0.728627	0.501164	0.483392
farabi	0.704430	0.493481	0.625469
Faravardehaye tazrighi iran	0.679136	0.465669	0.335903
Hakim	0.565083	0.389697	0.224245
Iran darou	0.701778	0.486988	0.387661
jaber ebne hayan	0.777559	0.538969	0.271470
Karkhanejat darou pakhsh	0.579893	0.388474	0.115461
Kimi darou	0.674846	0.455108	0.466551
Kosar	0.710116	0.489958	0.271959
Labratoarhaye darouie razak	0.804317	0.548885	0.742110
Loghman	0.736295	0.518466	0.085429
Nirou colour	0.603979	0.418935	0.354142
Osveh	0.536200	0.376371	0.211784
Paksan	0.734782	0.519903	0.115291
Pars darou	0.740859	0.524797	0.539560
Rouz darou	0.507548	0.348364	0.420599
Shirin darou	0.770641	0.525151	0.194116
Sina darou	0.580156	0.408777	0.640513
Tehran darou	0.596847	0.402837	0.261558
Tehran shimi	0.775128	0.538289	0.421504
Tolid darou	0.418682	0.310297	0.566120
Tolide mavade avalie darou pakhsh	0.764869	0.520913	0.173026
Tolide somoume alafkosh	0.464518	0.327342	0.722909
Tolipers	0.773536	0.542324	0.272640
Zahravi	0.542147	0.386955	0.651274
R-squared	0.4	0.41	0.25

Table4.37. the effects of training programs on corporations Log (VPLC)

Model / Corporations	Dependent Variable: Log(VPLC)		
	Model 16 (Total training)	**Model 20 (General training)**	**Model 24 (Technical training)**
Abidi	0.606106	-0.031639	1.183257
Abou reihan	0.824819	0.144400	1.617148
Alborz darou	0.724263	-0.093039	1.291081
Amin	0.896176	0.109929	1.734838
chemical pharameciutical of daruopakhsh	0.742473	-0.064375	1.335934
Damloran	0.719592	0.098217	1.331097
Darou pakhsh	0.738005	0.042712	1.458449
Exir	0.702375	-0.069049	1.242941
Exir2	0.681940	-0.049245	1.220127
farabi	0.775032	0.010469	1.467701
Faravardehaye tazrighi iran	0.828676	-0.031367	1.519769
Hakim	0.963818	0.104129	1.865621
Iran darou	0.833337	0.055446	1.584899
jaber ebne hayan	0.838662	-0.078249	1.566015
Karkhanejat darou pakhsh	0.877738	0.133006	1.744491
Kimi darou	0.747152	0.028495	1.422844
Kosar	0.812350	0.042829	1.543129
Labratoarhaye darouie razak	0.715443	0.017375	1.317022
Loghman	0.681224	-0.109986	1.155629
Nirou colour	0.686377	0.026141	1.207889
Osveh	1.045256	0.164768	1.947217
Paksan	0.993032	-0.041174	1.932503
Pars darou	0.781025	-0.053329	1.386589
Rouz darou	0.860498	0.127258	1.542785
Shirin darou	0.929252	-0.062353	1.765834
Sina darou	0.677739	0.096717	1.219690
Tehran darou	0.891756	0.210033	1.742182
Tehran shimi	0.996174	-0.076570	1.954823
Tolid darou	0.671644	0.130276	1.185709
Tolide mavade avalie darou pakhsh	0.981731	0.030186	1.938750
Tolide somoume alafkosh	0.690288	0.075311	1.339206
Tolipers	1.209250	-0.031639	2.351498
Zahravi	0.606106	0.144400	1.183257
R-squared	0.44	0.37	0.41

4.6. Summarizing the corporate specific effects

Aggregately, assessing the obtained results regarding the effect of general and technical trainings on the productivity of the studied pharmaceutical corporations shows that:

* In both linear and logarithmic models, the relation between general trainings and labour productivity has been mainly estimated insignificant and for some corporations, this relation was estimated negative.
* In both linear and logarithmic models, a positive and significant relation was estimated between technical trainings and labour productivity.
* The logarithmic models have mainly had a higher determination coefficient compared to linear models and this shows the higher power of logarithmic models in explaining the relation between labour productivity and various trainings in the studied corporations.
* Based on the linear models, the highest estimated coefficient of technical trainings effect on the productivity was related to chimi Darou, Farabi and Loghman Corporations and based on the logarithmic models, the highest coefficient was estimated for Daroupakhsh, Iran Transfusion Products and TooliPers corporations.

4.7. Pierson autocorrelation factor

To calculate the relations between variables, Pierson auto correlation Factor was also used which its calculation results can be seen in table No 4.38.

Table No. 4.38. The results from auto correlation factor calculation between independent and dependent variables based on Pierson method

		Total production divided by labor hours	Total production divided by labor costs	Value added divided by labor hours	Value added divided by labor costs
Total capital divided by labor hours	Pearson Correlation	0.258	0.291	0.318	0.250
	Sig. (2-tailed)	0.000	0.000	0.000	0.040
	N	215	215	214	214
Total training costs divided by labor hours	Pearson Correlation	0.100	0.292	0.404	0.266
	Sig. (2-tailed)	0.139	0.000	0.000	0.050
	N	219	219	217	217
Technical training costs divided by labor hours	Pearson Correlation	0.320	0.204	0.424	0.290
	Sig. (2-tailed)	0.000	0.003	0.000	0.040
	N	219	218	217	216
General training costs divided by labor hours	Pearson Correlation	0.058	-0.037	0.089	-0.052
	Sig. (2-tailed)	0.395	0.592	0.192	0.446
	N	219	216	217	214

First group:

- There is a positive and significant relation between total production divided by labour hours and total capital divided by labour hours variables with more than 0.99 confidence. So the null hypothesis is rejected
- There is positive and significant relation with more than 0.99 confidence between total production derided by labour cost and total production divided by labour costs and total capital divided by labour hours variables. So the null hypothesis is rejected.
- There is a positive and significant relation between value added divided by labour hours and total capital divided by labour hours variables with more than 0.99 confidence. So the null hypothesis is rejected

- There is a positive and significant relation between value added divided by labour costs and total capital divided by labour hours variables with more than 0.95 confidence. So the null hypothesis is rejected

Second group:

- Based on the error value (more than 0.05) there is not significant relation between total production divided by labour hours and total training costs divided by labour hours variables. So the null hypothesis is not rejected.
- There is positive and significant relation with more than 0.99 confidence between Total production divided by labour costs and total training costs divided by labour hours. So the null hypothesis is rejected.
- There is positive and significant relation with more than 0.99 confidence between Value added divided by labour hours and total training costs divided by labour hours. So the null hypothesis is rejected.
- There is positive and significant relation with more than 0.95 confidence between Value added divided by labour costs and total training costs divided by labour hours. So the null hypothesis is rejected.

Third group:

- There is positive and significant relation with more than 0.99 confidence between total production divided by labour hours and specific training costs divided by labour hours variables. So the null hypothesis is rejected.
- There is positive and significant relation with more than 0.99 confidence between total production divided by labour and specific training costs divided by labour hours variables. So the null hypothesis is rejected.
- There is positive and significant relation with more than 0.99 confidence between value added divided by labour hours and specific training costs divided by labour hours variables. So the null hypothesis is rejected.
- There is positive and significant relation with more than 0.95 confidence between value added divided by labour costs and specific training costs divided by labour hours variables. So the null hypothesis is rejected.

Fourth group:

- Based on the error value (more than 0.05) there is not significant relation between total production divided by labour hours and general training costs divided by labour hours variables.. So the null hypothesis is not rejected.
- Based on the error value (more than 0.05) there is not significant relation between total production divided by labour costs and general training costs divided by labour hours. So the null hypothesis is not rejected.
- Based on the error value (more than 0.05) there is not significant relation between value added divided by labour hours and general training costs divided by labour hours variables. So the null hypothesis is not rejected.
- Based on the error value (more than 0.05) there is not significant relation between value added divided by labour cost and general training costs divided by labour hours variables. So the null hypothesis is not rejected.

CHAPTER 5

Conclusions and Recommendations

5.1. Conclusions

This study at first, provided a review of the literature on human resource training and its effect on firm performance and productivity, and then, it developed and proposed a framework for analyzing training and labor productivity issues, to suggest directions for future research, and improve the accuracy of the research results in the future on this topic. The paper reviewed the important theoretical models and proposed a framework for analyzing training and labor productivity Issues. Data from previous studies were used to assess the effects of training on firm performance. Based on the firm performance measures used in previous studies firm performance was classified into financial firm performance and non financial firm performance. The review offers new directions for future research that has potential to guide researchers and managers to decide on their human capital investment plans and provide training for employees.

As was explained in chapter 2, the successful and efficient firms have adopted and implemented clear and effective policies and strategies to develop human resources especially in regard with training to improve the knowledge and skill levels of the staffs in different organizational levels.

Since human resources and its productivity is the main and key factor in productivity of the whole organization and its economic operation, possessing effective human resources who bear appropriate and adequate knowledge, skill and attitude to perform the delegated responsibilities in appropriate quality and quantity, is considered as a valuable capital and will bring considerable economic benefits for the organization. For this reason, various organizations invest on developing their labors capabilities and expend considerable financial resources in addition to the lost working opportunities related to the staffs involved in the training process which have its own special costs.

Human resource training is the most important strategy and approach for human resources development and upgrading their capabilities level. So the trainings should be symmetric to the outlook, goals and strategies of the organization but flexible and result–oriented to be acceptable.

For this reason, selecting appropriate model and approach to evaluate the effect of implemented trainings, including technical and specific trainings and

general trainings, on the operation and productivity of human resources in an organization is very important and essential which is the purpose of this research.

The organization managers always have questioned whether the expended resources and investments to train the staffs (which include various costs especially the lost opportunity cost and separating from the staffs in different job levels) have had the required and expected effectiveness or not. So the basic question of this research is that which model best fits to evaluate the effect of staffs' training on human resources productivity in Iranian economic and industrial firms.

Consequently, according to chapter 1, the purpose of the research is looking and researching for appropriate model determination to evaluate and analyze the effects of training in general and technical and general trainings in particular, on an economic firm's labour productivity.

In chapter 2 it was explained that much studies have been performed in regard with the importance of various trainings and their relation with a society's growth and development and also with the operation of a firm and organization. All philosophers and scientists believe that the training is a requirement and essential issue without which, the potential capacities of human resources will remain useless and void. But in most of the times, proving the usefulness and effectiveness of this essential and important issue, needs to study and perform scientific and valid researches, which some of the results and models used was described in chapter 2. In other words, the level of effectiveness and usefulness of trainings through studying and explaining their relation and effects on the firm's labour productivity is the important issue and concern of the investors on training which in case of defining and applying appropriate research model can be a suitable base for evaluation and decision making.

To research on this issue and to determine the relation and effect of training on human resources productivity, this research was performed in quantitative method using panel data technique, which was fully explained in chapter 3. The findings showed that total cost variable, total training hours variable and per-capita capital variable have significant effect on human resources productivity in Iran pharmaceutical corporations.

To study the relation between training and human resources productivity and according to model and determined relation for this study, two types of linear production function and Cobb-Douglas production function has been used. To calculate human resources productivity, two criteria, including total production and value–added, have been used to measure the output level of the firms under study. And also two criteria including the sum of labour hours and human resources costs have been used to measure human resources input and regression analysis method based on panel data has been used to analyze the results and according to this method, the effect of training on the productivity is analyzed.

Since two types of production function has been utilized to evaluate the effect of training on productivity, the research 12 hypotheses have been analyzed two times and for this reason, 24 models and relations between the variables have been defined, examined and analyzed.

First the research findings were explained in viewpoint of linear production function and regarding the research 12 hypotheses. Findings show that the first hypothesis of the research regarding the presence of a relation between total training (the ratio of total training cost to total labour hours) and human resources productivity (the ratio of total production to total labour hours) is significant and training has a positive effect on the human resources productivity and also the model is significant based on the study results and so total training has positive effect on human resources productivity according to the first model.

The second hypothesis of the research which is based on the presence of relation between total training (the ratio of total training to the sum of human resources costs) and human resources productivity (the ratio of total production to labour costs) is significant and training has a positive effect on the human resources productivity. In other words, total training has positive effect on the human resources productivity according to the second model.

- ✓ According to the research findings, the third hypothesis, i.e, the presence of relation between total training (the ratio of total training to the sum of labour hours) and human resource factor productivity (the ratio of value – added to the sum of labour hours) is significant and the relation is positive. So total training has positive effect on the labour, factor productivity according to the third model.

- ✓ Regarding the fourth hypothesis, i.e presence of relation between training (the ratio of total training to the sum of labour costs) and labour factor productivity (the ratio of value-added to the sum of labour costs) is significant and has a positive relation. So total training has positive effect on the labour factor productivity, according to the fourth model.
- ✓ The research findings show that the fifth hypothesis, i.e. the presence of relation between general training (the ratio of general training costs to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is not significant and this relation is negative and hence, according to the fifth model, general training has negative effect on the labour productivity.
- ✓ The findings also show that the sixth hypothesis,i.e. the relation between general training (the ratio of general training costs to the sum of labor costs) and labour productivity (the ratio of total production to the sum of labour costs) is significant but negative. So according to the sixth model, general training has had negative effect on the labour productivity.
- ✓ The research findings represent that the seventh hypothesis i.e the relation between general training (the ratio of general training costs to the sum of labour hours) and labour factor productivity (the ratio of value–added to the sum of labour hours) is a positive but insignificant relation. In other words, general training, based on the seventh model, has had a positive effect on the labour productivity.
- ✓ Regarding the eighth hypothesis, the relation between general training (the ratio of general training costs to the sum of labour costs) and labour factor productivity (the ratio of value–added to the sum of labour costs), the research findings show this relation negative but insignificant. In other words, according to the eighth model, general training has not have significant effect on the labour productivity.
- ✓ The research findings show that the ninth hypothesis, i.e the relation between technical training (the ratio of technical training costs to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is positive and significant and significant and hence according to the ninth model, technical training has had positive effect on the labour productivity.
- ✓ According to the research findings, the tenth hypothesis, i.e the relation between technical training (the ratio of technical training costs to the sum of labour costs) and labour productivity (the ratio of total production to

the sum of labour costs) is positive and significant and according to the tenth model, has had positive effect on the labour productivity.

- ✓ The research findings show that the 11th hypothesis, i.e the relation between technical training (the ratio of technical training costs to the sum of labour hours) and labour factor productivity (the ratio of value added to the sum of labour hours) is positive and significant and hence according to the 11th model, technical training has had positive effect on the labour productivity.
- ✓ The research findings also show that the 12th hypothesis, i.e the relation between technical training (the ratio of technical trainings cost to the sum of labour costs) and labour factor productivity (the ratio of value added to the sum of labour costs) is significant and positive. In other words, according to the 12th model, technical training has had positive effect on the labour productivity.

Now the research findings regarding the research 12 hypotheses are explained in viewpoint of Cobb-Douglas production function.

- ✓ According to the research findings, the first hypothesis, i.e the presence of relation between total training (the ratio of total training to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is significant and there is positive relation. In other words, according to the 13th model, total training has had positive effect on the labour productivity and if the total training costs to total labour hours increase by one percent, labour productivity will increase by 0.37 percent.
- ✓ The second hypothesis, i.e the relation between total training (the ratio of total training costs to the sum labour costs) is positive and significant and hence according to the 14th model, total training has had positive effect on the labour productivity and if the ratio of total training cost to the sum of labour costs increases by one percent, labour productivity will increase by 0.24 percent.
- ✓ The third hypothesis, i.e the relation between total training (the ratio of total training cost to the sum of labour hours) and labour factor productivity (the ratio of value-added to the sum of labour hours) is significant and positive. So according to 15th model, total training has had positive effect on the labour productivity and if the ration of total trainings cost to the sum of labour hours increases by one percent, labour productivity will increase by 0.94 percent

- ✓ The fourth hypothesis, i.e the relation between total training (the ratio of total training cost to the sum of labour costs) and labour factor productivity (the ratio of value added to the sum of labour costs) is significant and positive and according to the 16th model, if the ratio of total training costs to the sum of labour costs increase by one percent, labour productivity will increase by 0.51 percent.
- ✓ The fifth hypothesis, i.e the relation between general training (the ratio of general training cost to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is not significant. Hence according to 17th model, there is not significant relation between general trainings and labour productivity.
- ✓ The sixth hypothesis, i.e the relation between general training (the ratio of general training cost to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is significant but negative. It means that according to 18th model, if the ratio of general tainings cost to the sum of labour costs increase by one percent, labour productivity will decrease by 0.125 percent .
- ✓ The seventh hypothesis, i.e the relation between general training (the ratio of general training cost to the sum of labour hours) is not significant. So according to 19th model, change in the ratio of general training cost to the sum of labour hours does not have significant effect on the labour factor productivity.
- ✓ The eighth hypothesis, i.e the relation between general training (the ratio of general training cost to the sum of labour costs) and labour productivity (the ratio of value added to the sum of labour costs) is not significant in high level of confidence but in low level of confidence (90 percent) it is significant. Hence generally it is said that according to 20th model, change in the ratio of general tarining cost to the sum of labour costs does not have high effect on the labour factor productivity.
- ✓ The ninth hypothesis. i.e the relation between technical training (the ratio of technical trainings costs to the sum of labour hours) and labour productivity (the ratio of total production to the sum of labour hours) is signigicant and positive. So according to 21st model, if the ratio of technical trainings cost to the sum of labour hours increases by one percent, labour productivity will increase by 0.36 percent.
- ✓ The tenth hypothesis, i.e the relation between technical training (the ratio of technical trainings costs to the sum of labour costs) and labour

productivity (the ratio of total production to the sum of labor costs) is signigicant and positive. Hence according to 22nd model, if the ratio of technical trainings cost to the sum of labor costs increases by one percent, the labor productivity will increase by about 0.36 percent.

- ✓ The 11th hypothesis. i.e the relation between technical training (the ratio of technical trainings costs to the sum of labor hours) and labor factor productivity (the ratio of value added to the sum of labor hours) is signigicant and positive. So according to 23rd model, if the ratio of technical trainings costs to the sum of labor hours increases by one percent, the labor productivity will increase by 1.3 percent.
- ✓ The 12th hypothesis, i.e the relation between technical training (the ratio of technical training costs to the sum of labor costs) and labor factor productivity (the ratio of value added to the sum of labor costs) is positive and signigicant. According to 24th model, if the ratio of technical trainings costs to the sum of labor costs increases by one percent, the labor productivity will increase by 0.55 percent.

So generally and according to the research findings it can be concluded that:

A- In models based on linear production function, the following variables have positive effect on and significant relation with labour productivity:

- Total training cost divided by total labour hours
- Total training cost divided by total labour costs
- Total technical training costs divided by total labour hours
- Technical training costs divided by total labour costs

And the following variables do not have significant relation with labour productivity and in some cases have had negative effect on labour productivity:

- General training costs divided by total labour hours
- General training costs divided by total labour costs

B. In models based on Cobb-Douglas production function, the following variables have positive effect on and significant relation with labour productivity:

- Total training cost divided by total labour hours
- Total training cost divided by total labour costs
- Technical training costs divided by total labour hours

- Technical training costs divided by total labour costs

The following variables do not have significant relation with labour productivity and in some cases have had negative effect on the labour productivity:

- General training costs divided by total labour hours
- General training costs divided by total labour costs

So according to the research results regarding the effect of various trainings on the labour productivity in different pharmaceutical corporations and in case of selecting linear model to explain the relation between training and productivity, the following issues are notable:

- General trainings have mainly had insignificant effect on the labour productivity in different corporations. This result is identical to the results derived using panel model for all corporations.
- Tehnical trainings in general have had positive and significant effect on the labour productivity in different corporations. This result is identical to the results derived for all corporations

If the Cobb-Douglas production function is used to explain the relation between various trainings and labour productivity, the following results can be presented:

- General trainings have had insignificant effect on the labour productivity in corporations under study and even in some corporations such as Zahravi, Abidi, Daro-pahksh, Exir, Exir 2, Iran Transfusion products, Jaber-Ibn-Hayyan, Loghman, Paksan and …. , this relation is estimated negative.
- The relation between technincal trainings and labour productivity has been estimated positive and significant in all corporations under sutdy.

5.2. Recommendations

Although the role and importance of labor training in different levels of various Iranian economic and industrial organizations and firms, including pharmaceutical industry, is quietly accepted by high and middle managers and stock holders and firm owners and also by the firms labours, there are some oppressive truths and limiting views that if some solutions are thought of and some helpful studies and researches are performed, can provide appropriate conditions for serious attention and more investment from owners and managers industrial firms in labour training and the results of studies and researches can from one side create more trust and confidence in managers and stockholders to invest on labour training and from the other side results in training process modification in various economic firms, especially industrial firms, and increases the training activities effectiveness which itself is inside a supporting ring.

5-2-1- the important challenges and problems of training in Iran pharmaceutical firms

The findings show that the most important challenges and problems regarding labour training in Iran pharmaceutical firms include the following:

1- Little attention to the firms' targets and strategies and labours' real needs in the process of determining training needs and passive acting
2- Little flexibility of training systems based on the charges in science and technology of pharmaceutical industry
3- Non – codified and unclearity of strategies in human resources field, especially labour development and training in most pharmaceutical firms of Iran
4- Weak planning and weak definition of the training courses concepts, especially in general training courses
5- Weak time – planning of training courses implementation and consequently and not – on time implantation of some specific trainings for labours
6- Lack of effective evaluation system for trainings and uncertainty of stockholders, managers and even the labours about the trainings effectiveness in labour knowledge and skill level in various levels, especially for general training courses
7- The weakness in feedback obtaining from training implementation results and so non – modification of the process of training assessment, design, planning, implementation and evaluation in firms.

8- Non – performing accurate and enough researches and surveys and in the same way scientific way regarding the effects of different trainings on the firms operation especially from economic view.
9- Lack of specialty and professional view towards human resources development management especially training process management and unrelated educational field, the experiences and background and attitudes of most training managers of pharmaceutical firms.
   - Due to the weakness and defect of information related to job assignments and preconditions from viewpoint of required knowledge, skills and other capabilities in most firms, there is not the possibility of detailed training assessment and therefore, passive instance trainings are more considered.
   - In most cases, there is not symmetry between the job and employee regarding the acquisition conditions and required knowledge and skill and the gap between job acquisition conditions and the employee has not been identified and analyzed and hence, there's no regular and effective plan to fill the gap between the job and employee.
   - The analysis of effective factors on total productivity and specifically labour productivity has not been performed in most firms and there is no scientific and accurate indices to periodically and continuously evaluate the labour productivity
   - Although the share of labour costs in finished price of pharmaceutical firms products stands in the third and even in second ranking after material and capital costs, pharmaceutical firms have ignored and do not pay much attention to labour productivity evaluation and how to improve their labour productivity level
   -

5-2-2- Weak points and advantages of specific and general trainings in Iran pharmaceutical firms

Based on the research findings and according to the results derived from assessing the research hypotheses the following advantages and weak points of training in pharmaceutical firms can be presented.

- **The advantages:**

1- The high and mid – level managers' attitude toward the necessity, importance and role of training in pharmaceutical firms operation is mostly positive and supporting.
2- Due to the importance and vital role of pharmaceutical industry products in the society, the labour development and training, especially specific trainings is a mandate and is backed up by surrounding regulations and rules.
3- Attention to specific trainings based on global standards in pharmaceutical industry and utilizing standard trainings of the industry
4- More symmetry between specific trainings and job position and condition of the labours and relating it to their real needs.
5- More sensitivity (compared to general training) to specific training process and acceptable investment in some firms on specific trainings.
6- The acceptable effectiveness of specific training in most firms, based on the results of this research and positive view of managers and owners of various pharmaceutical firms towards these trainings.
7- The higher average labour educational level of pharmaceutical firms in comparison to other industries which leads to more utilization of the labours from specific training courses.

- **The weaknesses**

1- General trainings are not usually based on a real assessment and a proportional to pharmaceutical firms goals and strategies and the content of general trainings are not designed and planed symmetric to pharmaceutical industry and the requirements of this industrial field
2- The content of most specific training courses is defined in a standard format for pharmaceutical industry, but the content of general training courses are mostly implemented as copying from other firms, most of which are out of pharmaceutical industry and without any attention to the necessity and purpose of these trainings and their symmetry with the firm conditions. So naturally they do not have the expected effectiveness and are always implemented case – by case and without any previous planning.
3- Most of trainings need periodical review and updating proportional to environmental changes and scientific and industrial advancements and new strategies of the firms and this requirement is ignored.

4- Since general trainings are less skill and technical oriented trainings and are designed and technical oriented trainings and implemented with a kind of generality, the managers and owners of the firms have little belief and tendency towards implementing these trainings and assessing their effectiveness in pharmaceutical firms.
5- The appropriate mechanism and model to evaluate training effectiveness, especially their relation to the firm operation does not exist and therefore the training managers are always in a defensive position to prove the usefulness of trainings and their effect on the firm productivity and operation.
6- The variety of training methods is low in the firms and teacher – student and speech methods are mostly used in training and other methods and specifically distance learning by using advanced training technology is less utilized.

5-2-3- Recommendations to decrease the challenges and omit the labour training problem in Iran pharmaceutical firms

- Utilizing the performed researches and industries and appropriate scientific models to evaluate the results of trainings held and consequently modifying the training process, especially in assessment and designing level.
- Selecting expert and educated managers with the related knowledge and experience to be responsible for human resources development management and labour training in pharmaceutical firms.
- Detailed quantitative and qualitative targeting on various general and specific trainings and emphasis on more attention toward them in designing, implementing and assessing of trainings.
- Basic and comprehensive attention to human factor and importance of labour productivity in total productivity and the firm's production and competitiveness power through clarifying and codifying strategies and targets of human resource field and establishing a comprehensive and integrated human resource system in pharmaceutical firms.
- Using quantitative models such as various econometric models and methods to evaluate different production factors and their role and effect on total productivity of the firm and using their results in determination of policies, strategies and different systems of the firm especially in human resource management field in a systematic and periodic manner.

  - Enough attention to the quality, quantity and on – time aspects in implementation of various general and specific training process in whole the firm
  - Exact observance of GMP standards in assessing, designing, implementing and evaluating the trainings especially in specific training fields.
- Creating a measurement and productivity analysis system with emphasis on labour productivity due to the delicacy and complexity of this factor and its operation effect on other major production factors, especially material and capital factors in pharmaceutical firms and in the same time, the high average educational level of the labours (higher than diploma and much more percent having bachelor, master's degree and P.h.D) compared to other industries

References

1- Ahmad, S., & Schroeder, R.G. (2003), the impact of human resource management practices on operational performance. Journal of Operational Management, 21(1), pp. 19-43
2- Alliger, G.M. Tannenbaum, S.I., Bennett, W., Traver , H., & Shortland, A(1997) . A meta- analysis on the relations among training criteria. Personnel psychology, 50, pp. 341-358
3- Andries de Grip, Inge Sieben, The Effects of Human Resource management on Workers' Wages and Firm productivity, Faculty of Economics and Business Administration Maastricht University, RoA-RM-2003/9E, pp. 1-21
4- Aragon –Sanchez, A.,Barba – Aragon, I. , & Sanz – Valle R.(2003). Effects of training on business results. International Journal of Human Resource Management, 14(6), pp. 956-980
5- Barney, J. (1991). Firm resource and sustained competitive advantage. Journal of Management, 17(1), pp. 99-120.
6- Ballot, G., Fakhfakh, F., & Taymaz, E. (2001). Firms′ Human Capital, R&D and performance: A study on French and Swedish firms. Labor Economics, 8,pp. 443-462
7- Barron, J.M., M.C. Berger and D.A. Black (1999). Do workers pay for on – the – job training? Journal of Human Resource 34(2), pp. 235-252.
8- Barrett, A., & O'Connell, P.J. (2001). Does training generally work? The returns to in-company training. Industrial and Labor Relations Review, 54(3). pp. 647-662.
9- Bartel, A. P. (1995). Training, wage growth and job performance: Evidence from a company data- base. Journal of Labor Economics, 13(3), pp. 401-425.
10- Bartel, A.P. (2000). Measuring the employer's return on investments in training: Evidence from the literature. Industrial Relations, 39 (3), pp. 502-524.
11- Bartlett Kenneth R., "The Relationship between Training and Organizational Commitment: A Study in the Health Care Field", Human Resource Development Quarterly 12(2002), pp.335-352.
12- Bassi, L.J., & van Buren, M.E (1998). State of the industry report. Training and Development, 52(1), pp. 21-43.
13- Becker, Gary. (1962) Investment in Human Capital: A theoretical analysis. The Journal of Political Economy, Lxx 5, 2, 9-50, Chicago.

14- Becker, G.S. (1962). Investment in Human Capital: A theoretical analysis. The Journal of Political Economy, 70(1), pp. 9-49.
15- Bernthal, P., & Wellins, R. (2006). Trends in leader development and succession. Human Resource Planning, 29(2), pp. 31-40.
16- Bishop, J. (1991). On the job training of new hires. In D. Stern & J. M. M. Ritzen (Eds.), Market failure in training? pp. (61-94). New York: Springer – Verlag.
17- Black, S.E., & Lynch, L.M. (1996). Human – capital investment and productivity. The American Economic Review, 86(2), pp.263-267.
18- Blundell, Richard and Lorraine Dearden, Costas Meghir and Barbara Sianesi (1999) Human Capital Investment: the returns from education and training to the individual, the firm and the economy fiscal studies, 20, (1) , 1-23, UK.
19- Boon, M. and B. van der Eijken (1997). Employee training and productivity in Dutch manufacturing firms. Statistics Netherlands research paper 9716, Voorburg, Netherlands.
20- Boon, M., & Van der Eijken, B. (1998). Employee training and productivity in Dutch manufacturing firms. Netherlands official statistics, 13(1), pp. 19-24.
21- Burrow, J. & Berardinelli, P. (2003). Systematic performance improvement – refining the space between learning and results. Journal of Workplace Learning, 15(1), pp. 6-13.
22- Chapman, P.G. (1993). The economics of training. (1st edition) Exeter. Uk: BPCC whearons Ltd.
23- Chmielewski, T.L., & Phillips, J.J. (2002). Measuring Return- on – Investment in Government: Issues and procedures. Public personnel Management. 31, 2, pp. 255-237
24- Corvers, F. (1997). The impact of human Capital on labor productivity in manufacturing sectors of the European Union. Applied Economic, pp. 975-987.
25- Delaney John T. and Huselid Mark A., "The Impact of Human Resource Management Practices on Perceptions of Organizational Performance," Academy of Management Journal 39 (1996): 949-969; Huselid Mark A., "The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance," Academy of Management Journal 38 (1995): 635-672; Collins Christopher J., and

Smith Ken Q., "Knowledge Exchange and Combination," Academy of Management Journal 49 (2006): pp. 544-560.
26- Desimone, R. L, Werner, J. M., Harris, D. M. (2003). Human resource development. Mason, south western.
27- Devanna, M.A., Fombrun, C.J., & Tichy, N.M. (1984). A framework for strategic human resource management. In C.J Fombrun, N.M. Tichy & M.A. Devanna (Eds.), strategic human resource management, pp.33-55. New York , Ny: wiley
28- Elena Avedillo – Cruz: A manual on quick productivity appraisal (QPA) (Manila, Development Academy of the Philippines, 1984).
29- Elwood, F.H (1996). The Flawed Four – level Evaluation Model. Human Resource Development Quartely. 7, pp. 5-19.
30- Ely, R. (2004). A Field study of group diversity, participation in diversity education programs, and performance, Journal of Organization Behavior, 25(6), pp. 755-780.
31- Feams, D., Sels, L., Dewinne, S., & Maes, J. (2005). The effect of individual HR domains on financial performance. International Journal of Human Resource Management, 16(5), pp.676-700.
32- Fey, C. Bjorkman, I., & Pavlovskaya, A. (2000). The effect of HRM practices on firm performance in Russia. International Journal of Human Resouce Management, 11(1), pp. 1-18.
33- Fitz – Enz, J. (1990). Human Value Management. New York: McGraw-Hill.
34- Fitzgerald, W. (1992). Training versus development. Training and Development, 46(5), pp. 81-84.
35- Garcia, M. (2005). Training and business performance: The Spanish case. International Journal of Human Resource Management, 16(9), pp. 1691-1710.
36- Gelderblom, A. and J. de Koning (1996). Evaluating effects of training within a company: methods, problems and one application. Labor 10, pp. 319-337.
37- Ghebregiorgis, F., & Karsten, L. (2007). Human resource management and performance in a developing country. International Journal of Human Resource management, 18(2), pp. 321-332.
38- Greg L. Stewart, Kenneth G.Brown. Human Resource Management: Linking strategy to practice pp.322-323, Hoboken, NJ: John Wiley & Sons, 2009.

39- Groot, W. (1999a). Productivity effects of enterprise –related training. Applied Economic Letters 6, pp. 369-371.
40- Groot, W. (1999 b). Enterprise – related training: a survey. In: van wieringen, F. and G. Attwell (Eds.). Vocational and Adult Education in Europe, kluwer Academic publishers, Dordrecht, pp. 357-373.
41- Guest, D.E. (1987). Human resource management and industrial relations. Journal of Management Studies, 24(5), pp. 503-521.
42- Helms, Merilyn M., 1996 "perspectives on productivity and Quality for Competitive Advantage", The TQM Magazine, Vol. 8.1996.
43- Hentze, J., Kammel , A. & Lindert , K. (1997) . personalfuhrungslehre: Grundlagen, Funktionen und Model der fuhrung. 3 Aufl, Bern. Stuttgart, Wien : Haupt
44- Holton, E.F. (1996). The Flawed Four – Level Evaluation Model. Human Resource Development Quarterly, 7(1) , pp. 5-21
45- Huang, T. (2000). Are HR practices of effective firms distinctly different from those of poorly performing ones? International Journal of Human Resource Management, 11(2), pp. 436-451.
46- Huselid, M.A. (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. Academy of Management Journal, 38(3), pp. 635-672.
47- Ichniowski, C., Shaw, k., & Prennushi, G (1997). The effects of human resource management practices on productivity. American Economic Review, 87(3), pp. 291-313.
48- Katou, A. & Budhwar, P. (2007). The effect of HRM policies on organizational performance in Greek manufacturing firms. Thunderbird International Business Review, 49(1), pp. 1-35.
49- Kopelman E.Richard, Managing productivity in organizations: A practical oriented perspective, PP. 105-116, Mc Graw- Hill Book Company. 1986
50- Kozlowski, S.W.J., & Klein, K.J. (2000) A multilevel approach to theory and research in organizations: contextual, temporal, and emergent processes. In K.J. Klein & S.W.J. Kozlowski (Eds.), Multi- level theory, research, and methods in organizations: Foundation, extensions, and new directions (3-90). San Francisco, CA: Jossey – Bass Publishers.
51- Kozlowski, S.W. J. & Salas, E (1997). An organizational systems approach for the implementation and transfer of training. In J.K Ford. S.W. J. Kozlowski, K. Kraiger, E.Salas, & M. Teachout (Eds.) Improving training effectiveness in work organizations (247-287). Mahwah. NJ: Erlbaum.

52- Kraiger, K., Mclinden, D., & Casper, W.J. (2004). Collaborative planning for training impact. Human Resource Management, 43(4), pp. 337-351.
53- Krueger, A, & C. Rouse, (1998). The impact of workplace education on earnings, turnover and job performance. Journal of Labor Economics, 16(11), pp. 61-94.
54- Kumpikaite Vilmante, "Human resource development evaluation: practical aspect, Economics and Management: 2007. 12, pp. 592-599.
55- Kumpikaite, V., Sakalas, A. (2005). The Model of Human Resource Development system focused on consistency of the organization and its Employee's Developments Interest. International Human Resource Management: Making a Difference in a World of Differences. Proceedings of the International Human Resource Management Conference, Australia, Brisbane, pp.1-26.
56- Kurosawa Kazukiyo: "Structural approach to the concept and measurement of productivity (2)", in Keizai Shushi (Economic Journal of Nihon University), Vol. 50, No. 2, 1980, pp. 96-135.
57- Kurosawa, Ohtake and Ariga, 2005 “Productivity, Training and Human Resource Practices – Disentagling complex Interactions using a survey of Japanese Manufacturing Organizations", Interfaces for Advance Economic Analysis, Discussion Paper no. 062, 2005, Kyoto University, Japan.
58- Lawler, E. E, Mohrman, S.A. & Ledford, G.E. (1998). Strategies for high performance organizations – The CEO report. San Francisco, CA: Jossey – Bass Publishers.
59- Lynch, L. M and S.E Black (1995). Beyond the incidence of training: evidence from a national employers survey. NBER working paper series 5231.
60- Martocchio, J. J., & Baldwin, T. T. (1997). The evolution of strategic organizational training. In R.G. Ferris (Ed.), Research in Personnel and Human Resource Management, (Vol. 15, 1-46). Greenwich, CT: JAI.
61- Masayoshi Shimizu, Kiyoshi Wainai, Kazuo Nagai, Value Added Productivity Measurement and Practical Approach to Management Improvement.pp. Asian productivity organization. Tokyo, 1991.
62- Mohammad Baygi Yazdan, Instructional System Design/Development, 2008.
63- Ng, Y.C. & Siu, Y.M. (2004). Training and enterprise performance in transition: evidence from china. International Journal of Human Resource Management, 15(4/5), pp.878-894.

64- Noe, R.A.2005. Employee Training and Development (Third Edition). New York: McGraw – Hill.
65- OECD (Organization for Economic Co-Operation and Development), Measuring Productivity-OECD Manual, 2001.
66- Paul, A., & Anatharaman, R. (2003). Impact of people management practices on organizational performance. International Journal of Human Resource Management, 14 (7), pp. 1246-1266.
67- Phillips, J. J. (1994).Measuring return on investment, (vol.1).Alexandria, VA: American Society for Training and Development.
68- Phillips, J. J. (1996). How much is the Training? Training & Development. April, pp. 20-24.
69- Pine, J. & Judith, C. T. (1993). ROI of soft – skills training. Training, 2, pp. 55- 60.
70- Prokopenko Joseph, Klaus North, Productivity and Quality Management: A Modular Programme, PP , International labor office, Asian productivity Organization
71- Prokopenko Joseph, productivity Management: A practical; hand book, PP International labor office 1987.
72- Rao, Mohan P, Miller, David M., 2004"Expert systems applications for productivity analysis", Industrial Management & Data Systems, Volume 104 Number 9, 2004, pp. 776-785 Copyright © Emerald Group publishing limited. ISSN 0263-5577.
73- Reenen, John, Dearden and Reed, 2005, "Impact of Training on Productivity: Evidence from British Panel Data" Center for Economic Performance, London school of Economics and Political Science, CEP Discussion paper no. 674, 2005.
74- Robinson, D.G & Robinson, J. (1989). Training and impact. Training and Development Journal, 43(8), pp. 39.
75- Rodriguez J.M., & Ventura J. (2003) Human resource management systems and organizational performance: an analysis of the Spanish manufacturing industry. International Journal of Human Resource Management, 14(7), pp., 1206-1226.
76- Rogers, E.W. & Wright, P.M. (1998). Measuring organizational performance in strategic human resource management: problems, prospects, and performance information markets. Human Resource Management Review, 8(3), pp. 311-331.

77- Rouda, Robert H. & Kusy, Mitchell E., "High Performance Training", copyright 1996 by the Technical Association of the pulp and paper Industry.
78- Salas, E, & Cannon – Bowers, J. A. (2000). The anatomy of team training. In S. Tobias & D. Fletcher (Eds.). Training and retraining: A handbook for business, industry, government and the military (312 – 335). Farmington Hills, MI: Macmillan.
79- Salas, E., & Cannon – Bowers, J.A (2001).The science of training: A decade of progress. Annual Review of psychology, 52, pp. 471-499.
80- Savery K., Lawson, Luks, Alan. J. 2004 "Does Training Affect Outcomes of the organization?" Journal of Management Development, Vol. 23, 2004Smith, A. (1992). Training and Development in Australia. Australia: Butterworths.
81- Schmenner, Roger W; Rho, Boo Ho, 1990 "An International Comparison of Factory Productivity", International Journal of Operations & Production Management, Volume: 10, Number: 4.
82- Schuler, R.S. & Jackson, S.E. (1987). Linking Competitive strategies with human resource management practices. Academy of Management Executive, 1(3), pp., 207-219.
83- Schuler, R. S. (1989).Strategic human resource management and industrial relations. Human Relation, 42(2), pp.157-184.
84- Sulaman Hafeez siddiqui and Waheed Asghar, "Linking Training, Productivity and Competitive Strategy: Implications of value Chain Model for Strategically Effective Training Programs", International Review of Business Research papers, Vol. 4 No.1 January 2008, pp.310-324.
85- Sumanth , David J., Productivity Engineering and Management, Mc Graw- Hill Book Company. 1985.
86- Tangent, Stefan, 2005 "Demystifying Productivity and Performance" International Journal of Productivity and Performance Management, Vol. 54, 2005.
87- Tharenou Phyllis, “Do Organizations Get Positive Results from Training? The Big Picture,” in P. Holland and H. De Cieri (Eds.), Contemporary Issue in Human Resource Development: An Australian perspective (Melbourne, Australia: Mc Graw Hill, 2006), pp.153-174.
88- Timmer Marcel, Moergastel Ton Van, Stuivenwold Edwin, Ypma Gerard, EU KLEMS Growth and Productivity Accounts,Version 1.0, Part I, Methodology, OECD, 2007.

89- Urquhart, Rob. A survey to measure your company's human resource productivity: A checklist of measures and actions, 2004.
90- Vilmante Kumpikaite, Human Resource Training Evaluation, Engineering Economics. 2007. pp. 29-36.
91- Winfred Arthur, Jr. Winston Bennett, Edens Pamela S., and Bell Suzanne T., "Effectiveness of Training in Organizations: A Meta-Analysis of Design and Evaluation Features," Journal of Applied Psychology 88, (2003):pp. 234-245.
92- Wright, P. C., & Geroy, G.D. (2001). Changing the mindset. International Journal of Human Resource Management, 12(4), pp.586-600.
93- Wright, P. M., & McMahan, G.C. (1992). Theoretical perspectives for strategic human resource management. Journal of Management, 18(2), pp. 295-320.
94- Wright, P. M. & Snell, S.A. (1991). Toward an integrative view of strategic human resource Management. Human Resource Management Review, 1(3), pp. 203-225.
95- Yeung, A.K. & Berman, B. (1997). Adding value though human resources: Reorienting human resource measurement to drive business performance. Human Recourse Management, 36, pp. 321-335.
96- Zwick, T. (2006). The impact of training intensity on establishments productivity. Labor Economics, 11, pp.715-740.

Appendixes

Appendix A: Table for Data Gathering-**X Y Z** Company

Year	Training Cost			Training hours			Value Added	*Total output*	Labor Cost	Total work time	Labor Productivity (Based on cost)		Labor Productivity (Based on hours)	
	Technical	General	Total	Technical	General	Total					Based on Total output	Based on Value added	Based on Total output	Based on Value added

Appendix B: Sample society (pharmaceutical companies in IRAN)

Array	Name of company	Array	Name of company
1	Abidi	21	Osveh
2	Abou Reihan	22	Pars Darou
3	Alborz Darou	23	Rouz Darou
4	Amin	24	Shirin Darou
5	Barij Essence	25	Sina Darou
6	Chemical Pharmaceutical of Daroupakhsh	26	Tehran Darou
7	Damloran	27	Tehran Shimi
8	Daroupakhsh	28	Tolid Darou
9	Exir	29	Tolid MavaD Avalieh Daroupakhsh
10	Farabi	30	Tolid Somoun
11	Faravardehaye Tazrighi IRAN	31	Zahravi
12	Hakim		
13	Iran Darou		
14	Jaber Ebne Hayan		
15	Karkhane jat Daroupakhsh		
16	Kimi Darou		
17	Kosar		
18	Laboratory Darouie Razak		
19	Loghman		
20	Nirou Colour		