PRIVATE AND CO-OPERATIVE GRANITE QUARRIES IN THRISSUR DISTRICT – A COMPARATIVE STUDY

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For the Award of the Degree of

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Under the Faculty of Social Sciences

By

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APRIL 2003

CERTIFICATE

This thesis entitled "**Private and Co-operative Granite Quarries in Thrissur District – A Comparative Study**" is a record of bonafide research work done by Shri Markose K.T., and is cleared for submission for the award of the Doctor of Philosophy under the Faculty of Social Sciences of the Cochin University of Science and Technology.

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The original work done by Shri Markose K.T is the outcome of his own effort and has not formed the basis for award of any degree, diploma, associateship, fellowship or other similar title. This thesis is worth submitting for the degree of Doctor of Philosophy under the Faculty of Social Sciences.

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DECLARATION

I declare that the thesis entitled "**Private and Co-operative Granite Quarries in Thrissur District – A Comparative Study**" is a record of bonafide research work done by me under the supervision of Dr. P.R. wilson, Professor, School of Management Studies, Cochin University of Science and Technology. I further declare that this thesis had not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title of recognition.

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OPERATIONAL DEFINITIONS

Granite

The dictionary of geological terms defines granite as "Phanerocrystalline rock, compact and polishable for building and decoration purposes mainly consisting of minerals having hardness of 6-7 mohs."

The term granite employed in the dimension stone industry is some what ambiguous and does not always correspond in all respects to the petrological definition of the term. A true granite is light coloured acid ingenues, granular rock of deep seated (plutonic) origin, generally grey, red or pink, white and green in colour, characterized mainly by the presence of quartz, alkali, feldspar and minor amounts of ferromagnesian minerals like pyroxenes, amphiboles and mica. Commercial granite include not only true granite but other types of igneous and metamorphic rocks such as syenites, diorites, dolomites, gabbro granitic schists, granitic grein, charnockites and khondalites. Thus in commercial usage, all the above mentioned rock types irrespective of their mineralogical composition and origin are called granites. In Kerala the most common type of granites are charnockite and khendalite. Charnockite is having high deposit in Thrissur and Pathanamthitta districts. In local language charnockite is called "karingallu".

Quarry

Quarry is an excavation or pit, usually open to the sky from which granite is obtained by cutting, blasting and metalling.

Quarry Worker

A quarry worker is one who engages in any of the activity in the quarry such as supervision, drilling, blasting, cutting, breaking the stone, metalling, carrying and loading the stone. He or she is paid according to the nature of the work.

Private Sector

Private sector quarries represent all the 30 non-mechanised quarries in Thrissur district, which are selected at random from a population of 90 non-mechanised quarries.

(a) Group one in private sector - Quarries paying royalty and seigniorage fully

(b) Group two in private sector - Quarries paying royalty and seigniorage partially.

(c) Group three in private sector - Quarries who do not pay royalty and seigniorage.

Co-operative Sector

This represents Anappara Karinkal Thozhilali Co-operative Society situated at Anappara, Vilvattom Village, in Thrissur district.

Royalty

Royalty is the amount payable to the Mining and Geology Department for mining the rocks. It is calculated on a tonnage basis.

Seigniorage

Seigniorage is the amount payable to the government for the lease value of the land.

Non-mechanised Quarries

Non mechanized quarries represent quarries that do not use any machines for operation. In such quarries drilling is done by the help of jack hammer.

Mechanised Quarries

Mechanised quarries are those which work with the help of machines. Here, drilling, blasting, hammering, crushing etc. are done with the help of machines. All crusher quarries are known as mechanized quarries.

Rubbles

It is a big stone used for the foundation of building and other structures.

CHAPTER I

INTRODUCTION

Ever since he dawned on this earth, man has been using granitic rock for his well being. It is the physical properties of granite such as hardness, rift and grain, low porosity, permeability, fractures, joints and high compressive strength that made rock useful for man from pre-historic times to this day.

Granite (stone) which helped to generate fire lit the lamp of civilization. Stone was also used to make weapons for protection from wild animals and to hunt wild animals for food until more sophisticated weapons like bow and arrow were developed. Excavations carried out at pre-historic sites bear testimony to this. As time passed and settled life started mankind started looking for shelter and more protection. The natural caves and tafonis formed by the weathering action of geological agents were obviously the first choice for shelter. The settled life also prompted man to express his thoughts and feelings in some form or the other. Crude sketches and scribblings on the cave walls bear testimony to this.

When the idea of longevity of such sketches flashed in his mind he might have thought of expressing himself in a more durable way.

Bruising technique is one of the results of such an idea. This technique enabled him to chisel on the flat surface of granites. Such bruising (Chiseling) can be seen at Billamarayagudda and Warangal near Lingusuar. This bruising technique was later developed to engrave stone inscriptions that are found in abundance from the 9th to the 17th century A.D.

During the megalithic period granite was used to construct chamber tombs called dolmens. The dolmens of Hirebenkal (Gangavathi Taluk) Kumati (Hadgali Taluk) are the best examples of the skill and ingenuity of the men of that period. They look as if they are small rooms with vertical slabs on four sides and one slab on top.

As centuries rolled, granite had been extensively used throughout the globe as a medium for sculpture and architecture. Granite was also used to build houses and their beautification. In the modern era granite is used for very many purposes such as construction of bridges, piers, dams, seawalls, river walls, bridge super-structures, kerbstone pavements, monumental structures, institutional buildings landscaping, park, railways, roads etc. Broadly speaking there are eight categories of granite products. They are:

1. Rough blocks
2. Slabs
3. Panels
4. Tiles

5. Monuments

6. Fancy and decorative items like pen-stand, flower-vase, table tops, tea-poys and others.

7. High precision products like surface plates for engineering application.

8. Rubbles, metals etc for building materials.

Thus, it can be seen that, granite has been used by man right from pre-historic period to the present day, not only to protect himself from wind, rain, wild animals but also to hunt food. Granite has also served as a medium to express his feelings and artistic taste. He has also used it to make statues, temples and other architectural monuments and constructions. In the computer age also granite is useful in many ways. Hence, it can be said that granite has been a companion to man through ages.

1.1 REVIEW OF LITERATURE

The literature on granite quarries is abysmally poor. Whatever literature is available mainly deals with geochemical aspects of granites, rather than commercial aspects of the industry.

V.Nata Rajan and B. Krishnan, (G.S.I., Trivandrum, 1999) in their study concluded that "Dimension industry in Kerala is presently in its infant stage and only two varieties have so far attained from the export market. Though the state consists of hard silicate rocks of different

colours, texture and totality of appearance comparable to granites exported from elsewhere in the country. Its commercial exploitation is very difficult due to the peculiar limitations of the terrain. The charmockite and leptynite occurrence of Trivandrum and Kollam are commercially known as green granite and Kerala white.

M.P.Muraleedaran, V.M.Nair and V.S. Subramanian, (G.S.I., Trivandrum, 1999) indicated that the problems of granite exploitation in Kerala are manifold. Firstly, the industry invites large-scale capital investment with sophisticated machinery, which can sustain only if a balance is achieved between supply and demand. Secondly, Kerala granite is not commercially viable because of the intensive weathering conditions and vegetal cover. Thirdly geographic forms like pediplanes, granite corestone plates, rawares and rubbins which provide extensive sheet rocks free from fractuse and weathering as that occurring in the arid, semi-arid areas of neighbouring states are practically absent in Kerala. Finally, density of population, presence of cash crops in many of the areas, expensive labour etc. make quarrying activities very difficult.

In a study conducted by R.Sreenivasan, (Chettinadu Granite Madras 1999), it is revealed that "quarrying of granite deposits is some what different from mining of major mineral deposits. According to him, the three important aspects to be considered in granite quarrying are (a) geological aspects (b) mining aspects and (c) environmental aspects. He also mentioned that dimensional granite include not only

true granite, but other types of ingenious and greissess, gabbros, charnockites and khondalites. In commercial aspects all the above mentioned rocks are treated as granites.

A paper presented by K.Gopalakrishnan, (G.S.I., Madras 1999), concluded that 75%-80% of the working mines on commercial granite are failures. The reasons attributed to such large scale failures are: (i) lack of understanding of the geological setting of the granite type in the state and (ii) lack of proper systematic geo-scientific assessment of the deposit before the start of exploitation.

In 1999, a paper entitled "Granite in the service of man through the ages" presented by H.Chandrasekhar it was stated that "granite has been used by man right from pre historic period to the present day, not only to protect himself from the natural agencies like wind and rain, but also from the wild animals. The stone has been his medium of expression of his artistic urge in the form of statues, temples and other architectural constructions. Hence, it can be said that granite has been a companion of man through the ages from ancient times to the present.

In a study Saravanan, (INMA group of companies, Madras 1999) noted that the management of Indian mineral resource is extra ordinary complex because of the variety of physical characteristics of mineral resources, their hectrogenity and non availability, their uncertain occurrence and often deep underground location, the remoteness of sites and requirements. The extent, rigour and cost of

production activities in mineral resource development are far in excess of those required for development of these industries. He also mentioned that quarrying is very capital intensive and has always been long-term future oriented than other industries. He also pointed out that for Indian conditions of quarrying, it is ideal to have a semi-mechanised kind of operation so as to minimise the capital investment on machineries and also to utilise the vast manpower available in rural areas.

According to R.Srinivasan, (Chettinadu Granites, Madras 1999), there should always be a balance between environment preservation and economic development. Like other industries, quarrying industry also affects the environment, although relatively to a lesser extent. He noted the following type of pollutions that affect environment due to quarrying of minerals viz., land degradation, noise pollution, air pollution, water pollution, health impact

Franco Ferrasini, (Executive Committee Member, Verona Fair, Italy) holds the view that all nations and people are united by the common interest in marble and stone, fundamental elements for the existence and very culture of man. Nations are different, their houses are dissimilar, but they are bound by a common passion - a consummate love, for things beautiful.

K.Rajaram, (G.S.I.,Madras 1999) noted that 'though the granite trade has attained maturity it has not come through as healthy and value based principles. What is seen today is the proliferation of

middlemen who have absolutely no knowledge in the trade but play a vital role purely in their money power. On false promises and assurances, orders are procured and defaulted. Landowners lease-out the area to operators who in turn goes up to a certain level and switches over to subleasing. Traders enter into the picture with marginal advances who then may or may not get the material supplies, processors do not own quarries. Many quarry owners do not have processing units. K.Rajaram also noted that granite exploration, exploitation and export are being carried out without the active participation of and consultation of geo-scientists. Scientific approach is the nucleus and without which the trade is lifeless and disorganised.

B.Kanishkan, (G.S.I., Madras: Market Scenario of Indian Granites 1999) opined that India has good potential to remain in the trade for centuries. But our strategy has to be changed to compete effectively with other competitors.

G.B. Sukumaran and K.Rajaram, (Department of Geology, Presidency College, Madras 1999) in their study concluded that 'qualities of one rock type do not correlate with the other and each has its own potential and utilities which has to be recognised and made use of in the suitable application slot. Their key findings are:

a) Rocks which look similar may have different technical qualities and hence different fields of application.

b) Rocks which differ aesthetically may have similar technical qualities and hence identical fields of application.

According to Koti Reddy, (Small Industries Institute, Madras 1999) "The future of Indian granite trade is brightening. We are exporting both processed and non-processed granites. Due to this potentialities for employment as well as foreign exchange are increased.

Sathya Prakash Mishra and K.N.Singh, (G.S.I., Lucknow 1999) expressed the view that granite monuments have withstood the vicissitudes of time. Rock had the tenacity to survive for over 2200 years. The suitability of granite as construction and monumental material can be best understood from the study of ancient monuments. The sculpture of the bygone ages pointedly affirm the durability and suitability of stone for long lasting use. Indian granites are the time tested building and ornament materials stone.

Mr.Taichiro Hasono, (President, Japan Stone Trade Association 1999) holds the view that the Indian granite sector is unscientific in nature. Hasty quarrying is resulting in higher percentage of wastage, smaller size blocks and lesser quality materials which would in turn make India lose its export market"

I.Sathiya Sundaram conducted a study in the year 1996 with the help of Foundation of Indian Mineral Industries on the basis of the study and recommend the following:

a) Insistence of granite factory in every state (having deposits) for value added products.

b) To make available term loan facilities for granite industries.

c) Make arrangements for providing necessary facilities for training and research for stone industry.

d) To make data for export market.

e) To participate international exhibitions and fairs.

f) To do away with discriminatory treatment between public and private units, in matters of leasing renewals etc.

I.Sathya Sundaram in an article titled Granite Industry: Potent Expert Potentials (Facts For You, August 1995) opined that "scientific quarrying and dressing is necessary to produce dimensional blocks. Modern techniques depend less on explosives and more on techniques like Jet Burners and Compressor drilling (in order to produce blocks without cracks and other defects). Equally important is scientific removal of waste from quarry site."

A study conducted by Federation of Indian Minerals Industries (Facts For You, Nov-1994) concluded. "There is a big information gap at the national level, in the collection of information on the dimension stone industry in general and the granite industry in particular. These needs to be plugged, if there is to be forecasting of internal and

external demand and for the purpose of formulating a long-term strategy for granite exports."

1.2 SIGNIFICANCE OF THE STUDY

Kerala, the most literate, clean and beautiful state of India, is a leading producer of granite. She is blessed with natural resources. In fact the boom in the construction industry in Kerala which was fueled by Gulf money made this industry a fertile soil for employment generation and profit maximisation. The demand for granite can be classified into (a) Regular demand and (b) New demand.

Regular demand for granite emanates from building constructions, existing roads, railway tracks, sea wall building, etc. In addition, granite is also needed for maintenance of roads, ports, airports, etc. In modern living granite is used in kitchen slabs, pillars, flooring and wall cladding, panels, tiles, monuments and other decorative items like pen stand, flower vase, tabletops, tea-poys, high precision products like surface plates for engineering application etc. Moreover, comparing to other building materials, like marble, slate and sandstone, granite enjoys many advantages, viz. (i) Grater variety in colour and appearances, (ii) Cheaper than marble or slate, (iii) Can be cut in the thickness of 20mm, 10mm and 4mm, (iv) It is more resistant to weathering in polluted environment, (v) Not freezable, (vi) It is acid resistant and can withstand any temperature, (vii) Non slippery and does not smell unpleasantly, (viii) High durability and low maintenance cost.

Granite quarrying can help to reduce unemployment and under employment in Kerala and thereby contribute to the economic development of the state. In such a context it is useful to study the working problems of the granite quarries in the state. Existing studies on quarries and quarrying are confined to the geological and geochemical aspects or breaking strengths etc. There is hardly any study relating to the economic and financial aspects of granite quarrying in Kerala. Hence an attempt is made here to analyse the different aspects of granite industry in Kerala. Time and resource constraints forced the researcher to confine the study to Thrissur district. Private and co-operative sector quarries were taken for the study.

1.3 STATEMENT OF THE PROBLEM

There were no specific rules and regulations regarding granite quarrying activities in the early stages. Those who wanted granite could get it from the locality. But much developments have taken place since the entry of cement and concrete in construction works.

Quarry work is really tough. It consumes much time and energy. But the wages paid is comparatively low compared to the risk involved and effort acquired. Most of the quarry workers do not have any subsidiary income. It is also heartening to note that a quarry worker cannot work normally for more than 15 to 20 years.

Most of the workers develop physical disabilities owing to hard work in the quarry. Rheumatism, stomachache, chest pain and body pain are only a few of the sicknesses found among them. It is worth mentioning that even the primary basic amenities like drinking water and sanitation are not provided in or near the quarries. So also is the case with safety measures. Nothing is done to keep the workers safe from accidents. The only safety measure is an alarm which is given during the time of granite blasting. Workers are expected to move to safe places on hearing alarms.

Quarrying provides substantial volume of employment. This is highly important in a state experiencing acute unemployment.

In the light of the above statements the following objectives are set for the study:

1) To study problems connected with quarry operations.

2) (a) To compare the financial performance of private quarries with co-operative quarries.

   (b) To ascertain the significant difference or differences if any, of the individual expenses in private quarries and co-operative quarry.

   (c) To ascertain the significant difference or differences if any, of the individual expenses in the private quarries, i.e., (i) quarries paying royalty and seigniorage fully (ii) quarries paying royalty and seigniorage partially and (iii) quarries who do not pay royalty and seigniorage.

3) To study the socio-economic background of granite quarrying.

4) To study the monetary and welfare benefits and to ascertain the significant difference or differences, if any, in the individual incomes of employees in both sectors.

5) To suggest remedial measures wherever possible.

1.4 HYPOTHESES

1) There is significant difference in individual expenses in the case of private and co-operative sector quarries.

2) There is significant difference in cost among private quarries.

3) There is significant difference in monitory and welfare benefits of employees in private and co-operative sector quarries.

1.5 SCOPE OF THE STUDY

The study is confined to non-mechanised private and co-operative granite quarries in Thrissur district. There are 90 non-mechanised quarries in Thrissur district. Data were collected for the period from 1994-'95 to 1999-2000. 31st March of every year was considered as the closing date of the year. It envisages an analysis of various problems connected with quarrying operations, financial analysis, cost analysis, demand and supply position of quarry products and socio-economic background of workers. It also suggest some measures to improve the working conditions of granite quarrying.

1.6 METHODOLOGY

The study is both descriptive and analytical in nature. It is descriptive with regard to theoretical concepts and analytical with respect to interpretation of data. The study was conducted in three stages.

In the first stage the management problems of the quarries were found out. For collecting primary information from the management of non mechanized quarries, structured interviews were conducted with the help of schedule.

In the second stage, cost analysis and financial performance were studied using various techniques such as ratio analysis, percentages, index numbers, test of significance, chi square test, regression analysis etc.

In the third stage, socio-economic aspects of quarrying in private and co-operative sectors were studied. For this purpose primary and secondary data were used. The primary data were collected through structured interviews with the help of pre tested schedules from the owners, customers, lorry drivers, workers, forest guards, union leaders, local public, officials from geology department, authorities from CESS etc.

Secondary data were collected from published reports of the co-operative society, books, journals etc.

1.6.1 Universe and Sample

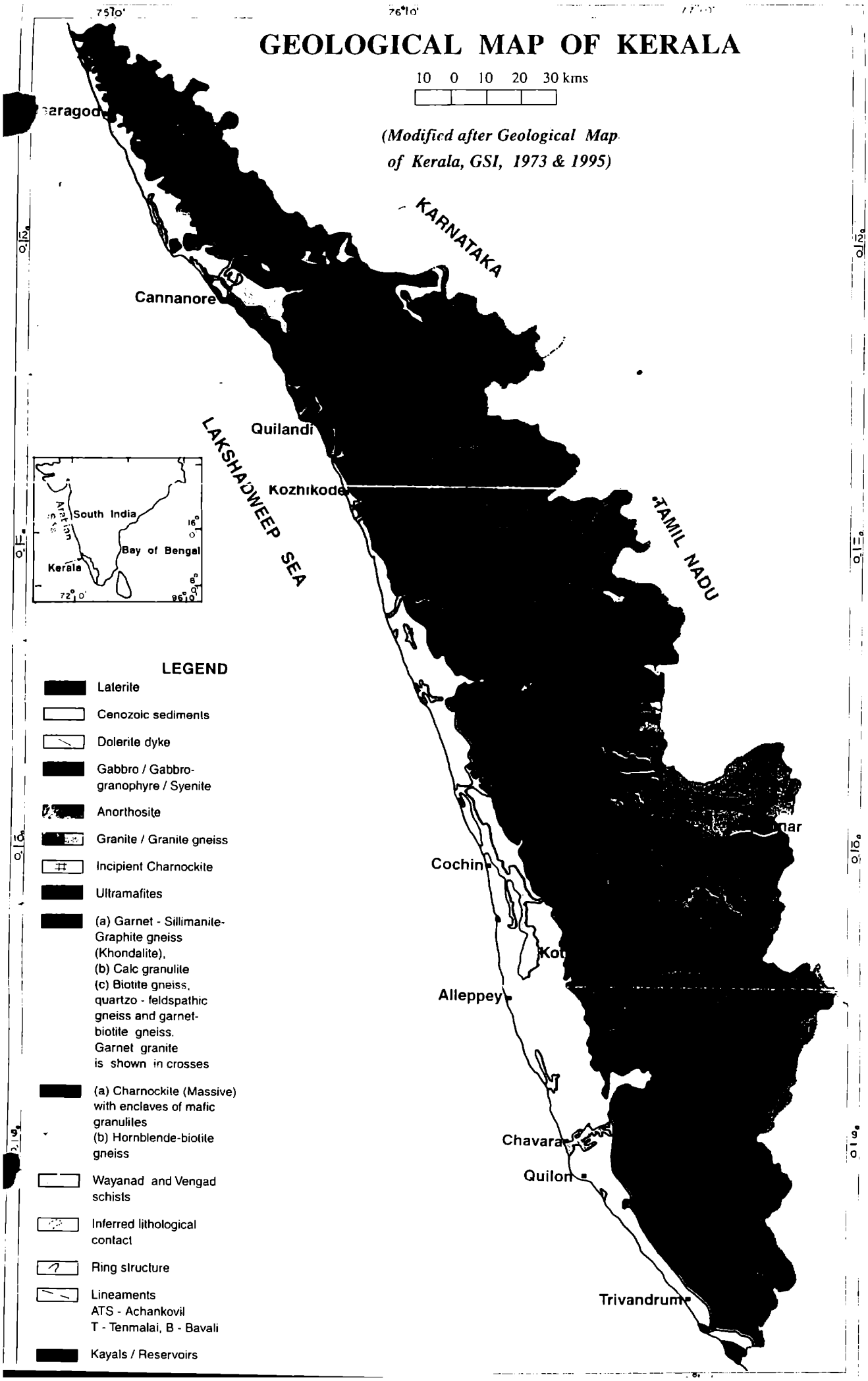
The quarries of Thrissur district form the universe of the study. Thrissur district is selected for the study due to the following reasons. (1) Thrissur has high deposits of granite (charnockite) vis-à-vis other districts (refer map No.1). (2) Thrissur has maximum number of non-mechanised quarries (90 units) compared to other districts of Kerala. (3) Thrissur is the only district in the state where quarrying activities are conducted in the co-operative sector. (4) Thrissur being the geographical centre of Kerala, the granite products can be easily transported to different parts of Kerala. (5) Thrissur is the land of festivals and fireworks and as a result of which, explosives, which are the main ingredient for blasting the rocks are easily available. (6) Trainers for blasting (Aassans) were also easily available traditionally in Thrissur district and hence quarrying became more popular in Thrissur district. (7) The topography also favoured Thrissur for granite quarrying.

There are 90 non-mechanised private quarries, in Thrissur district. The coverage of the quarries vary from 50 cents to 3 acres. Thirty non-mechanised private quarries were selected under stratified random sampling method. The strata was based on the payment of royalty and seigniorage for granite. Those strata are: (i) 19 quarry units functioning in own patta land and porambokku land (they pay royalty and seigniorage fully), (ii) 6 are on forest land (they pay royalty and

GEOLOGICAL MAP OF KERALA

10 0 10 20 30 kms

(Modified after Geological Map of Kerala, GSI, 1973 & 1995)



LEGEND

- Laterite
- Cenozoic sediments
- Dolerite dyke
- Gabbro / Gabbro-granophyre / Syenite
- Anorthosite
- Granite / Granite gneiss
- Incipient Charnockite
- Ultramafites
- (a) Garnet - Sillimanite-Graphite gneiss (Khondalite), (b) Calc granulite (c) Biotite gneiss, quartzo - feldspathic gneiss and garnet-biotite gneiss. Garnet granite is shown in crosses
- (a) Charnockite (Massive) with enclaves of mafic granulites (b) Hornblende-biotite gneiss
- Wayanad and Vengad schists
- Inferred lithological contact
- Ring structure
- Lineaments ATS - Achankovil T - Tenmalai, B - Bavali
- Kayals / Reservoirs

seigniorage partially) and (iii) 5 on illegal private quarries (they pay neither royalty nor seigniorage). 33.33 per cent of the universe was taken as sample and found that it represents the universe.

Table 1.1

Table 1.1 represents the universe and the sample units selected for study for Thrissur district

Private non-mechanised quarries	Universe	Sample
Group I (paying royalty and seigniorage fully)	57	19
Group II (paying royalty and seigniorage partly)	18	6
Group lll (paying no royalty and seigniorage)	15	5
Co-operative quarry	1	1

Sample - 33.33% of the population.

1.6.2 Data Collection

Both primary and secondary data were collected for the study. Primary data for the study were collected with the help of pre-tested well structured schedules. The investigator discussed the major aspects of granite quarrying and its allied activities with many experts like senior geologists, officials of mining and geology department, Thrissur; Assistant Director-Mining and Geology Department, Trivandrum; Director-Geological Survey of India, Trivandrum; scientists in CESS, Trivandrum, teaching faculties, KFRI-Thrissur; President of the private

quarry owners association-Thrissur; owners of private quarry, workers of private quarry, president, secretary and workers of 'Anappara Karinkal Thozhilali Co-operative Society'. On the basis of above discussion, a schedule was developed for conducting pilot study. This schedule was tested and found good enough to generate necessary data. Most of the respondents from private quarries were reluctant to respond until they were convinced about the purpose of the study.

Secondary data pertaining to quarrying were collected from the owners of private sector quarries. Except a few, owners of private sector quarries failed to give dependable data with respect to actual production, royalty payment, dead rent, seigniorage, profitability etc. To overcome this, data relating to salary, wages, prices etc. were collected from the workers, owners as well as consumers. Personal observation and indirect oral interviews were also used for collection of data especially on the output, royalty payment, seigniorage payment etc. This approach facilitated crosschecking. The data so collected formed the basis for preparing trading account, profit and loss account and balance sheet of private quarries for the respective period.

Data regarding the operation of co-operative society were collected from published trading account, profit & loss account and balance sheet. Besides these, discussions were held with the secretary, president, members of the Board of Directors, workers etc.

1.6.3 Tools Used for the Study

Data thus collected from the primary as well as secondary sources were analysed and interpreted by using statistical and financial management tools. Averages, percentages, ratios, test of significance, index numbers, standard deviations chi square test, regression analysis and various financial analytical techniques were used. Tables and charts were drawn to exhibit the relevant data.

1.7 LIMITATIONS OF THE STUDY

The study covered only the organised, non-mechanised granite quarries in Thrissur district in the private and the co-operative sectors. The study covered only a period of six years from 1994-95 to 1999-2000. Of the 90 quarries only 30 quarries were randomly selected for the study.

The study has to cover processing, marketing, consumption, value additions, export possibility, employment potentiality, productivity, linkage between non-mechanised and crusher sector etc. However, emphasis was given to aspects like problems connected with quarrying operations, social and economic aspects of quarrying, financial performance, cost analysis and viability of co-operative sector and private sector quarries etc.

The owners and some government officials were unwilling to disclose the actual figures. Most of the respondents were using crude

form of accounting and they were not in a position to give past data accurately.

Data collected from employees, owners, lorry drivers, brokers, union leaders, etc were estimates rather than real. In order to facilitate analysis, the accounting period is taken as 1st April to 31st March every year.

Geographical differences in the location of quarry affects the products of the quarry. But this is not taken as a variable in the study.

Bonus, provident fund, leave with wages, holiday wages, gratuity etc are calculated on yearly basis and the inflation factor is not adjusted.

There is wide disparity in land value, labour charges, among the different rural areas. The study about granite quarry was based on sampling and the limitations applicable to any sampling will also be applicable to the present study.

Mechanised crusher quarries are not taken because of non comparability. The crusher quarries have a coverage of 5 to 30 acres of land. Some crushers have 5 acres of land and a total investment of Rs.10 lakhs. Others have 10 to 20 acres of land and their investment varies between Rs.25 to Rs.50 lakhs. Few of them have above 25 acres of land with an investment varying from one crore to three crores of rupees. Their size of machinery, extent of mechanisation etc are varying from crusher to crusher and hence comparison is not possible.

They produce and sell only 1/2" metal and baby metal. They are not selling boulders or 6" metals which are very important for construction industry.

1.8 SCHEME OF THE STUDY

The thesis is organized under six chapters as detailed below:

The first chapter provides an introduction to the study. This chapter contains, a brief history, review of literature, significance of the study, problem statement, objectives, hypotheses, scope, methodology, the universe, tools and limitations of the study.

The second chapter deals with history of granites in India and specially in Kerala. It also covers the various features of charnokite quarries.

Chapter three gives a detailed study of the production, financial performances and the cost analysis of quarries of both sectors. This chapter also gives a detailed view of the significant difference between the expense of private and co-operative sectors, and the significant difference in the expenses of various groups in private sector.

Chapter four presents the socio-economic background of workers and the significant difference in the income of the employees in both the sectors.

Chapter five provides a detailed study of the various problems connected with quarrying operations, demand and supply of granite products.

Chapter six presents conclusions drawn from the study. The suggestions for the working up of a good system of granite quarrying are also incorporated in this chapter.

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CHAPTER II

HISTORY OF GRANITE QUARRIES

In this chapter an attempt is made to study the history of granite quarries.

2.1 HISTORY OF INDIAN GRANITES

The use of granite in India has been as old as India's history itself. In ancient times, granite was extensively used in the building of temples, palaces and other big structures[1]. During the earlier part of this century granite came to be used for making kerb-stones, pavements and buildings. Granite has been used as structural, architectural and ornamental stones in India since the early historic period. The stone sculptures of the sub-continent are divided into 12 chrono cultural subdivisions[2].

1.	Pre Maurya to early post Maurya period	650 BC - 72 BC.
2.	Kushan Gandhar art	1 AD - 176 AD
3.	Satvahnan Period	200 BC - 200 AD
4.	Gupta Art	320 AD - 600 AD
5.	Chalukya Art	550 AD - 973 AD
6.	Pallava Art	600 AD - 750 AD

7.	The Pala school	700 AD - 1200 AD
8.	The Orissa school	700 AD- 1200 AD
9.	Khajuraho Temples	950 AD -1200 AD
10.	Hoysala Art	1111 AD - 1318 AD
11.	Other Medieval Monuments	100 AD - 1600 AD
12.	Modern Achievements	After 1600 AD

2.2 EARLY USES OF GRANITE IN NORTH INDIA

Granite appeared for the first time in the Indian architectural and monumental panorama during the 3rd century BC. Caves were cut in the highly quartzose pre-cambrian granite gneiss of Barahar range in Bihar. Thus the Mauryan period marked the beginning of rock cut architecture in India[3]. Granite was also used in the foundation of the great cyclopean structures on which the work began during this period. More advancement was made in the rock-cut architecture during SHUNGA period, (185 BC - 72 BC) and more extensive attempts were made to excavate caves in granites and the choice shifted to softer and horizontally-bedded rocks. These caves were cut in GONDWANA sand-stone near Bhubneshwar and Decan belts 130 km away from South Bombay in the 2nd century before Christ. Work on Ajanta also appears to have been begun during this period. Use of granite in sculpture is almost negligible throughout the rest of the history in North India till the medieval period. A few temples at Khajuraho, located over Bunder Khand granite, are made of the granite rocks obtained from the local outcrops. Sculptures of finely polished granite

decorate the temples where the rock was easily available from the concerned state. The better known examples are the sculptures from Udaipur region of Rajastan and Gaya in Bihar.

Ashoka, the great, the Mauryan emperor, embraced Buddhism after the great war of Kalinga. He undertook great efforts to spread his religion of love and non violence. He sent 'BIKHUS' to far off places, even beyond the Indian subcontinent. He engraved the message of the Buddha on stones to preach and to spread the religion. Five such inscriptions are found near Koppal town. One of them is engraved on the base of a "balcony"-shaped tefoni of granite. The third inscription which is very important for historical reasons is found in a cave formed by granite boulders in a hill range west of Maski, Lingosugar Taulk, Raichur district. The other two inscriptions are also engraved on granite boulders.

The end of the Gupta Era saw a decline in the quality of sculptural art in North India. Coinciding with this period the South emerged as a major centre of stone art. The South produced most of its monumental temples and sculptures in the late and post Gupta era under the monarchical patronage of the Chalukyas, Pallavas, Rashtrakutas, Cholas, Pandyas and Nayaks.

2.3 GRANITE MONUMENTS OF SOUTH INDIA

Granite was extensively used in temples of the south. The Pallavas built many rock cut temples at Mahaballipuram near Madras.

Such temples with their fine sculptures are made in solid charnockites and some in reddish granites[4]. The charnokites are amongst the strongest and most durable stones. Yet they are quite amenable to fine dressing and the bluish quartz in them imparts a cool elegance to the sculptures. The temple at Kanchipuram is another remarkably beautiful structure of this period. From the latter part of the 8th century the temples of the region were entirely built of cut, moulded, carved and sculptured blocks of granite.

The subsequent phase of sculpture belongs to the Cholas who ruled for the century after the fall of Pallava dynasty. The best known monument in this period is the Brihadishavara temple of Thanjavur. It is a tall and imposing structure built of granite and rises to a height of 66 m. The huge spire at the top of the main shrine is believed to weigh over 80 tonnes. Similar constructions can be seen at Gangaikonda Cholapuram in Tiruhcirapalli district.

Skilful use of granite became extensive in the medieval monuments. A colossal structure of this period is the 17m tall sculpture of Bahubali at Sravanabelagola near Hassan in Karnataka[5]. It is made of solid granite. The image is well polished and cut out of monolithic block (180 AD). The sculptures and monuments of the fabulously wealthy Vijayanagar empire of the 14th century at Hampi near Hospet is marvelous. Granites are highly used for the temples of Warengal region of Andhra pradesh. The 16th century temples of Madurai Meenakshi and Rameswaram in Tamil Nadu are made of

pink and grey granites. Madurai Meenakshi temple is noted for its 61 m high entrance and the group of seven pillars which emit musical notes when touched, whereas Rameswaram is known for its 1220 m long corridor, the longest of such structures in the world. Obviously the artisans of that period knew very well that granite was highly suitable for supporting large structures.

In Karnataka, granite was extensively used as a medium of sculpture and architecture during the Vijayanagar period (14th century to 17th century AD). Sand stones, lime stone, and soap stones were extensively used for this purpose during the periods of Badami, Chalukyas, Rasthtrakutas and Kalyan Chalukyas. It is the perishability of granite which prompted to use granite for their creativity. Vijayanagar kingdom was established at Hampi which is surrounded by granite hills. The raw materials like sand stone, lime stone, basalt and soap stone were located at far off places from Hampi. Thus granite became the natural choice. Further, the superior physical properties of the rock also attracted sculptors and builders alike. During this period, famous temples of VIRUPAKSHA, VIJAYA VITTAL and artistic statues like Narasimha, and dancing damsels were carved out of granite. These artistic creations have attracted the attention of the art-lovers all over the world.

The great monuments in granite resist the vicissitudes of time. Rock has the tenacity to survive for over 2200 years[6]. The suitability of granite as construction and ornamental material can be best

understood from the study of ancient monuments. The sculptures of the bygone ages pointedly affirm the durability and suitability of the stone for long-lasting structures. Indian granites are time-tested building and ornamental stones.

The present day civilization needs a continuous flow of raw material especially minerals and metals, in ever increasing quantities, for various capital as well as consumer goods. From the early years, in India mineral wealth has been considered as belonging to the entire community. It was only with the consent of the State that mining could be done and the wealth so generated had to be shared with the State. Kautilya (4^{th} BC) in his Arthasastra went to the extent of saying:

"Besides collecting from mines, the twelve kinds of revenue the govt. shall keep as a state monopoly both mining and commerce in minerals".

The continuum that the Indian mining industry provides between the glorious past and much-expected future, has a fascinating story to narrate. In Keeping with the objective of industrial policy resolution in 1956 Govt. undertook positive steps in shouldering greater responsibility in developing capital-intensive mines and minerals based industries. This is reflected in the fact that the value of mineral productions which was merely 60 crores in 1947 have not gone up substantially to more than 10,000 crores.

2.4 MARKETING

India is an important producer of granite. Other major producers of granite are Scandinavia, Spain, South Africa, Brazil and the U.S.A. India is well placed in respect of granite with deposits that may last for about 1000 years. The Indian granite occupies an important place in the world market because of its quality. It is hard and has the ability to preserve glossy polish and fine finish. So it is readily acceptable in the world market.

Of the different varities of granite, black granite is highly popular. However, gray, pink and multi-coloured brown granite are being increasingly used now-a-days. Nearly 75 per cent of the granite production is used for construction activities. Granite can find widespread application in other areas such as cladding monuments, and decorative pieces owing to its inherent advantages.

Granite can be used as a value-addition product. The major value addition (10 to 25 times) takes place at the stage when granite is produced as a dimensional block.

Indian granite has demand all over the world. Of the 200 attractive varieties of granite those have been identified in the world market today, more than 100 varieties are found in India[7]. India has vast deposits of multicoloured granite in States like Andhra Pradesh, Utter Pradesh, West Bengal, Tamil Nadu, and Karnataka.

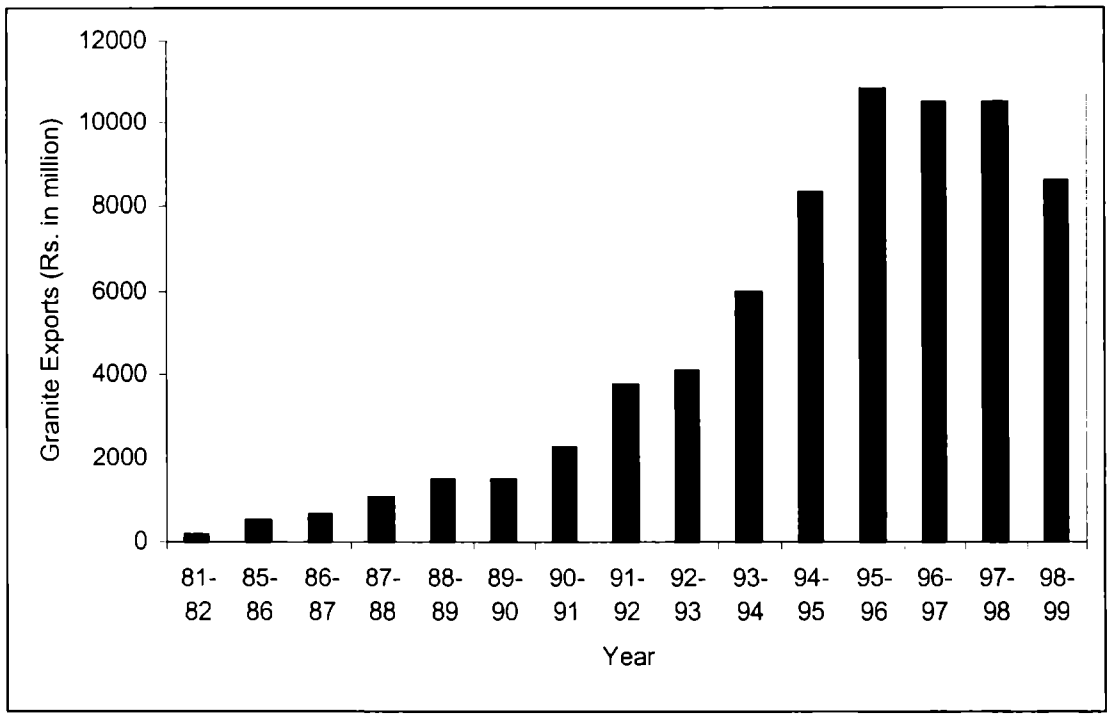
It is the buyer-preference than resource availability, which determines the demand for granites. For example, rocks like ebony black granite of South Africa, and multi coloured varities of India are considered premium varities in the world market today.

The taste of the overseas buyers in different countries is mainly based on their sentimental and aesthetic values. In Japan people prefer black colour, and so all their monuments are out of black colour. This gives an edge to black and medium gray granite varieties is restricted in the Japanese market. European countries are totally different, and they like multicoloured granite varieties with voilet, pink and blue colours with attractive designs. In countries likeTaiwan and Korea, the interest lies in red varieties of granite. In the U.S.A, they like black and other coloured granite. The demand for processed tiles and slabs preferably made out of green granite is preferred in Gulf countries. India is proud to possess all these varities of granite which can cater to the different tastes of people living all over the globe.

Profitability of granite industry mostly, if not entirely, depends on marketability. The acceptance of a particular variety of function in the international market depends on the personal taste of the consumer in the case of readymade granites - for eg. the Japanese are mad after Kunnam and Paithuur Black of Tamilnadu while the West German market clamour and compete for a multi-coloured granite of Krishnagiri in Andhra Pradesh.

Diagram 2.1

Export of granite from India from 1981-82 to 1998-99



Source: Collected from Facts For You - September 2000.

No doubt the Indian granite exports have steadily grown over years. In the last decade the export has grown from 30 million US dollar to 80 million US dollar. During the last few years 1993-1997, it almost reached 150 crores. Considering the quality of resources this figure is alarmingly low. India's share in the world granite market is only 10 per cent i.e., Rs. 1500 crores. Almost 95 per cent of Indian export is in the shape of raw blocks.

The main world market for granite, both raw and processed are:

Europe : West Germany, Italy, Netherlands, Portugal, Denmark, France.

North America : United States and Canada.

Middle East : Saudi Arabia, Kuwait, U.A.E and Oman.

Far East : Japan, Hong Kong, Singapore & Taiwan.

Japan is the major importer of Indian granite accounting for 28 per cent of their import followed by Italy 11 per cent, Germany 8 per cent and the Netherlands 2 per cent.

All the above data relate to almost raw block export, as India is yet to make an impact on finished products in other countries. Since Japan re-exports a portion of imported granite after further processing, it is felt in some quarters that attempts to increase export of processed granites to the world market may lead to a shrinkage of Japanese orders for Indian granites. Another factor is to have an acute competition with Italy who is the world champion in this field.

Italy, due to technological advancement, controls 60-70 per cent of the total market of finished granite goods. Italy imports a variety of raw granite blocks from all over the world, and process them into lengthy building slabs, monuments and tiles. They are making slabs, panels, tiles, monuments, decorative items like pen-stand, flower-vase, table tops tea-poys, high precision products like surface plates for engineering application etc.

Besides Italy, W. Germany, Canada, USA, China, Sweden and Korea also contribute to the supply of processed products to the world market.

Indian granite industry still holds a promising future because of certain rare material available in India even though the potentialities have not been utilized to the fullest extent.

For marketability of granite in the international market, the material should be acceptable both technically and on aesthetic value[8]. Fashion, which is ever changing, also plays a dominant part. Indian granite is yet to achieve such a position. Till such time export of raw block should be continued, as importing countries like Germany, Italy, USA, Japan, France etc. produce high class finished products of all categories in their highly sophisticated units and are insisting to import rough blocks from India even at a higher price. Otherwise China, which is ready to supply rough blocks to any extent will snatch away that market from India. India should formulate an appropriate export policy to enhance export both to rough and cut blocks on the one hand and value added processed products on the other.

India's share in the global market for granite is fast dwindling with the entry of countries, like China and South Africa. The entry of more South East Asian countries, and the export thrust given to the industry in China could also alter global trade. For eg. Spain and Italy are exporting granites to the tune of 15 million tonnes every year and their price ranges between 200 and 250 UD/CBM only, whereas India's

price cannot be less than 350 UD/CBM. Therefore, global competition to India's export is going to be tough in the forthcoming years[9]. Besides the technological advancement in quarrying and processing are made to minimize the production cost and match with international quality standards, the pride of place presently occupied by India in the world market may be lost.

2.5 LOCAL MARKET

Consumption of granite in the construction industry in India has been picking up tremendously in the last few years. Most of the multi-storeyed office complexes, supermarkets, hotels, houses etc. use granite slabs instead of marble for decorative purpose. The 100 per cent of EOU are permitted to sell 25 per cent on their production in the local market, and hence they can sell this portion to meet the rising local demand. Many of the small units set up in the country to cut and polish the waste granite blocks become sick, since their production cost is high compared to the buying power of the local customers.

2.6 BUYERS TASTE AND MARKET STRATEGY

The taste of the overseas buyers is different in different countries and is mainly based on sentimental and aesthetic values. In Japan people are sentimental to black colour and all their ornaments are made out of black granite only. The Japanese market is mainly restricted to black and medium grey granite varieties. In countries like Taiwan and Korea, the interest lies in red varieties of granites. The

market in European countries are totally different and they like multi-coloured granite varieties having a combination of violet, pink and blue colours with attractive designs. In USA they like black and coloured granite. The demand for processed tiles and slabs preferably made out of green granite is picking up in gulf countries. India has the advantage of possessing all such varieties of granite which can cater to the different tastes of people living all over the world.

2.7 PRESENT SCENARIO OF INDIAN GRANITE

The Indian granites occupy an important place in the world market because of their hardness and ability to preserve glossy polish and fine polish. The govt. has declared granite as 15th thrust sector.

The granite market was worth Rs.13 billion in 1997. However, with over 15 per cent of the world's granite reserve, India's share in the international market was only 10 per cent in 1995.

In 1996 there were 750 granite exporters of whom 580 were quarry operators and dimensional block exporters, and 50 came under the Small Scale Sector. The rest were 100 percent export-oriented units dealing with processed granites[10].

The main value addition takes place at the stage when granite is produced as a dimension block. The value addition that occurs when a dimensional block is produced from rock ranges between 10 to 25 times. When the dimension block is processed into slab, monument, etc. a further value addition of about two to three times occurs. But for

this value addition higher cost in the form of additional investment on machinery, labour and power are required.

Nearly 75 per cent of the granite production is used for construction. But, given the inherent advantages, granite can find more widespread application in other areas such as cladding, balustrades and decorative pieces.

India exports granites mainly to the USA, the UK, Germany, Japan , Italy and the Netherlands.

The government of India is aware of the export potential of the granite industry. Yet most of the recommendations of the Extreme Focus Committee had favoured a flexible quarry licensing policy coupled with an easy renewal procedure- a major demand of the industry. It had suggested the first mining lease for a minimum of 20 years with further assured renewals having a uniform and reasonable royalty and dead rent all over the country.

The industry has formed a development panel under the chairmanship of R.Veeramani. The Ministry of Mines had setup the Granite Development Council in 1995 to come to the aid of the industry.

The sluggish demand for granite is due to their prohibitive costs. And the primary reason for the prohibitive cost is high rate of royalty and seignorage levied by the state governments. Also, banks are

allowing credit facilities only against export, but not for enhancing the mining activity.

The mining industry is controlled by three ministries, viz. the Commerce Ministry, the Industry Ministry, and the Ministry of Mines. In such a situation, co-ordination becomes very difficult and that creates problems for mining industry.

Apart from the problems mentioned above, Open General Licence (O.G.L) facility is denied to the granite industry for importing mining machines with minimum customs duty as in the case of diamond and jewellery industry.

The polishing units of India are processing only 17 varieties, while there are about 70 coloured varieties of granite in the country.

The industry has been pleading with the Central government to upgrade granite as a major mineral (at present it is a minor mineral coming under the States list) so that it could come under the concurrent list and hence can have a uniform policy regarding leases, royalty and dead rents for granite quarrying[11].

The granite industry is a victim of adhoc policies both at the national and state levels. There is thus a strong case for concerted measures to boost granite output and exports.

None-the-less, Indian granites have good export prospects. There is enormous reserves of granite in almost all the states in the

country. A modest estimate shows that the available known reserves will last for at least 400 to 500 years. Further explorations may extend the resource yet for another 500 years. So no problem in the resource availability can be expected in promoting exports. All that required is scientific planning, organised development, and faster actions to remove the constraints faced by the granite industry to cope with the high demand in overseas market.

Italy, Germany, Japan and France are the leaders in the manufacture of machineries, tools, consumables, etc. and possess high technology and fabrication knowhow. Further, Italy is the world centre of stones. With proper planning, ground work, India can emerge at least as a second world stone centre as she has large reserves of a variety of stones.

2.8 GRANITES OF KERALA

2.8.1 Kerala Physiography

Kerala state comprises a narrow strip of land with an area of 38863 km^2 extending between north latitudes $8^0 17^1 30^{11}$ and $12^0 27^1 40^{11}$ and east longitudes $74^0 51^1 57^{11}$ and $77^0 24^1 470^{11}$. The western ghats, with the magnificent array of sky scrapping peaks on the east, and the Arabian sea washing its shore on the west are the natural boundaries of the State[12]. Dakshin Kannada, Kudaku and Mysore districts of Karnataka bound its northern and north-eastern political borders, while the TamilNad districts of Nilagiri, Coimbatore, Madurai

Ramarathapuram, Thirunalveli & Kanyakumari define its eastern and south- eastern boundaries.

The shape of Kerala resembles a scalene triangle with its base on the long coast (560KM) and its ape on the western ghats. The width of the state ranges from a minimum of 11 km. to a maximum of 124 km.

2.8.2 Geographical History of Kerala

The erstwhile Travancore, Cochin and Malabar region constitute the present Kerala. Kerala has attracted many foreigners by virtue of her spices, agricultural products, landscape and access to navigation. The early travellers also contributed to the geographical understanding of this region. Thus Francis Buchanan Hamilton, a medical officer in the service of East India Company, during a visit to Malabar coast in 1800 noted the occurrence of a brickred weathering product of rocks at Angadippuram in Malabar, and named it laterite. Angadippuram, thus became the type of area for laterites, which are fond extensively in all tropical countries. He also noted the occurrence of iron ore at Vellathur and gold at Nilambur. In 1802, W. Ainslie recorded the occurrence of gold in Nilambur. The iron ore are in Varakalt hill near Calicut was described by Babingten (1819). Yaing (1829) reported the occurrence of fine specimens of native gold in the riverbeds of Nilambur hills. General Cullen discovered lignite at the base of the coastal cliffs near Kannur in 1830. In 1840, New bold traversed the Malabar area through Palaghat gap and noted the geological features

of the region, including the occurrence of carbonaceous stratum at Beypore.

Well organised geological investigations were initiated with the inception of the G.S.I in 1851. Till 1890, W.King, R. Bruce Foote, and P.Lake gave a fair account of the geology of Travancore and Malabar. During 1890-1893 T.H. Holland highlighted the iron ore occurance, and the importance of charnockite granites in Malabar area and S. Kerala.

I.C.Chacko and Massillamani geologist in the erstwhile Travancore state during 1908-1910, carried out studies on the lignite of the Warkali Formation. In 1914 GH Tipper studied the monosite sands of Travancore. Picchamutha & Prasanna Kumar (1933) carried out investigations on Warkalai formation. Fox (1936) on the geology of cochin state. H. Crookshank studied the Wynad gold fields in 1940. M.S, Krishnan carried out investigations of the clay mines at Kundara and also the graphite and china clay of erstwhile Travancore state during 1942-43[14].

After independence, geological investigations have been intensified and a new direction was given to suit the specific needs of the country and its development programmes. Detailed mapping, systematic prospecting preliminary and detailed explorations were carried out by the G.S.I in different parts of the country. It was further intensified with the establishment of a circle office at Trivandrum in 1962 by G.S.I.

In Kerala, the most-found granite type is Charnockite, which is commonly, used for all types of construction activities. In almost all parts of Kerala, this is available in large quantities and hence no systematic study was conducted regarding the availability and marketing of this rock. The researcher has consulted Dr. P.K. Thampi, Scientist of CESS at Trivandrum about this and he pointed out that no study was made regarding charnockite rocks in their commercial aspect. In Kerala, charnockite types of rocks are called granites.

2.8.3 Charnockite

Major rock formations, cropping out within the Kerala region belong to the charnockite-geneiss association. Most parts of the western ghats, especially mountain peaks are composed of charnockites. Two leading characteristics of charnockite are the grunulitic texture and the invariable presence of rhombic pyroxene amongst the constituents. This was first recognised by the Judd from granulitic rocks of Nilgiri hills. In 1893, Thomas H. Holland, of G.S.I noticed that these rocks had a very wide distribution in south India especially in Kerala. These are used for building or construction purposes and ornamental purposes. The name Charnockite was suggested by Holland, in honour of Job charnock, the founder of Culcutta, whose tombstone was made of this rock. Charnockite was defined as "a hypersthere granite, composed of hypersthone microcline, quartz and accessory iron ore associated with granalitic rocks[15]. The characteristic features of the sequence are the invariable

presence of hypersthene and granulitic texture. Even after 100 years, ever since Holland first drew the attention of earth scientists to this group of high grade rock from S. India, very few studies were seriously conducted regarding its commercial aspect.

Holland first suggested that the rock constitute a distinct petrographic province. According to him the charnockite series include a number of lithological types genetically related to one another. The members of charnockite series vary from acid types having the mineralogical and chemical composition of granite to ultra basic forms of Pyroxenites and consisted of[16]

1. acid varieties, represented by charnockite
2. intermediate varieties, which are by far the most abundant and characterized by composite structure and are the coloured minerals tending to gather into groups.
3. Basic varieties mineralogically equivalent to the norites and composed of pyroxene, plagioclase and iron ores often with hornblende,
4. Ultra basic varieties, composed of hypersthence angite, hornblende, sometimes with olivine, green spinel and magnetite.

Although the name charnockite was restricted to the acid form only, this stipulation was not adhered to by later works. Chatlersee (1974) defined charnockite as "an orthopyroxene quart-feldspar rock

with or without garnet, characterized by the greenish blue feldspar and greyish blue quartz, the feldspar being micro perthite and sodic plagioclase which is often anti perthite. The variation in the composition of pyroxenes within the charnockite is attributed to differentiation". The term charnockite suite was suggested for these differentiation series by Subramaniam (1959) to include rocks of the acid division, encompassing alaskites, birkremites, enderbites, and hypersthene quartz syenite all of which are considered primarily of magmatic origin. Results of recent researches tend to dispute the magnetic origin[17] of charnockites and rather shift towards metamorphic origin of these rocks. This is primarily because of their occurrence within granulite provinces, and on account of their characteristic metamorphic mineral assemblages.

The Kerala region is an important segment of the South Indian charnokite type of granite, where major units of the archaean continental crust, such as granialitic, granites gnessier and green stone are preserved. The ex-humed continental crust in most part of the state makes the area suitable for the study of granite petrogenesis. Southern parts of the state, south of Achankovil, shear zone, exposes an assemblage of magmatised and sedimentary rocks. (Khondalite-charnockite assemblage)

From the north of Achankovil shear zone up to Palghat gap charnokite rocks predominate. Northern flank of the gap consists of metasedimentary sequence of khondalite and calc- granulate with

crystalline lime stone bands. Granulites, schists and grnisses, intruded by acid and alkaline platens constitute the northern most parts of the state[18].

The bulk of the rocks of Kerala, especially the granulates and associated grnissess belong to pre Cambrian. The following are the other important type of rocks generally found in Kerala.

2.8.3.1. Ancient Supracrustals

The oldest-dated rocks in Kerala, namely charnockite, contain several enclaves of schistose rocks. These are found in Sultan Battery, close to Karnataka boarder through Manathavady in Wynad plateau to Taliparambu and Payyannur and to the eastern parts of Kasargod district.

2.8.3.2 Charnockite - Gneiss Association

The most wide-spread rocks in Kerala are charnockite and associated gneisses. They are found in major parts of western ghats and the midland regions of the state especially in central and north part of Kerala. Large bands of charnockites are also observed within the south Kerala Khondalite belt.

2.8.3.3 Khondalite

Garnet - sillimanite gneiss , containing varying amounts of graphite and some quartz and orthoclase has been termed as khondalite. Its occurences are seen in various parts of the state. The largest area is noticed in south Kerala. Another linear belt is observed in the

northern flank of the Palghat gap, where it is seen in association with calc- granulite and lime stone[19].

2.8.3.4 Intrusive rocks

Intrusive phase within the Kerala region includes sporadic occurrence of basic and ultra basic bodies and dykes belonging to lower middle age proterozoic age, these are found in south Kerala. Dolerite dykes, contemporaneous with the Deccan Basalt magnetism are the dominant phase and occur within charnokite. It is also found in Nilambur valley and Wynad area[20].

2.8.3.5 Territory and quaternary sediments

These types of rocks are generally found on coastal belts. Both marine and non-marine orders of the Neogene period fringe the coastal tract into two major basins of deposition.

1) Between Trivandrum and Ponnani in the South and Central Kerala with a maximum width of 16 K.M between Quilon and Kundara.

2) Between Kannore and Kasargode in the north with a maximum width of 10km. at Cheruvathoor. These include rocks of Vaikon formation, comprising gravels, coarse to very coarse sand, lime stone, sands and clays, sandy clays and sand stone,. Sediments of the quaternary period, consisting of sands, lagoonal clays, shell deposits, terisands etc. Total thickness of the sedimentary sequence exceeds 600M in the Ambalapuzha, Alapuzha region.

2.8.3.6 Off shore Sediments

The western Atlantic type passive continental margin along the Kerala cost' has a 50 km. wide continental shelf, hosting the Kerala - Luccadive basin. It contains a elastic sequence of marine shak and sand with very few lime stone. The major basin of share records sediments of over 400 m thickness.

2.8.4 Laterite

Laterite was first reported in Angadippuram of Malablar. A weathering product of rocks, rich in secondary oxides of iron Aluminum or both with or without quartz and clay, it serves as a building material ore for Aluminium/ Nickel/ Manganeze/ Iron etc. and is a good acquifer of ground water. In Kerala laterites of more than one generation are present and are centered in elevations of 600M and below. Vast dissected latrite are present in parts of Malappuram, Kannore and Kasargod district[21].

2.8.5 Soils

Ten broad groups of soils are found in Kerala. The most predominant type is the lateritic soil, reddish brown to yellowish red in colour supporting a wide range of crops such as coconut , tapioca, rubber, arecanut, pepper, cashew etc[22]. The properties of the soil vary depending on the bed rock characteristics.

2.9 MINERAL RESOURCES IN KERALA

One of the noticeable characteristics of mineral deposits, which can be exploited profitably, is their non-uniform distribution. No country is self-sufficient in all mineral resources. A look at the world minerals map indicates that some areas are very rich in the occurrence of certain minerals / fuels, indicating a spatial control over distribution of mineral deposits.

Geologic time control over mineralisations like coal, oil etc. suggest temporal control of mineralisation. This is also true of many rare metal mineralisations associated with intrusive phases. Concentration of a large number of mineral deposits along plate boundaries,especially convergent margins like in the Andes is also a fact to reckon with. Major deposits of iron ore and phosphorous are associated with sedimentation histories. Tropical weathering resulted in the formation of major bauxite deposit and to some extent deposits of nickel and manganese. This in turn suggests that geologic and tectonic settings, tectno-magmatic and depositional environment are some of the key factors controlling mineralization.

There is a general notion that Kerala is poor in mineral resources, as major metalliferous or fuel resources are not known in the region. However, if we work on the generalised hypothesis of Gregorian, the noted Soviet geo-chemist that every 10,000 km^2 area of the surface of

the earth is found to have major mineral deposits of global dimension, the picture is not that bad. Considering the geographic area of the state, 38683 km^2, there must be a major mineral deposits and a number of smaller ones. The available data indicate that the placer mineral deposits of Chavara is one of the largest of its kind in the world. Further, before the First World War, the entire graphite production of British India came from Travancore belt. These and a host of other minerals in smaller amounts, would suggest that the state is not that poor in the mineral front, a more effective utilisation of a available resources is what is needed[23].

A state like Kerala with high density of population requires to re-evaluate its mineral resources and demarcate and protect through legislation the mineralized areas from encatchment and other land uses. Otherwise different land-use patterns like plantation and massive civil structures can for ever obliterate the prospect of extracting the minerals. It may be noted that the former gold and graphite workings are presently under plantation coverage, and good quality china clay areas are lost because of indiscriminate house construction.

Table 2.1 shows the resources of important minerals in Kerala.

Table 2.1

Resources of important minerals in Kerala (in million tonnes)

recoverable reserves as on 1-9-1990

Mineral	Proved	Probable	Possible	Total
Bauxite	1.22	5.07	1.63	7.92
China clay	0.18	4.35	89.9	94.46
Fire clay	-	0.01	7.81	7.82
Garnet (granular)'00 tonnes	74.8	591.2	9.00	675.00
Gold (i.) placer ore	-	2.55	22.2	24.75
ii. Metal	-	-	2	4
Graphite ('000 tonnes)	-	324.87	190.63	515.5
Iillimenite	9.386	16.565	8.226	34.177
Iron ore (magnetite)	-	24.19	11.26	35.45
Lime stone	0.41	18.43	6.85	25.69
Luecoxene (tonnes)	60435	-	-	60435
Magnesite ('000 tonnes)	-	-	33	33
Quartz and silica sand	7.64	31.07	71.08	109.79
Rutile	0.466	1.399	0.411	2.276
Sillimanite ('000 tonnes)	1235.9	1620.2	2171.7	5027.8
Talc/ Soap stone ('000 tonnes)	-	-	8131	8131
Zircon (tonnes)	530189	-	-	530189

Source: Indian Mineral 1994, Vol.1, P. 148 - Monthly Statistics of Mineral production, March 1995 and 1996 - Indian Bureau of Mines, Nagpur.

2.10 EXPLOITATIONS OF STONES IN KERALA

Granite quarrying is essentially an open cast working and granite quarries can be broadly classified as 1. Commercial granite quarries 2. Building stone quarries.

2.10.1 Commercial Granite Quarries

This comprises quarries producing ornamental or decorative stones. Quarrying is done both in the hilly tracts and in middle level lands. The extent of leases varies and accordingly the scale of mechanisation also varies. Most of the quarries are semi mechanised. Commercial granite industry in Kerala is presently in its infant stage, and only two varieties have so far attained attention from the export market. Though the state consists of hard silicate rocks of different colours, textures and totality of appearance comparable to granites exported from other parts of the country, commercial exploitation of the same as dimensional stone is crippled with problems and many limitations peculiar to the terrain. The charnockite and leptonite occurrence of Trivandrum and Kollam districts have begun to be exploited for export purposes and are commercially known as green granite and Kerala white.

Kerala state consists of large deposits of charnokites ranging from a basement complex of high grade granulitic facies of metamorphites and high temperature facies of metasedimetnary rocks

both prevaded by later metasomatic facies of Peninsular Gneissic complex with its synetetonic and late tectonic magnatism giving rise to plutonic intensive rocks. Moreover, many of the inherent defects as moles, lines, flowers, inclusion of secondary minerals, pitted surfaces, hair line cracks, joints etc are found in charnockite type rocks, and hence it cannot be used for commercial purposes. In the same quarry area, meter by meter, the quality performance charnockite varies and hence cannot be treated for commercial purposes.

2.10.2 Building stone quarries

These quarries belong to charnockite types, and produce slabs, size stones and aggregate for the civil constructions, works, road formation, railway work etc. Those types of rocks are generally worked in hilly areas. The quarrying is mostly manual, involving mild blasting, using gun powder. As even the smallest fragments are utilised, the problems of waste do not generally arise. Employment opportunities are high because in many places people do not allow full mechanisation.

2.11 FEATURES OF GRANITE QUARRIES IN KERALA

2.11.1 Non-perishable product

Kerala's granite is everlasting and time-tested. Man has used this type of granite from prehistoric period to the present day. Stone has been man's medium of expression from time immemorial. His

artistic urge found expression in the form of statues, temples and other architectural works. Some monumental sculptures made of charnokite during 2000 B.C is available today. The non-perishable nature of charnokite attracted man to use it for the construction of temples and many other important buildings. TANJORA fort in Tamil Nadu, the GOLKANDA fort in Hydrabad, the giant monolith granite statue of Bahubali, the tallest in the world, Chitra Durga and Belkery forts in Karnataka are a few examples.

Granite was used to build the famous Vidhan Soudha in Bangalore and Karnataka University building at Darwar. AT Hydrabad, Osmania University main building is built out of granite. All the above shows the demand for granites due to its non-perishability.

2.11.2 No Credit Sale

Due to the particular character of this industry credit sales do not generally take place. Of the total sale only 2 per cent to 7 per cent sales are on credit basis, that too also only for a very short period say 3 to 5 months. Credit sales are generally given to Govt. contractors or private contractors, and they will give money within a stipulated period. Due to the high demand in the construction field, generally credit sales do not take place. Table 2.2 presents information regarding credit sales of private sector units on an average basis.

Table 2.2

Table showing credit sale for various year

	94-95	95-96	96-97	97-98	98-99	99-2000
Sales (Rs)	999200	1022800	1098600	1100800	1240000	1105700
Credit Sales(Rs)	20983.2	25058.6	28124.16	26199.04	38812	32065.3
per cent on sales	2.1	2.45	2.56	2.38	3.13	2.9

Source: Survey data.

Table 2.2 shows the high demand for quarry products in construction and other areas. When demand for the products is low the credit sales would have been much higher. In 1994-95 the percentage of credit sale on sales was 2.1. In the next four years it increased to 2.45, 2.56, 2.38 and 3.13 in that order. In the year 1999-2000 it was 2.9 per cent.

2.11.3 Possibility of high value-addition

Of the granites produced, 75 per cent are used for construction purposes, but due to advance in technology, value addition can be high. For e.g. in the late 1980s Japan designed a honey-combed 4 m.m granite (combined with aluminum foil) which is as strong as an equivalent size granite slab of 20 m.m thickness. This is highly advantageous compared to conventional 20 m.m granite and 10 m.m tiles. Other value added finished products are, external wall cladding,

internal wall cladding, housing tiles, stair cases, window sills out side facade, balconies, parapet walls, projections, kitchen and bath room slabs, interior furnishing like fire places, table tops, monuments, statues, tombs etc. Stones are used even for musical effects as in the Sapthaswara in Madurai Meenakshi Temple or Sucheedram Temple near Kanyakumari.

2.11.4 Non-Competition from similar products

Compared to some other similar stone products like laterite, marble, sand stone, quartz etc granite has high strength, durability and beauty. It is comparatively cheaper than marble and slate stone on tonne basis. Compared to other stones, it has greater variety of colour, texture, structural features and hardness.

Colour is usually imparted to granite by the feldspar constituents of rock and may vary according to the degree of its assemblage. The color is modified to a great extent by quartz, Ferromagnesium minerals like hornblende hypersthene garnets and micas, yellow grew etc. More of hornblende, augite and biotite, mica is responsible for rendering black colour.

Hardness chiefly depends upon the percentage of quartz, textural compactness of the mineral constituents and unrelated state of the rocks.

Table 2.3

Mineralogical composition

Rock Type	Bulk density	Range of Mohs hardness	Figures in percentage			
			Quartz	Alkali feldspar	Calcie feldspar	Fero magnesian minerals
Grey granite	2.6	5.85 -6	15	35	40	10
Multi coloured granite	3.5 to 4	6.1-6.25	20	-	30	50
Black granite	4.5 to 5	6-6.5	5	5	45	45
Red/ pink porphyritic	4	6.5	25	55	15	5
Black galaxy	4.5	6.5	-	-	50	50

Source: Indian Stone: House Journal of All India Granites and Stone Association, Bangalore -1999.

From table 2.3 we can understand that the bulk density, range of hardness etc, are high in black granite.

The texture of granite signifies the grain size and the arrangement of mineral constituents. Granite with uniform distribution of minerals is as important as the uniform grain size. Light and dark coloured minerals if distributed uniformly impart uniform colour and texture. The success of granite depends on such constituent qualities of colour and texture[24].

Its general characteristics are freedom from flaws, damaging veins, cavities and similar imperfections that may impair its structural homogenity and adversely affects its strength and appearance.

2.11.5 Easy availability of debt finance

In non-mechanised granite industry, finance is not a problem at all. In this field almost all the sales are on cash basis. Yet in times of urgent need producers depend on indegenous money-lenders because of the various formalities required by the bank and other formal organisations. Another feature of this industry is that all cash payments are made at the end of the week. In the meantime sufficient cash comes from selling their products.

Table 2.4

Table showing cash flow position of a Pvt. Quarry for various years

Year	Weekly Production Cost and other payments (RS)	Weekly sale (Rs.)	Net-flow	Cash-flow Index
1994-95	18027.8	24980	6952.2	100
1995-96	19721	25270	5549	79.81
1996-97	22586	27465	4879	70.18
1997-98	23485	27520	4035	58.04
1998-99	24245	31000	6755	97.16
1999-2000	26147.5	27642.5	1495	21.5

Source: Survey data.

Comparing to 1994-95, for the next 5 years cash-flow index has come down by 20.19 per cent, 29.82 per cent, 41.96 per cent, 2.84 per cent and 78.5 per cent.

From the table 2.4 it is clear that sufficient cash flow is generated to meet the liabilities in connection with quarry production. Hence money is not needed for day-to-day operations of the business. If some capital investment is needed it can be had from the local money-lenders on easy terms.

The conditions in Co-operative society are also the same. Sales are on hundred percent cash basis, and hence finance is not at all a problem. To make some capital investments, money can be had from apex Co-operative bank or adjust it from their past reserves.

Table 2.5

Table showing cash flow position of Co-operative Society on weekly basis

Year	Weekly Production Cost (RS)	Weekly sale (Rs.)	Net-flow	Cash-flow
1994-95	32236.44	54177.25	21940.81	100
1995-96	39572.46	70429.11	30856.65	140.64
1996-97	47196.92	77647.58	30450.66	138.78
1997-98	32154.66	50449.05	18294.39	83.38
1998-99	60958.32	76842.98	15884.66	72.4
1999-2000	76920.56	95280.17	18359.61	83.68

Source: Data collected from the final accounts of Anappara Karinkal Thozhilali Co-operative Society, Thrissur.

In 1995-96, cash flow index has increased by 40.64 per cent and 38.78 per cent comparing to 1994-95. In the next three years it has decreased by 16.62 per cent, 27.6 per cent and 16.32 per cent.

2.11.6 The seasonal changes in sales

In granite industry, the sales of the products are affected by the seasons like raining and summer. In rainy season, demands are low and hence production will also be low as in low level areas, transportation and construction become practically impossible. In summer season, due to higher demand, production will be high. But nowadays people have a tendency to store or they will give advance amount to the quarry owners, so that they can get the products comparatively at low rate. This process will nutralise the impact of seasonality on sales.

Table 2.6

Seasonal sales of products in private sector per day

Product	June, July, August Weekly sales	Remaining month weekly sales
Rubbles	12 Lorry	48 Lorry
6" metal	3 Lorry	12 Lorry
1/2 " metal	1 Lorry	4 lorry

Source: Survey data.

During low sales season (June through August, weekly production of rubble, 6" metals and ½" metals fall to the level of 12, 3

and 1 lorry respectively. Whereas in the rest of the months, the sales will be in the order are 48, 12 and 4 lorries respectively. Hence the low sales are balanced by high demand seasons.

2.11.7 Can be made highly mechanized

Quarry industry is highly labour intensive. But due to the diminishing labour forces and non-availability of labour, the production process in granite industry can be made highly mechanised. In crusher quarries major process of quarrying is mechanised (for example drilling, blasting, hammering, loading, crushing processes etc. are done on mechanical basis). The advantage is that the owners need not wait for the convenience of the labour and to some extent, they can avoid the problems connected with labour. With the help of highly mechanized units in a quarry 10 or 15 persons can perform the work of 200 or more workers. For that, high capital investment is essential. One of the problems of the existing mechanised industry is that they will not sell rubble or 6" metal. They sell only 1/2" or 1/4" metals to earn more profit.

2.11.8 New unit entry is difficult

Even though there is high demand for quarry products new entry into this field is very difficult. Three types of quarries are in operation, viz., pattaland quarry, purombok revenue quarry and forest quarry. To start a new quarry in porambok and forest quarry is very difficult because govt. policies are not favourable for quarrying activities.

Pattaland quarrying is possible but a lot of conditions are to be fulfilled. The following are the conclusions:

(a) There shall not be any household or houses in and around 500 meters.

(b) A no objection certificate is to be obtained from village officer, Thahazildar and from the District Collector for the ownership of the land.

(c) A blasting license is to be obtained from the office at Chennai.

(d) A certificate is to be obtained from Pollution Control Board.

(e) Get royalty and seigniorage fixed from the Department of Mining and Geology.

2.11.9 Very easy to control the business

There is certain assured demand for the quarry products, and hence all the products will be sold off. Similarly, once the quarry is on it will go on without much problem. Usually problems arise on matters relating to the payment of royalty, seigniorage and obtaining explosive license etc. All other problems are negligible and hence it is very easy to control the sector.

2.11.10 Greater variety in colour and appearances

Of the 200 types of granites found all over the world 100 varities are found in India. The taste of the buyers is different for different

countries. Among the charnockite type, the most wanted one is black charnokite which has high texture hardness, and overall characteristics. Large deposits of rocks of this type are found. They halve greater variety and colour[25].

2.11.11 Theaper than marble or slate

Compared to marble and slate, granite is cheaper on tonne basis. The granite waste can be used for rubbles, 6" metals and ½ " metal. The waste of marble cannot be used like that.

2.11.12 It is non slippery and does not have unpleasant smell

From the historic period stones are used for pavements owing to its non-slippery nature and pleasant smell. Granites have unlimited range of uses. They are not freezable, are acid resistant, and can withstand any temperature. Because of these qualities it can be used for paving work, in historical centres, pedestrain areas, streets squares, parks, gardens, residential areas, sports centres, cement concrete terrazo etc. It is non-slippery, it does not soften in summer heat and does not smell in un-pleasantly[26].

The problems of granite exploitation in Kerala are manifold. Firstly the industry invites large-scale capital investment with expensive and sophisticated machinery, which can sustain only if a balance is achieved between supply and demand. Unlike the neighbouring states, Kerala granite occurrences can be commercially viable only sparingly i.e. from each occurrence, recovery of stones will

have to be done highly selectively, because of intense weathering conditions and vegetal coverage. Gemographic forms like pediplanes, granite corestne planes ruwares, and nubbins which provide extension sheet rocks free from fracture and weathering as that occurring in the arid-semi arid areas of neighbouring states are practically absent in Kerala. Moreover, the presence of cash crops in most of the places, high population which render extensive quarrying into an environmental hazard and expensive labour place the dimension stone industry in a rather difficult position. Although points such as high accessibility proximity of ship facility etc. weigh in favour of trying for the development of dimension stone industry in the state, an organised systamatic resource survey, and later management giving due regard to environmental aspects, and socio-economic conditions with suitable amendments in the laws governing granting of leases etc, only can help the industry to cope with competitions in the export scenario. In the mean time, it is also essential to assess the market performance of Kerala stones, in comparison with the different varieties, recovered from other parts of the country, vis-a-vis established standards of quality and durability.

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CHAPTER III

FINANCIAL PERFORMANCE OF CO-OPERATIVE AND PRIVATE GRANITE QUARRIES

After presenting the introduction and the history of granite quarrying, it is proposed to evaluate the financial performance of quarries in the private and the co-operative sectors. The analysis is done in three sections. Section A deals with production, Section B deals with financial performance and Section C, the comparative performance of private and co-operative sector quarries. Statistical tools are used to highlight the significant differences among the three groups of private sector quarries, i.e. (i) quarries paying royalty and seigniorage fully (ii) quarries paying them partially and, (iii) those who do not pay anything in that account.

SECTION - A

3.1 PRODUCTION

This section provides a summarized view of the production of quarry materials for co-operative sector and private sector. Table 3.1 gives the production of quarry materials for the years 1994-95 to 1999-2000 in private sector.

Table 3.1
Production of quarry materials for the years 1994-95 to 1999-2000 in private sector

	Boulder		6" metal		½" metal	
Year	Lorry	Tonnes	Lorry	Tonnes	Units	Tonnes
1994-95	1205	6025	245	1225	100	250
95-96	1210	6050	250	1250	110	275
96-97	1208	6040	232	1160	214	535
97-98	1230	6150	228	1140	137	342.5
98-99	1232	6160	208	1040	141	352.5
99-200	1245	6225	205	1025	179	447.5

Source: Survey data.

It is clear from table 3.1 that the production of boulder in 1994-95 was 6025 tonnes. During the subsequent years, it was 6050, 6040, 6150, 6160, 6225 tonnes respectively. It indicates that the boulder production of private sector shows an increasing tendency.

Table 3.2 gives the production of various quarry products for the years 1994-95 to 1999-2000 for co-operative sector.

Table 3.2
Production of quarry materials for the years 1994-95 to 1999-2000 in co-operative sector

	Boulder		6" metal		½" metal	
Year	Lorry	Tonnes	Lorry	Tonnes	Units	Tonnes
1994-95	3618	18090	348	1740	359	897.5
95-96	4712	23560	612	3060	312	780
96-97	4913	24565	602	3010	632	1580
97-98	3412	17060	316	1580	223	557.5
98-99	4036	20180	318	1590	189	472.5
99-200	5912	29560	592	2960	945	2362.5

Source: Collected from the annual report of Anapara Karinkal Thozhilali Co-operative Society.

In co-operative society, the production of boulder in 1994-95 was 18090 tonnes. During the next two years production increased to 23560 tonnes and 24565 tonnes. In 1997-98 production decreased to 17060 tonnes. But the next two years production increased to 20180 and 29560 tonnes.

Regression Analysis

Co-operative Sector

Boulder	$Y = 11.105\ x$	$R^2 = 0.964$
6″ metal	$Y = 1.164\ x$	$R^2 = 0.919$
½″ metal	$Y = 0.556\ x$	$R^2 = 0.736$

Positive slope coefficient of all the three equations indicates that production is increasing from year to year.

Private sector

Boulder	$Y = -76033.4 + 41.143\ x$	$R^2 = 0.897$
6″ metal	$Y = -95260.714 - 47.143\ x$	$R^2 = 0.906$
½″ metal	$Y = 0.184\ x$	$R^2 = 0.934$

Here in the case of 6″ metal slope coefficient is negative indicating that there is reduction in the production of 6″ metal. For boulder and 1/2 " metal a positive trend was observed.

The above information is given in diagram 3.1 and 3.2.

Diagram 3.1

Boulder production in private sector and co-operative sector

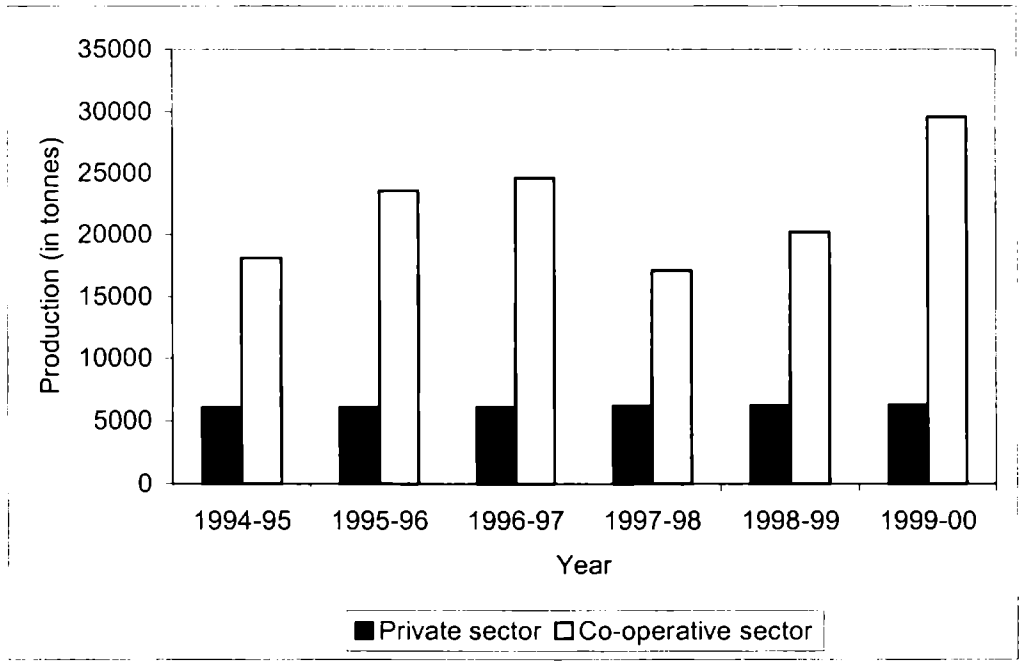


Diagram 3.2

6″ Metal production in private sector and co-operative sector

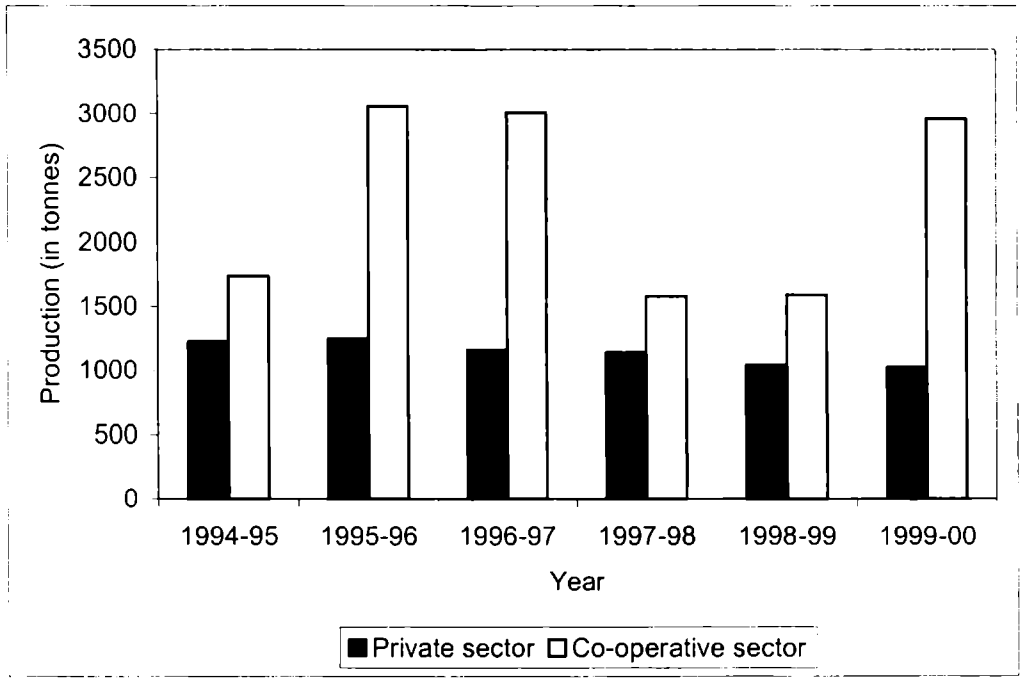
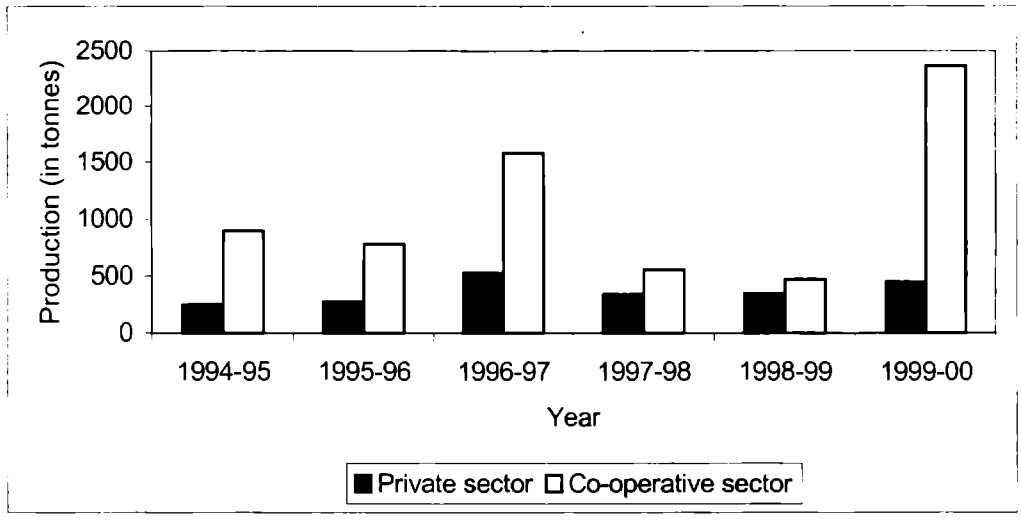


Diagram 3.3

½" Metal production in private sector and co-operative sector



SECTION - B

3.2 FINANCIAL PERFORMANCE

This section provides a summarized view of the financial position and operations of a unit. The focus of financial analysis is on certain key figures in the financial statements and the significant relationship that exist between them.

An in-depth analysis of financial statements and their use in decision making by various parties interested in them is also attempted. The focus of this chapter is on ratio analysis, as the most widely-used technique of financial statement analysis. The information derived from this analysis can be used the management, creditors, investors and others to form judgements about the operating and financial performance of the unit. The management should be particularly interested in knowing the financial strength of the unit to

make the best use of it, and to be able to spot out the financial weaknesses of the unit to take suitable corrective action. The future plans of the unit should be laid down in accordance with the strength and weaknesses of the unit[1]. Thus ratio analysis is a starting point for making plans. Through proper ratio analysis one is expected to answer the following questions:

Do investors consider the unit profitable and safe for the purpose of investing their money in the unit?

How efficiently does the unit use its assets?

Are the earnings of the unit adequate?

Is the unit in a position to meet its current liability?

What sources of Iong-term finance are employed by the unit and what is the relationship between them? Is there any danger to the solvency of the unit due to the employment of excessive debt or reserves?

Ratio analysis is defined as the systematic use of ratio to interpret the financial statement so that the strength and weaknesses of a unit as well as historical performance and current financial condition can be determined[2]. Ratios can be expressed as (a) Percentages (b) Fractions (e) Proportion of number. In view of the requirements of the various uses of ratio, these are classified:-

Profitability ratio, Activity ratio, Liquidity ratio, Capital structure/ Liverage ratio,

3.2.1 Profitability ratio

Generally, any type of economic activity unit should earn profits to survive and grow over a along period of time. Profits are essential, but it would be wrong to assume that every action initiated by management should be aimed at maximizing profits irrespective of social consequences. The operating efficiency of a unit and its ability to ensure adequate returns to its shareholders depend ultimately on the profit earned by it[3]. The profitability ratios are designed to provide answers to questions such as:-

Are the profits earned by the unit adequate?

What rate of return does it represent?

What is the role of profit for the various divisions and segments of the unit?

What is the earnings per share?

What was the amount paid in dividends?

What is the rate of return to equity holders?

Profitability ratios are determined in relation to sales and to investments.

3.2.1.1 Profitability ratio in relation to sales

These ratios are based on the premise that a unit should earn sufficient profit on each rupee of sales. If adequate sales are not earned

on sales, there will be difficulty in meeting the operating expenses and no returns will be available to the owners[4].

Gross profit margin = Gross profit / Sales x 100

Table 3.3

Table showing the average gross profit for private sector quarries for various years

Year	Sales (Rs)	Gross profit (Rs)	Percentage of .G. P .
1994-95	9,99,200	34,05,88	34.1
95-96	10,22,800	30,9960	29.4
96-97	10,98,600	264660	24.1
97-98	11,00,800	23,7770	21.2
98-99	12,40,000	33,9200	27.4
99-200	11,05,700	1,30,300	11.8

Source: Survey data.

It is clear from table 3.3 that every year gross profit percentage is coming down except for the year 1998-99. In 1994-95, gross profit percentage was 34. percentage and for other years it gradually fell. In the year 1998-99 it was 27.4 per cent; but below that of 1994-95. In 1999-2000 it was very low i.e. 11.8 per cent; the reason for this was that in proportion to the increase in cost of production, sales price was not increasing. More over, compared to the 1998-99 in 1999-2000 selling price of all quarry products fell down very drastically.

Table 3.4

Table showing the gross profit for the quarry under Co-operative society for various years

Year	Sales (Rs)	Gross profit (Rs)	Percentage of .G. P .
1994-95	2817217	136638758	48.5
95-96	3662314	1649034.34	45
96-97	4037674	1583273.4	39.2
97-98	2623353	951993.83	36.3
98-99	3495835	898458.61	22.5
99-200	4954569	880299.4	17.8

Source: Collected from the annual report of Anappara Karinkal Thozhilali Co-operative-Society.

It is clear from table 3.4 that every year gross profit percentage has been declining. In 1995-95 it was 48.5percentage whereas in all the other years, it was declining, and in 1999-2000 it reached the lowest figure 17.8 per cent. The reason for this was that selling price did not increase in commensuration with increase of cost of production. Another reason was in the low demand for quarry products. Compared to private sector, Co-operative sector was making high gross profit ratio. But in both cases, the percentage of gross profit was on the decline.

3.2.1.2 Net Profit ratio

Net profit ratio is also known as net margin. This measures the relationship between net profit and the sales of a unit. Ability of management to operate a business with sufficient success is generally

measured in terms of profit generated. The ratio of net profit to sales, essentially expresses the cost-price effectiveness of the operation[5]. This ratio also indicates the unit's capacity to withstand adverse economic conditions.

Table 3.5

Table showing the net profit ratio of private and Co-operative- Society

Year	Percentage of N.P in private sector	Percentage of N.P in Co-op-Society
1994-95	27.85	2.3
1995-96	22.8	2.3
1996-97	17.8	1.9
1997-98	14.7	1.4
1998-99	21.8	1.1
1999-200	5.4	0.7

Source: Data Collected from survey for private sector and from the annual reports for the Co-operative society.

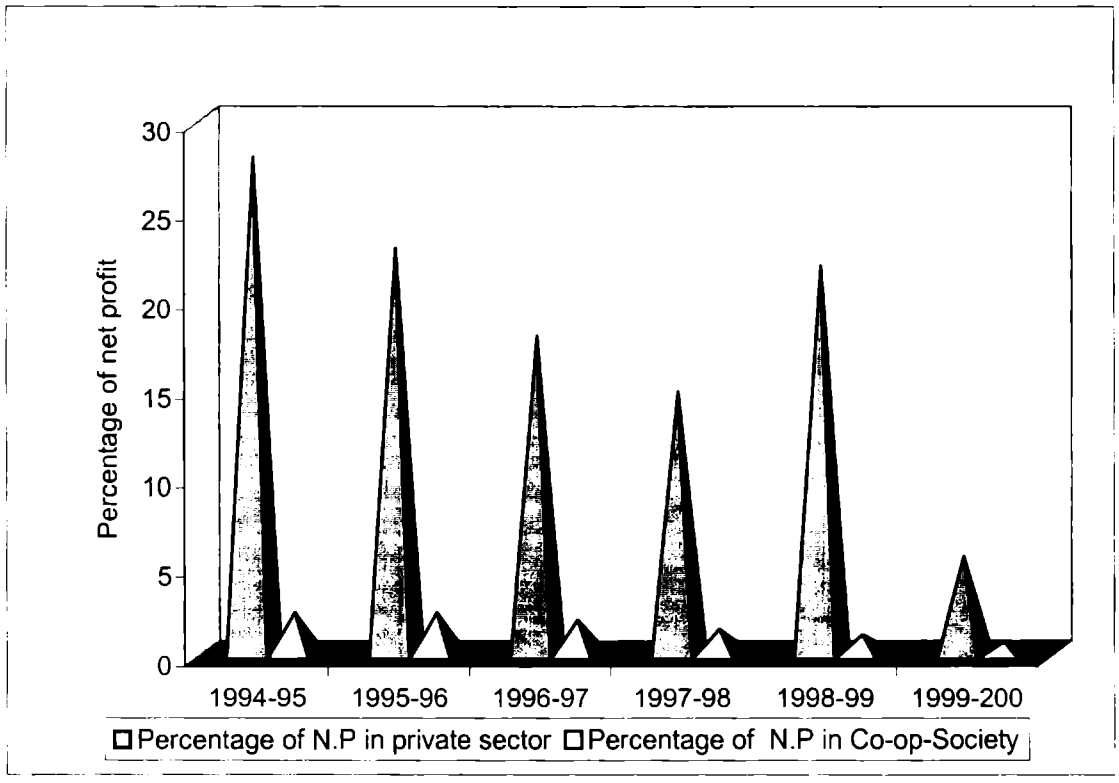
It is clear from table 3.5 that in both sectors net profit percentage has been declining during the period under review. Compared to the private sector, the Co-operative Society's net profit percentage was very low as expenses connected with depreciation, Provision for reserve, Gratuity, Provided fund, E.S.I., Contribution, Holiday wages, Leave with wages, Death fund, Bonus fund, Accidental insurance, Welfare funds, Salary to secretary and office staff, President's

allowance, committee meeting and general body meeting expense, legal fees, advertisements, electricity and water charges, stationery, miscellaneous expenses etc. are in gross profit.

The above information is given in diagram 3.4.

Diagram 3.4

Net profit ratio of private and Co-operative- Society



3.2..1.3 The expense of private sector Quarries

Expenses charged in gross profit in the case of private sector quarries are supervision charges, interest payable for borrowed funds and miscellaneous expenses.

Cost Ratio

Another profitability ratio related to sale is the cost ratio. It is computed by dividing cost by sales.

Cost of goods sold ratio = Cost of goods sold / Net sales x 100

Average percentage of cost of goods sold on sale for various years with respect to private sector quarries is given in table 3.6.

Table 3.6

Average percentage of cost of goods sold on sale for various years with respect to private sector quarries

Year	Cost of goods sold (Rs)	Sales (Rs)	Percentage of Cost of goods sold
1994-95	658612	999200	65.9
95-96	721840	1022800	70.6
96-97	832940	1098600	75.9
97-98	868100	1100800	78.8
98-99	900800	1240000	72.6
99-200	975400	1005700	88.2

Source: Survey data.

It is clear from table 3.6 that every year cost of goods sold was increasing. In 1994-95 it was 65.9 per cent sales and in the subsequent years it inferred an increasing trend and in 1999-2000 it reached 88.2 per cent of sales. Compared to 1998-99 it increased by 15.6 per cent during 1999-2000. The reason was that in 1998-99 selling price per load

for rubble was 735 rupees whereas for this in 1999-2000 it was only Rs.640. While sales price declined in 1999-2000, cost of production remained the same.

Table 3.7

Percentage of cost of goods sold for co-operative society quarries for various years

Year	Cost of goods sold (Rs)	Sales (Rs)	Percentage of Cost of goods sold
1994-95	1450866.75	2817217	51.5
95-96	2014272.7	3662314	55
96-97	2454905.79	4037674	60.8
97-98	1671074.58	2623351	63.7
98-99	3099872.13	3995835	77.5
99-200	4072655.7	4954569	82.2

Source: Collected from the annual report of Anappara Karinkal Thozhilali Co-Operative- Society.

It is clear from table 43.7 that every year cost of goods sold was increasing. In 1994-95 it was 51.5 per cent whereas in 1999-2000 it reached to 82.2 per cent of sales. The percentage of cost of goods sold is less in the Co-operative sector. This was largely because of the advantage of large-scale purchasing of explosive items and low labour rate. Co-operative society has licence for blasting and hence they get blasting materials at a lower cost.

In both the sectors, cost of goods sold was increasing. But selling price was not increase commensurating with increase in production cost. If these price is to be increased both the sectors have to consult each other and to take a common decision.

3.2.1.4 Operating expense ratio[6]

$$\frac{\text{Administrative expense + selling expense}}{\text{Net sales}} \times 100$$

It is a special feature of granite quarrying that very little has to be spent for selling by way of advertisement or commission.

Table 3.8

Percentage of operating expenses ratio for private and Co-op-Sector quarries for various years

Year	Private sector	Co-operative Sector
1994-95	6.25	46.2
95-96	6.6	42.7
96-97	6.3	37.3
97-98	6.5	34.9
98-99	5.6	21.4
99-2000	6.4	17.1

Source:- Data Collected from survey for private sector and from annual reports for Co-operative Society.

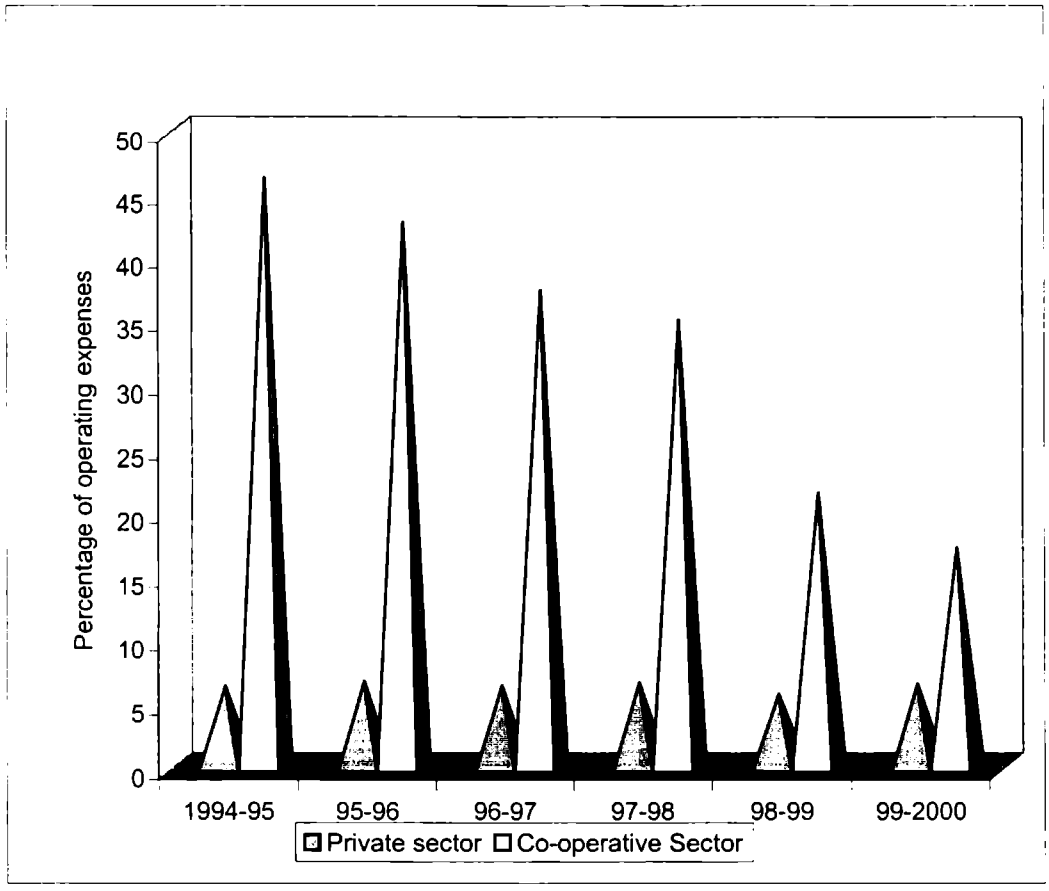
Operating expense ratio is high in the co-operative sector, whereas it is low in the private sector. In the Co-operative society this ratio has been declining. In 1994-95 it was 46.2 per cent whereas it was 17.1 per cent in 1999-2000. At the same time in private sector this ratio

remained more or less the same. As already mentioned there were a large number of expenses to be charged to the profit and loss account of Co-operative-Societies. No such charge exists in the private sector. High operating expense ratio of the Co-operative Society resulted from the distribution of profits among a large number of persons who are associated with quarrying work. In private sector all the profit goes to private individuals.

The diagrammatic representation of the above is given below.

Diagram 3.5

Percentage of operating expenses ratio for private and Co-op-Sector quarries for various years.



3.2..1.5 Operating ratio

$$\frac{\text{Cost of goods sold + Operating expense}}{\text{Sales}} \times 100$$

Table 3.9

Table showing the operating ratio in Co-operatives quarries and private sector quarries for various years

Year	Percentage of operating expense	
Year	Private sector	Co-operative Sector
1994-95	72.15	97.7
95-96	77.2	97.7
96-97	82.2	98.1
97-98	85.3	98.6
98-99	78.2	98.9
99-2000	94.6	99.3

Source: Data collected from survey of private sector and from annual reports of Co-operative-Sector.

Operating ratio increased in both the sectors in every year. It shows that for the last six years, profit of the quarry sector was coming down. The reasons for increase of operating ratio are:-

- Increased labour cost
- Increased blasting expense
- Increased Royalty and seigniorage

In addition to the above, a large number of appropriations are also made from the profits of Co-op-Sector quarry.

3.3 WAGES TO TOTAL COST OF PRODUCTION

Granite quarrying is a labour-intensive industry. Hence labour or wages constitutes an important component of production. Table 4.8 shows the percentage of wages to cost of production in the Co-operative sector and private sector.

Table 3.10

Percentage of wages to cost of goods sold in private sector and co-operative-sector quarries for various years

Year	Percentage wages to cost of goods sold pvt. sector	Percentage of wages to cost of goods sold co-operative- sector
1994-95	86.5	84.7
95-96	84.7	82.2
96-97	82.5	81.9
97-98	86.8	83.4
98-99	86.3	84.93
99-2000	86.9	85.8

Source: Data from survey of private Sector and from annual reports for Co-Operative- Sector.

In both the sectors the percentage of wage remains more or less the same. In the private sector percentage of wage varied between 82.5 and 86.9 per cent. In the Co-Operative-Society, it varied between 81.9 per cent and 85.8 per cent. Since both the sectors are working more or less in the same area, an increase of wage in one place will influence the other area. If there is any increase in wage or selling price in private sector that will be automatically reflected in co-operative sector quarry also.

The percentage of Royalty and seigniorage on total cost also varied in the co-operative and the private sectors. From table 3.10 it is

clear that in private sector it was 7.3 per cent on total cost in 94-95. In 1995-96 and 1996-97 it increased to 8.4 per cent and 8.1 per cent respectively. From 1998-99 onwards it showed a declining tendency. Another trend was increases in expenses with selling prices were decreasing. Similarly, percentage of royalty and seigniorage were increasing.

In the co-operative Society the percentage of Royalty and seigniorage remained more or less the same during the study period. It ranged between 10.5 per cent during 1994-95 to 11.7 per cent during 1997-98. The Co-operative Society pays higher rate of royalty and seigniorage to the government. In 1994-95 private Sector paid 7.3 per cent as royalty and seigniorage, the Co-operative Society paid 10.5 per cent. Like wise in 1999-2000 private sector paid only 5.4 per cent to the Government as royalty and seigniorage the Co-operative society paid 11.3 per cent on the same account.

Table 3.11

Table showing the percentage of royalty and seigniorage on total cost for private and Co-Operative Sector.

Year	Private Sector	Co-op S ector
1994-95	7.3	10.5
95-96	8.4	11.2
96-97	8.1	11.4
97-98	5.9	11.7
98-99	6.1	11.4
99-2000	5.4	11.3

Source: Collected from survey for private sector and from annual report for Co-operative- Sector.

Blasting expenses also constitute an important component of cost of production. With out hammering, and blasting, quarry industry cannot function. Blasting expense is the amount paid for explosives. There is great difference in cost in this account between the private and the Co-operative sectors. Table 3.12 shows the difference in blasting expense in the private and co-operative sectors.

It is clear from table 3.12 that every year the percentage of blasting expense was increasing. In 1994-95 it was 6.2 per cent, in 1995-96 it was 6.9 percent and it increased to 7.7 percent in 1999-2000. In the Co-operative Society the blasting expense showed a mixed trend. In 1994-95 it was 4.8 per cent and it increased to 6.6 in 1995-96. In 1999-2000 it decreased to 2.9 per cent. Moreover, there is difference between

Table 3.12

Percentage of blasting expense to total cost of production of private sector and co-operative sector for various years

Year	Private sector Percentage	Co-operative Sector Percentage
1994-95	6.2	4.8
95-96	6.9	6.6
96-97	6.7	6.7
97-98	7.3	4.9
98-99	7.6	3.67
99-2000	7.7	2.9

Source: Collected from survey for private sector and from annual reports for Co-operative Sector.

in the expenses of private and co-operative sectors. In private sector in 1994-95 it was 6.2 per cent whereas in the Co-operative Society it was 4.8 percent. In 1998-99 this figure was 7.6 per cent and 3.7 percent respectively. In 1999-2000 the percentage of blasting expense in private sector was 7.7 whereas it was 2.9 in the co-op society. In private sector expense is increasing year by year, whereas in the co-operative society, it was decreasing. This is because almost none of the quarries in the private sector has legal license to use explosives. So they have to purchase explosives at higher prices from those who have explosive licence and blasting license. The Co-operative-Society has the licence to blast and to keep explosives. So it can purchase explosives in bulk and hence, the cost will be always less.

3.4 PROFITABILITY RATIO RELATED TO INVESTMENT

The profitability ratio can be computed by relating the profits of a unit to its investment[7]. Such ratios are popularly known as Return on Investment Ratio (R.O.I). They are.

- Return on assets
- Return on capital employed
- Return on share holders' equity

3.4.1 RETURN ON ASSETS

The return on assets is a useful measure of the profitability of all financial resources invested in the units assets. It evaluates the use of total funds[8]. Table 3.13 shows the return on total assets in the co-operative- Sector.

Table 3.13

Percentage of return on total assets in Co-operative- Society

Year	Total Assets	Net Profit /Net Loss	Return on total assets
1994-95	1744907.48	65598.85	3.8
95-96	2652260.95	83195.55	3.1
96-97	3088903.65	76895.53	2.4
97-98	3261988.62	37770.12	1.2
98-99	4126496.9	42945.51	1
99-2000	4809571.04	37449.01	0.8

Source: Data collected from annual reports from co-operative society quarry.

Table 3.13 reveals that the return on asset was very low. Moreover, it declines every year. It was 3.8 percent in 1994-95, 3.1 percent in 95-96 and 8 percent in 1999-2000. The reason for the decline of return on asset was that every year profit dropped and a high proportion of amount was set apart in reserves and appropriations. Moreover, during 1998-99 and 1999-2000, there was a considerable reduction in the selling price of quarry products.

3.4.2 Return on assets in Private sector

There is no investment in private quarries except in land. Only very few have really purchased land, majority are operating quarries in encroached land. They have not invested anything on building, machinery, office equipments etc. They only spend some amount for road construction and shed construction, which they treat as a revenue expenditure.

3.4.3 Return on Capital employed

The return on capital employed indicates how well management has used the fund supplied by creditors and owners. The higher the ratio, the more efficient the unit in using the funds entrusted to it. Capital employed means the total of net fixed asset and working capital[9].

Table 3.14

Percentage of return on capital employed in Co-operative Society quarry for various years

Year	Capital employed	Net profit	R.O Capital employed
1994-95	1138678.57	65598.85	5.76
95-96	124877.457	83195.55	6.66
96-97	2312195.98	76895.53	3.33
97-98	2942369.53	37770.12	1.28
98-99	3068310.06	42942.51	1.4
99-2000	3171839.98	37449.01	1.2

Source: Data Collected from annual report of Co-operative Society quarry.

Return on capital employed shows a low percentage; but it is slightly higher than that on return for total assets. In the first year return on capital employed was 5.76 per cent and in the second year it has increased to 6.66 per cent. From 1996-97 on wards it showed some

decline and by 1999-2000 it reached 1.2 per cent. The reason for the low figure was due to diversion of huge amount from gross profit to reserves.These amounts are used for the welfare of the employees who are the owners of the co-operative society. In the Society, capital employed is higher than what is actually required.

Actually reserves should be added to the net profit of the year to get the exact picture of profit.

Table 3.15 shows the return on capital employed by the co-operative society after adding profit.

Table 3.15

Percentage of return on capital employed by co-operative society quarry for various years after adding reserves to profit

Year	Capital employed	Net profit reserves	per cent of return
1994-95	1138678.57	140598.85	12.35
95-96	124877.457	343195.53	27.48
96-97	2312195.98	236895.12	10.25
97-98	2942369.53	37770.12	1.28
98-99	3068310.06	267945.51	8.73
99-2000	3171839.98	137449.01	4.33

Sources: Data collected from the annual report of Co-op-Society.

When reserves are added along with profit, return on capital employed becomes high in some years and low in other years. For example, in 1994-95 to 1996-97 this figure was 12.35, 27.48 and 10.25 respectively. In the year 1997-98 profit was very low due to low sales and high cost of sales. Percentage of return was 1.28 per cent during

1997-98. In the year 1999-2000 the rate of return on investment was 4.33 per cent.

3.4.4 Return on share holders equity

Under this profitability is measured by dividing the net profit by the average share holders equity. In Co-operative society shareholders means equity share holders.

Table 3.16

Table showing the percentage return on equity share capital of co-operative Society for various years

Year	Equity share Capital	Net profit	Percentage of return on equity capital
1994-95	42735	65598.85	153.5
95-96	32205	83195.55	258.33
96-97	41930	76895.53	183.39
97-98	41270	37770.12	91.52
98-99	42005	42945.51	102.23
99-2000	42730	37449.01	87.64

Source: Data collected from the annual reports of co-operative society quarry.

There is very high return on equity shares of the co-operative quarry. It was 153.5 per cent in 1994-95, 258.33 per cent in 1995-96.

From 1996-97 onwards it showed a declining trend and by 1999-2000 it reached 87.64 per cent.

3.5 EARNING POWER

The earning power of a unit may be defined as the overall profitability of the unit[10].

Earning power = Net profit margin x Investment Turnover.

$$\text{Net profit margin} = \frac{\text{Net profit}}{\text{Sales}}$$

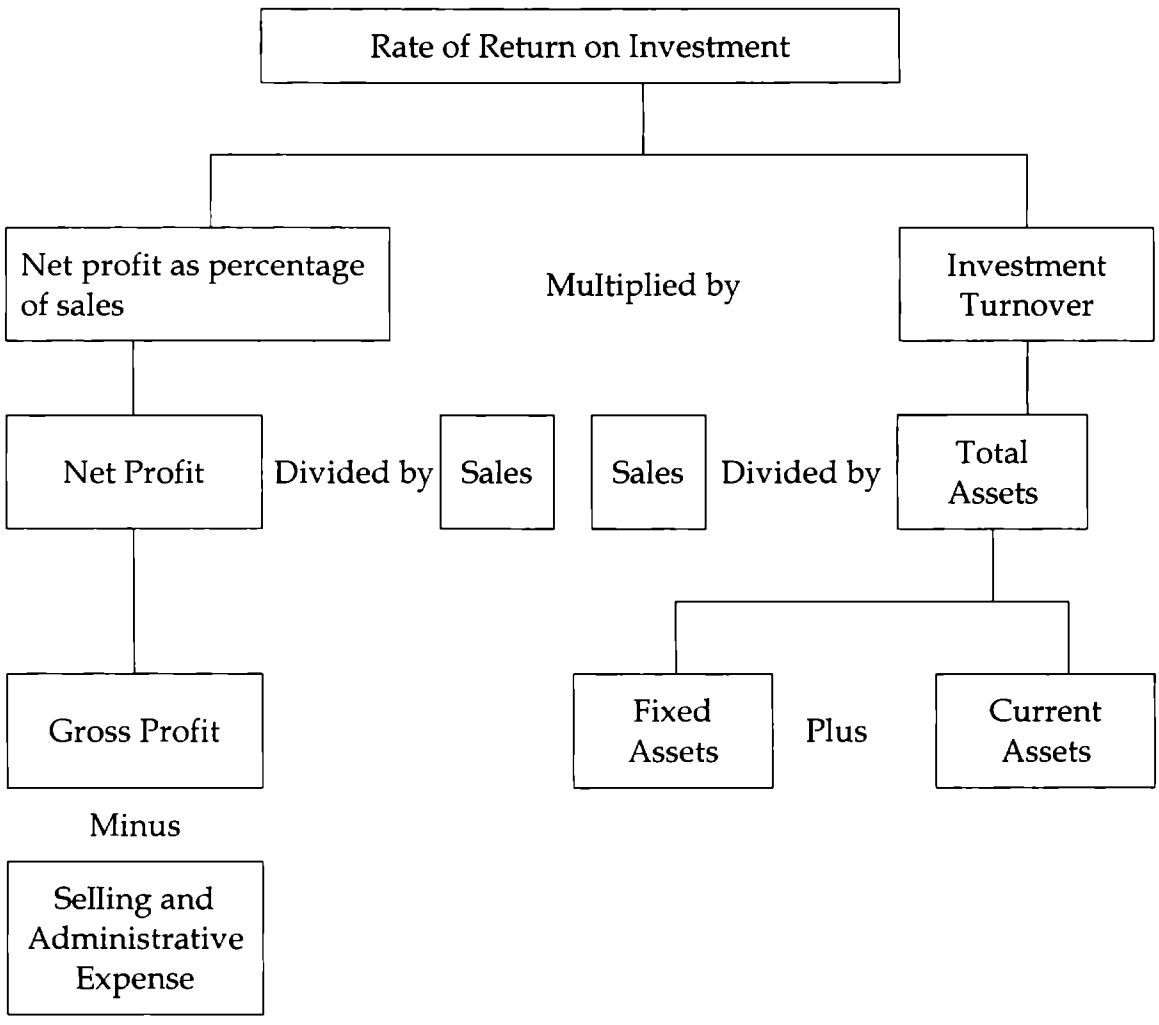
$$\text{Investment turnover} = \frac{\text{Sales}}{\text{Total asset}}$$

$$\text{Earning power} = \frac{\text{Net profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total asset}} = \frac{\text{Net profit}}{\text{Total asset}}$$

The operating efficiency of a unit in terms of the efficient utilization of the resources is reflected in net profit margin. It has been observed that although a high profit margin is a test of better performance, a low margin does not necessarily imply a lower rate of return on investments if a unit has higher investment turnover. Therefore, the overall efficiency of a unit can be expressed on the basis of the combination of the two. The combined profitability is referred to

as earning power. The basic elements of earning power of a unit are portrayed with the help of Du Pont chart[11].

DUPONTS CHART



Earning power is the same as the percentage return on total assets.

Table 3.17

Table showing return on investment as per Duponts model in co-op society quarry

Year	Net Profit	Sales	Total asset	Percentage of return on total assets
1994-95	65598.85	2817217	1744907.48	3.8
1995-96	831955.55	3662314	2652260.95	3.1
1996-97	76895.53	4037674	3088903.65	2.4
1997-98	37770.12	2623353	3261988.62	1.2
1998-99	42945.51	8495835	4126496.9	1.
1999-2000	37449.01	49854569	4809571.04	0.8

Source: Data collected from co-op society quarry

3.6 ACTIVITY RATIO

Activity ratios are concerned with measuring the efficiency in asset management. These ratios are called efficiency ratios or asset utilization ratios. Activity ratios are employed to evaluate the efficiency with which the unit manages and utilizes its assets. These are also called turnover ratios, because they indicate the speed with which the assets are being converted into sales. Several activity ratios are considered to judge the effectiveness of asset utilization.

3.6.1 INVENTORY OR STOCK TURNOVER RATIOS

This ratio indicates the number of times inventory is replaced during the year. It indicates the efficiency of the unit's inventory management.

$$\text{Inventory Turnover} = \frac{\text{Cost of good sold}}{\text{Average inventory}}$$

Table 3.18

Inventory Turn over during the period of 1994-95 to 1999-2000 in private quarry

Year	Cost of goods sold (Rs)	Average inventory (Rs)	Turnover times
1994-95	65 8612	6800	96.85
95-96	721 840	10,700	67.46
96-97	833 940	9,900	84.23
97-98	868 100	8,700	99.78
98-99	900 800	7,800	115.48
99-200	975 400	11,500	84.81

Source: Data collected from survey.

Table 3.19

Inventory turn over of co-operative quarry during the period of 1994-95 to 1999-2000

Year	Cost of goods sold (Rs)	Average inventory (Rs)	Turnover times
1994-95	1676294.67	19069.2	87.9
95-96	2057768.24	8443.5	243.7
96-97	2454239.6	3567.5	687.94
97-98	1672042.17	3003.5	556.7
98-99	3169832.89	38748	81.8
99-200	3999869.6	37776	105.8

Source: Data collected from the annual report of Co-operative- Society.

Table 3.20

Table showing inventory turnover in co-operative sector and private sector quarry

Year	Private sector	Co-operative sector.
1994-95	96.85	87.9
95-96	67.46	243.7
96-97	84.23	687.94
97-98	99.78	556.7
98-99	115.48	81.8
99-200	84.81	105.8

Source: Data collected from survey in private sector and annual reports of Co-operative sector.

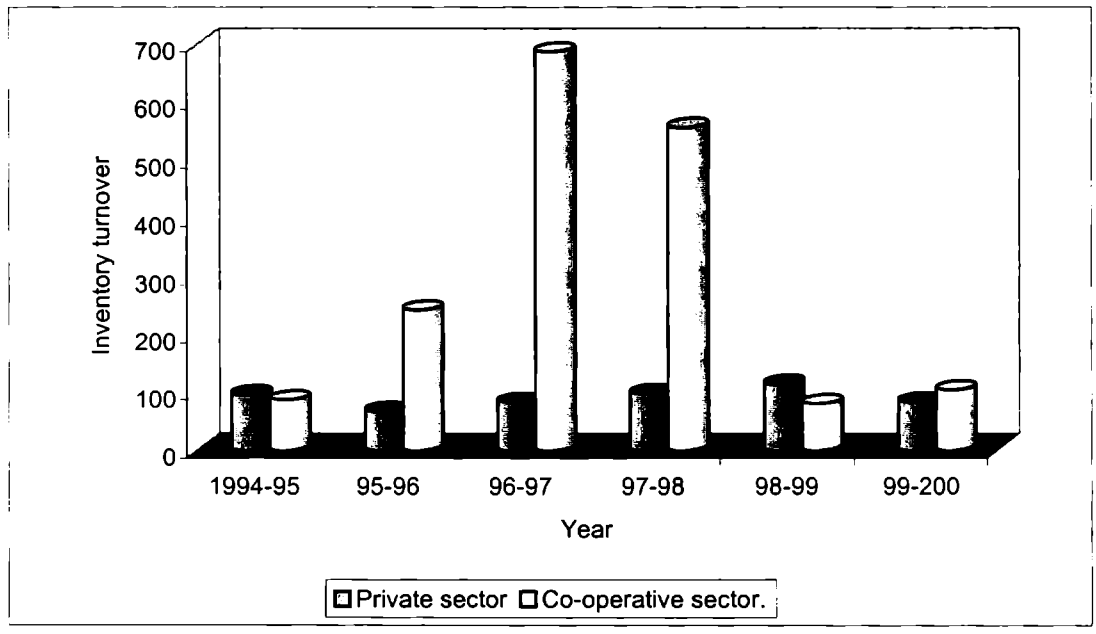
Tables 3.18 to 3.20 show that in both sectors, inventory turnover was high. In private sector in all the years, inventory turnover varies between 67.46 and 115.48 In the Co-operative- Society in the years 1995-96, 96-97, and 97-98 had a very high turnover that is 243.7, 687-94 and 556.7 respectively. It indicates that in both the sectors there is efficient management of inventory. One of the reasons for the above tendency is the nature of the industry. In all seasons since the construction work requiring the quarry products is in progress, whatever goods are produced, will be sold within a short period.

Co-operative Society's turnover ratio is higher than that of the private sector. The reason for this is the added faith of consumer in Co-operative Society. They issue bill for every sale describing the rate, quantity etc.

Following is the diagrammatic representation of inventory turnover in co-operative sector and private sector quarries.

Diagram 3.6

Inventory turnover in co-operative sector and private sector quarry



3.6.2 Debt Collection Period

According to information supplied by the owners of private sector quarries this debt collection period varies from two to three months that too also for very low amount. In the Co-operative Society, all sales are done on cash basis. Hence there is no debt and no question of debt collection period. Private parties give credit generally to the contractors. Contractors for convenience will give money only after realising their bill from the government. It will take two or three months. In this case private quarry owners will sell the materials at a higher price.

3.6.3 Asset Turnover Ratio

This ratio is also known as the Investment Turnover ratio. It is based on the relationship between the cost-sales and asset or investment of a unit[13]. Depending upon the different concepts of assets employed, the following are the different types of ratio.

3.6.4 Total Asset turnover ratio

This ratio shows the unit's ability in generating sales from all financial re sources committed to total assets[14].

$$\text{Total asset turnover ratio} = \frac{\text{Sales}}{\text{Total asset}}$$

Table 3.21

Table showing total asset turnover ratio in co-op society quarry from 1994-95 to 1999-2000

Year	Sales (Rs)	Total Asset	Turnover (Times)
1994-95	2817217	1744907.48	1.61
95-96	3662314	2652260.95	1.38
96-97	4037674	3088903.65	1.031
97-98	2623351	3261 988.62	0.8
98-99	8995835	412649.9	0.92
99-2000	4954569	4809571.04	1.03

Source: Data collected from annual reports of co-operative society quarry.

In 1994-95 fixed asset turnover was 1.61. It means that, total asset turnover of 1.61 times shows a sale of Rs.1.61 for one rupee investment in total asset. Subsequent years has shown lower figures, and in 1999-2000 it was 1.03 times. It shows that, the total asset turnover is not good and not efficiently managed. A large amount was blocked in total asset and its yield was very low. One of the reasons was that a large amount was blocked in cash, which did not yield anything.

3.6.5 Fixed Asset Turn Over

The fixed asset turnover measures the efficiency with which the unit is utilizing its investments in fixed assets such as land, building, plant and machinery, furniture etc.

Table 3.22

Table showing the fixed asset turnover for co-operative- society quarry from 1994-95 to 1999-2000

Year	Sales (Rs)	Fixed Assets (Rs)	Turnover
1994-95	2817217	790655.48	3.56
95-96	3662314	905972.97	4.04
96-97	4037674	916186.26	4.41
97-98	2623351	916186.26	2.56
98-99	3995835	1713556.6	2.33
99-2000	4954569	3220459.47	1.54

Source : Data collected from the annual reports of co-operative society quarry.

Table 3.22 reveals that the firms fixed asset turnover was decreasing year by year. In 1994-95 it was 3.56. In 1995-96, and 1996-97 it rose to 4.0 4 and 4.41. From 1997-98 onwards it showed a declining tendency and reached 1.54 in 1999-2000. Since it is a labour intensive industry once can say that this could be still higher.

3.7 PRIVATE SECTOR

Since there was no fixed asset in private sector there was no question of such turnover ratio.

3.7.1 Net Asset Turn Over

Since net asset is equal to capital employed, net asset turnover may also be called capital employed turnover ratio[15].

$$\text{Net asset turnover} = \frac{\text{Sales}}{\text{Capital employed}}$$

Table 3.23

Table showing the capital turnover for Co-operative Society from 1994-95 to 1999-2000

Year	Sales (Rs)	Total capital employed (Rs)	Turnover (Times)
1994-95	2817217	1291 506.57	2.18
95-96	3662314	2344400.98	1.56
96-97	4037674	2984299.53	1.35
97-98	2626351	3109280.06	0.84
98-99	3995835	3213844.98	1.24
99-2000	4954569	3934322.64	1.26

Suitable: Data collected from the annual report of co-co society quarry.

In 1994-95 net asset turnover was 2.18 and in the subsequent years it droped to 1.56, 1.35, 0.84, 1.24 and 1.26 respectively. It indicates that capital turnover ratio is not satisfactory.

3.7.2 Sales to Inventory

It is the relation ship between sales and stock.

$$\text{Sales to inventory} = \frac{\text{Sales}}{\text{Stock}}$$

Table 3.24

Table showing sales to inventory ratio in private sector and co-operative- sector quarry for various years

Year	Sales/ inventory private Sector	Sales/ Inventory Co-operative sector
1994-95	138.7	212.79
95-96	72.03	1003.92
96-97	110.97	1157.92
97-98	93.28	1041.01
98-99	326.3	53.29
99-2000	57.58	8601.6

Source : Data Collected from survey for private sector and from annual report for co-operative sector quarry

There is high inventory turnover in both sectors. In Co-operative Society, inventory turnover is higher than the private sector turnover.

It indicates that there is high demand for quarry products in all seasons.

3.8 LIQUIDITY RATIO

It is extremely essential for a unit to be able to meet its obligations as they become due. The ratio which shows the ability of the unit to meet its current obligation is known as liquidity ratio. A unit should ensure that it does not suffer from low liquidity or from high liquidity. Low liquidity will result in poor credit rating and loss of creditors' confidence. A very high liquidity is also bad, because idle assets earn nothing[16]. The ratio which indicates the liquidity of a unit is:

$$\text{Current ratio} = \frac{\text{Current asset}}{\text{Current liability}}$$

Current asset includes cash and those assets which can be converted into cash within a year such as marketable securities, debtors, stock and prepaid expenses. All obligations maturing within a year are included in current liabilities. Current liability includes creditors, bills payable, accrued expenses, Bank overdraft, income tax liability and long term debt maturing in the current year.

3.8.1 Current ratio for Private sector

In private sector current as assets means cash, bank balance and prepaid expenses, current liability means creditors and out standing expenses.

3.8.2 Co-Operative Sector

Here, current asset means cash balance, cash at Bank, stock of raw materials, and prepaid advances and current liability means outstanding expenses. In society all sales are on cash basis, and hence these is no debtors or bad debts.

Table 3.25

Table showing the current ratio in private sectors and co-operative sector for from 1994-95 to 1999-2000

Year	Current ratio private sector	Current ratio Co-Operative Sector
1994-95	8:1	6.3:1
95-96	1.2:1	5.9:1
96-97	1.5:1	20.2:1
97-98	2:1	5.6:1
98-99	1.8:1	15.9:1
99-2000	.6:1	5.9:1

Source: Data collected from primary source for private sector and annual report from co-operative sector quarry.

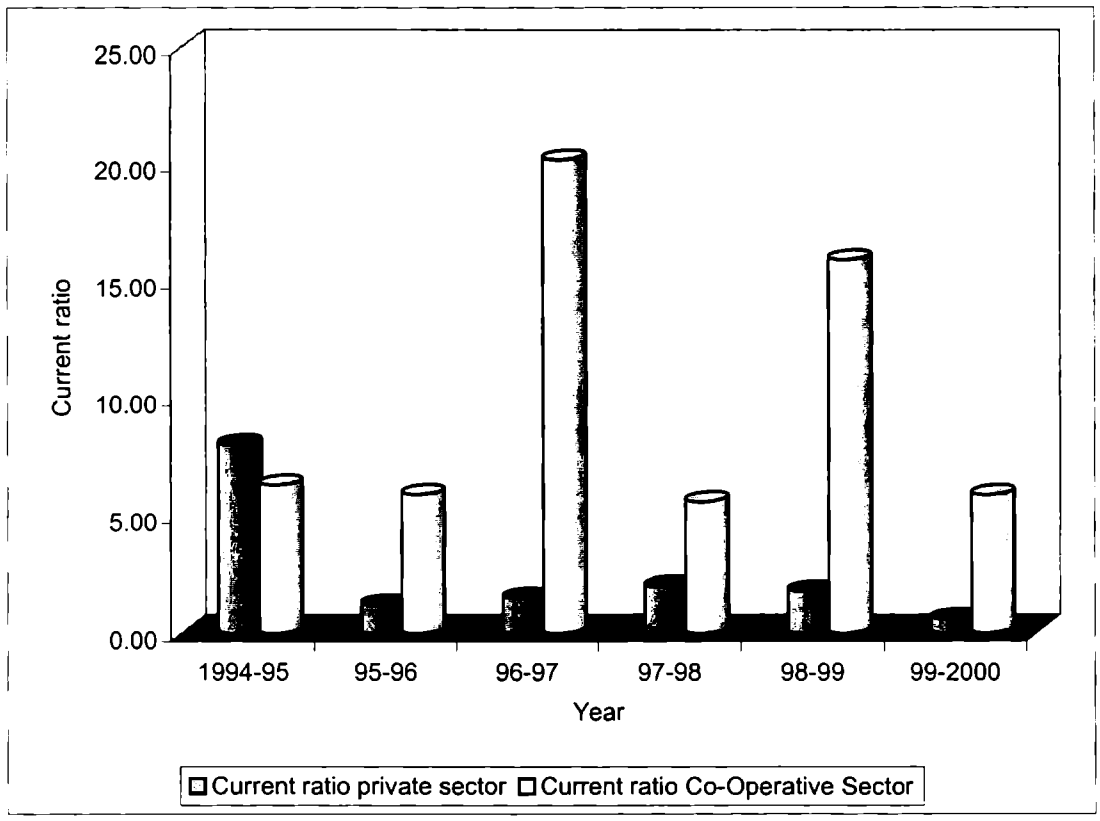
In private sector current ratio is less than the standard current ratio, 2:1 In1994-95 it was 8:1 and 1.2:1, 1.5:1, 2:1, 1.8:1, .6:1 for the subsequent years. In 1999-2000 to meet a liability of one rupee they had the current assets worth rupees 0.6 or 60 paise only. If any problem arises, they have to meet it by borrowing from local money lenders.

In the Co-Operative Society current ratio shows a high figure 6.3 in 1994-95 .In 95-96 it was 5-9, in 96-97 it reached to 20.2:1 and in 1999-2000 it was 5.9:1. A large amount of money is invested in current asset, especially in cash and Bank balance. The yield from the current asset is very low, and hence it is an indication of inefficient management. But since the quarry is a labour-intensive industry, high liquidity ratio is necessary.

Diagrammatic representation of the above is given below.

Diagram 3.7

Current ratio in private sectors and co-operative sector for from 1994-95 to 1999-2000



3.9 QUICK RATIO

The quick ratio or acid test ratio is a more refined measure of the unit's liquidity. This ratio establishes a relationship between quick or liquid assets and current liabilities[17]. Cash is the most liquid asset. The other liquid assets are, cash at Bank, book debts prepaid expenses, marketable securities. The exclusion of inventory is based on the reasoning that it is not easily and readily converted into cash. In quarry industry, cash in hand, cash at Bank and prepaid expenses are treated as liquid asset.

$$\text{Quick ratio} = \frac{\text{Quick asset}}{\text{Current liability}}$$

Table 3.26

Table showing the quick ratio of private sector and Co-operative sector from 1994-95 to 1999-2000

Year	Private sector	Co-op-Sector
1994-95	.5:1	6.1:1
95-96	.9:1	5.8:1
96-97	1.2:1	20.1:1
97-98	1.6:1	5.5:1
98-99	1.2:1	15.8:1
99-2000	.4:1	5.8:1

Source : Data collected from survey for private sector and from annual reports for co-operative- sector quarry.

In private sector, the quick ratio was low compared to the standard ratio of 1:1. In 1994-95 it was .5:1 and in 95-96 it was .9:1.In the next three years it rose to 1.2:1, 1.6:1 and 1.2:1. In 1999-2000 it was .4:1 Even though their quick ratio was very low, they could meet the

liability in some or other way. In co op- society, liquid ratio showed a high figure. In 1994-95 it was 6:1:1 and in the subsequent years it was 5.8:1, 20.1:1, 5.5:1, 15.8:1 and 5.8:1 respectively

3.9.1 DEFENSIVE INTERVAL RATIO

Apart from paying current liabilities, the liquidity position of a unit should also be examined in relation to its ability to meet projected daily expenditure from operations[18]. The defensive interval ratio provides such a liquidity. It is a ratio between the liquid assets and the projected daily cash requirements.

Defensive interval ratios : Liquid assets / Projected cash requirements

Table 3.27

Defensive interval ratio in private sector and co-operative- sector quarry from 1994-95 to 1999-2000

Year	Private sector (days)	Co-operative sector (days)
1994-95	13	164
95-96	15	219
96-97	17	273
97-98	19	241
98-99	14	238
99-2000	10	93

Source: Survey data.

Data collected from survey for private sector and from the annual reports from co-operative sector quarry.

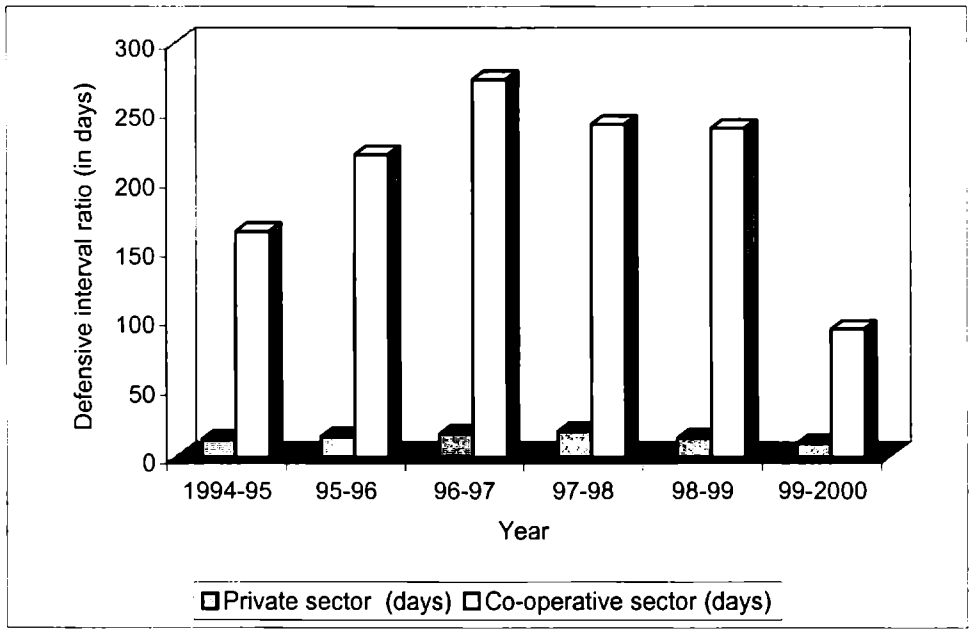
In 1994-95 defensive internal ratio 13 days indicate that the unit was having liquid assets which could meet the operating cash

requirements of business for 13 days without resorting to future revenues. A higher ratio would be favorable as it would reflect the ability of a unit to meet cash requirements for a longer period of time. In private sector, defensive internal ratio was shorter. But due to the peculiarity of this industry, shorter period was not a problem, because, every day, there was sales, and the payments were made only at the end of the week. In Co-op-Society defensive interval rate was higher. In 1994-95 it was 164 days. In the subsequent years it was 219, 273, 241 and 238 respectively. In the 1999-2000, it was 93 days. In the Co-operative society, this ratio was highly favourable.

The above information can be diagrammatically represented as follows.

Diagram 3.8

Defensive interval ratio in private sector and co-operative- sector quarry from 1994-95 to 1999-2000



3.10 LEVERAGE / CAPITAL STRUCTURE RATIO

The leverage or capital structure ratio may be defined as financial ratios which throw light on the long-term solvency of the unit as reflected in its ability to assure the long term creditors with regard to (1) period payment of interest (2) Repayment of principal on maturity or in predetermined instalments at due dates.

3.10.1 Co-operative Society

In the Co-operative society, there was no long-term debt. All of its financial needs were met by revenue of sales, past reserves or temporary loans from district Co-operative banks. Hence there is no need to calculate leverage ratios.

3.10.2 Private Sector

In private sector also, there was no long-term debt, because major quarries are of encroached ones or forest quarries. Due to its particular nature, if any finance was needed it was met from temporary sources. Hence in this sector there was no need to calculate Leverage or capital structure ratio.

SECTION C

3.11 COST ANALYSIS

This section is intended to find out whether there is any significant difference regarding the expenses with respect to the operation of private sector and co-op. sector quarries. Attempt is also made to find out whether there was any significant difference in

expense among the three groups of private sector quarries namely (i) those who paid royalty and seigniorage fully, (ii) those who paid royalty and seigniorage partially and (iii) those who did not pay anything at all as royalty or seigniorage.

To make the analysis more meaningful and useful to management it can be classified under two heads, viz., fixed and variable costs. Fixed cost remains fixed irrespective of the level of operations while variable costs vary depending on the level of operations.

By analysing the cost the management will be in a better position to identify the important cost elements that exert major influences on the total cost. This information will help the management to exercise control measures so as to minimise the loss or to maximise the operational profit.

3.12 'T' VALUES FOR VARIOUS EXPENSES IN PRIVATE AND CO-OPERATIVE SECTOR

Let us consider the 't' value for various expenses in the private and co-operative sector quarries and their significance for the years 1994-95 to 1999 -2000. Table value of 't' at 29 degrees of freedom is 2.045. If modulus value of the calculated 't' value is greater than 2.05, the corresponding means are significant.

** high significance at 1% level.

* high significance at 5% level.

ns = no significance

Table 3.28

Table showing the t value for various expenses per load for the year 1994-95 in the private and the co-op. sector(Rs)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	82.91	40.80	11.03	67.33	66.53	40.00	103.60	125.17	48.53	610.61
SD	1.84	0.96	1.81	2.15	3.22	0.00	47.95	7.60	9.43	17.83
Cooperative	76	35	10	60	55	40	10	75	253	630
t value	20.57**	33.046**	3.128**	18.64**	19.59**	-	10.69**	36.164**	-118.792**	-5.96**

Source:- Data collected from survey for private sectors and from annual report for co-op. sector.

Table 3.28 shows that the average expense in the private sector quarries for drilling was Rs.82.91, Blasting, Rs.40.8, blasting-man, Rs.11.03; hammerman Rs.67.33, woman, Rs.66.53; seginerage Rs.10.36, loading, Rs.125.17; administrative expense, Rs.48.53 and sales, Rs.610.61. In the co.op society the respective expense for drilling, blasting, blast man, hammer-man, woman, segniorage, loading, administrative expenses and sales were Rs.76, Rs.35,Rs.10, Rs.60, Rs.55, Rs.10, Rs.75, Rs.253 and Rs.630 respectively. The 't' value for the sectors for drilling, blasting man, hammer man, woman, royalty, seigniorage, administrative expense and sales are 20.57, 33.048, 3.128, 18.64, 19.59, 10.89, 36.164, -118.792 and -5.96 in such order. Modulus of all the above 't' values are above 2.045. It indicates that there is high significant difference in expenses in the case of private sector and co-operative sector quarries.

The reason for significant differences are:-

3.12.1 Drilling

For drilling the Co-op. society has own drilling machinery. The society had a uniform rate for drilling also. Moreover, at the time of purchasing drilling machine the society enjoyed many concessions by virtue of being a co-op. society. The persons working in drilling machines are permanent employees and hence they are entitled to get many other benefits. This makes the society's employee's wage low. The private sector quarries had to hire drilling machines and for that they had to pay higher charges. Moreover, during high demand seasons, they had to give higher rates for the jackhammer machines also. Apart from these, as the drilling machines employees in the private sector do not have any employment security, they demand high wages for their work.

3.12.2 Blasting Expenses

Average blasting expense per lorry was Rs.35/- in the co.op quarry, whereas it was Rs. 40.8 in private quarry. The co.op quarry had explosive licence. Hence it was eligible to get explosive materials at controlled rate. Private quarries, on the other hand did not possess explosives licence. They get explosives through illegal ways and for that they have to pay more for it. If any accident happens at the time of blasting, they have to spend a lot as blasting without lincence is a criminal offence. Moreover, for illegal explosions, they have to bribe many functionaries in different departments.

3.12.3 Blasting man

He is a person who possesses authorized licence to use the explosives. In the co-op. society at the time of the survey there were two blasting men who have blast-man licence. Since they were permanent employees, their jobs were protected. But their wages were comparatively low. In case of accident, they are entitled to get all legal protection. In the case of private sector, blasting was done by persons who did not have licence. They were not eligible to get legal protection as they did not have valid licence. Only an experienced person can do blasting and hence his rate will usually be high.

3.12.4 Hammer man

Hammer man is a person who breaks the unsize stone into sizeable ones. His job is generally very hard in nature and needs experience. To break a stone he has to study the nature of the stone and hammer it accordingly. In the co-op. sector, since he was getting other benefits, his direct wage was low. In private sector, the pay was higher as he did not get anything other than the pay. His output will be higher, since wages are in proportion to output. In the co-op. sector for hammering wages are paid on a daily basis.

3.12.5 Woman Helper

Woman helpers are employees who help the drilling man as well as the blasting-man. They also bring water to the quarry and remove waste accumulated in the quarry. In the co-op. quarry they were permanent employees and enjoyed many other benefits. Hence their

usual wage was low. But in a private quarry though the nature of work is more or less the same, they have to be paid higher wages as they did not get anything other than the wages.

3.12.6 Royalty

Royalty in both the sectors was the same and hence there was no difference between the sectors.

3.12.7 Seigniorage

Since the Co-op society enjoyed some benefit, its seigniorage was low. But people who were working in revenue purambokku quarry have to pay seigniorage between Rs.25 and Rs.30 per load. In the case of forest quarries the seigniorage per load was Rs.170.

3.12.8 Loading

In the co-op. sector, the loading rate was only Rs. 75/- per load as the loading workers enjoyed various benefits other than the direct wages. They also get more loading work compared to the private sector. But in private quarry, their rates were very high as they were not eligible to get any other benefits. Moreover, they helped the quarry owners for selling the quarry products. Even though they were not treated as productive employees, they enjoyed higher wages compared to the other workers in the quarry.

3.12.9 Administrative expense

Administrative expenses are those charges against profit and loss account. These are expenses for administering the quarries in an organised manner. In the co-op. society, they have to set apart a lot of

appropriation like depreciation, reserves, provision for future loss, bonus fund, education fund, social contribution, Co-operative fund, building fund, dividend etc. Moreover, the co-operative quarry has to pay the salary to the secretary, the office staff and meet expenses connected with the annual general body meeting. Direct or Board member's allowance, allowance of the president etc. As a result, the co-operative quarry's administration expense was found to be very high. In a private sector quarry, there was only one supervisor to administer the activities and hence the administration charges remained very low.

3.12.10 Sales

In a private sector quarry the selling price was generally low as they often reduced selling price to attract customers. But the co.op. society quarry did not resort to such measures.

Table 3.29

Table shows the 't' value for various expenses per load in the year 1995-96 in Co-op. sector and private sector (Rs.)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	87.14	43.83	11.93	72.03	68.97	50.00	110.80	125.83	52.97	613.56
SD	2.73	1.74	2.02	4.06	3.78	0.00	52.12	8.00	10.78	19.73
Coperative	82.00	35.00	10.00	60.00	55.00	50.00	10.00	75.00	238.60	630.00
't' value	10.33**	27.75**	5.25**	16.25**	20.22**	-	10.59**	34.82**	-94.28**	-4.57**

Table 3.30

Table showing the 't' value for various expenses per load in the year 1996-97 in Co-op. sectors and private sector (Rs.)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	89.83	44.95	13.43	78.50	73.43	50.00	112.00	131.50	56.17	619.87
SD	1.95	2.09	1.85	4.62	2.69	0.00	49.94	6.97	10.65	22.92
Coperative	82.00	40.00	10.00	65.00	60.00	50.00	10.00	85.00	218.40	630.00
't' value	21.96**	13.00**	10.16**	16.00	27.38**	-	11.19**	36.56**	-83.40**	-2.42**

Table 3.31

Table showing the 't' value for various expenses per load in the year 1997-98 in Co-op. sectors and private sector (Rs.)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	94.31	48.79	15.28	84.52	76.14	80.00	119.20	146.90	60.38	630.34
SD	1.81	3.31	2.05	4.83	3.11	0.00	54.10	10.39	10.69	34.77
Coperative	88.00	4.00	12.00	65.00	65.00	80.00	20.00	85.00	168.50	630.00
't' value	19.15**	14.55**	8.75**	22.13**	19.59**	-	10.04**	32.64**	-55.41**	0.05 ns

Table 3.32

Table showing the 't' value for various expenses per load in the year 1998-99 in the co-op. and private sector (Rs.)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	98.89	50.76	15.76	88.72	80.07	80.00	121.20	152.41	64.31	735.79
SD	2.23	2.43	1.84	5.64	2.34	0.00	52.31	10.23	10.24	19.08
Coperative	90.00	45.00	12.00	70.00	65.00	80.00	20.00	100.00	259.75	750.00
t value	21.79	12.98	11.16	18.17	35.21**	-	10.60**	28.06**	-104.53**	-4.08**

Table 3.33

Table showing the 't' value for various expenses per load in the year 1999-2000 in Co-op. sectors and private sector (Rs.)

	Drilling	Blasting Expenses	Blasting man	Hammer man	Woman	Royalty	Seigniorage	Loading	Administration expense	Sales
Average	100.25	51.72	15.93	87.76	82.07	80.00	121.20	153.10	65.52	648.10
SD	2.93	2.53	1.71	15.84	3.14	0.00	52.31	10.39	9.76	41.54
Coperative	95.00	45.00	12.00	70.00	65.00	80.00	20.00	100.00	146.80	640.00
't' value	9.83**	14.53**	12.59**	6.14**	29.79**	-	10.60**	28.00**	-45.61**	1.07

Tables 3.29 to 3.33 show that there was significant difference between private sector and co-op sector in all the years except in sales in the year 1999-2000. Average sales in the private sector in 1997-98 was 630.34 rupees per load and in the co-op sector, 630 rupees. In private sector compared to previous years, cost of production was increasing and hence they could not reduce the selling price. In both the sectors, they could not increase selling price as that would affect sales adversely. During 1999-2000 there was a depression in the selling price compared to the previous year. In 1998-99 the selling price per load in the private sector was Rs.735.79/- whereas in 1999-2000 it was Rs.648.1. Similarly in the Co-op sector the respective figures were Rs.750 and Rs.640. In 1999-2000 the selling price per load in private sector was Rs.648.1 and in the co-op sector Rs.640. Hence there was no significant difference in the selling prices in the two sectors.

Table 3.34

Average drilling charge per load of private sector and Co-op. sectors and their 't' values for the years 1994-95 to 1999-2000

Year	Private Sector			Co-op sector			Significance
	Average (Rs.)	% increase	SD	Average (Rs.)	% increase	't' value	
1994-95	82.91	100	1.84	76	100	20.57	**
95-96	87.14	105.1	2.73	82	107.9	10.33	**
96-97	89.83	108.3	1.95	82	107.9	21.96	**
97-98	94.31	113.7	1.81	88	115.8	19.15	**
98-99	98.89	119.3	2.23	90	118.4	21.79	**
99-2000	110.25	120.9	2.93	95	125	9.83	**

Source: Data collected from survey for private sector and from annual reports for co-op sector.

From table 3.34 it is clear that there was significant difference in the case of drilling charges between private sector and the co-op sector quarries. The drilling expenses of private sector increased by 5.1 % in the second year, 8.3% in the 3rd year 11.7% in the 4th year 19.3 % in the 5th year and 20.9% in the 6th year compared to 1994-95. In the co-operative society the increase was 7.9% in the second and the 3rd year 15.8%, 18.8% and 25% in the subsequent years compared with 1994-95.

Table 3.35

Average blasting expense per load of private sector and co-operative sector and their 't' value for the year 1994-95 to 1999-2000

Year	Private. Sector			Co-op sector		't' value	Significance
	Average (Rs.)	% of increase	SD	Average (Rs.)	% of increase		
1994-95	40.8	100	.96	35	100	33.046	**
95-96	43.83	107.4	1.74	35	100	27.75	**
96-97	44.95	110.17	2.09	40	114.3	13	**
97-98	48.79	119.5	3.31	40	114.3	14.55	**
98-99	50.76	124.4	2.43	45	128.6	12.98	**
99-2000	51.72	126.8	2.53	45	128.6	14.53	**

Source: Data collected from survey for private sector and from annual reports for co-op sector.

Table 3.35 reveals that there was significant difference between blasting expenses of private sector and the co-op sector during 1994-95 to 1999-2000. Blasting expense in the private sector has gone up by 7.4% during 1995-96 and 10.17, 19.5, 24.4 and 26.8% during 1996-97, 1997-98, 1998-99 and 1999-2000 respectively. In the co-op society the expense remained the same during 1995-96 and then increased by 14.3% during 1996-97 and 1997-98 and then by 28.6% during 1998-99 and 1999-2000.

Table 3.36

Average blaster man expense per load of private sector and the co-op. sector and their 't' value for 1994-95 to 1999-2000

Year	Private. Sector			Co-op sector		't' value	Significance
	Average (Rs.)	% of increase	SD	Average (Rs.)	% of increase		
1994-95	11.03	100	1.81	10	100	3.128	**
95-96	11.93	108.2	2.02	10	100	5.25	**
96-97	13.43	121.8	1.85	10	100	10.16	**
97-98	15.28	138.5	2.05	12	120	8.75	**
98-99	15.76	142.8	1.84	12	120	11.16	**
99-2000	15.93	144.74	1.71	12	120	12.59	**

Source: Data collected from survey for private sector and from annual reports for co-op sector.

Table 3.36 reveals that there was significant difference between blasterman expense per load in the case of private and co-op sectors during 1994-95 to 1999-2000. In private sector it increased by 8.2% during 1995-96 and then to 21.8%, 38.5%, 42.8%, and 44.4% during 1996-97, 1997-98, 1998-99 and 1999-2000 respectively. In the co-op sector this expenditure remained the same till 1996-97 and then increased by 20% during 1997-98 to 1999-2000.

Table 3.37

Average hammer-man expense per load in private sector and the co-op sector and their 't' value for the years 1994-95 to 1999-2000

Year	Private Sector			Co-op sector		't' value	Significance
	Average (Rs.)	% of increase	SD	Average (Rs.)	% of increase		
1994-95	67.33	100	2.15	60	100	18.64	**
95-96	72.03	106.9	4.06	60	100	16.25	**
96-97	78.5	116.6	4.62	65	108.3	16.0	**
97-98	84.52	125.5	4.83	65	108.3	22.13	**
98-99	88.72	131.8	5.64	70	116.7	18.17	**
99-2000	87.76	131.83	15.84	70	116.7	6.14	**

Source: Data collected from survey for private sector and from annual reports for co-op society.

It is clear from table 3.37 that there was significant difference with respect to hammer-man expense between private sector and the co-op sector quarries during 1994-95 to 1999-2000. In private sector quarries, hammer-man expense had gone up by 6.9% during 1995-96 and then by 16.60%, 25.5%, 31.8% respectively in the subsequent years. In the co-op. sector there was no change with respect to expenses during 1995-96. But the expenses then went up by 8.3% during 1996-97 and 1997-98. In the next two years the increase accounted 16.7 per cent.

Table 3.38

Average expense of woman helper per load for private and Co-op sectors and their 't' values for 1994-95 to 1999-2000.

Year	Private Sector			Co-op sector		't' value	Significance
	Average (Rs.)	% of increase	SD	Average (Rs.)	% of increase		
1994-95	66.53	100	3.22	55	100	19.59	**
95-96	68.97	103.7	3.78	55	100	20.22	**
96-97	73.43	110.37	2.69	60	109.1	27.38	**
97-98	76.14	114.4	3.11	65	118.2	19.59	**
98-99	80.07	120.3	2.34	65	118.2	35.21	**
99-2000	82.07	123.4	3.14	65	118.2	29.79	**

Source: Data collected from survey for private sector and from annual reports for co-op sector.

Table 3.38 shows that there was significant difference with respect to helper woman's expense in private and the co-op sectors during the period between 1994-95 and 1999-2000. In private sector, the expense of woman helper increased by 3.7 per cent during 1995-96 and then by 10.37, 14.4, 20.3 and 23.4 during the subsequent years. In the co-op sector there was no increase in this expense during 1995-96 and 1996-97. But during 1997-98 it increased by 9.1% and by 18.2 % during the next three years.

Table 3.39

Average expense for Seigniorage per load in private sectors and Co-op sector and their 't' value for the years 1994-95 to 1999-2000

Year	Private Sector			Co-op sector		't' value	Significance
	Average(Rs.)	% of increase	SD	Average(Rs.)	% of increase		
1994-95	103.6	100	47.95	10	100	10.69	**
95-96	110.8	106.9	52.12	10	100	10.59	**
96-97	112	108.1	49.94	10	100	11.19	**
97-98	119.2	115.1	54.1	20	200	10.04	**
98-99	121.2	116.9	52.31	20	200	10.6	**
99-2000	121.2	116.9	52.31	20	200	10.6	**

Source: data collected from survey for private sector and from annual reports for co-op sector.

Table 3.39 reveals that there was significant difference in seigniorage expenses with respect to private and the co-op sector during the period under reference. In private sector expense increased by 6.9% during 1995-96 and by 8.1%, 15.1% and 16.9% during 1997-98, 1998-99 and 1999-2000 respectively. In the co-op sector there was no increase in this expenses during the first three years and during the last three years, it went up by 100%.

Table 3.40

Average loading expense per load for Pvt and the co-op sector and their 't' values from 1994-95 to 1999-2000.

Year	Private Sector			Co-op sector		't' value	Signifi-cance
	Average (Rs.)	% of increase	SD	Averge (Rs.)	% of increase		
1994-95	125.17	100	7.6	75	100	36.164	**
95-96	125.83	100.1	8	75	100	34.82	**
96-97	131.5	105.1	6.97	85	113.3	36.56	**
97-98	146.9	117.4	10.39	85	113.3	32.64	**
98-99	152.41	121.8	10.23	100	133.3	18.06	**
99-2000	153.1	122.3	10.39	100	133.3	28	**

Source: data collected from survey for private sector and from annual reports for co-op sector.

Table 3.40 reveals that there was significant difference between private sector and co.op sector with respect to loading expense. In the private sector the loading expense has increased steadily. It went up by 5.1% during 1996-97, 17.4% during 1997-98, 21.8% during 1998-99 and 22.3% during 1999-2000 compared with 1994-95 prices. In the co-op. sector loading expense remained the same during 1994-95 and 1995-96 and in the next two years it went up by 13.3% and in the subsequent two years, by 33.3% compared with 1994-95 expenses.

Table 3.41

Average administrative expenses with respect to private sector and the co-op sector and their 't' value from 1994-95 to 1999-2000

Year	Private Sector			Co-op sector		't' value	Signifi-cance
	Average (Rs.)	%	SD	Average (Rs.)	%		
1994-95	48.53	100	9.43	253.0	100	-118.79	**
95-96	52.97	109.2	10.78	238.6	94.3	-94.28	**
96-97	56.17	115.7	10.65	218.4	86.3	-83.4	**
97-98	60.38	124.4	10.69	168.5	66.6	-55.41	**
98-99	64.31	132.5	10.24	259.75	102.66	-104.53	**
99-2000	65.52	135.0	9.76	146.8	58.02	-45.61	**

Source: Collected from survey for private sector and from annual report for co-op. sector.

Table 3.41 reveals that administrative expenses of Pvt: sector and the co-op- sector also varied significantly from 1994-95 to 1999-2000. In private sector administrative expenses have gone up by 35% during 1999-2000 compared with 1994-95 period. In the co-op-sector, this expense declined by 5.7% during 1995-96, 13.7% during 1996-97 and 33.4% during 1997-98. Then there was a sudden jump during 1998-99 to witness a steep decline during 1999-2000.

Table 3.42

Average sales price of private and the co-op-sector and their 't' values from 1994-95 to 1999-2000

Year	Private Sector Average (Rs.)	%	SD	Co-op-Sector Average (Rs.)	%	Total	Significance
1994-95	610.61	100	17.83	630	100	-5.96	**
95-96	613.56	100.48	19.73	630	100	-4.57	**
96-97	619.87	101.5	22.92	630	100	-2.42	**
97-98	630.34	103.2	34.77	630	100	.05	Ns.
98-99	735.79	120.5	19.08	750	119.04	-4.08	Xx
99-2000	648.1	106.1	41.54	640	101.6	1.07	N5

Source : Collected from survey for private Sector and from annual report from Co-op-Sector.

Table 3.42 shows that there was no significant difference in selling price with respect to private and the co-op-sectors. The price was slightly higher in private sector except for 1999-2000. In private sector, increase in selling price was relatively low and the increase ranged between 0.48 per cent during 1995-96 and 1999-2000. In the co-op. sector, the selling price remained the same during 1994-95 through 1997-98. Then it increased by 19.04% during 1998-99 and then came down more or less to the original level. In both the sectors selling price increased at a higher rate during 1998-99 compared with the other years.

3.13 VARIATIONS IN EXPENSES IN PRIVATE SECTOR QUARRY

As already stated the quarries functioning in private sector can be classified under three groups.

Group 1 - This group comprised of quarries which paid royalty, and seigniorage fully

Group 2 - This group of quarries paid full royalty and seigniorage partly.

Group 3 - This group of quarries did not pay any royalty and seigniorage.

Here an attempt is made to find out whether there is any significant difference among these three groups of quarries with regard to the different categories of expenses.

Boulder Section

Table 3.43

Comparison between Group 1 and 2 (94-95)

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	82.02	0.967	86.40	0.652	-9.49**
Blasting	41.00	1.00	40.00	0	2.20 ns
Blast man	10.26	.650	14.50	.447	-14.54**
Hammer man	67.84	2.062	65.60	1.342	2.29**
Woman helper	67.83	2.385	62.60	2.510	4.16**
Loading	127.89	3.843	110.60	0	20.30**
Administrative	41.63	2.191	60	0	-36.54**
Total sales	619.64	6.847	575.00	0	14.34**

Source: Data compiled from primary data.

Table 3.43 shows the mean, the standard deviation and the 't' values of the different expenses with respect to quarries belonging to the first and the second group. The mean expense of drilling of quarries belonging to the 1st group was 82.02 rupees. For blasting it was Rs.41, for blast man, Rs.10.26; hammer-man, Rs.67.84 woman

helper Rs.67.83, loading Rs.127.89, administrative expense Rs.41.63 and total sales Rs.619.64. In the case of group 2, the respective mean expenses were Rs.86.4,Rs.40, Rs.14.5, Rs.65.6, Rs.62.6, Rs.110, Rs.60 and sales, Rs.575. There was significant difference among all the items in these groups except for blasting. The reason for this was that group I and group II quarries have to buy blasting materials from unauthorised sources and for that they have to pay the same price.

Table 3.44

Comparison between group 1 and group 3 and their 't' values for the year 1994-95

Variables	Group 1		Group 3		t- value
	Mean	SD	Mean	SD	
Drilling	82.02	0.967	82.83	.873	-1.83ns
Blasting	41.00	1.00	40.83	.983	.36ns
Blast man	10.26	.653	10.33	.516	.24 ns
Hammer man	67.84	2.062	67.17	2.483	.67 ns
Woman helper	67.73	2.385	66.33	3.83	1.00ns
Loading	127.89	3.843	117.50	28.240	.90 ns
Administrative	41.63	2.191	72.50	28.24	-2.67*
Total sales	619.64	6.847	611.67	9.832	2.24*

There was significant difference in the case of expenses relating to loading, administrative and sales in the case of quarries belonging to group 1 and group 3. In the case of other expenses there was no significant difference between the two groups. For group 1, the mean

administrative expense was Rs.41.63 whereas it was Rs.72.5 for group 3 quarries. This was because of the fact that group 3 quarries have to pay more to various departments to escape from royalty and seigniorage payments.

Table 3.45

Comparison between Group 2 and 3 for the year 1994-95

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	86.40	0.652	82.83	.873	7.53**
Blasting	40.00	0	40.83	.983	-1.88 ns
Blast man	14.50	.447	10.33	.516	15.15**
Hammer man	65.60	1.342	67.17	2.483	-1.26ns
Woman helper	62.60	2.150	66.33	3.83	-1.86 ns
Loading	110	0	117.50	28.240	- .59 ns
Administrative	60	0	72.50	28.24	-95ns
Total sales	575.00	0	611.67	9.832	-8.26*

It is clear from table 3.45 that there was significant difference in expenses relating to drilling, blastman, and total sales with respect to quarries belonging to group 2 and group 3. In the case of other expenses namely blasting, hammer-man, women helper, loading there was no significant difference.

There was significant difference in expenses relating to drilling, blasting, blasting-man, loading, administrative and total sales with respect to quarries belonging to group I and group 2. In the case of hammer-man and woman helper, there was no significant difference.

Table 3.46

Comparison between Group 1 and Group 2 and their 't' values for the year 1995-96

Variables	Group 1		Group 2		t- value
	Mean	SD	Mean	SD	
Drilling	86.19	2.239	91.58	.694	-5.24**
Blasting	43.74	1.284	46	1.414	-3.44**
Blast man	11.26	1.408	15.4	.894	-6.19**
Hammer man	72.53	4.599	71.4	2.191	.53ns
Woman helper	69.47	2.913	66.6	4.219	1.79ns
Loading	128.42	3.355	110.0	0	12.08
Administrative	45.53	3.806	70.0	3.536	-12.96**
Total sales	622.19	10.037	57.5	0	20.5**

Table 3.47

Comparison between Group 1 and 3 and their 't' value for the year 1995-96

Variables	Group 1		Group 3		t- value
	Mean	SD	Mean	SD	
Drilling	86.19	2.239	86.47	1.017	.29 ns
Blasting	43.74	1.284	42.33	1.633	2.19 ns
Blast man	11.26	1.408	11.17	1.169	.15 ns
Hammer man	72.53	4.599	71.00	3.578	.74 ns
Woman helper	69.47	2.913	69.47	2.913	.08 ns
Loading	128.42	3.355	130.83	4.196	-1.37ns
Administrative	45.53	3.806	62.33	2.582	-10.01 **
Total sales	622.19	10.037	618.33	9.832	.83 ns

Table 3.47 reveals that there was significant difference in administration expenses between group I and 3 quarries. With respect to all other expenses there was no significant difference.

Table 3.48

Comparison between Group 2 and group 3 and their 't' values for the year 1995-96

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	91.58	.694	86.47	1.017	9.51**
Blasting	46.00	1.414	42.33	1.633	3.93**
Blast man	15.40	.894	11.17	1.169	6.62**
Hammer man	71.40	2.191	71.00	3.578	.22 ns
Woman helper	66.60	4.219	69.47	2.913	-.90 ns
Loading	110.00	0	130.83	4.196	-9.39**
Administrative	70.00	3.536	62.33	2.582	4.16**
Total sales	575.00	0	618.33	9.832	-9.79**

The expenses on drilling, blasting, blasting-man, loading, administration and total sales showed significant difference between group 2 and group 3 quarries. The difference was non-significant in the case of expenses on hammer-man and woman helper.

Table 3.49

Comparison between Groups 1 and Group 2 and their 't' values for the year 1996-97

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	89.28	1.162	93.40	1.140	-7.07**
Blasting	44.50	1.323	48.20	2.049	-4.97***
Blast man	12.84	1.463	16.00	1.414	-4.32**
Hammer man	76.98	4.773	77.60	4.336	.88 ns
Woman helper	73.84	2.455	72.80	1.924	.88 ns
Loading	133.42	5.015	120.00	0	5.89**
Administrative	48.68	3.667	71.00	4.183	-11.19**
Total sales	628.21	13.85	576.00	2.24	8.26**

Table 3.49 shows that tere was significant difference between the expenses relating to drilling, blasting, blasting-man, loading, administration between group 1 and group 2 quarries. But in the case of hammer-man and woman helper, there was no significant difference.

Table 3.50

Comparison between Groups 1 & Group 3 and their 't' values for the year 1996-97

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	89.28	1.162	88.60	.738	1.70 ns
Blasting	44.50	1.323	43.67	1.506	1.30 ns
Blast man	12.84	1.463	13.17	1.602	-.46 ns
Hammer man	76.98	4.773	75.50	3.146	2.00 ns
Woman helper	73.84	2.455	72.67	3.93	.88 ns
Loading	133.42	5.015	135.00	5.477	-.66 ns
Administrative	48.68	3.667	67.50	3.017	-11.36**
Total sales	628.21	13.85	630.00	6.325	-.30ns

Table 3.50 shows that there was high significant difference between the group 1 and group 3 only in the case of administrative expense. In case of all other expenses, there was no significant difference between group 1 and group 3 quarries.

Table 3.51

Comparison between Groups 2 & Group 3 and their 't' values for the year 1996-97

Variables	Group 2		Group 3		t- value
	Mean (Rs)	SD	Mean (Rs)	SD	
Drilling	93.40	1.140	88.60	.738	8.45**
Blasting	48.20	2.049	43.67	1.506	4.23**
Blast man	16.00	1.414	13.17	1.602	3.08**
Hammer man	77.60	4.336	75.50	3.146	.93 ns
Woman helper	72.80	1.924	72.67	3.93	.07 ns
Loading	12.00	0	135.00	5.477	-6.07**
Administrative	71.00	4.183	67.50	3.017	1.61 ns
Total sales	576.00	2.24	630.00	6.325	-18.04**

There was high significant difference in expenses between group 2 and group 3 quarries except in the case of hammer-man, woman helper and administrative expense (Table 3.51).

Table 3.52

Comparison between Groups 1 & Group 2 and their 't' values for the year 1997-99

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	93.64	.767	98.20	1.095	-10.83**
Blasting	48.32	2.626	54.40	.894	-8.41**
Blast man	14.63	1.461	18.80	1.195	-5.92**
Hammer man	85.21	5.138	(84.4)	3.782	.33 ns
Woman helper	75.79	2.507	75.60	3.782	.14 ns
Loading	150.00	6.667	128.00	4.472	6.92**
Administrative	53.32	3.58	79.00	4.183	-13.84**
Total sales	641.05	33.842	578.00	2.739	4.14**

Table 3.52 shows that, there was no significant difference in expenses relating to hammer-man and woman helper group 1 & 2 quarries. On all other cases of expenses, there was high significant difference between the groups.

Table 3.53

Comparison Between Groups 1 & Group 3 and their 't' values for the year 19997-98

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	93.64	.767	93.80	.892	-.41 ns
Blasting	48.32	2.626	46.50	1.643	1.59 ns
Blast man	14.63	1.461	14.83	1.472	-.29 ns
Hammer man	85.21	5.138	82.50	4.183	1.17 ns
Woman helper	75.79	2.507	78.00	4.00	-1.63 ns
Loading	150.00	6.667	150.00	8.994	.68 ns
Administrative	53.32	3.58	71.33	5.456	-10.10**
Total sales	641.05	33.842	631.67	7.528	.67 ns

Table 3.53 shows that there was significant difference only with respect to group 1 and group 3 quarries in administrative expenses .In all other cases there was no significant difference in expenses .

Table 3.54

Comparison Between Groups 2 & Group 3 and their 't' values for the year 1997-98

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	98.20	1.095	93.80	.892	7.36**
Blasting	54.40	.894	46.50	1.643	10.11**
Blast man	18.80	1.195	14.83	1.472	4.97**
Hammer man	(84.4)	3.782	82.50	4.183	.78 ns
Woman helper	75.60	3.782	78.00	4.00	-1.02 ns
Loading	128.00	4.472	150.00	8.994	-4.97**
Administrative	79.00	4.183	71.33	5.456	2.89*
Total sales	578.00	2.739	631.67	7.528	-15.02**

It is clear from table 3.54 that there was high significant difference between the expenses of quarries in group 2 and 3. But hammer-man and woman helper, there was no significant difference in expenses between the groups.

Table 3.55

Comparison between Groups 1 & Group 2 and their 't' values for the year 1998-99

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	98.15	1.48	103.40	.548	-7.70**
Blasting	50.68	1.765	54.60	.894	-4.75**
Blast man	15.00	1.00	19.60	.894	-9.32**
Hammer man	89.63	5.708	88.00	6.708	.55 ns
Woman helper	79.58	1.677	80.00	3.536	.39 ns
Loading	155.26	5.130	130.00	0	10.83**
Administrative	57.37	3.059	81.00	2.236	-16.07**
Total sales	745.16	12.690	700.00	0	7.83**

Table 3.55 shows that there was no-significant difference with respect to expense relating to on hammer-man and woman helper between group 1 and 2. In all other cases of expenses there were high significant differences between group 1 and group 2 quarries.

Table 3.56

Comparison between Groups 1 & Group 3 and their 't' values for the year 1998-99

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	98.15	1.48	98.15	.418	.00 ns
Blasting	50.68	1.765	48.50	1.975	2.57*
Blast man	15.00	1.00	15.67	1.211	-1.36 ns
Hammer man	89.63	5.708	85.63	3.764	1.52 ns
Woman helper	79.58	1.677	81.67	2.582	-1.86ns
Loading	155.26	5.130	158.33	4.082	-1.50 ns
Administrative	57.37	3.059	75.83	3.764	-12.23**
Total sales	745.16	12.690	730.00	7.746	2.74*

It is clear from table 3.56 that there was significant difference in expenses relating to blasting, administration and total sales between group 1 and group 3 quarries. All other items of expenditures did not show any significant difference between group 1 and group 3 quarries.

Table 3.57

Comparison between Groups 2 & Group 3 and their 't' values for the year 1998-99

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	103.40	.548	98.15	.418	18.06**
Blasting	54.60	.894	48.50	1.975	6.34**
Blast man	19.60	.894	15.67	1.211	6.00**
Hammer man	88.00	6.708	85.63	3.764	.68 ns
Woman helper	80.00	3.536	81.67	2.582	.90 ns
Loading	130.00	0	158.33	4.082	-15.38**
Administrative	81.00	2.236	75.83	3.764	2.39*
Total sales	700.00	0	730.00	7.746	-9.49**

Table 3.57 shows that there was significant difference in expenses relating to all items except hammer-man and woman helper.

Table 3.58
Comparison between Group 1 & group 2 and their 't' values for the year 1999-2000

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	99.29	1.910	106.16	.792	-7.77**
Blasting	51.42	2.219	55.60	1.342	-3.98**
Blast man	15.26	.806	19.60	.894	-10.49**
Hammer man	87.63	19.463	89.00	6.519	-.15 ns
Woman helper	81.84	3.420	82.00	2.739	-.10 ns
Loading	156.32	4.956	130.00	0	23.15**
Administrative	58.95	2.677	82.00	2.739	-17.06**
Total sales	658.68	46.543	606.00	8.944	2.48*

Table 3.58 shows that there was significant difference in expenses relating to all items except hammer-man and woman helper with respect to group 2 quarries.

Table 3.59
Comparison between groups 1 & group 3 and their 't' values for the year 1999-2000

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Drilling	99.29	1.910	99.33	1.211	.05 ns
Blasting	51.42	2.219	50.00	0	2.79 ns
Blast man	15.26	.806	15.67	1.211	-.95 ns
Hammer man	87.63	19.463	86.67	2.582	.12 ns
Woman helper	81.84	3.420	82.50	2.739	-.43 ns
Loading	156.32	4.956	158.33	4.082	-1.00 ns
Administrative	58.95	2.677	75.83	3.764	-12.23**
Total sales	658.68	46.543	641.67	4.082	.88 ns

Table 3.59 shows that there was high significant difference only in administrative expenses between group 1 and group 3 quarries. In all other cases there was a no significant difference in expenses between the two groups.

Table 3.60

Comparison Between Groups 2 & group 3 and their 't' values for the year 1999-2000

Variables	Group 2		Group 3		t- value
	Mean	SD	Mean	SD	
Drilling	106.16	.792	99.33	1.211	10.78**
Blasting	55.60	1.342	50.00	0	9.33**
Blast man	19.60	.894	15.67	1.211	6.00**
Hammer man	89.00	6.519	86.67	2.582	.81 ns
Woman helper	82.00	2.739	82.50	2.739	-.30 ns
Loading	130.00	0	158.33	4.082	-15.38**
Administrative	82.00	2.739	75.83	3.764	3.04*
Total sales	606.00	8.944	641.67	4.082	-8.80**

Table 3.60 shows that there was significant difference between the groups in all expenses except hammer-man and woman helper.

3.14 'T' TEST FOR GROUPS 1 AND 2; GROUP 1 AND 3 AND GROUP 2 AND 3 FOR 6" METAL

Table 3.61

Comparison between Group 1 & 2 for the year 1994-1995

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	177.53	2.480	186.00	4.183	-5.88**
Loading	156.05	3.566	159.00	2.236	-1.47ns
Total sales	720.53	1.577	714.00	2.236	**

Source:- Data collected from survey.

Table 3.61 shows that there was significant difference between groups 1 and 2 with respect to sales and labour expenses. But for loading expenses it showed no significant difference between the groups.

Table 3.62

Comparison between Group 1 and group 3 for the year 1994-1995

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	177.53	2.480	173.67	2.160	3.14**
Loading	156.05	3.566	158.33	4.082	-1.32 ns
Total sales	720.53	1.577	724.17	4.915	-1.79 ns

Source: Data Collected from survey.

Table 3.62 reveals that there was significant difference in between groups 1 and 3 relating to labour expenses; loading and sales and there was no significant difference in expenses between the groups.

Table 3.63

Comparison between group 2 and group 3 for the year 1994-1995

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	186.00	4.183	173.67	2.160	6.30**
Loading	159.00	2.236	158.33	4.082	0.32 ns
Total sales	714.00	2.236	724.17	4.915	-4.24**

Table 3.63 reveals that there was significant difference in expenses between the groups for labour and sales, and for loading, the difference was not significant.

Table 3.64

Comparison Between Group 1 and group 2 for the year 1995-1996

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	197.21	10.973	200.00	6.124	-.54 ns
Loading	156.05	3.566	159.00	2.236	-1.74ns
Total sales	720.53	1.577	714.00	2.236	7.57**

Table 3.64 indicates that there was high significant difference with respect to expenses between groups 1 and 2 for sales. But for labour and loading, the difference was not significant

Table 3.65

Comparison Between Group 1 and group 3 for the year 1995-1996

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	197.21	10.973	188.33	2.582	1.94ns
Loading	156.05	3.566	158.33	3.566	-1.32 ns
Total sales	720.53	1.577	724.17	4.916	-2.90**

Table 3.65 shows that for group 1 and 3, the difference was not significant for labour. But for loading and sales, there was high significant difference in expenses between the groups.

Table 3.66

Comparison Between Group 2 and group 3 for the year 1995-1996

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	200.00	6.124	188.33	2.582	4.27**
Loading	159.00	2.236	158.33	3.566	.32 ns
Total sales	714.00	2.236	724.17	4.916	-4.24**

Table 3.66 shows that there was high significant difference between labour and sales for groups 2 and 3 and for loading the difference was not significant.

Table 3.67

Comparison between Group 1 and group 2 for the year 1996-1997

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	197.89	3.035	202.00	4.472	-2.44*
Loading	157.89	4.508	160.00	0	-1.03 ns
Total sales	720.79	1.873	715.00	3.536	5.08**

Table 3.67 shows that there was significant difference between groups 1 and 2 with respect to sales, and for loading the difference was not significant

Table 3.68

Comparison between Group 1 group 3 for the year 1996-1997

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	197.89	3.035	192.50	6.124	2.94**
Loading	157.89	4.508	165.00	13.784	-2.01 ns
Total sales	720.79	1.873	725.00	5.477	-1.85ns

Table 3.68 shows that there was significant difference in expenses between groups 1 and group 3 for labour expenses and for loading and sales, the difference was not significant.

Table 3.69

Comparison between Group 2 and group 3 for the year 1996-1997

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	202.00	4.472	192.50	6.124	2.97**
Loading	160.00	0	165.00	13.784	-.80 ns
Total sales	715.00	3.536	725.00	5.477	-3.65**

Table 3.69 shows that there was high significant difference between groups 2 and 3 for labour and sales and for loading the difference was not significant

Table 3.70

Comparison between Group 1 and group 2 for the year 1997-1998

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	225.11	2.622	228.00	2.739	-2.18*
Loading	185.79	2.507	193.00	5.507	-4.32**
Total sales	721.32	2.262	716.00	2.236	4.69**

Table 3.70 shows that there was significant difference between group 1 group 2 with respect to loading and sales

Table 3.71

Comparison between Groups 1 & 3 for the year 1997-98

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	225.11	2.622	221.67	2.583	2.81**
Loading	185.79	2.507	182.50	4.183	2.38*
Total sales	721.32	2.262	727.50	6.892	-2.16*

Table 3.71 reveals that there was significant difference in expense between groups 1 and 3 for labour loading and sales.

Table 3.72

Comparison between Groups 2 & 3 for the year 1997-1998

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	228.00	2.739	221.67	2.583	3.94**
Loading	193.00	5.507	182.50	4.183	3.53**
Total sales	716.00	2.236	727.50	6.892	-3.55**

Table 3.72 indicates that there was high significant difference in expenses for all item for groups 2 and 3.

Table 3.73

Comparison between Group 1 & 2 for the year 1998-99

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	225.26	2.023	230.00	0	-10.21**
Loading	186.36	2.810	193.00	5.701	-3.78**
Total sales	811.84	9.459	800.00	0	5.46**

Table 3.73 shows that there was high significant difference in expenses between groups 1 and 2 for labour, loading and sales.

Table 3.74

Comparison between Group 1 and group 3 for the year 1998-99

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	225.26	2.023	223.33	2.582	1.91 ns
Loading	186.36	2.810	184.17	3.764	1.51 ns
Total sales	811.84	9.459	815.83	9.174	-.91 ns

Table 3.74 reveals that the difference was not significant with respect to expenses relating to labour, loading & and sales between groups 1 and 3.

Table 3.75

Comparison between Groups 2 and group 3 for the year 1998-99

Variables	Group 2		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	230.00	0	223.33	2.582	6.32**
Loading	193.00	5.701	184.17	3.764	3.09*
Total sales	800.00	0	815.83	9.174	-4.23**

Source: Survey data.

Table 3.75 indicates that there was significant difference in expenses between groups 2 and group 3 for labour, loading and sales.

Table 3.76

Comparison between Group 1 and group 2 for the year 1999-2000

Variables	Group 1		Group 2		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	241.32	3.267	248.00	5.701	-3.48**
Loading	186.62	2.810	194.00	4.183	-4.92**
Total sales	725.26	8.736	723.00	4.742	.55 ns

Source : Survey data.

Table 3.76 clarifies that there was significant difference in expenses between groups 1 and 2 for labour. But for loading and sales, the difference was not significant.

Table 3.77

Comparison between Groups 1 and group 3 for the year 1999-2000

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	241.32	3.267	233.33	3.267	2.52 ns
Loading	186.62	2.810	184.17	3.764	1.29 ns
Total sales	725.26	8.736	726.67	4.082	-.38 ns

Source : Survey data.

Table 3.77 points out that there was no significant difference in expenses between groups 1 and 3 for labour, loading and sales.

Table 3.78

Comparison between Group 2 and group 3 for the year 1999-2000

Variables	Group 1		Group 3		t- value
	Mean (Rs.)	SD	Mean (Rs.)	SD	
Labour	248.00	5.701	233.33	3.267	3.57*
Loading	194.00	4.183	184.17	3.764	4.11**
Total sales	723.00	4.742	726.67	4.082	-1.42 ns

Source: Survey data.

Table 3.78 shows that there was high significant difference in expenses between groups 2 and 3 for labour and loading. But in the case of sales it was not significant.

3.15 POSITIVE EFFECTS OF GRANITE QUARRIES

1. Quarry products are more resistant to weathering in polluted environment.
2. Quarry products are not freezable.
3. Quarry products are acid resistant and can withstand any temperature.
4. Quarry products are non slippery and do not smell unpleasantly.
5. Quarry products are having high durability and low maintenance cost.
6. Quarry give direct and indirect employment opportunities to a large number of people.
7. Quarry promotes construction work which are a must for community development.
8. It earn foreign exchange by value added products such as: slabs, panels, tiles, monuments, penstands flowervase, table tops, tea poys, high precision products like surface plates for engineering applications, panels, cubes, straight edges, measuring prisms and other materiological aids.

9. The abandoned pits of the quarries can be used as water reservoir, boating (entertainment) and for fish culture.

3.16 NEGATIVE EFFECTS OF QUARRIES

1. Quarrying of granites causes forming of big pits which is dangerous, especially in raining season.
2. Majority of the quarries are functioning in forest areas. It results the clearing of forest.
3. The upper layer of the rocks are dumped near the quarry areas. It creates lot of problems.
4. Land degradation.
5. Noise pollution.
6. Water pollution
7. Health impacts
8. Unscientific methods of quarrying leads to poor recovery in quarries.
9. Due to heavy loaded traffic, the roads nearby quarry site are in a very poor condition.
10. Children and women are exploited in quarrying.

11. Black money (evation of seigniorage and royalty) is highly circulating in this field and it leads to bribery and unethical practices.

3.17 REMEDIAL MEASURES

(1) Security measures should be increased and made effective, specially in private sector in view of the danger involved in this work. In co-operative sector insurance facilities are provided.

(2) Royalty and seigniorage may be reduced to avoid manipulation. The existing amount for royalty and seigniorage is Rs.80 and Rs.120 per lorry.

(3) Cess may be imposed on mining of quarry and can be given to local bodies for development of roads in their respective areas.

(4) Quarrying may be operated on scientific basis. In the planning stage of quarrying, if there is a discussion with the experts from geology departments, several quarry failures may be avoided. They can easily detect the quarries having holes, low textures, lines, excessive quarts etc. The granite may have varying technical characteristics such as chemical composition, porosity, frost resistance etc., which can be found out only by an expert.

(5) Quarry lease may be exempted during the first two years as is done in the case of major minerals such as coal, iron ore, aluminium etc.

(6) Training should be given to labourers to exploit granites scientifically to avoid many of the existing failures of quarrying.

(7) We have to limit the quarrying of stones for construction activities, because the supply of rocks may legally exhaust. We can concentrate on value added products of granite to get more money and create more employment opportunities. In connection with this our neighbouring state Tamil Nadu, already implemented several noteworthy measures. In 1978, Tamil Nadu Minerals Limited was incorporated to exploit minerals including granite in a scientific way. In 1986, TAMIN Granites, a 100 per cent export oriented factory was setup. This factory is reported to be the second largest factory of its kind in Asia. Japanese developed another technology a honey combed 4 mm granite slab (combined with aluminum foil) which is as strong as equivalent size granite slab of 20 mm thickness. Italy, Japan and France are the leaders of manufacturer of machineries, tools, consumables etc. for granite industries and possesses high technology and fabrication know-how. Further, Italy is the world centre for stones. India can join hands with these countries to develop value added products.

(8) Abandoned quarry pits may be used (a) as water reservoir for irrigation and drinking purposes (b) for fish culture especially for ornamental fishes. (c) for pedal boats to attract the tourists.

3.18 CONCLUSION

Ratios are tools which enable and one to analyse business situations and to monitor their performance and help plan forward. The following are the conclusions on the basis of on the basis of financial statement analysis of the quarries.

1. Positive slope coefficient of all the three equations indicates that boulder production is increasing from year to year.

2. 6" metal slope coefficient is negative indicating that the production decreases with the year.

3. Gross profit ratio for both rates is high. But net profit in the case of co-op-society quarry is low.

4. Percentage of cost to goods sold was high in private sector when compared with the co-op-sector.

5. Operating expense ratio is high in co-op sector quarry compared with private sector quarry.

6. Wages remain more or less the same in both sectors.

7. Payment of Royalty and seigniorage is higher in co-op-sector than in the private sector.

8. Return on total asset and return on investment is very low in co-op. sector quarry.

9. Return on equity capital is very high in co-op sector quarry.

10. Inventory turn over is high in quarries operating in both the sectors.

11. With respect to the liquidity ratio (Current ratio, liquidity ratio, defensive interval ratio), Co-operative Society is better.

12. There was significant difference between the expenses of private sector and co-operative sector quarries.

13. Among the expenses of the private sector quarries, there was significant difference between

(a) The quarry which pays Royalty and Seigniorage in full and those which pay partially.

(b) The quarry which pays Royalty and seigniorage, full, and those who do not pay at all.

(c) The quarry paying royalty and seigniorage partially and those that do not pay at all.

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CHAPTER IV

SOCIO-ECONOMIC BACKGROUND OF WORKERS

In the last chapter the financial aspects of the quarries were analysed using ratios and tests of significance. In this chapter an attempt is made to provide the profile of quarry workers in terms of their socio-economic background, family situations, living conditions etc. Various personal characteristics such as age, sex, educational qualification, saving habit, job and health condition etc. of the workers are also analysed in this section.

4.1 AGE

Work in a quarry is really a hard one. People belonging to all ages are engaged in quarry work. Adolescents of 15 years to those above 50 years were working in granite quarries. However, workers belonging to the age group of 30-40 dominate in quarries.

Table 4.1
Age group of workers

Age (years)	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Below 15	39	5.71	-	Nil
15-20	20	2.95	-	-
20-30	131	19.03	4	3.83
30-40	328	47.65	37	32.68
40-50	129	18.75	55	49.53
50 and above	41	5.91	16	13.96
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.1 reveals that child labour is still existing in private sector. Child labour constitutes 5.71 percentage of the total workforce employed in quarries. All these children, hailing from Tamil Nadu are working along with their parents. Workforce who belong to the age group of 15-20 belonging to this age group works in co-operative society's quarry. Around 19.03 percentage of the workforce in the private sector quarries belong to the age group of 20-30. But their strength in the co-operative sector is only 3.83 percent. Of the total workforce in the private sector quarries 47.65 per cent belongs to 30-40 age group, 18.75 belongs to 40-50 age group and 5.91 per cent belongs to above 50 age group. In the co-operative sector 32.68 per cent of the workforce belongs to 30-40 age group, 49.53 per cent belongs to 40-50 age group and 13.96 per cent belongs to 50 and above age group.

Majority of the work force in both the sectors belong to the 30-50 age group. This indicates that, people above 50 find quarry work very though. So also is the case with people belonging to the age groups of 20-30. Their strenght comes only19.03 per cent.

4.2 RELIGION

Though religion does not have anything to do with quarry work, it has been found that most of the quarry workers are either Hindu or Christians. Among the Hindus, majority are from backward communities. Table 4.2 shows the total quarry workers and their percentage according religion.

Table 4.2

Percentage of workers belonging to Hindu or Christian community working in private sector and co-operative sector quarries

Religion	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Hindu	362	52.58	72	64.56
Christian	305	44.36	34	30.58
Muslims	21	03.06	6	4.86
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.2 shows that 52.58 per cent of the private sector workers belong to Hindu religion. Their percentage is 64.51 in the co-operative sector.

The following diagram clarify the above information.

Diagram 4.1

Workers belonging to Hindu or Christian community working in private sector quarries

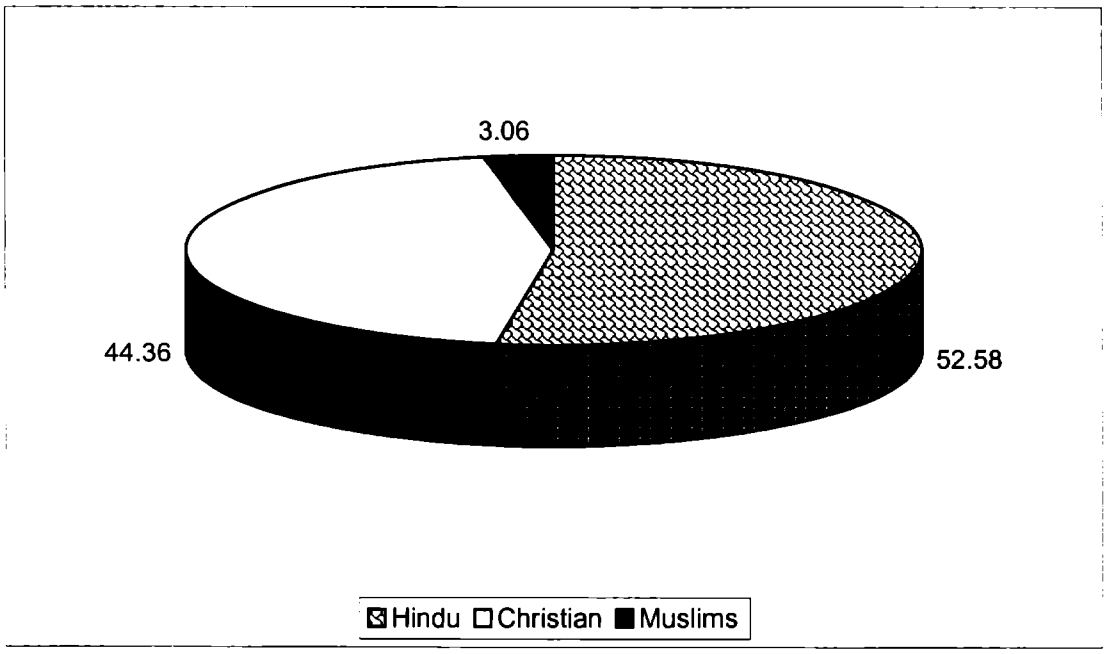
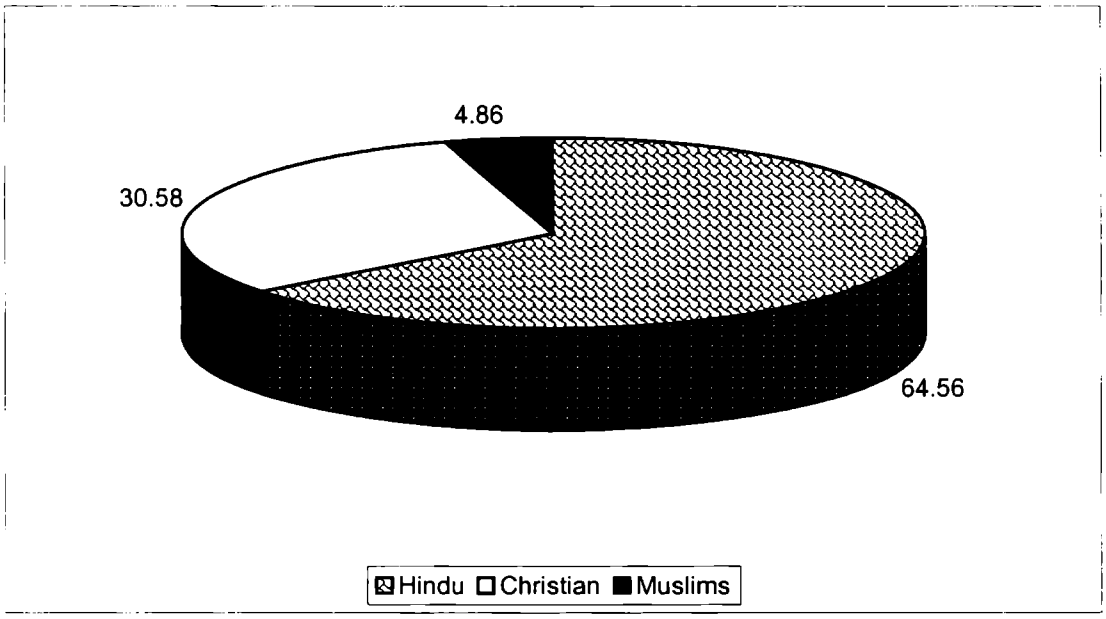


Diagram 4.2

Workers belonging to Hindu or Christian community working in co-operative sector quarry



4.3 EDUCATION

Quarry work is an area where workers require more physical strength and training rather than formal education. However, lion's share of the workers working in this sector have completed primary education. A few graduates also are employed in this sector.

Table 4.3

Educational status of workers in private and co-operative quarries

Educational Qualification	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Illiterate	58	8.5	6	5.3
Upto 5th STD	431	62.6	65	58.4
6th to 10th STD	175	25.4	41	36.3
Degree	24	3.5	-	-
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.3 shows that 8.5 per cent of the workers in private sector and 5.3 per cent of workers in the co-operative sector were illiterate. About 62.6 per cent workers in the private sector and 58.4 per cent of workers in the co-operative sector have studied up to 5th standard. Around 3.5 per cent of the workers in private sector are degree holders.

4.4 SIZE OF FAMILY

The size of the family members consists of all members of the family. That is father, mother, and children. The study revealed that most of t he workers have small family

Table 4.4

Size of the family (Percentage basis)

Size of family (Number)	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Below 3	105	15.2	13	11.3
3-4	195	28.4	29	26.3
5-6	212	30.8	33	29.8
6-7	139	20.2	24	21.4
Above 7	37	5.4	13	11.2
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.4 reveals that 15.2 percentage in private sector and 11.3 percentage of co-operative sector workers have family size below three members. Around 30.8 percentage workers in private sector and 29.8

percentage of workers in co-operative sector are have family size between 5-6. Around 5.4 percentage of private sector workers and 12.4 percentage of co-operative sector workers have more than seven members in their family.

4.5 LAND OWNERSHIP

Most of the quarry workers only own less than 50 cents of land. In private sector, almost all the quarries are situated in remote village areas, and the land value of that area is comparatively low. But the co-operative quarry is situated in a semi-urban area, and the land value is high. Table 4.5 shows the size of holdings of the workers.

Table 4.5

Land ownership of workers on percentage basis in private and co-operative sectors

Land Ownership (in cents)	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Nil	52	7.5	10	8.7
0-10	321	46.6	76	67.8
10-20	140	20.3	10	8.7
20-30	70	10.2	6	5.6
30-40	40	5.9	5	4.7
40-50	31	4.6	4	3.2
50 and above	34	4.9	1	1.3
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.5 reveals that 7.5 percentage of private sector and 8.7 percentage of co-operative sector workers do not possesses any land. Around 46.6 percentage of private sector workers and 67.8 percentage of co-operative sector workers own only less than 10 cents of land. 4.9 percentage workers in private sector and 1.3 percentage workers in the co-operative sector possess land holdings above 50 cents. It has been revealed that, the quarry workers possessed only small holdings of land and majority of them possesed only less than 10 cents. Comparing to private sector, the co-operative sector workers possessed less land, as the price of land near the co-operative sector is high compared with private sector quarries.

4.6 OWNERSHIP OF HOUSE

Majority of the workers own their own house. The houses were either thatched or tiled. Very few workers have no houses. Those who do not have houses of their own live in rental houses. Few of them hire houses in *porambokku* (revenue land) land. Table 4.6 shows the ownership of houses in private and the co-operative sector quarries.

Table 4.6
The ownership of house in private sector and co-operative sector

Size of ownership	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Own house	628	91.3	100	89.6
Rental or *poramboku*	52	7.5	10	8.7
Staying with relatives	8	1.2	2	1.7
Total	688	100.00	112	100.00

Source: Survey data.

Table 4.6 shows that 91.3 percentage of private sector and 89.6 percentage of co-operative sector workers own their own houses. Around 7.5 percentage of private sector workers and 8.7 percentage of co-operative sector workers live in rented or *poramboke* land houses. Those who do not have own houses or rented houses are staying with their relatives.

The above information is represented in the following diagrams.

Diagram 4.3

Ownership of house in private sector

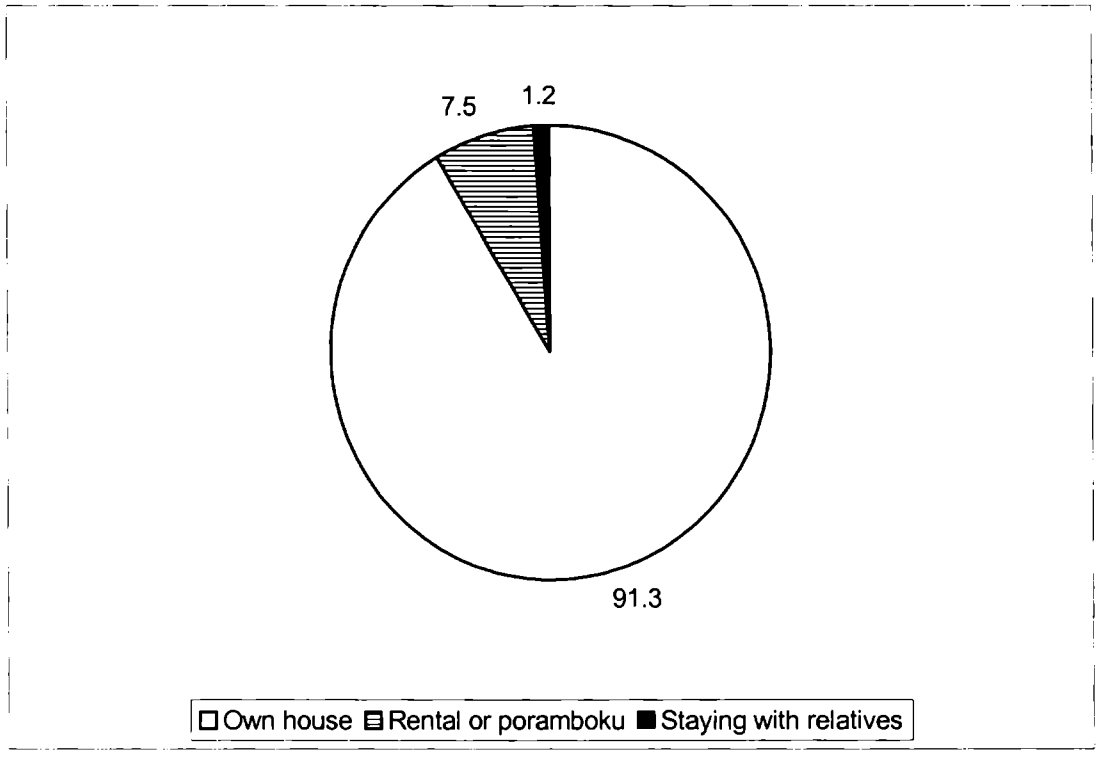
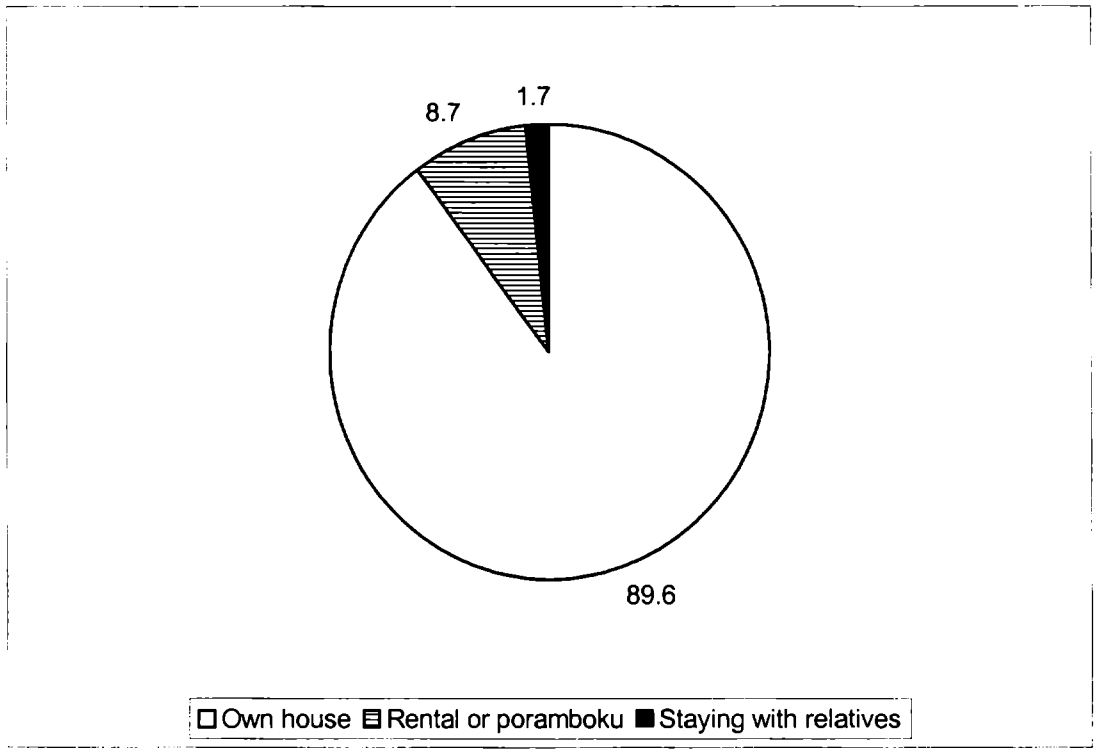


Diagram 4.4

Ownership of house in co-operative sector



4.7 WAGES OF WORKERS

Table 4.7 shows the wage paid to different category of workers working in private sector quarries.

Table 4.7

Average wages of worker in private sector quarries for various years for a day

Category of worker	94-95	95-96	96-97	97-98	98-99	99-200
Supervisor	90	95	95	95	120	120
Compressor operator	85	90	90	95	125	125
Measuring of section	75	80	85	85	90	90
Mada worker	75	80	80	80	85	93
Drilling	130	130	140	140	160	160
Boulder man / Hummer man	130	130	140	140	160	160
Jelly ½ "	75	85	85	90	93	93
Loading	160	170	170	190	195	195

Source: Survey data.

Supervisor in a quarry is a person who supervises all activities in connection with the working of a quarry. Very often, in private quarries, the owner or sub-leaser himself will be the supervisor. Compressor operation and drilling are done by people who are working in the jack hammer machine. Measuring employee is the person who oversee the loading of rubbles, 6" and ½" metals etc. In private quarries the owner himself will act as the measuring employee. "Mada worker" will usually be a woman, who will be rendering help to the owner in petty works like removing 6" metals, earth or jelly etc. Boulder man is the person who breaks the un-sized boulder to sizable boulder. Jelly worker is a person who converts below-size metals into ½" metals. Loading workers are persons engaged in loading activity.

From table 4.7 it can be seen that average wage increased by 25 per cent to 30 per cent during the between 1994-1995 and 1999-2000.

In private sector quarries employees get only wages. But they can get advance in case of need and that is to be repaid in instalments or as lumpsum depending upon circumstances. Any extra payment in the form of bonus, depends on the mercy of the owner. In case of any accident at the working place, the victim or victims get some temporary help only from the employer, or the quarry owners association. There after, the owners share the liability to look after the victims of accident. In short, the employee gets wages only and no other extra benefits.

Table 4.8 shows the daily wages paid to different categories of workers in the co-operative sector.

Table 4.8

Daily wages paid to different categories of workers during the year 1994-95 to 1999-2000

Category of worker	94-95 (Rs)	95-96 (Rs)	96-97 (Rs)	97-98 (Rs)	98-99 (Rs)	99-200 (Rs)
Super visor	85	85	90	90	94	94
Compressor operator	85	85	92	92	95	95
Measuring of section	75	80	80	80	85	85
Mada worker	75	78	78	80	85	85
Drilling	125	125	140	140	150	150
Boulder man/ Hummer man	125	125	140	140	150	150
Jelly ½ "	75	80	80	90	90	90
Loading	150	150	160	160	175	175

Source: Data collected from the annual report of Anappara Karinkal Thozhilali Co-op Society.

From table 4.8 one can understand that the daily wages were comparatively low in co-op society vis-a-vis the private sector. But in addition to the wages, the employees in the co-op sector enjoy a large number of extra benefits. The extra benefits include:

4.7.1 Bonus:- the employees get maximum bonus in this sector. It is usually distributed during Onam season. Bonus includes production incentive wages also. Table 4.9 shows the percentages of bonus distributed from 1994-95 to 1999-2000.

Table 4.9

Percentage of bonus distributed during the period of 1994-2000

Year	1994-95	95-96	96-97	97-98	98-99	99-200
Bonus percentage	25	28	30	25	35	38

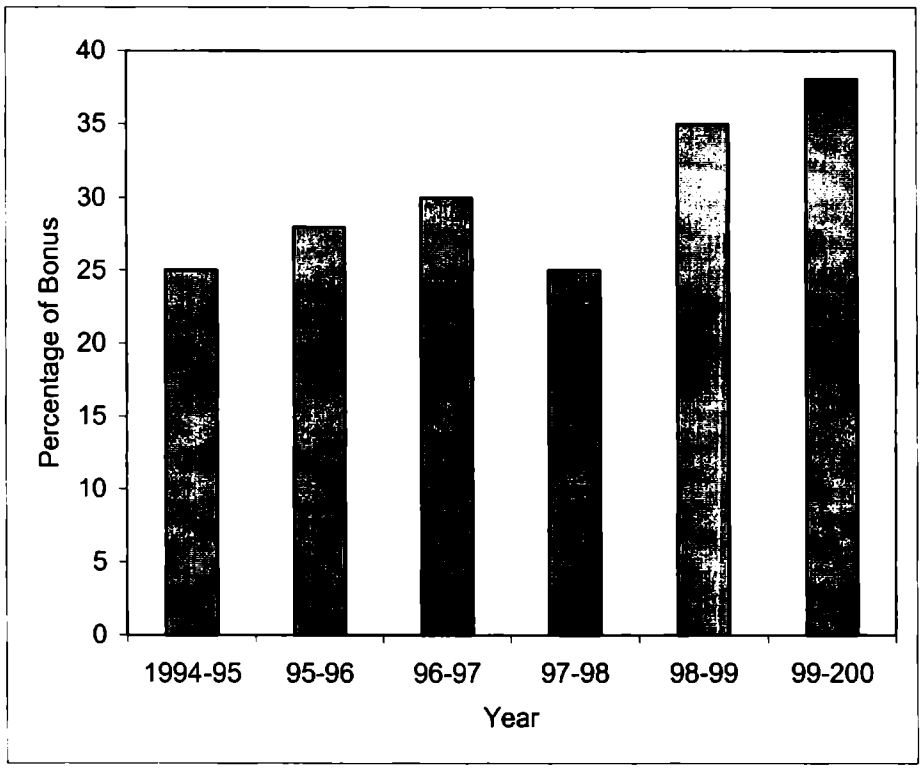
Source: Data collected from the annual report of Anappara Karinkal Thozhilai co-op society.

Table 4.9 reveals that in 1994-95 bonus distributed accounted 25 per cent of the wages paid. It has increased to 28 per cent in 1995-96, 30 per cent in 1996-97, 35 per cent in 1998-99 and 38 per cent in 2000. In the year 1997-98, the bonus distributed declined to 25 per cent, due to decrease in profit.

Diagram 4.5 clarifies the above information.

Diagram 4.5

Bonus distributed during the period of 1994-2000



4.7.2 Gratuity: Those who work for at least 240 days in a year are eligible to get 15 days wages as gratuity. This amount is paid at the time of retirement.

4.7.3 Holiday Wages: Those who work for 240 days in a year are eligible to get 13 days wages as holiday allowance.

4.7.4 Leave with wages: Those who complete 240 days in a year are eligible to get 15 days leave credit which can be encashed.

4.7.5 The society contributes 6.25 per cent of wages to the provident fund, as per the Provident Fund Act.

4.7.6 The society contributes 5.5 per cent of the total wage to the E.S.I scheme.

4.7.7 The society also contributes 8 per cent of the total wages to the welfare fund scheme.

Table 4.10 below shows the benefits distributed by the co-op society in the year 1999-2000.

Table 4.10
Average wage of an employee in Co-Op-Sectors for 1999-2000

Category worker	Wages I	Wages II	Annual Benefits
Supervisor	94	148.29	4042
Compressor operator	95	149.87	4085
Measure of section	85	134.08	3655
Mada worker	85	134.08	3655
Drilling	150	236.62	64.50
Boulder man / Hummer man	150	236.62	7525
Jelly ½ "	90	141.97	3870
Loading	175	276.06	7525

Source: Data collected from the annual report of Co-op Society.

Note: Wages (1) Daily wages given to the employees

Wages (11) include 38 per cent bonus + 6¼ per cent P.F + 5½ per cent ESI + daily wages.

Annual benefits includes, gratuity + holiday wages + leave with wages.

Table 4.11 shows yearly income including all the benefits received by the workers in both the sectors for 240 days.

Table 4.11

Yearly income of an employee in the private sector and the co-op sector is 2000

Category of employees	Private Sector			Co-op Sector	Co-op Sector Total
	Daily	Bonus	Total		
Supervisor	120	1340	30140	94	39630.4
Compressor operator	125	1201	31204	95	40052
Measuring section	90	1040	22640	85	35836
Mada worker	93	1304	23624	85	35836
Drilling	160	1240	39640	150	63240
Boulder man /Hummer man	160	1800	40200	150	63240
Loading	195	2021	48821	175	73780
Jelly ½"	93	1280	23600	140	37944

Source:Data collected from the Annual Reports of Anappara Karinkal Co-Op. Society and from survey data for private sector.

It is clear from table 4.11 that wages paid to the different categories of workers in the co-operative sector is less than that is paid to the employees in private sector. But the total emoluments that an employee gets in the co-operative sector is higher than the total

emoluments received by an employee in the private quarry. For example, a supervisor in a private sector quarry gets Rs.120 per day and an annual bonus of Rs.1340. In a year (240 days) the total wages he gets account Rs.30140. In the co-operative sector, his daily wage is Rs.94. but annually he gets a total amount of Rs.39630.4. In addition, he gets various other benefits as well which are not available to a private sector quarry employee. This is true in the case of other employees also. A compressor operator gets Rs.31204 in private sector, where as in the co-operative sector he gets Rs.40,052. A boulder man gets Rs.40,200 in private sector whereas he gets Rs.63,240 in the co-op sector. A loading worker in private sector gets Rs.48,821 while a similar person gets Rs.73,780 in co-op sector.

In addition to the above, an employee in the co-operative sector is eligible to get the following benefits also.

- Pension including family pension.
- Shed construction allowance up to Rs.500 per year.
- Tools allowance up to Rs.600 per year.
- Dividend (10 per cent)
- Festival advance – Rs.2000 per year (Refundable)
- Education scholarships to children up to Rs.500.
- Education loan without interest up to Rs.1000.
- Advance up to Rs.2000 (Refundable)

- Common benefit fund.
- Death fund (Rs.500 for the deceased member.)
- Excursion trip at the expense of the society.
- Accident relief fund.
- Scheme for hire-purchase up to Rs.36000 for a period of three years.
- Conducting chitties and kuries, monthly deposits etc for the employees.

4.8 T VALUE OF INCOME BETWEEN PRIVATE SECTOR AND CO-OPERATIVE SECTOR

4.8.1 Supervisor

Table 4.12

Yearly income of supervisor of private and the co-operative sector and their 't' value for 1994-95 to 1995-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	22810	219.09	33184	-250.349	**
1995-96	23754	360.32	33796	-52.648	**
1996-97	23986	107.95	36216	-20.52	**
1997-98	24996	1475.9	35136	-37.63	**
1998-99	29444	698.1	38953.6	-74.617	**
1999-2000	30140	685.62	39630.4	-75.81	**

Source: Survey data for private sector and annual report from Anappara Karinkal Thozhilazhi Co-operative Society.

Table 4.12 reveals that there was significant difference between the yearly income of supervisor (including all benefits) in private and co-operative sector during 1994-95 to 1999-2001. In the year 1994-95 the average annual income of a supervisor in private sector was Rs.22810 whereas the same worker in the co-operative sector got Rs.33184. Likewise in all the years there was high difference between the incomes received by employees of both the sectors. In the year 1999-2000, the 't' value of both the sectors shows -75.81, which shows that there was high significant difference between the two sectors.

4.8.2 Compressor Operator

Table 4.13

Yearly income of compressor operator of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	21578	128.40	33184	-495.083	**
1995-96	22714	421.31	33796	-144.071	**
1996-97	23010	385.10	37020.8	-199.274	**
1997-98	24252	497.87	35916.8	-128.328	**
1998-99	30188	1009.88	39368	-49.789	**
1999-2000	31204	750.22	40052	-64.5977	**

It is clear from table 4.13 that there was high significant difference between the yearly income of private sector and co-operative sector employees during 1994-95 to 1999-2000. However, compressor operator

got only Rs.21578 in private sector, the same operator got Rs.33184 in the co-operative sector during 1994-95. During 1999-2000 the respective amount was Rs.31204 and 40052. Their 't' value for the same year was -495.083, which showed high significant difference in income between the two sectors.

4.8.3 Measuring Worker

Table 4.14

Yearly income of measuring worker of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	18622	215.89	29280	-270.398	**
1995-96	19646	388.18	31808	-171.606	**
1996-97	20828	486.10	32192	-128.046	**
1997-98	21720	829.79	31232	-82.7862	**
1998-99	22456	668.80	35224	-104.565	**
1999-2000	22640	219.09	35836	-329.899	**

There is high significant difference between the yearly income of measuring worker in private sector and the co-operative sector between 1994-95 and 1999-2000. A measuring worker got Rs.18822 in private sector and Rs.29280 in the year 1994-95. The respective figures for the year 1999-2000 was Rs.22640 and Rs.35836. This shows that there was high significant difference between the two sectors.

4.8.4 Mada Worker

Table 4.15

Yearly income of mada worker of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	19550	3044.50	29280	-17.5048	**
1995-96	20670	2922.45	31012.8	-19.3844	**
1996-97	21748	3015.92	31387.2	-17.5058	**
1997-98	22560	3357.09	31232	-14.1487	**
1998-99	23432	3916.18	35224	-16.4925	**
1999-2000	23624	4037.64	35836	-16.5661	**

Table 4.15 shows that there was high significant difference in income of 'mada worker' between private sector and the co-operative sector for all the years. 't' value for 1994-95 was -17.5048 and for 1999-2000 it was -16.5661. This shows that there was high disparity in income between the two sectors.

4.8.5 Drilling Worker

Table 4.16

Yearly income of drilling worker of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	32340	559.31	48800	-161.19	**
1995-96	32772	508.73	49700	-182.255	**
1996-97	34614	663.83	56336	-179.227	**
1997-98	35680	438.18	54656	-237.199	**
1998-99	39152	950.44	62160	-132.591	**
1999-2000	39640	737.94	63240	-175.167	**

Table 4.16 clearly indicates that there was high significant difference between the income of drilling worker in private and the co-

operative sector for all the years. The 't' value between the two sector was -161.19 for the year 1994-95 and -175.167 for the year 1999-2000 for the two sectors.

4.8.6 Bolder Man

Table 4.17

Yearly income of boulderman of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	32660	219.09	48800	-405.848	**
1995-96	32908	526.32	49700	-174.748	**
1996-97	35006	703.77	56338	-166.005	**
1997-98	35944	854.21	54658	-119.982	**
1998-99	39600	827.39	62160	-149.345	**
1999-2000	40200	553.36	63240	-228.053	**

The table clearly shows that there was high significant difference in income of bolder man the two sectors for all the years. From 1994-95 to 1999-2000, the 't' value for the two sectors were, -405.848, -174.748, -166.005, -119.982, -149.345 and -228.053.

4.8.7 Jelly Worker

Table 4.18

Yearly income of jelly (½") worker of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	18774	131.45	29280	-437.761	**
1995-96	21086	339.02	31808	-173.225	**
1996-97	21292	447.82	32192	-133.316	**
1997-98	21880	597.93	35136	-121.429	**
1998-99	22768	484.74	37296	-164.158	**
1999-2000	23600	553.36	37944	-141.979	**

Table 4.18 clearly indicate that there is high significant difference in income of jelly worker between the two sectors during the whole period from 1994-95 to 1999-2000. In 1994-95, the income of jelly worker in private sector was Rs.18774 and for the co-operative sector, Rs.29280 and for the year 1999-2000 the respective figures were Rs.23600 and Rs.37944. It clearly indicate that there was high disparity in income between the two sectors.

4.8.8 Loading Worker

Table 4.19

Yearly income of loading worker of private sector and the co-operative sector and their 't' value for 1994-95 to 1999-2000

Year	Private Sector		Co-op. sector	't' value	Significance
	Mean	SD			
1994-95	40150	0.00	58560	-	**
1995-96	41414	684.46	59640	-145.849	**
1996-97	42480	1653.59	64384	-72.5531	**
1997-98	47358	772.82	62464	-107.075	**
1998-99	48740	1079.46	72520	-120.661	**
1999-2000	48821	8744.98	73780	-15.6325	**

Table 4.19 shows that there was high significant difference in income of loading workers between the two sectors. From 1994-95 to 1999-2000. The respective 't' values were -145.849, -72.5531, -107.075, -120.661 and -15.6325.

4.9 SAVING HABIT

The poor sections of the community generally spends all of their income for making day-to-day expenses. They generally do not have

anything to save. In times of contingency requirements, they borrow from money lenders or others. Quarry workers condition is very similar to that of the poor peseants, but their position was better than most of their fellow men.

Table 4.20
Saving habit of quarry workers

Saving habit	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Yes	404	58.67	92	82.56
No	284	41.33	20	17.44
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 23.34$

Table 4.20 shows that 58.67 percentage of workers in private sector and 82.56 percentage of workers in the co-operative sector have some saving.

To test whether there is any dependency between the sector in which the workers are working and the saving habits of the workers, a χ^2 test was performed. Computed value of χ^2 is 23.34. The table value of χ^2 at one degree of freedom is 3.84. Here the calculated value is greater than the table value indicating that there is a dependency between the sector in which workers are working and the saving habit of workers. Hence the above table indicate that the workers in the co-operative sector shows higher saving habits.

The following diagrams clarify the above information.

Diagram 4.6

Saving habit of private sector quarry workers

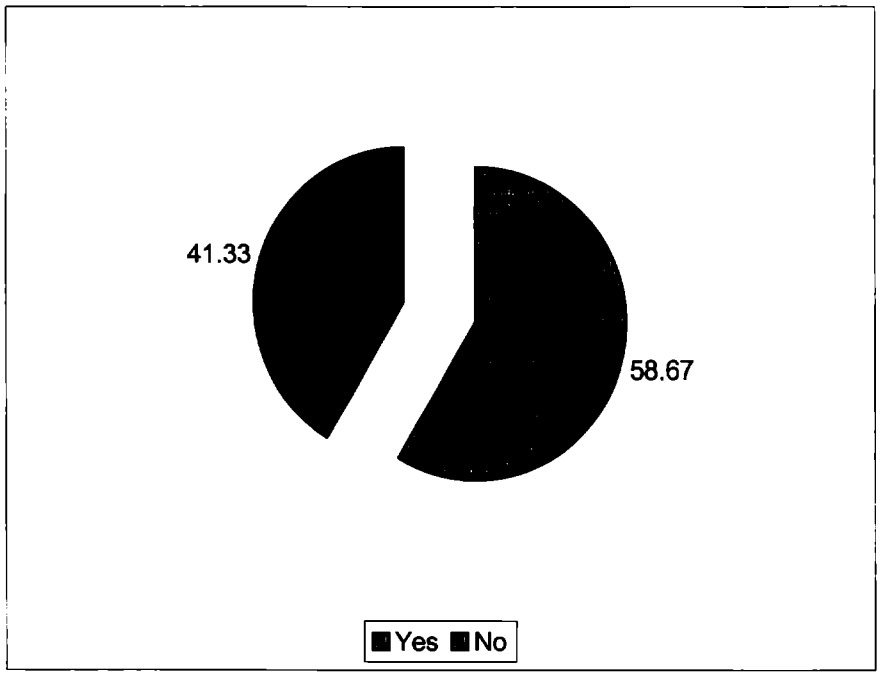
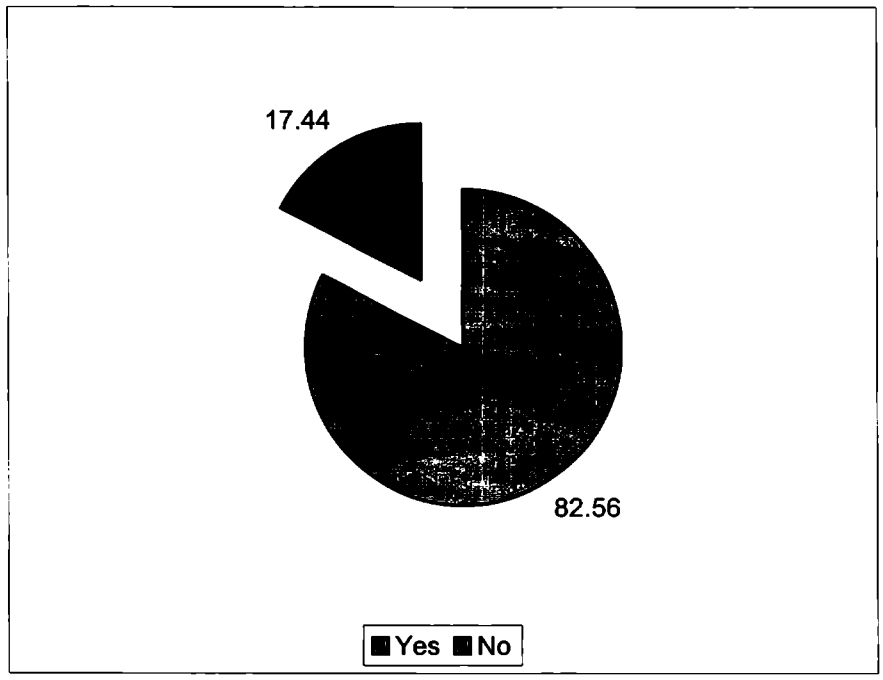


Diagram 4.7

Saving habit of Co-operative sector quarry workers



4.9.1 Nature of Saving Habits

The nature and mode of the savings of the workers differed. But most of them saved in the form of chitties and kuries. Table 4.21 shows the nature of savings of the workers.

Table 4.21
Nature of savings of the workers on percentage basis

Nature of Savings	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Post office	13	1.85	2	1.43
Banks	32	4.65	3	2.65
LIC	59	8.56	2	2.56
Chitty	335	48.65	59	52.75
Gold	10	1.55	6	5.36
Others	239	34.74	40	35.25
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 12.52$

Table 4.21 reveals that 48.65 percentage of private sector workers and 52.75 percentage of the co-operative sector workers who had savings, invested their savings in chitties and kuries. Around 1.85 percentage workers in private sector invested their savings in post office, 4.56 percentage, in banks, 8.56 percentage in LIC, 1.55 percentage in gold and 34.74 percentage in other investments. The corresponding figures in the co-operative sector were 1.43, 2.65, 2.56, 5.36 and 35.25 percentage. Other forms of investment include investment in land holdings, household equipments, bicycles, animals etc.

Computed value of χ^2 is 12.52. The table value of χ^2 at fivedegree of freedom is 11.1. Here the calculated value is greater than the table

value indicating that there is a dependency between the sector in which workers are working and the nature of savings.

The above information is depicted in the following diagrams.

Diagram 4.8

Nature of savings of the workers (private) on percentage basis

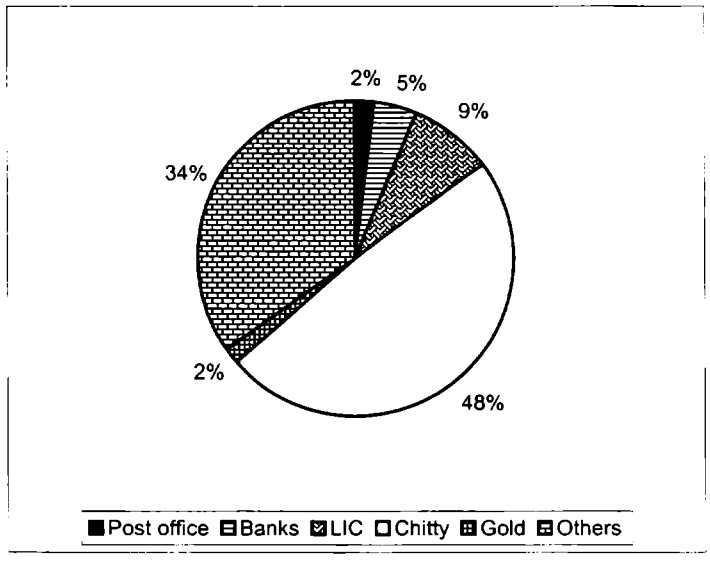
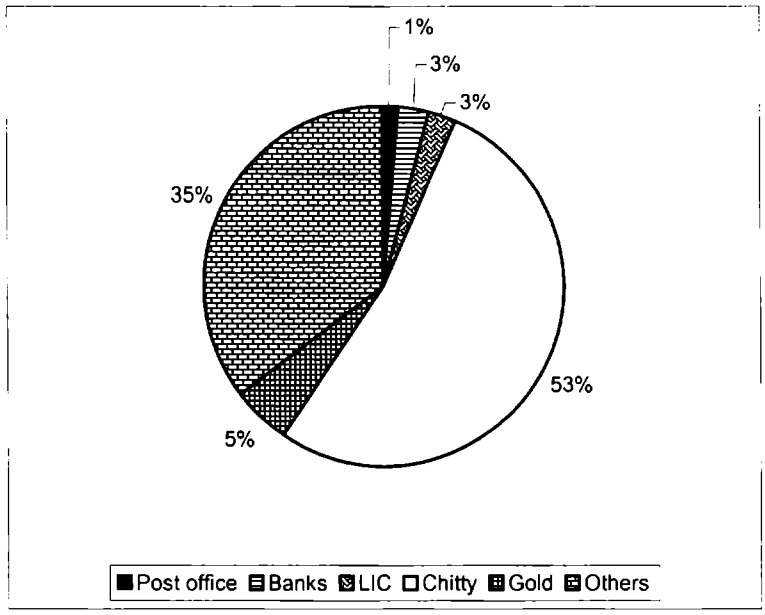


Diagram 4.9

Nature of savings of the workers (co-operative) on percentage basis



4.10 INDEBTEDNESS

Most of the quarry workers both in private sector and the co-operative sector have loans either from moneylenders, or chitty institutions. Very often they find it difficult to payback the loan the result that they remain in debt throughout their life.

Table 4.22

Amount of indebtedness of workers

Amount (Rs.)	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
No debt	89	12.94	17	15.47
Up to 1000	390	56.64	36	32.56
1000-10000	160	23.21	46	40.76
10000-20000	38	5.61	10	8.65
Above 20000	11	1.60	3	2.56
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 24.49$

It can be seen from table 4.22 that 12.94 per cent of the private sector workers and 2.56 percent of the co-operative sector workers had no debt at all. Around 56.64 percentage of private sector workers and 32.56 percentage of co-operative sector workers had debt up to Rs.1000/-. 23.21 percentage of private sector workers and 40.76 percentage of the co-operative sector workers had debt between Rs.1000 to Rs.10000/-. 5.61 percentage and 8.65 percentage of private sector workers and co-

operative sector workers have indebtedness between Rs.10000/- to Rs.20000/- Workers who had indebtedness above Rs.20000/- accounted 1.6 per cent in the private sector and 2.56 per cent in the co-operative sector.

Computed value of χ^2 is 24.49. The table value of χ^2 at four degree of freedom is 9.49. Here the calculated value is greater than the table value indicating that there is a dependency between the sector in which workers are working and the indebtedness. Indebtedness of co-operative sector workers were comparatively high. This was because of their better borrowing capacity on account of their job security.

4.11 SOURCE OF CREDIT

The sources of indebtedness of the quarry workers are shown in table 4.23.

Table 4.23
Sources of credit of workers on percentage basis

Source of credit	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Banks	106	15.35	24	21.45
Co-operative society	155	22.48	21	18.43
Moneylenders	266	38.75	34	30.63
Housing board	37	5.36	9	8.45
Others	124	18.06	24	21.04
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 6.67$ ns

Table 4.23 reveals that 37.83 percentage of private sector workers and 39.88 percentage of co-operative sector workers have taken loans from commercial banks and co-operative societies. Similarly, 37.75 per cent of private sector quarry workers were indebted to many bankers, 5.36 to Housing Board, 18.06 percentage to others. The comparative percentage of the co-operative sector quarry workers indebted to these agencies were 30.63, 8.45 and 21.04 in that order.

Computed value of χ^2 is 6.67. The table value of χ^2 at four degree of freedom is 9.49. Here the calculated value is less than the table value indicating that the source of credit is independent on the sector in which workers are working. Hence the percentage of source of credit in two sectors shows a similar pattern and it is not significant.

The following diagrams give the above information clearly.

Diagram 4.10

Sources of credit of workers (private) on percentage basis

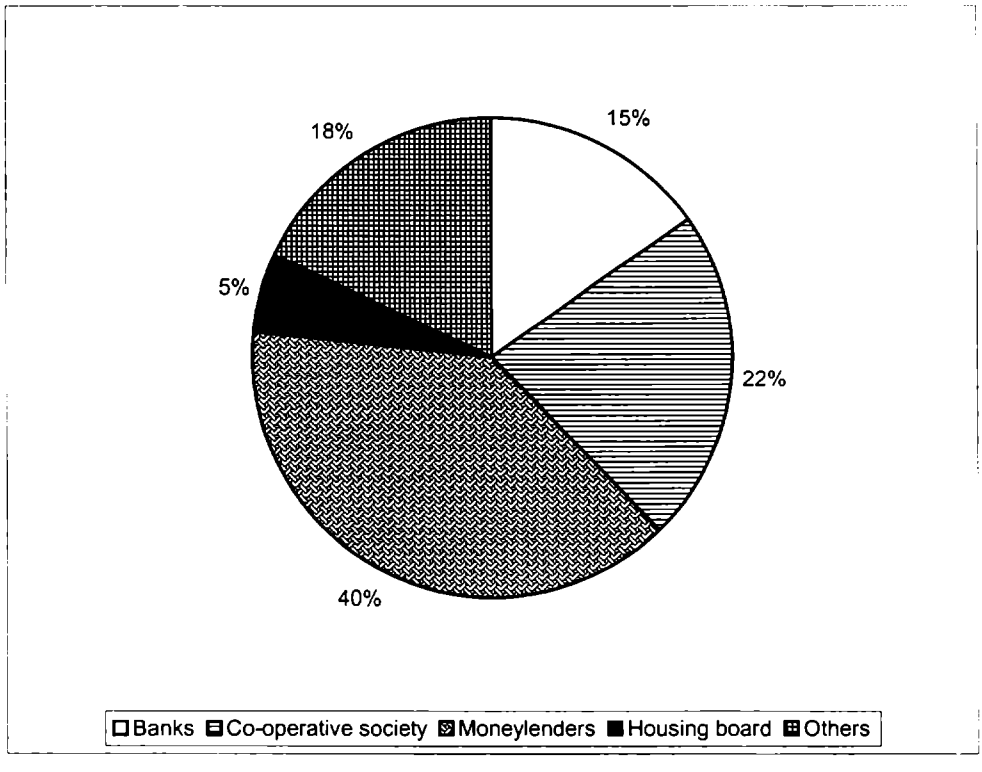
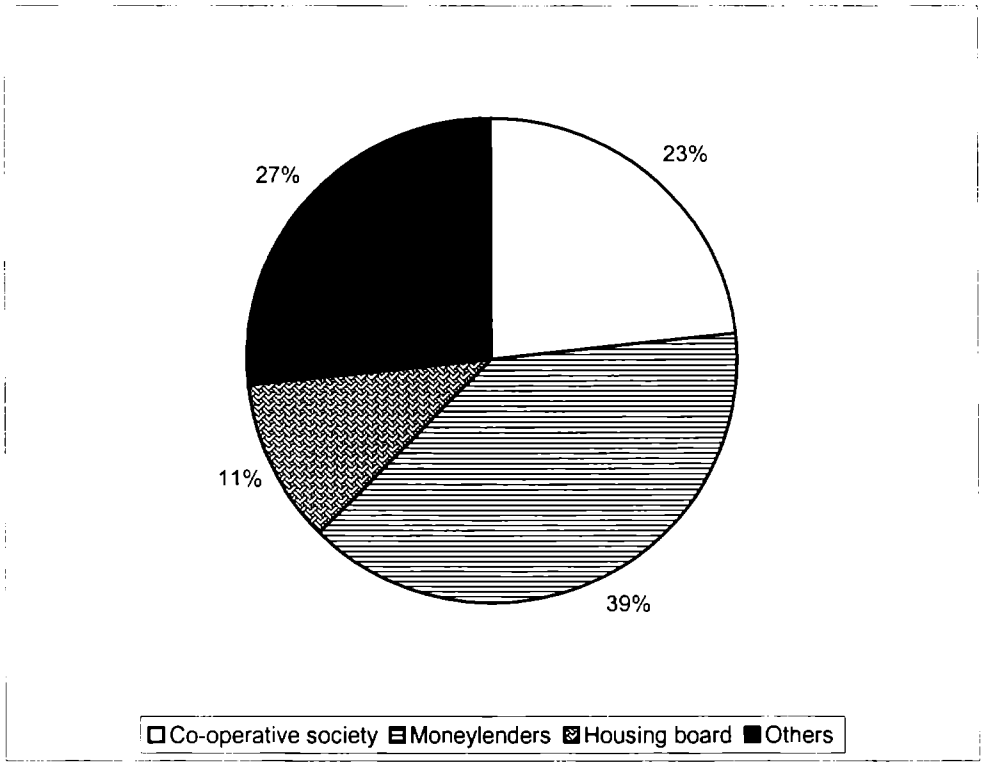


Diagram 4.11

Sources of credit of workers (co-operative) on percentage basis



4.12 RATE OF INTEREST

Table 4.24

Rate of interest on loan

Rate of interest on loan (percentage)	Percentage of workers	
	Private sector	Co-operative sector
Below 15	18.06	21.04
15-20	32.38	30.61
20-30	38.75	30.63
Not known	16.81	17.72
Total	100.00	100.00

Source: Survey data.

Table 4.24 reveals that the minimum interest on loan was less than 15 per cent. Of the private sector quarry employees who have availed loan 18.06 per cent pay interest up to 15 per cent, 32.38 per cent between 15 to 20 per cent, 38.75 per cent, between 20-30 per cent. More than 16 per cent of the workers did not have any idea about the interest they paid on loan availed by them. Similarly, workers in the co-operative sector who availed loans, 21.04 per cent pay interest up to 15 per cent, 30.61 per cent, between 15 and 20 per cent, 30.63 per cent, between 20 to 30 per cent. Around 18 per cent did not have any idea about the interest they paid on loans availed by them.

4.13 JOB AND HEALTH CONDITION

Quarry work is very hard in nature and requires good heath and physique. Quarry work can adversely affect the health and future life of the workers. In spite of these adverse conditions, many are engaged in this work. This study explored the various aspects of health hazards connected with employment in quarries. The study reveals that majority of the workers in a quarry are involved in breaking rock and their loading. Drilling and blasting of rocks are skilled jobs which are done by experts using instruments like jack hammer, rock breakers etc. The blasted rock pieces, which are mostly in the form of big boulders will then be broken into usable sizes using big hammers. This is usually done by male workers. Loading of rubbles are also done by male workers as these require good health and physique. Earth removal and metalling are done by female workers having good health and physique. Because of the heavy work, employees in quarries cannot work continuously for

whole days in a week. Table 4.25 shows the number of days of work carried out by employees per week.

Table 4.25

Days of employment on percentage basis

Days of work	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
3-4	301	43.8	25	22.42
5-6	387	56.2	87	77.58
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 18.23$

Table 4.25 reveals that 43.8 percentage of workers of private sector and 22.42 percentage of workers of the co-operative sector men is work only 3 to 4 days in a week. Around 56.2 percentage of private sector employees and 77.58 percentage of private sector workers in the co-operative sector quarry workers work between 5-6 days. But the percentage of working days are high in the co-operative sector because the higher degree of mechanisation in this sector.

Computed value of χ^2 is 18.23. The table value of χ^2 at one degree of freedom is 3.841. Here the calculated value is greater than the table value indicating that there is a dependency between the sectors in which workers are working and the days of work.

4.14 REASONS FOR ABSENCE

The major reasons for less days of work done by workers in a quarry are illness and physical weakness. Family problems, local festivals, harvesting in agricultural seasons etc. are the other reasons.

Table 4.26

Reasons for absenteeism of workers on percentage basis

Reason for absence	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Physical weakness	299	43.5	45	40.60
Illness	224	32.6	40	35.4
Family affairs	127	18.4	17	15.6
Festivals & other reason	38	5.5	10	8.4
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 2.21$ ns

Table 4.26 reveals that 43.5 percentage of the private sector employees and 40.6 percentage of the co-operative sector employees were not able to work regularly because of physical weakness. Around 32.6 percentage of private sector and 35.4 percentage of co-operative sector employees were absent due to illness. Around 18.4 percentage of private sector employees and 15.6 percentage of co-operative sector employees were absent due to family affairs. More than 8.4 per cent of workers in the co-operative sector and 5.5 per cent of workers in the

private sector quarries absent themselves due to festivals and other reasons.

Computed value of χ^2 is 2.21. The table value of χ^2 at three degree of freedom is 7.81. Here the calculated value is lesser than than the table value indicating that reasons of absenteeism is independent on the sector, and hence the reasons for absence for two sectors are not significant.

4.15 DURATION OF WORK

Work is available in quarries through out the year except in heavy rainy season. But workers could not work long years in quarries, reasons already mentioned. Table 4.27 shows workers experience in the quarry field.

Table 4.27
Period of work in the quarry field

Period of work (in years)	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Up to 5	94	13.7	9	8.4
6-10	87	12.6	17	14.7
11-15	211	30.6	29	25.8
16-20	129	18.7	27	24.4
21-25	97	14.3	16	14.5
Above 25	70	10.1	14	12.2
Total	688	100.00	112	100.00

Source: Survey data. $\chi 2 = 5.18$ ns

Table 4.27 shows that, majority of the workers, i.e., 30.6 percent in private sector and 25.8 percentage in co-operative sector have worked in

between 11 to 15 days. Only 10.1 percentage of the workers in private sector and 12.2 percentage in co-operative sector workers worked more than 25 years. The percentage of workers worked more than 20 years are low, because of their physical weakness, illness and other reasons.

Computed value of χ^2 is 5.18. The table value of χ^2 at five degree of freedom is 11.1. Here the calculated value is lesser than the table value indicating that period of work is independent on the sector in which the workers are working.

4.16 FREQUENCY OF CHANGING EMPLOYER

Disputes often arise between the employer and the workers with respect to payment of wages and or other reasons. If an employer is prepared to give gives more wages and other benefits workers will continue in the quarry. Otherwise they will leave the quarry and seek employment in other quarries. No permission is needed for leaving the quarry.

Table 4.28

Frequency of change in employment

Frequency of change	Private sector
No change	15.8
1-3	66.7
4-6	13.7
7 and above	3.8
Total	100.0

Source: Survey data.

Table 4.28 shows that only 15.8 percentage in private sector quarries were working continuously in the quarry. While 66.7 percentage of the workers changed quarries up to 3 times, 13.7 percentage of the workers, up to 6 times and 3.8 percentage of the employers changed quarries more than 7 times. Labour turnover in the co-operative sector was very low due to the additional benefit they get and the security provided.

4.17 REASONS FOR CHANGE

Table 4.29 shows the reason for change of quarry in workers.

Table 4.29

Reasons for change of quarry by workers

Reasons for change	Private sector (in %)
Wage dispute	38.68
Other problems	25.32
Feasibility	3.68
No special case	32.32
Total	100.0

Source: Survey data.

Table 4.29 shows that 38.68 percentage of the employees changed quarries due to wage problems and 25.32 percentage due to other reasons. Nearness or feasibility of access accounted 3.68 per cent and 32.32 per cent changed without any special reason.

4.18 ACCIDENTS

The possibility of accident is very high in quarries. For blasting rock, quarry operators use gun powder. It should be carefully used, otherwise it can cause accidents. Accidents can also occur during sizing, loading and unloading etc.

Table 4.30
Accidents met by workers in quarries

Accidents	Percentage of workers	
	Private sector	Co-operative sector
Nil	32.53	49.68
Once	12.36	12.38
Twice	14.32	18.68
Thrice	17.68	11.53
More than three	23.11	7.73
Total	100.00	100.00

Source: Survey data.

Table 4.30 reveals the extent of accidents met by workers in quarries. About 32.53 percentage of the workers of private sector and 49.68 percentage of workers in the co-operative sector had not faced any accident during the period under study. Around 12.36 and 12.38 percentage of workers in both the sectors met accident once, 14.32 percentage of workers private sector and 18.68 percentage of workers in the co-operative sector met accidents twice. About 47 per cent workers in private sector and 19 per cent of workers in the co-operative sector met accidents three or more than three times.

The above information is clarified in the following diagrams.

Diagram 4.12
Accidents met by workers in private quarries

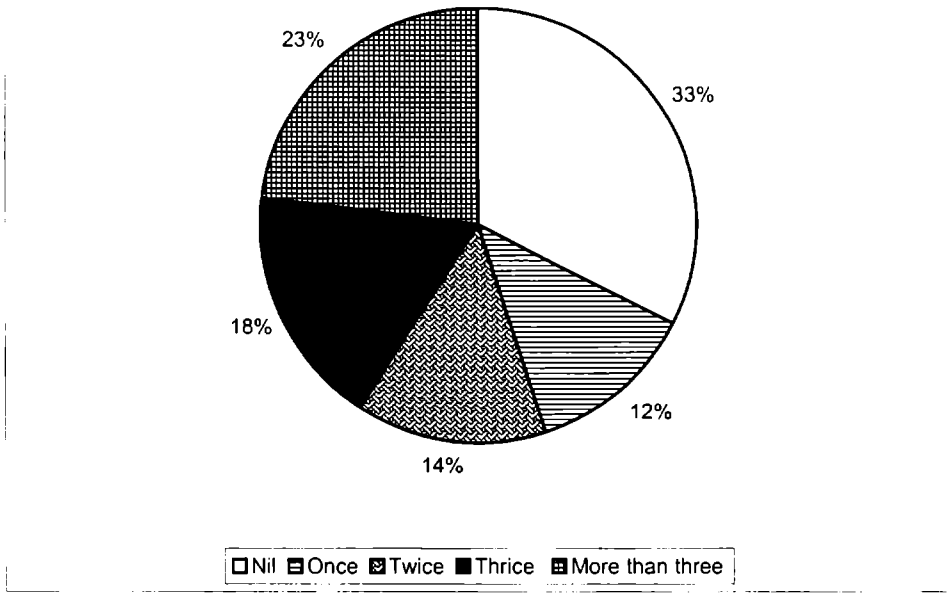
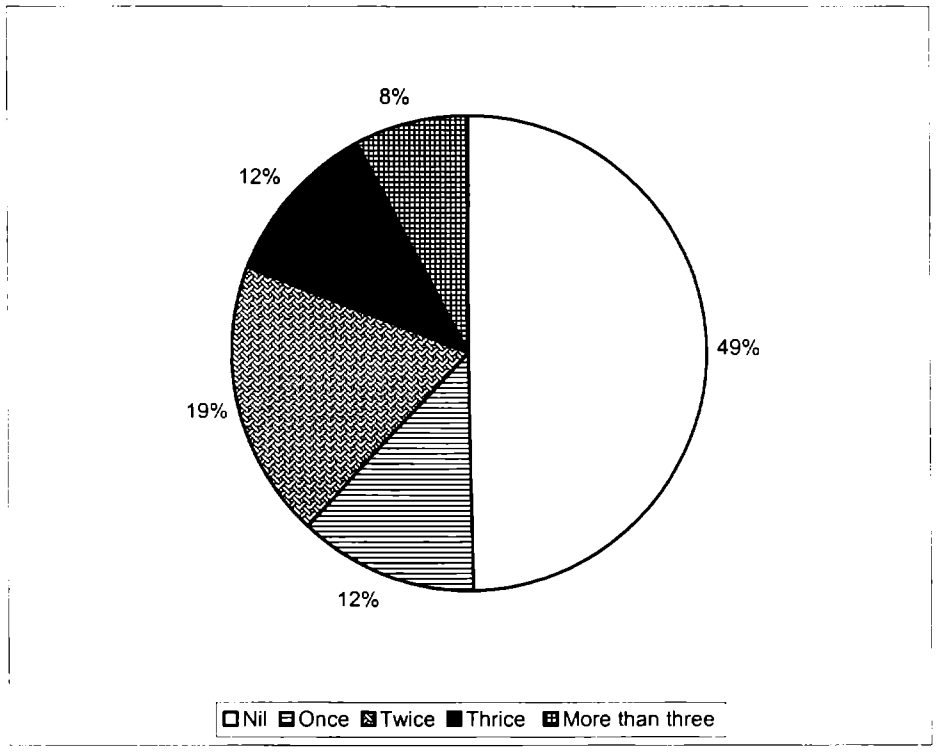


Diagram 4.13
Accidents met by workers in co-operative quarries



4.18.1 Nature of Accidents

Table 4.31

Nature of the accidents of workers

Nature of accidents	Percentage of workers	
	Private sector	Co-operative sector
Wounds and cuts	65.86	70.48
Fractures	8.58	7.43
Fingers amputed	2.53	2.01
Other accidents	23.03	20.08
Total	100.00	100.00

Source: Survey data.

Table 4.31 reveals that majority of accidents were in the nature wounds and cuts. In private sector this figure is 65.86 percent and in co-operative sector, 70.48 percent. Around 8.58 percent of the workers of private sector and 7.43 percent in co-operative sector had met with fractures. A major percentage of workers in both the sectors got their fingers amputed. (2.53% in private and 2.01% in the co-operative sector). More than 23 per cent of the workers in the private sector and 20 per cent in the co-operative sector had accidents of minor nature which they do not remember. While ESI facilities enjoyed by the co-operative sector workers. Such facility was not extended to private sector quarry

employees. In private sector quarries they do not even had first aid facility.

4.19 SAFETY FACILITIES

Generally the management or owners of quarries are expected to provide safety measures during the operation of quarries. But many of them did not provide any safety measures. The eagerness to get more rocks leads to hasty quarrying and that often results in accidents.

Table 4.32

Safety measures provided on percentage basis

Safety measures	Percentage of workers	
	Private sector	Co-operative sector
Yes	Nil	20.35
Few	3.8	25.55
Very few	20.5	28.39
Nil	75.7	25.71
Total	100.00	100.00

Source: Survey data. $\chi^2 = 217$

Private sector quarries evaded response to questions relating to safety matters. More than 20 per cent of the employees of the co-operative sector mentioned that the co-operative sector provided adequate safety measures while 3.8 percentage of workers in private sector and 25.55 percentage of workers in the co-operative sector opined that there existed a few safety measures. But 75.7 percentage of the

workers of private sector and 25.71 percentage of workers in the co-operative sector revealed that there were no safety measures in quarry.

Computed value of χ^2 is 217. The table value of χ^2 at two degree of freedom is 5.99. Here the calculated value is greater than the table value indicating that there is a dependency between the sector in which workers are working and the safety measures they provided.

4.20 TOILET AND SANITARY FACILITIES

In both the sectors workers were not provided with any toilet or sanitary facilities. If they want to meet nature's call they have to take resort to open places. One of the reasons for this state of affairs is that, almost all quarries are functioning away from living areas. The co-operative society provided some toilet facilities, but the facilities provided are away from the quarries.

4.21 ILLNESS

The study revealed that illness is very common among the quarry workers. The illness is largely caused by rock dust and gun powder.

Table 4.33

Occurrence of illness

Occurrence of illness	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Yes	360	52.3	50	44.7
No	328	47.7	62	55.3
Total	688	100.00	112	100.00

Source: Survey data. $\chi^2 = 2.23$ ns

Table 4.33 reveals that 52.3 percentage of workers in private sector and 44.7 percentage of workers in the co-operative sector suffered from illness. But they did not consider the illness very serious because of family burden.

Computed value of χ^2 is 2.23. The table value of χ^2 at one degree of freedom is 3.84. Here the calculated value is lesser than the table value indicating that the occurrence of illness is independent on the sector in which the workers are working.

4.21.1 Nature of Illness

Table 4.34

Nature of illness of the workers on percentage basis

Nature of illness	Percentage of workers	
	Private sector	Co-operative sector
T.B	5.38	4.58
Asthma	7.28	6.48
Heart disease	8.68	7.63
Severe back pain	48.53	46.78
Chronic headache	16.73	17.38
Others	13.40	17.15
Total	100.00	100.00

Source: Survey data. $\chi^2 = 1.39$ ns

Table 4.34 indicates that majority of workers in both the sectors are suffering from back pain. It is due to the peculiar nature of quarry work. Around 16.73 percentage of workers in private sector and 17.38 percentage of workers in the co-operative sector were affected chronic headache.

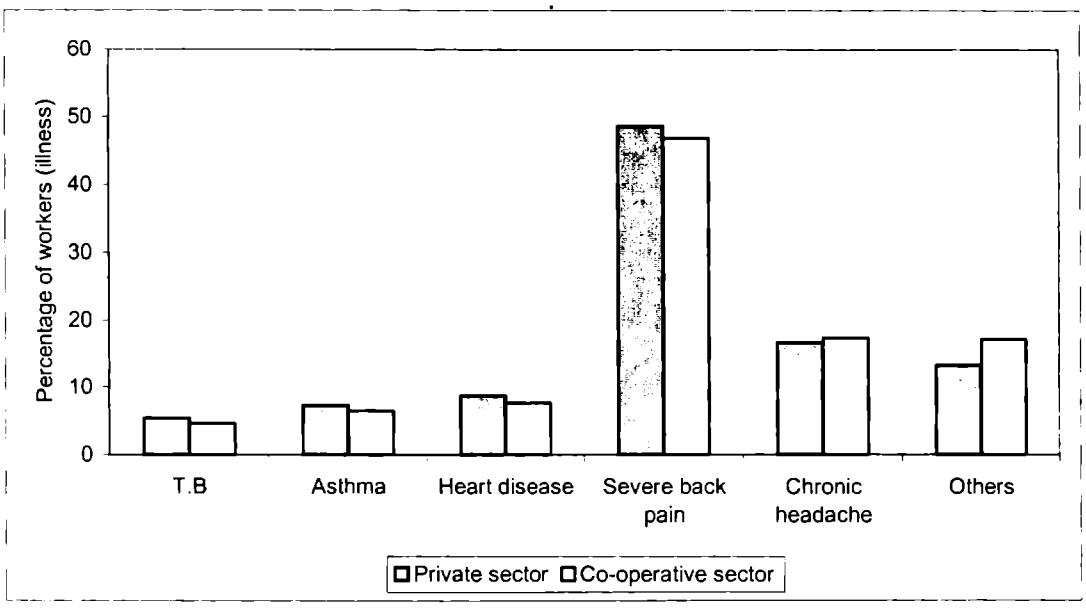
More than 50 percentage of workers in both the sectors were suffering from one type or the other type of illness. Compared with other work percentage of illness was high in quarries. Back pain, headache, asthama are high among quarry workers.

Computed value of χ^2 is 1.39. The table value of χ^2 at five degree of freedom is 11.1. Here the calculated value is lesser than the table value indicating that the nature of illness is independent on the sector in which the workers are working.

Diagram 4.15 clarifies the above information.

Diagram 4.14

Nature of illness of the workers in private and co-operative sector



4.22 ALCOHOL CONSUMPTION

The study revealed that alcoholism has also widely prevalent among the quarry workers. This affects the health and economic condition of the workers.

Table 4.35
Alcohol consumption of male workers

Alcohol consumption	Private sector		Co-operative sector	
	No.	Per cent	No.	Per cent
Yes	334	48.6	52	46.7
No	354	51.4	60	53.3
Total	688	100.00	112	100.00

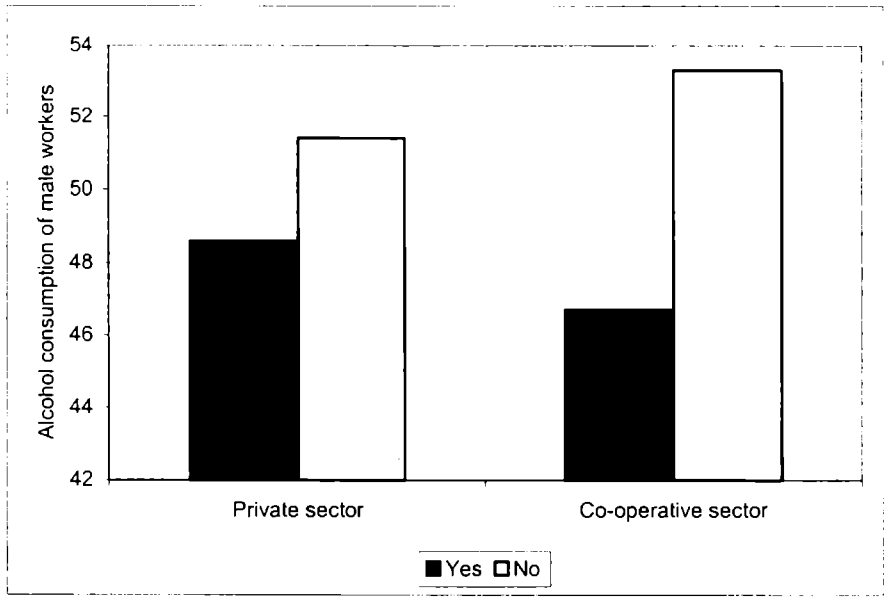
Source: Survey data. $\chi^2 = 0.14$ ns

Table 4.35 reveals that around 48.6 percentage of the male workers in private sector and 46.7 percentage of workers in the co-operative sector were using alcohol habitually. Majority of the alcoholic addicted workers revealed that they could not sleep without consuming alcohol. They were using it to forget the day long hard work in the quarry site. If they have no ready cash, they borrow money from somewhere and use that to take alcohol. They did not bother about the consequences of drinking. Among the workers who are using alcohol, 64 percentage was using it regularly and the rest, occasionally.

Computed value of χ^2 is 0.14. The table value of χ^2 at one degree of freedom is 3.84. Here the calculated value is lesser than the table value indicating that alcohol consumption is independent on the sector in which the workers are working.

Diagram 4.16 depicts the above information.

Diagram 4.15
Alcohol consumption of male workers



4.23 SMOKING

Along with alcoholism, smoking habit is high among quarry workers.

Table 4.36

Smoking habit of workers

Smoking habit	Percentage of workers	
	Private sector	Co-operative sector
Yes	62.32	59.65
No	37.68	40.35
Total	100.00	100.00

Source: Survey data. $\chi_2 = 0.29$ ns

Table 4.36 reveals that 62.32 percent of private sector quarry workers and 59.65 per cent of co-operative sector quarry workers were in the habit of smoking. This contributed partly to the poor health of quarry workers.

Computed value of χ^2 is 0.29. The table value of χ^2 at one degree of freedom is 3.84. Here the calculated value is lesser than the table value indicating that smoking habit is independent on the sector in which the workers are working.

4.24 INSURANCE MEMBERSHIP

In private sector majority of the owners are not keeping any register to mark the attendance of their workers. According to the Insurance Act 1949, every employee should become apart of an insurance scheme and the premium should be paid by the employer. But the employers do not take initiative to insure the employees. In the co-operative society, every worker was brought under the purview of the ESI scheme. Table 4.37 shows the status of private quarry workers with respect to insurance.

Table 4.37

Insurance membership of employees on percentage basis

Insurance	Private Quarry
Yes	43.18
No	56.82
Total	100.00

Source: Survey data.

Table 4.37 reveals that 56.82 per cent of the workers in the private sector quarries not brought under any of the insurance schemes. And in the case of those who were brought under the scheme, the premium is paid by the workers themselves.. Many of the workers are not aware of about the importance of insurance, and even if they are aware that they cannot afford it.

4.25 MEMBERSHIP IN TRADE UNION

Most of the quarry workers are members of one trade union or the other. Loading workers who got high payment were actively engaged in trade union activities. Majority of the workers were members of trade unions such as CITU, INTUC, BMS, AITUC etc.

Table 4.38

Nature of application of workers to Trade Unions

Memberhip	Percentage of workers	
	Private sector	Co-operative sector
CITU	58.6	100.00
INTUC	34.5	-
BMS	3.2	-
AITUC	1.6	-
Not applicable	2.1	-
Total	100.00	100.00

Source: Survey data.

The study revealed that 58.6 percentage of private sector quarry workers and 100 percentage of the co-operative sector quarry workers were members of CITU. Around 34.5 percentage of private sector workers were in INTUC. 3.2 percentage in BMS, 1.6 percentage in AITUC. 2.1 one percentage of workers do not have membership in any of these trade unions.

4.26 JOB SATISFACTION

Job satisfaction depends on factors such as remuneration, interest in the work, permanent nature of the work etc.

Table 4.39

Job satisfaction of the workers

Job satisfaction	Percentage of workers	
	Private sector	Co-operative sector
Satisfied	38.7	89.5
Unsatisfied	61.3	10.5
Total	100.00	100.00

Source: Survey data. $\chi^2 = 100.138$

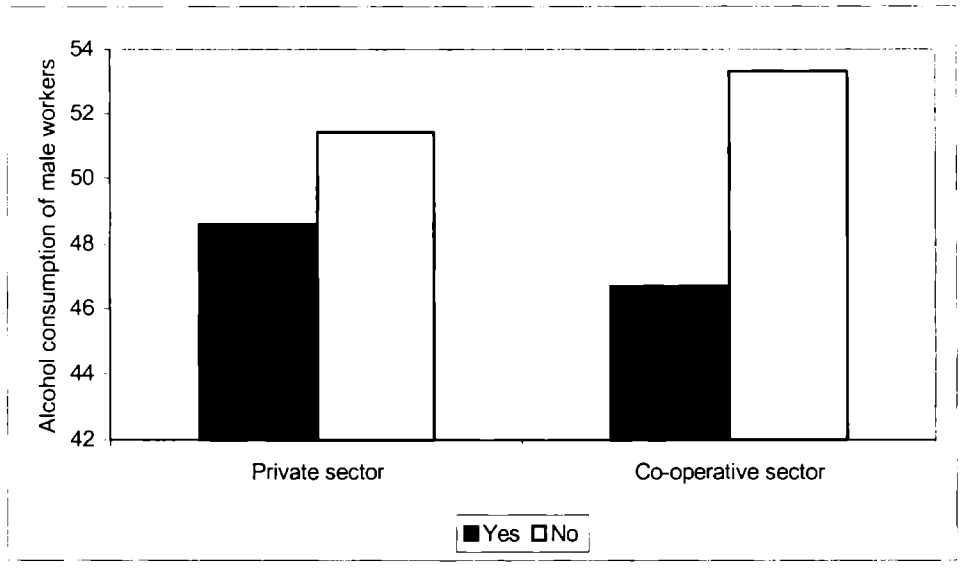
The study revealed that 38.7 percentage of workers in private sector and 89.5 percentage of the co-operative sector were satisfied with their respective work. Loading workers were highly satisfied as they earned more money compared to other workers.

Computed value of χ^2 is 100.138. The table value of χ^2 at one degree of freedom is 3.84. Here the calculated value is greater than the table value indicating that there is a dependency between the sector in which workers are working and the job satisfaction.

The above information is clarified in diagram 4.16.

Diagram 4.16

Job satisfaction of the workers



4.27 WOMAN LABOUR

Women labour is discriminated against male labour in quarries. Most of the women employed in quarries are between 18-45 years of age. Equality of gender is not recognised in quarries due to the nature of the job. Hence there are significant variations in wage rate also. Apart from this lady workers are not provided primary facilities like sanitation or facilities to respect their privacy. If they have to attend nature's call they have to go to open place. Since almost all quarries are away from populated places, they do not feel this as a problem. But the low wages and absence of primary facilities make women folk reluctant to work in the quarries. Hence, their workforce is declining gradually. Table 3.24 shows the comparative wage of women and male workers in private sector quarries .

Table 4.40

Table showing the wages of woman worker and Male worker in private sector quarry from 1999-2000

Year	Wages of Woman (Rs)	Wages of man (Rs)
1994-95	75	140
95-96	80	140
96-97	85	160
97-98	85	160
98-99	90	180
99-2000	90	180

Source: Survey data.

From table 4.40 it can be seen that a woman worker's wage ranged between Rs.75 to Rs.90 per day, whereas that of a male worker varied between Rs.130 to Rs.160. It is highly discriminatory as a woman's work is equally hazardous as that of a male worker. But payment is said to be made on the basis of quantity of work produced by a male and female worker.

The above information is given in the following diagram.

Diagram 4.17

Wages of woman worker and Male worker in private sector quarry from 1999-2000

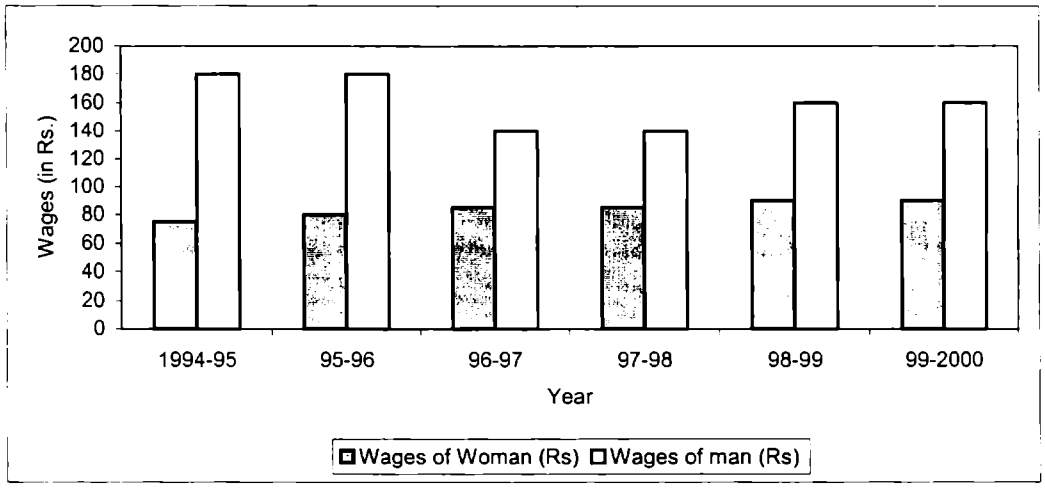


Table 4.41 shows the percentage of women and male workers employed in private as well as co-operative sector quarries.

Table 4.41

Table showing the percentage of male and female workers for 1994-to 2000

Year	Private Sector (Percentage)		Co-operative sector (Percentage)	
	Women	Male	Women	Male
1994-95	48.5	51.5	42.7	57.3
95-96	42.7	57.3	39.6	60.4
96-97	37.3	62.7	38.7	61.3
97-98	32.4	67.6	37.5	62.5
98-99	27.4	72.6	37.5	62.5
99-2000	21.7	78.3	36.8	63.5

Source: Data collected from survey data for private sector and from the annual report of Anappara Karinkal Co-operative Society for co-operative sector.

Table 4.41 shows that in the private sector women force is declining year by year. In 1994-95 women labour accounted 48.5 per cent whereas in 1999-2000 it was only 21.7 per cent of the total force employed. The reasons for the decline of women labour force were:

(1) Low wages:

(2) Lack of primary facilities

(3) After marriage many are not interested to work in quarries.

(4) Many women employees were working in ½" Jelly metals. But after, crusher industries entered the quarry sector, many shifted to crusher quarries for ½" metal. This has reduced the opportunity of woman labour to a great extent.

(5) Women workers do not consider themselves as primary earners. If their husbands are earning a fair amount, they will not go for quarry work.

(6) They are less preferred than men owing to many legal formalities.

(7) The new generation women, who have at least S.S.L.C education, may go for some where else, even though they earn little less from other work. Table 4.42 shows the average wage earned by an S.S.L.C girl in a private quarry and from a private shop.

Table 4.42

Average wages of a woman employee in private quarry and a private shop for 1994-95 to 2000

Year	Monthly wages from quarry (Rs)	Monthly wages from a shop (Rs)
1994-95	1800	1000
95-96	1920	1000
96-97	2040	1200
97-98	2040	1200
98-99	2160	1300
99-2000	2140	1300

Source: Survey data.

In 1994-95 a woman working in a shop used to get Rs.1000/- per month whereas she could have got Rs.1,800/- per month if she worked in a quarry. In 1999-2000 she earned Rs.1300/- from a private shop whereas she could have earned Rs.2140/ from the quarry (Table 3.26).

In the co-operative sector, the percentage of woman labour varied between 42.7 to 36.8 between 1994-95 and 1999-2000. The decline is due to retirement and voluntary retirement. In the co-operative sector also there is much difference between the wages of a woman worker and that of a male worker.

Table 4.43 shows the wages of a woman worker and a male worker in a co-operative society.

Table 4.43

Table showing wages of female and male in co-operative quarry from 1994-1995 to 1999-2000

Year	Wages of Female (Rs)	Wages of Male (Rs)
1994-95	75	125
95-96	78	125
96-97	78	140
97-98	80	140
98-99	85	150
99-2000	85	150

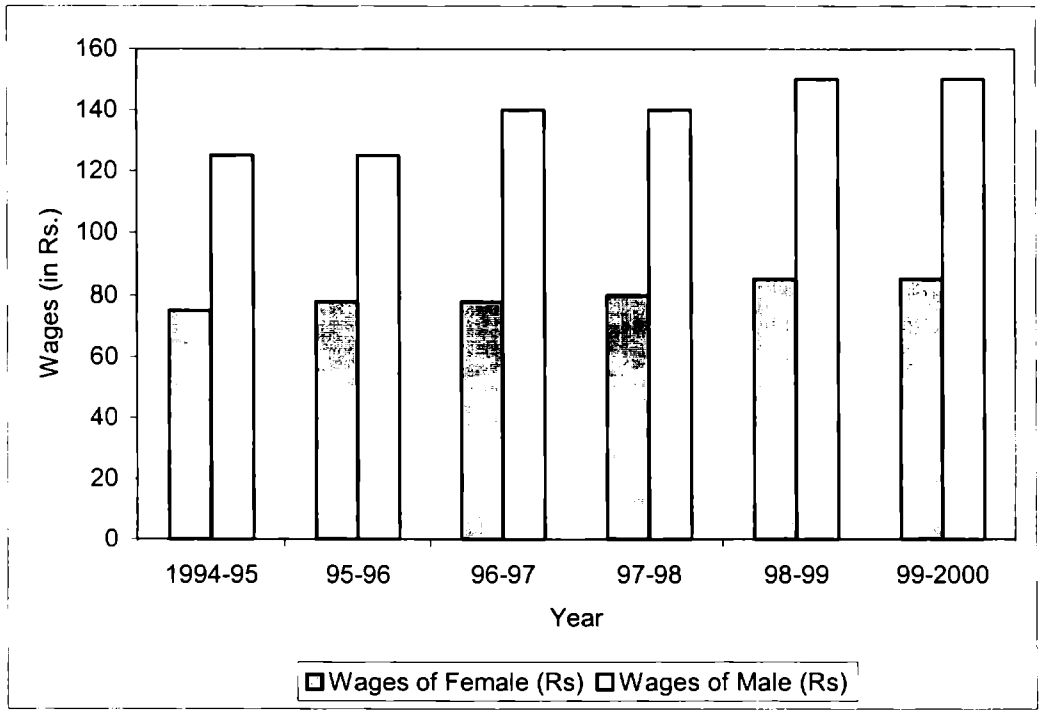
Source: Data collected from the annual report of Anappara Karinkal Society

There is high wage difference between male and female workers in Co-operative quarry also. But they are eligible to get many other benefits, and hence they are comparatively happy.

It is clarified in diagram 4.18.

Diagram 4.18

Wages of female and male in co-operative quarry from 1994-1995 to 1999-2000



4.28 CHILD LABOUR

Child labour is prevailing in the quarry sector. They are employed to bring water, remove the upper layer of the rocks, do metaling process, and such other minor activities. Child labour exists, because there are people willing to use children for profit. A child is paid much less, but

he is obedient, does not join any union and could be moulded to perform repetitive jobs.

Majority of quarry employees are from Tamil Nadu. They come with family and live very near to the quarry site. Their, children also get employment in the quarries. If the management deny employment to their children, the whole family will leave the quarry, and will seek employment in some other place. Table 4.44 shows the percentage of child labour to total labour in quarries.

Table 4.44

Percentage child labour to total labour for various years

Year	Percentage of Child Labour	Percentage of other labour	Total
1994-95	7.5	92.5	100
95-96	5	95	100
96-97	5.26	94.74	100
97-98	4.44	95.66	100
98-99	5.4	94.6	100
99-2000	5.71	94.29	100

Source: Survey data.

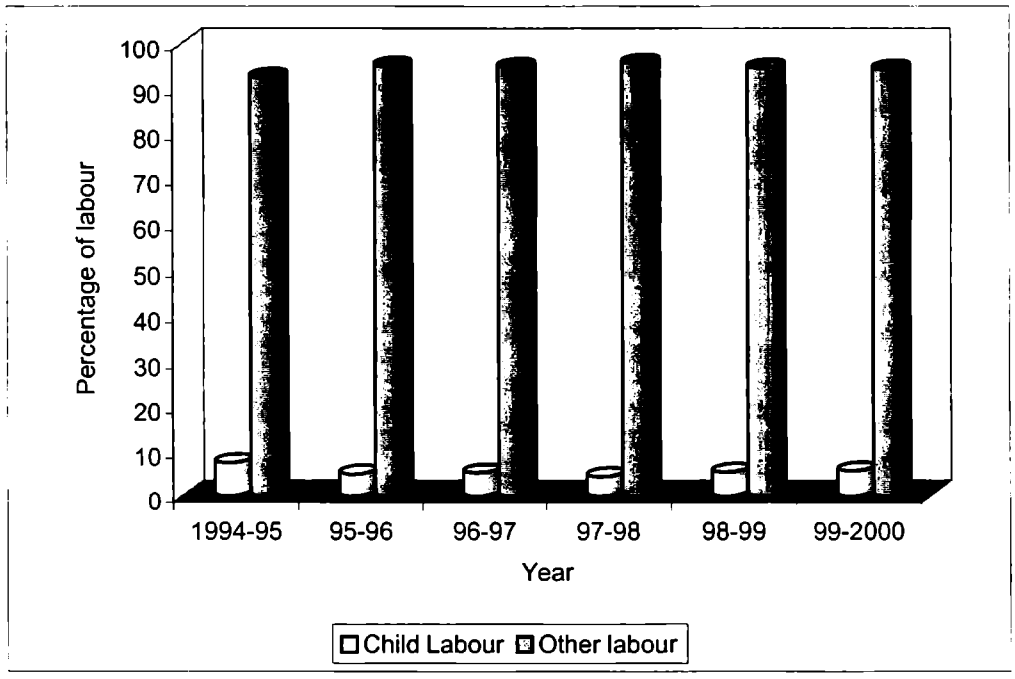
It is clear from table 4.44 that the percentage of child labour in quarries varied between 4.4 in 1997-98 to 7.5 in 1994-95. There was high demand for all quarry products and high wage rate also existed during the earlier periods. Due to it, local labour force was attracted to this field. But during the next two years the prices declined and hence the

local people were not highly attracted to this field. As a result Tamil families were working in the quarry along with their children.

The above information is given in diagram 4.19.

Diagram 4.19

Percentage child labour to total labour for various years



4.28.1 Co-Operative Sector

Co-operative Societies are formed as per the rules and regulations of the Co-operative Societies Act. In Trichur, as already mentioned, the quarry is working under this co-operative sector. This quarry do not employ child labour in any of its activities.

The historic judgment delivered by a division bench of the Supreme Court on December 10th 1996 focused the issue relating to child labour in the country and in the States. In a country which has the

shameful record of tolerating exploitation of not less than 35 million children as workers in a wide range of industries and in the service sector the judgement of the Supreme Court will be hailed as a triumph of human sensitivities over a mind set which is stuck to the myth that child labour is inevitable.

The judgement also barred the employment of children in beedi-making, carpet weaving, cement manufacture, mining and quarrying activities, cloth printing, dyeing and weaving, manufacture of fire works, matches and explosives, mica cutting and splitting, binding and construction industry, soldering, process in electronic industry, tanning, soap manufacture, wool cleaning, slate pencils, building and construction industry. But inspite of the judgment child labour is flurishing in all the mentioned areas.

4.29 CONCLUSION

The socio-economic condition of quarry workers is very poor. They have to work in all seasons in the quarry. Due to rigorous hard work, these labourers do not derive any sort of job satisfaction. The study leads to the following conclusions.

1. Majority of the workers in both sectors belonging to the age group of 30-40 years.

2. In both sectors the workers had a schooling of up to 5th standard.

3. The size of the family in both sectors to which the labourers belong were more than five.

4. The wages of workers remain more or less same in both sectors. But the workers in co-operative sector receives more fringe benefits.

5. Saving habit is high in co-operative sector.

6. In both sectors there is indebtedness of workers, but the indebtedness is high in co-operative sector.

7. Due to the hardship of work, the workers could work only less than five days a week.

8. Majority of the workers in both sectors are suffering from TB, asthma, chronic headache and severe back pain.

9. Smoking habit and alcohol consumption are high in both sectors.

10. Most of the employees were not covered in any of the insurance scheme in private sector.

11. Wage difference exists between male and female workers.

12. Child labour is still prevalent in private quarries.

CHAPTER V

PROBLEMS CONNECTED WITH QUARRY OPERATIONS

This chapter is divided into two sections. Section A analyses the problems connected with quarrying operations and Section B, demand and supply of granite products.

SECTION - A

After the enactment of the Environmental Protection Act 1986, there has been a greater awareness in India, specially in Kerala, of the need to preserve good environment and of taking effective steps for the restoration of the damaged environment to the best possible extent. There should always be a balance between environment preservation and economic development. Quarrying of granite affects environment although relatively to a less extent. Apart from environmental issues many other problems are faced by the management of granite quarries.

Kerala state has huge deposit of rocks ranging from basement complex of high grade granulitic facies of high quality in nature. Due to its high strength, quality and colour it is in high demand. In olden days people possessing land having rock deposits used to consider it as a waste. But today they consider that as a precious deposit!

The stone industry has made inroads in the fast moving world of fashions and aesthetics by providing various value added products. Irrespective of differences in attitude and cultures people of the globe are bound by a common passion - a constant love - for things that are beautiful. Granite is one of such things that binds people and as long as that interest continues, granite industry will be active in business. This doesn't mean that it will be problem free. In this chapter it is proposed to highlight some such problems faced by the industry. Since the study is confined to quarries in Thrissur district the problem highlighted herein are relevant to those quarries only.

5.1 MARKETING PROBLEMS OWING TO DISTANCE

Very often distance creates problems in marketing of quarry products. Kerala possesses an undulating terrain with high lands, mid lands and low lands. Though deposits of rock are found in almost all places, the higher the rock deposits the higher will be the quarry products. But quarrying is not possible in all places because of legal restrictions. As the distance between quarries and consumers increases cost of marketing goes upward and that creates problems. Table 5.1 shows the distance of private quarries in Thrissur district from the final consumers.

It is clear from Table 5.1 that the mean distance of a quarry from the consumption place is 25 km. (25-30). First and Third quartile are 19.28 and 34. and Median 27.5. It indicates that 25 per cent of lorries

have to ply an average distance of 19-20km, 50 per cent of the lorries have to run 28 to 30 km and the upper 25 per cent lorries have to run 34

Table 5.1

Average distance of quarry from the consumption place

Distance of quarry from consumption place (km)	No. of quarry units
Below 10	5
10-15	10
15-20	8
20-25	10
25-30	24
30-35	15
35-40	10
40 above	8
Total	90

Source: Survey data.

to 35 km. To cover 10-20km, lorry owners charge Rs.250, for 30km, Rs.350 - Rs.400 and for 35 km Rs.400 - Rs.450. So long distance and the consequent higher cost of transportation create problems connected with marketing.

5.2 AGENTS COMMISSION

Since most of the consumers do not have direct touch with the owners of quarries both parties have to depend on brokers for marketing. For agent's services, they have to give commission.

Commission may vary from quarry to quarry and even from season to season. In slack (low demand) season the agents are to be paid highly. June to September form the slack season. All other months are treated as high demand season. Table 5.2 shows the commission per load given to brockers. Very often brokers are lorry drivers themselves.

In 1994-95 and 1995-96, the commission amount remained the same, that is Rs.10 per load. In 1996-97 and 97-98 it increased to Rs.15 and Rs.20 respectively. Commission further increased to Rs.25 during 1998-99 and 1999-2000. Compared to 1994-95 the increase was 50 per cent in 96-97 and 100 per cent in 1997-98, 150 per cent in 98-99 and 99-2000.

Table 5.2

Commission Payable to brokers in private sector for 1994-95 to 1996- 2000

Year	Commission per load (Rs)	Index
1994-95	10	100
95-96	10	100
96-97	15	150
97-98	20	200
98-99	25	250
99-2000	25	250

Source: Survey data.

It shows brokers and lorry drivers play a significant role in marketing. Any increase in selling price, automatically increases the

commission but the reverse so not happen. Table 5.3 shows the relation between commission and selling price.

Table 5.3

Percentage of commission and selling price for private quarries infer different years per load

Year	Average selling price (Rs)	Commission (Rs)	Percentage Commissio n on sale
1994-95	610.61	10	1.65
95-96	613.56	10	1.63
96-97	619.87	15	2.4
97-98	630.34	20	3.17
98-99	735.79	25	3.39
99-2000	648.1	25	3.85

Source: Survey data.

It is clear from Table 5.3 that the commission paid in 1994-95 accounted 1.65 per cent of sales. During the subsequent years it accounted 1.63, 2.4, 3.17, 3.39 and 3.85 percentages respectively. The higher rate of commission becomes a problem as that affects the profit margin.

A co-op society is working in the same belt as that of the private sector in the study area. The society also pays commission to drivers or brokers, and such expenditures is accounted under miscellaneous head.

In addition to the commission from owners, the agents take commission from the customers also. Table 5.4 shows the commission taken from the customers.

Table 5.4

Commission from customers for private sector quarries per load for the year 1994-95 to 1999-2000

Year	Commission (Rs)	Index of Commission
1994-95	5	100
95-96	8	160
96-97	10	200
97-98	10	200
98-99	10	200
99-2000	10	200

Source: Survey data.

It is clear from Table 5.4 that the commission taken from the customers increased from Rs.5 in 1994-95 to Rs.10 per load from 1996-97 onwards.

For bulk purchases, say for more than 10 lorries of rubbles or 6" metals, the lorry drivers or brokers also get a discount of 5 per cent to 1.23 per cent apart from the commission. Table 5.5 shows the discount received by lorry drivers or agents.

Table 5.5

Discount payable to the lorry drivers from 1994-95 to 1999-2000 per load

Year	Discount (Rs)	Percentage of discount on sale
1994-95	3	0.49
95-96	3	0.48
96-97	5	0.81
97-98	5	0.79
98-99	8	1.08
99-2000	8	1.23

Source: Survey data.

Table 5.5 shows that for bulk purchases the drivers or agents received discounts ranging from 0.49 per cent in1994-95 to 1.23 per cent in 1999-2000. The discount as in the case of commission affects the profit margin of quarry owners.

Apart from commission and discounts the lorry drivers and agents get materials on credit and the period of credit extends up to a week. But they sell the product generally for ready cash and so they get an opportunity to roll around Rs.18000 to Rs.24000 per week. This process will continue throughout the year. By using the money so obtained (Rs.18000 to 24000) many of the lorry drivers and agents make money by lending the amount at an interest rate varying from Rs.3 to Rs.5 per hundred rupees per week. So one can earn Rs.540 as interest for Rs.18000 for a week. Considering 40 active weeks for a year, they get minimum Rs.15000 per year without any investment on their part.

ln slack season private quarry owners employ their own agents in important centers of lorry route to canvas lorry drivers and through them sell their products.

5.3 SELLING PRICE IS ADJUSTED ABOVE THE COST OF PRODUCTION

Since all the products of a quarry are used for construction and for other decorative purposes there is high demand for all quarry products. Since all construction activities are highly planned in nature, consumers will find necessary provision for money to purchase quarry products.

Table 5.6 reveals that in the year 1994-95, quarry units made a profit of 4.05 per cent on their sales. From 1995-96 onwards, quarry units were working on loss, i.e. in 1995-96 loss accounted 1.62 per cent of their sales and for the next years, the respective figures were 4.8 per cent, 15.1 per cent 2.21 per cent and 16.58 per cent. In 1995-96 cost of production has increased by 6.4 per cent whereas selling price has increased by .48 per cent. For the subsequent years, the respective figures were 9.54 and 1.35, 23.83, and 3.23, 28.37 and 20.5 and 28.95 and 6.13 respectively.

Table 5.6

Table showing the cost of product and selling price of product per load for rubbles

Year	Cost of production	Cost of production index	Selling price	Selling price index	Profit / Loss	Percentage of profit / loss
1994-95	585.9	100	610.61	100	24.71	+4.05
1995-96	623.5	106.42	613.56	100.48	-9.94	-1.62
1996-97	649.81	109.54	619.87	101.35	29.94	-4.83
1997-98	725.52	123.83	630.34	103.23	-95.18	-15.1
1998-99	752.12	128.37	735.79	120.5	-16.33	-2.21
1999-2000	755.55	128.95	648.10	106.13	-107.44	-16.58

Source: Survey data.

The cost of production presented in Table 5.7 includes royalty and seigniorage also. On an average a quarry owner will get 5 lorry rubbles a day, hence for one week his production will be 30 lorry rubbles. For 30 lorry loads of rubbles, they will take royalty & seigniorage pass only

for 2 loads or 10 tonnes. For the remaining 28 loads, no royalty or seigniorage will be paid. Even though on load basis, they earn very little profit or suffer even loss yet on a total basis of 30 loads they make reasonable profit.

Table 5.7

Table showing individual cost per lorry load for various years

Particulars	1994-95 Rs	95-96 Rs	96-97 Rs	97-98 Rs	98-99 Rs	99-2000 Rs
Drilling	82.91	87.14	89.83	94.31	98.89	100.25
Blasting	40.80	43.83	44.95	48.79	50.76	51.72
Blasting man	11.03	11.93	13.43	15.28	15.76	15.93
Hammer man	67.33	72.03	78.50	84.52	88.72	87.76
Woman helper	66.53	68.97	73.43	76.14	80.07	82.07
Royalty	40.00	50.00	50.00	80.00	80.00	80.00
Seigniorage	103.60	110.80	112.00	119.20	121.20	121.20
Loading	125.17	125.83	131.50	146.90	152.41	151.10
Administration expenses	48.53	52.57	56.17	60.38	64.31	65.52
Total cost	585.90	623.50	649.81	725.52	752.12	755.55

Source: Survey data.

Blasting of 30 loads of rubbles will also provide four loads of 6" metal. For this extra loads of 6" metals, they need pay only labour charges and loading charges.

Table 5.8

Table showing cost of production of 6" metal for a load

Year	Labour Rs	Loading Rs	Total cost (Rs.)	Sales (Rs.)	Proft (Rs.)	Index of profit
1994-95	180	160	340	720	380	100
95-96	200	160	360	725	365	96.05
96-97	200	160	360	725	365	96.05
97-98	230	190	420	720	300	78.95
98-99	230	190	420	820	400	105.25
99-2000	250	190	440	700	260	68.42

Source: Survey data.

Table 5.8 reveals that sales of 6" metals realized profit during all the years under review. But the index of profit fluctuated. Compared with 1994-95 the index of profit has come down to 96.05 in 1995-96; 96.05, in 1996-97, 78.95, in 1997-98 and 68.42 in 1999-2000. In 1998-99 it increased to 105.25.

Per every 30 load of rubbles, the quarries get 4 units of ½" metal. Table 5.9 shows the cost of ½" metal for 4 units and the resultant profit.

In 1994-95 percentage of profit on sales was 32.18 and for the next four years it varied and were 19.68, 7.18, 30.45 and 12.27 respectively. In 1999-2000, it ended up in loss (20.63 per cent).

Table 5.9

Table showing cost of production of 1/2" metal for 4 units and the resultant profit

Year	Labour (Rs.)	Loading (Rs.)	Total cost (Rs.)	Sales (Rs.)	Profit /Loss (Rs.)	Percentage of profit /loss
1994-95	1600	570	2170	3200	1030	32.18
95-96	2000	570	2570	3200	630	19.68
96-97	2400	570	2970	3200	230	7.18
97-98	2400	660	3060	4400	1340	30.45
98-99	3200	660	3860	4400	540	12.27
99-2000	3200	660	3860	3200	660	-20.63

Source: Survey data.

From Table 5.9 we can understand that except for 1999-2000, ½" metal made profit. Even with a little loss on ½" metal, production has to be continued as otherwise is not, the fragments left will be a hindrance for further work.

As already mentioned, of the 30 loads of rubbles per week royalty and seigniorage is paid only for two loads.

Table 5.10

Table showing profit position from 28 loads on account of non-payment of royalty and seigniorage

Year	Cost of Production Rs	Association fee(Rs.)	Cost of sale (Rs.)	Sales (Rs.)	Profit (Rs.)	Total profit per 28 loads (Rs.)
1994-95	442.3	50	492.3	610.61	118.31	3312.68
95-96	462.7	50	512.7	613.56	100.86	2824.08
96-97	487.81	50	537.81	619.87	82.06	2297.68
97-98	526.32	50	576.32	630.24	54.02	1512.56
98-99	550.92	50	600.92	735.79	134.87	3776.36
99-2000	554.35	25	579.35	648.1	68.75	1925.00

Source: Survey data.

Table 5.11 shows the overall profits from all quarry products on weekly basis.

Table 5.11

Table showing profit from various quarry products/week

Year	Profit /Loss from 2 loads (Rs)	Profit from 28 loads (Rs)	Profits from 6" metal (Rs)	Profit/ Loss from ½ metal (Rs)	Total profit (Rs)	Profit index
1994-95	49.42	3312.68	1520	1030	5912.1	100
95-96	-19.88	2824.08	1460	630	4894.2	82.78
96-97	-59.88	2297.68	1460	230	3927.8	66.44
97-98	-190.36	1512.56	1200	1340	3862.2	65.32
98-99	-32.66	3776.36	1600	540	5883.70	99.51
99-2000	-214.88	1925.00	1040	-660	2090.12	35.31

Source: Survey data.

Table 5.11 shows that, all the quarry units made profit. But the profit during all years under consideration earned by the units is dwindilling.This is indicated by the fall in profit index.In 1995-96 profit index fell to 82.78 in 1996-97 to66.44;in1997-98 to 65.32 ; in 1998-99there was a slight increase and the index of profit increased to 99.59.But in 1999-2000 the index of profit fell to 35.31.

If the units pay royalty and seigniorage as per rules there will be very little profit from quarry business..

5.4 LABOUR

Labour is a very important factor in quarries irrespective of the level of mechanisation. In Thrissur district alone, on an average, 50,000 employees are working in the quarry sector. Of the labour force 25 to 30 per cent are from Tamil Nadu. Labour force is decreasing every year owing to various reasons.

Drilling is an important operation with respect to blasting. Drilling is to be done in proper, depth, width and space. Unless drilling is properly done, blasting will not be economical. To ensure proper drilling every quarry keeps one or two master drillers or "Assans" or "GURUs". One can become an Assan or Guru only by continuous training and long experience.

Labour turnover and absenteeism are major problems faced by owners in every quarry. After acquiring expertise or skills very often employees move from one quarry to another. Festivals, agricultural operations or higher remuneration in other sector are the causes of absenteeism.

Labour accounts about 80 per cent of the total cost of production expenses in a quarry. Table 5.12 shows the percentage share of cost accounted by different components in the total cost of production

Table 5.12

Percentage of various elements of cost to total cost of production for the years 1994-95 to 1999-2000 in Private sector

Year	Labour	Blasting	Royalty and Seigniorage	Total Cost
1994-95	86.5	6.2	7.3	100
1995-96	84.7	6.9	8.4	100
1996-97	85.2	6.7	8.1	100
1997-98	86.8	7.3	5.9	100
1998-99	86.3	7.6	6.1	100
1999-2000	86.9	7.7	5.4	100

Source: Survey data.

Table 5.12 shows that the percentage of labour cost to total cost remained more or less the same during the study period. In 1994-95 it was 86.5 per cent of the total cost. In the subsequent years it was 84.7 per cent, 85.2 per cent, 86.8 per cent, 86.3 per cent, and 86.9 per cent respectively.

In the co-op sector also labour constitutes the major component of total cost of production.

In the co-op sector quarry also the percentage of labour cost to total cost remained more or less the same as that of the private sector quarries. In 1994-95, it was 84.7 per cent. In the subsequent years it was 82.2, 81.9, 28.5, 79.5 and 78.5 per cent respectively.

Table 5.13

Percentage of various elements of cost on total cost from 1994-95 to 1999-2000 in Co-operative sector

Year	Expense on percent			
	Labour	Blasting	Royalty and Seigniorage	Total Cost
1994-95	84.7	4.8	10.5	100
95-96	82.2	6.6	11.2	100
96-97	81.9	6.7	11.4	100
97-98	78.5	9.8	11.7	100
98-99	79.5	9.1	11.4	100
99-2000	78.5	10.2	11.3	100

Source : Data collected from the annual reports from Anappara Karinkal Co-op Society.

Diagram 5.1 indicates the percentage of labour component to other components in the total cost for various years in private sector quarries.

Diagram 5.1

Percentage of labour component to other components in the total cost

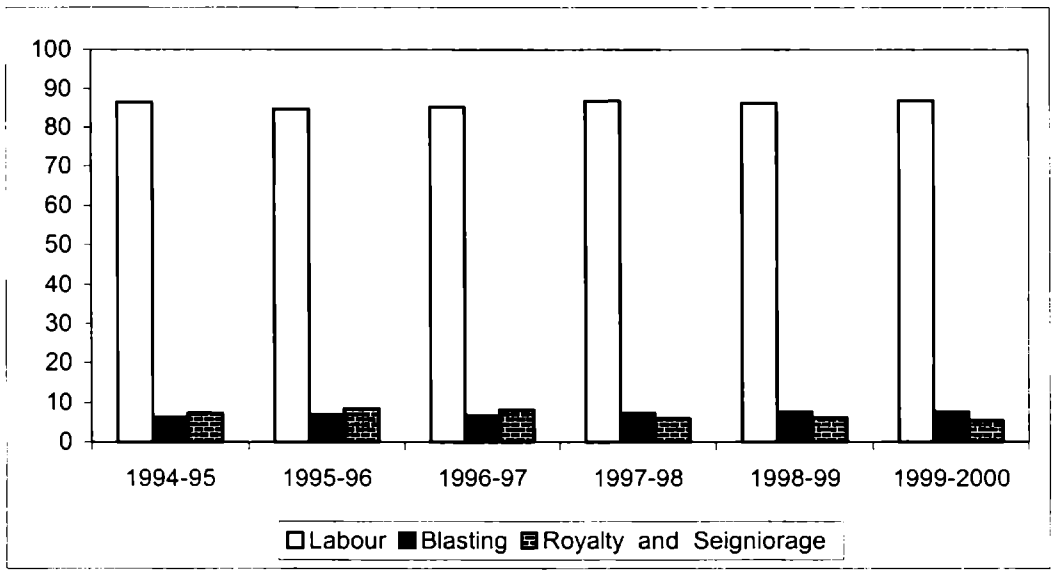
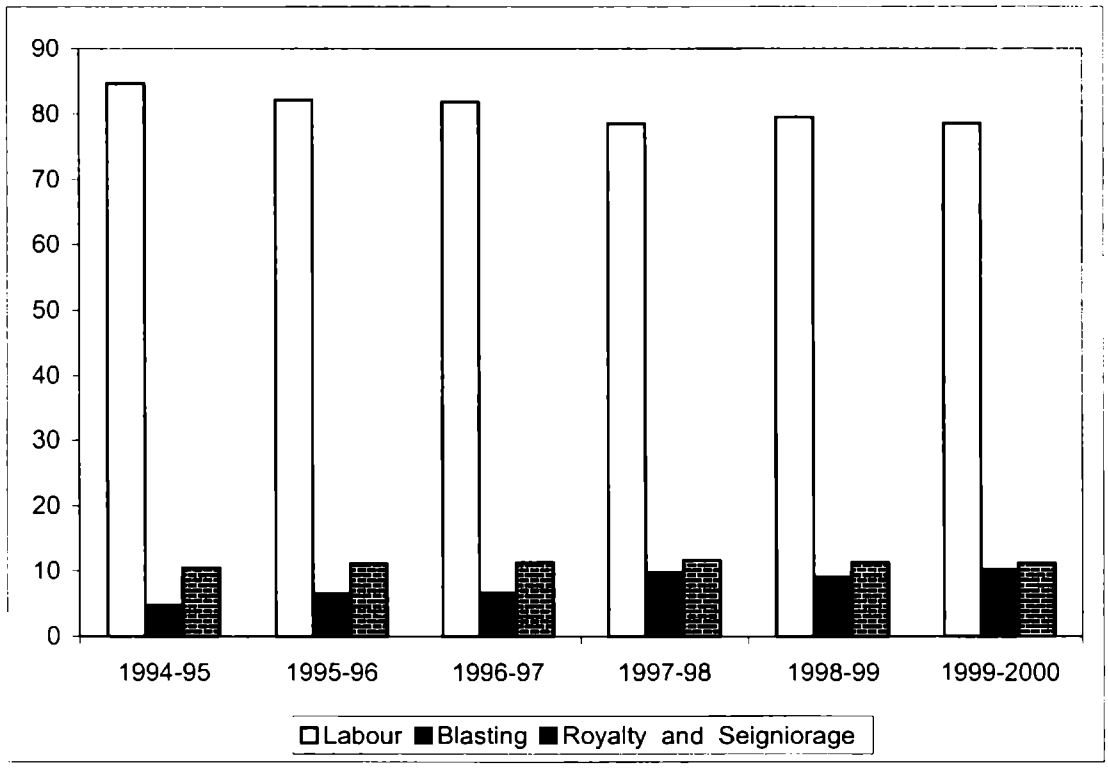


Diagram 5.2 shows the various percentages of cost of production for co-op sector for various years.

Diagram 5.2

Various percentages of cost of production for co-op sector for various years



From the diagrams it is clear that labour is an important factor in quarry industry. Hence it is a labour intensive industry. Since it is a labour intensive industry, labour turnover, absenteeism, disparities in wage structure in both sectors will create problems to both sectors.

5.5 SUB LEASING

Considering the multifarious problems connected with quarry production owners of quarries prefer to sub-lease quarries to subcontractors or employees. In the case of sub-lease all activities will be carried out by the sub-leaser, i.e. drilling, blasting, hammering, loading etc. Royalty, seigniorage and all other managerial expenses will be met by the quarry owner. For every lorry of rubbles and allied products, the sub-leaser will have to pay a fixed amount to the owners. Table 5.14 illustrates the amount payable by the sub-leaser to the owner.

Table 5.14

Table showing the amount paid by the sub-leaser for 1994-95 to 2000

In Private sector

Year	Rubbles (Rs)	6" Metals (Rs)	½"Metals (Rs)
1994-95	130	190	230
95-96	130	190	230
96-97	130	190	230
97-98	130	190	370
98-99	180	305	270
99-200	130	190	230

Source: Survey data.

From Table 5.14 it is clear that the sub-leaser has to pay Rs.130/- on each and every load of rubbles for the year 1994-95 to 1997-98. In

1997-98 the payment it was increased to Rs. 180/- and then in 1999-2000 it was brought down to Rs.130/- per load.

In the case of 6" metal the sub-leaser had to pay Rs 190/- per load during 1994-95 to 1997-98. In 1997-98 it was hiked to Rs.305/- and then in 1999-200 it was reduced to Rs.190/-

In the case of ½" metal, the sub-leaser had to pay Rs.230/- per load during the years 1994-95 to 1996-97. In 1997-98 it was increased to Rs.370/- per load. In 1998-99 it was brought down to Rs.270 and in 1999-2000, further reduced to Rs.230/- per load.

Table 5.15 shows the amount secured by the sub-leaser by selling various quarry products.

Table 5.15

Sub leaser's amount per lorry from1994-2000

Year	Rubbles (Rs)	6" metals (Rs)	½ " Metals (Rs)
1994-95	470	535	970
95-96	470	535	970
96-97	470	535	970
97-98	470	535	1520
98-99	620	630	1520
99-2000	470	535	970

Source: Survey data.

From Table 5.15 it can be seen that the sub-leaser realised the same amount in all the years starting from 1994-95 to 1999-2000 except during 1998-99. During 1998-99 they enhanced the price of raw materials. But they could not continue that price due to various reasons. The Table 5.16 shows the average profit received by the sub-leaser from Rubbles, 6" metals and ½" metals.

Table 5.16

Average profit of a sub-leaser from Rubbles during 1994-95 to 1999-2000

Year	Cost of production (Rs)	Amount Received (Rs)	Profit/Loss
1994-95	402.5	470	67.50
95-96	428.4	470	41.60
96-97	445	470	25.00
97-98	495	470	-25.00
98-99	505	620	115-10
99-2000	505	470	-35-00

Source: Survey data.

Table 5.17

Profit of a sub-leaser from 6" metal form 1994-95 to 1999-2000 per load

Year	Cost of production (Rs.)	Amount Received (Rs)	Profit/ Loss (Rs.)
1994-95	340	535	195
95-96	360	535	175
96-97	360	535	175
97-98	420	535	115
98-99	420	630	210
99-2000	440	510	70

Source: Survey data.

Table 5.18

Profit/Loss of a sub-leaser from ½ metal during 1994-95 to 1999-2000 per load

Year	Cost of production (Rs)	Amount Received	Profit / Loss
1994-95	790	970	180
95-96	940	970	30
96-97	1090	970	-120
97-98	1120	1520	400
98-99	1420	1520	100
99-2000	1420	970	-450

Source: Survey data.

Table 5.16 reveals that, in the case of rubbles, the sub-leaser earned profit in all the years except for the yea.r 1997-98 and 1999-2000. During these years 1997-98 and 1998-2000 the sub-leaser incurred a per load loss of Rs.25 and Rs.35 respectively. In the year 1995-96 and 1996-97, the profit fell down. In 1998-99 the sub-leaser earned a profit of Rs.115 per load, because of the high selling price of the product. In 1999-2000 he incurred a loss of Rs.35 per load but he continued operation as he could earn profit from 6" metals.

Analysis of Table 5.17 reveals that every year per load profit of 6" metal was coming down. In 1994-95 the profit was Rs.195 per load, and then it fell to Rs.175 during 1995-96 and 1996-97. The profit further declined to Rs.115 in 1997-98. During 1998-99 profit increased to Rs.210 but then touched the bottom during 1999-2000 (Rs.70 per load)

Table 5.18 reveals that earnings from ½" metal declined year by year. In 1994-95 it was Rs.180. It fell to Rs.30. in 1995-96 and then increased a loss of Rs.120 per load in 1996-97. In 1997-98 the situation was reversed and earned a profit of Rs.400 per load. But profit fell again to Rs.100 per load in the year 1998-99. In 1999-2000 the sub-leaser incurred a loss of Rs.450 per load.

Even though, profit from rubbles, 6" and ½" metals came down and even resulted in loss, the sub-leaser continued operations by compensating the loss by engaging himself and his wife continuously for six days in a week. That way he could earn Rs.340 per day (Rs.200+Rs.140). More over, he hopes to get a hike in price of all quarry products in the succeeding years. If he stops production of ½" metal on account of the loss, then, he has to face the problem of waste and waste removal. Hence, even if he incurs a little loss he has to continue production of ½" metals.

The problem of sub-leasing creates lot of problems to the management. Since sub-leasers have been active workers for long, it is difficult to eliminate them. In case of strikes and other problems the real owner has little control over the workers. The subleaser will exploit the quarries in the most unscientific manner, as they are interested to get maximum production within a limited time. He will not follow the rules and regulations, and if any consequences arise, burden will be shifted on to the actual owners. Further problems connected with royalty, seigniorage, blasting materials, environmental concerns, labour

problems, marketing problems etc. are to be handled by the owners. Conflicts often arise between quarry owner and the sub-leaser in handling such problems.

5.6 USE OF HIRED MACHINERY

The use of machinery is quite limited in both the co-operative and the private sector quarries. The only machinery used is Jack hammer. It is used to drill holes in the rocks. The private quarry owners do not generally purchase it because they are available on rental basis.

Since almost all the quarry sites are located closely, they can easily get the service of Jack hammer on rent. It is not economical to purchase a jack-hammer as the quarry owners generally own or occupy one to three acres of quarry only. The cost of a jackhammer varies between Rs.12 lakhs to Rs.15 lakhs. Moreover, several formalities are to be complied with in case they decide to buy one availing bank loan. The only difficulty that quarries face in not having own jack hammer is that they will forced to pay higher hiring charges during the peak seasons.

The co-operative sector owns jackhammer. But in peak season, they are forced to hire additional machinery from outside for which they have to pay high charges. For hiring machinery on higher rates the secretary has to get sanction from the president or the Board of directors. In private sector such formalities are not required for hiring machinery at higher rates.

5.7 ROYALTY

Royalty is the amount payable to the Mining and Geology Department for mining rocks. The existing rate of royalty is Rs.16 per tonne. Royalty has to be paid to the Department in advance. Quarry owners have to pay advance either for one month, or three months or the whole year. A lorry which can carry 5 tonnes of rubble, has to pay Rs.80 per load as royalty to the government. But by paying Rs.80 for each load, quarries cannot function profitably. If they really pay royalty and seigniorage as per regulations, the price of one load of rubble will be around 725 rupees. The existing price in 2000 was only Rs.625/- per load. This compels the quarry owners to evade royalty payments.

According to regulations transporting rubbles without proper documents about royalty payment and others is an offence. If a lorry carrying rubbles without proper documents is caught a minimum of Rs.5000/- can be imposed as penalty. To escape such a situation and other types of harassment from the side of various officials connected with mining, and law enforcement the Quarry Owners Association has to grease the palms of officials connected with mining and law enforcement. In addition the quarry owners association has to prevent "kanikka" during festivals like Onam, Vishu, X'mas etc.

5.8 SEIGNIORAGE

Seigniorage is the amount payable to the Government for the ownership of the land in which the quarry is located. In addition to the royalty, the owner has to pay Rs.150/- per load to the Govt. as

seigniorage in the forest quarries and Rs.20/- each in patta and porumbok quarries. In Trichur district, a large number of forest quarries are functioning in Kundukad area, Mangalliappara, Thaliampara, Kongampara, Erumapethy, Varavoor, Desamangalam, Peechi, Chalakkudi etc.

If the owners pay royalty and seigniorage according to the law, they cannot carry on the operations profitably. To make the operations feasible and profitable the owners come to an understanding. As per the understanding for every 30 loads they sell they pay seigniorage and royalty only for two. For the remaining 28 loads they pay @ Rs.20 to Rs.25 per load to the Forest Department as bribe to escape punishment.

Table 5.19 shows the income received by Govt. from Royalty and seigniorage.

Table 5.19

Income from Royalty and seigniorage from 1994-2000

Year	Royally and Seigwiorage	Lorry/ load	Unit	Week	Total Amount (Rs.)
1994-95	170	2	90	40	12,24000
95-96	190	2	90	40	13,75200
96-97	190	2	90	40	13,75200
97-98	230	2	90	40	16,57000
98-99	230	2	90	40	1657000
99-2000	230	2	90	40	1656000

Source: Survey data.

Table 5.19 reveals that from Thrissur district the Govt. got income to the tune of Rs.12,24,000 to Rs.16,56,000 every year between 1994-95

and 1999-2000 as royalty and seigniorage. But the government could have got several times of this income if the officials were honest. The amount that is evaded by owners is shown in Table 5.20.

Table 5.20

The amount of royalty and seigniorage evaded from 1994-95 to 1999-2000

Year	Royally and Seigniorage	Lorry/ load	Unit	Week	Total Amount
1994-95	170	28	90	40	171,36 000
95-96	190	28	90	40	191,52 000
96-97	190	28	90	40	191 52 000
97-98	230	28	90	40	231,84000
98-99	230	28	90	40	231,84000
99-2000	230	28	90	40	231 84 000

Source: Survey data.

Table 5.20 reveals that the Government has lost a total amount of Rs.12,49,92,000 as royalty and seigniorage during a period of six years starting from 1994-95 to 1999-2000 from Thrissur district alone. A sizeable share of this might have been received by officials of various departments as gratification.

5.9 EXPLOSIVES

Explosives like gunpowder, cape candles etc are needed to blast the rock. Of the 90 recognised and many unrecognised quarries working in Trichur district, only less than 10 units have licence to keep and use the explosives. Ninety per cent of the quarry owners do not have licence and they are blasting rock illegally. For that they have to bribe officials

connected with explosive department, police department, geology department etc. As most of the quarry owners do not have licence they will be forced to stop quarry activities in the event of some law and order problem, or bomb blasting in any part of the state or district. Table2.21 shows the loss of working days due to such incidents.

Table 5.21

Loss of working days connected with explosions

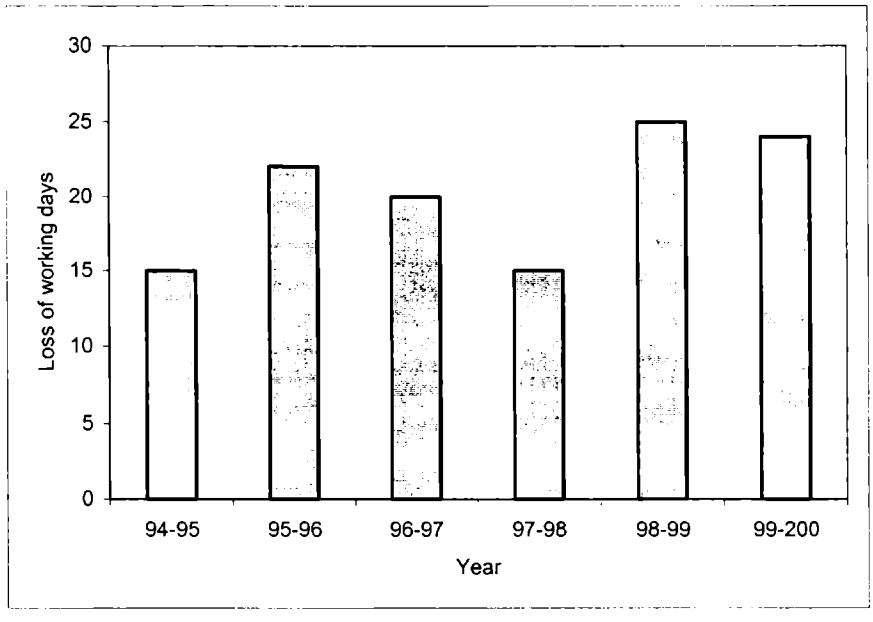
Year	94-95	95-96	96-97	97-98	98-99	99-200
Loss of working days	15	22	20	15	25	24

Source: Survey data.

From Table 5.21 one can understand the extent of loss of working days due to problems, which are not directly related to quarry operations. The above information is clarified in diagram 3.1.

Diagram 5.3

Loss of working days connected with explosions



A lot of procedural formalities are to be complied with to get the explosives licence. To get the explosives licence (they call it a magazine which means a highly secured, air tight strong building to store the explosive materials) one has to get a no-objection certificate from the Village Officer. Since majority of the quarries are functioning either in the forest or poramboku area, the village officer will not give N.O.C.

Those who hold patta land, have to get N.O.C from different officials such as village officer, Thahasildar, district collector, fire force department and police department, before approaching the Explosive Department located at Chennai. The process is so cumbersome and so persons possessing 50 cents to 3 acres of land prefer not to go for it.

Corruption at the bureaucratic level is so rampart in the Explosive Department at Chennai. Apart from this, the various departments connected with quarrying demand quarry products either free or at a nominal price for their kith and kin's construction activities.

5.10 POLLUTION, ENVIRONMENTAL AND ECOLOGICAL DEPARTMENTS

Since there are some problems connected with pollution, environment and ecology in quarrying the quarry owners, have to please the functionaries of these departments also. They make casual visits to the quarry sites and give suggestions relating to various aspects of operations.

5.11 QUARRY OWNERS' ASSOCIATION

There are quarry owners at state-wise, district-wise and locality-wise associations to deal with the problems connected with quarrying activities. The association deals with issues connected with labour, hiring of machinery, dealings with different departments such as police, Mining and Geology, Explosive, Forest, political problems, insurance, death of employees, contributions etc. For facilitating their functions the Association has units with 10 to 15 numbers in each area and they charge a fee for rendering such services. Table 5.22 shows collection of one quarry owner's association which comprises of 15 quarrying units.

Table 5.22

Collection for Quarry Owners Association for the year 1999-2000

Type of product	No: of Unit	Weekly Load	Collection per Load (Rs.)	Total Weekly Collection (Rs)	Yearly Collection (Rs) (40 weeks)
Rubble	15	450	20	9000	360000
6" Metals	15	60	20	1200	48000
½" Metal	15	15	20	300	12000
Total	65	525	60	10500	420000

Source: Survey data.

Table 5.22 reveals the income collected by a quarry owners association having 15 units. The Association has to meet various

expenses from the income collected from quarry units. Table 5.23 gives the amount spent by the Quarry Owners Association in 1999-2000.

Table 5.23

Amount spent annually by quarry owners for various expenses

Particulars of Expenses	Rs.
Salary	36,000-00
Accidental benefit	48 600-00
Contribution to various purpose	95,600-00
Management expenses	160,000-00
Office and Miscellaneous expenses	40,000-00
Balance	38,800-00
Total	4,20,000-00

Source: Survey data.

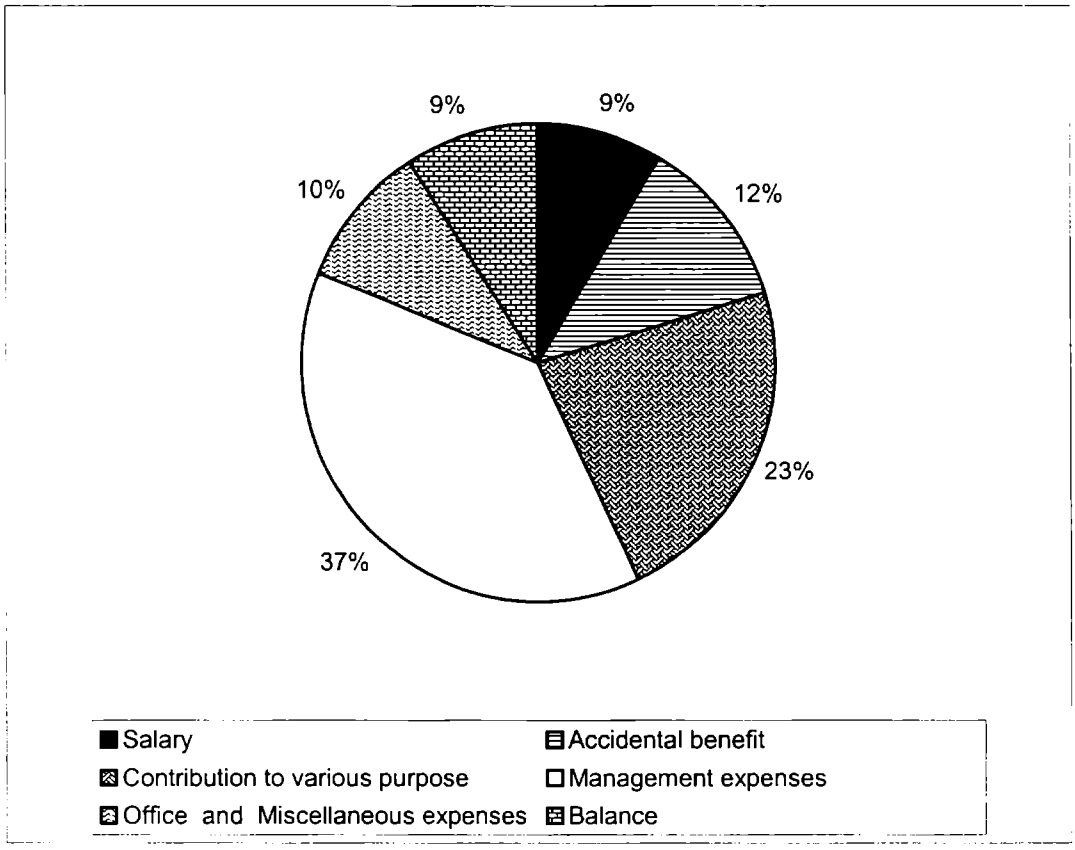
Table 5.23 lists the various expenses incurred by Quarry Owners Association in connection with operation of quarries falling within their purview. In a locality there are 10-15 quarry units under a Quarry Owners Association. All the selling procedures of materials are done through the association. The employee of an association will give a token to each lorry by collecting the sales amount. By producing the token the drivers can collect the materials from the quarry. The employee will settle the amount to the owners at the end of the day or the week. The employee of Quarry Owners Association is liable for all the transactions in connection with quarry products. Association spent Rs.48600/- as compensation to victims of accident during the course of quarrying. The Association paid Rs.95600/- as contribution to local temple, churches, political parties, soicial organisations and to

education and relief funds etc. Management expenses as well as office and miscellaneous expenses incurred accounted to Rs.2,00,000.

The information is represented with the help of a pie diagram.

Diagram 5.4

Amount spent by quarry owners for various expenses



5.12 ENVIRONMENTAL POLLUTION

Environment is defined as the dynamic interaction between the physical components and biotic elements. Human interference with nature causes climatic changes and sometimes modifies the physical components of nature itself.

Quarrying involves, opening large pits on the surface of the land and stripping of exposed rocks deposits for blasting. The depth of the pit and other operations mostly depend on the value of mineral deposits and the operations often involve complete or partial mechanisation. These activities cause a notable impact on environment. The general nature of environmental problems connected with granite quarries are:

(a) Land degradations.

(b) Noise Pollution

(c) Air Pollution

(d) Water Pollution

(e) Health impacts

5.12.1 Land degradation

In general quarrying of granites in the hill areas does not produce considerable land degradation. Since most of the high tracts are barren or support very thin cover of vegetation like shrubs and bushes, the known damage to the land is only minimum. But when quarrying activities spread to agricultural lands (Patta) or forests that makes serious problems such as degradation of land or destruction of forests.

5.12.2 Noise Pollution:

Use of jack hammers, heavy-duty handling equipments like poclain, Dozers, cranes and dumpers and blasting can arise pollution near and at the site of granite quarrying.

Noise and dust arising out of Jack hammer drilling and crushing of stones are deafening and continuous while that of blasting is only for a short period. Loud noise, above the maximum permissible limits, even for a short duration, has adverse effects on human health and often impair hearing ability.

5.12.3 Accumulation of waste rocks

Twenty to thirty-five per cent waste occur in quarrying granite. These wastes are heaped in and around the quarries and that create serious environmental problems.

5.13 FORMING BIG PITS

Granite quarries leave big sears on the landscape and they cause serious problems. During rainy season, the pits get filled with water and as there is no fencing arrangement around the pits. Such pits become death traps of human and animal life. Thirty-six deaths were reported in Trichur district from such pits during the last 10 years.

5.14 LACK OF UNIFORM LEASING POLICY ON GRANITE QUARRIES

The State Govt. are reluctant to grant long-term mining leases to the owners of granite quarrying. The leases are renewed year by year or granted to a maximum of 10 years only. In countries like Brazil and South Korea, the lease period is as long as 40 to 50 years. Uncertainty in leasing naturally retards investments, and results in hasty quarrying. The quarry leaser should be granted a minimum period of 15 to 20 years to develop a quarry.

5.15 UNSCIENTIFIC METHODS OF QUARRYING SELECTION AND EXPLOITATION RESULT IN POOR RECOVERY IN QUARRIES.

In the planning stage normally nobody consults any one or more of the expert bodies such as Mining and Geology Department, Geological Survey of India, CESS authorities or expert geologists. As a result, several of the granite quarries fail owing to holes, low textures, lines, excessive quarts etc. Only through scientific methods of quarrying such failures can be avoided. The advantage of scientific quarrying are many. Some of which are mentioned below:-

Environmental conditions under which the stone is laid has to be carefully studied. Example, in case of cladding and paving, whether the application of the stone is on the exterior of interior can be found only by scientific methods.

Among varying technical characteristics are chemical composition, porosity, frost resistance, resistance to wear, the coefficient of thermal expansion, shock and buckling resistance and so on. The stone may be exceptionally good, in one or two characteristics and poor in others. This knowledge is very essential to make use of stone properly. For example a stone having exceptionally poor coefficient of thermal expansion, and good buckling and shock resistance is ideal for application in fire places, machine shops etc.

A stone has to be set in combination with other stones, or with other materials such as wood concrete, glass or any other synthetic

substances. In such cases, compatibility in technical qualities of the materials used is essential with uniform wear and tear resistance.

Hence the misconception that all stones are suitable for all application centres, leads to mismatch between the stone selected and the application area where it is used. To know about, it the management has to consult experts before excavating rocks.

5.16 UNETHICAL PRACTICE OF QUOTING LOW RATES BY BUSINESS MEN TO COUNTER THE ACUTE COMPETITION.

To attract customers specially in slack seasons owners have a tendency to quote lower rates for their products. Owners who do not pay royalty and seigniorage either fully or partially can sell their products at lower rates than those who pay. Other factors that prompt owners to offer products at low prices are:

- Attracting customers.
- Distance of quarry.
- Self-employment of owners and their family members in quarries.
- Quality of the rock.

Table 5.24 gives selling prices of different quarry products during 1999-2000.

Table 5.24

The table showing the selling prices of Rubbles from 1999-2000 for private quarry

Selling price (Rs)	No. of quarry
575	5
600	8
610	4
620	11
630	2
	30

Source: Survey data.

From Table 5.24 it is clear that different quarry owners are selling rubbles at different prices. The price varies from Rs.575 to Rs.630 per load. Price war among the quarry owners attracts customers to those quarries which offer the lowest price.

Table 5.25 shows the difference of prices in 6" metals and ½ " metals in private quarry sector.

Table 5.25

Price of 6" metals per load in different quarries (1999 2000)

Price (Rs)	No: of units quarry
700	5
725	8
740	4
750	13
Total	30

Source: Survey data.

Table 5.26 shows that price of 6" metal per load varied from Rs.700 to Rs.750 during 1999-2000.

Table shows price of ½ " metals indifferent quarries in private sector.

Table 5.26

Selling price of ½ metal in different quarries in 1999-2000

Price per unit (Rs)	No: of units quarry
950	8
960	11
970	8
980	3
Total	30

Source: Survey data.

5.17 MALPRACTICES OF LORRY DRIVERS

The capacity of a lorry carrying quarry products generally varies from 1.5 cubic unit to 2 cubic units. But consumers do not have much knowledge about this. The drivers pay price according to the loading capacity only. But while selling the same to consumers, they inflate the measurement and thereby charge a higher price. For example, a lorry having a capacity of 1.5 cubic unit, will have to pay Rs. 1350/- per load for ½ " metal; (1.5x 900) to the quarry owner. But the same will be sold to the final consumers as 1.7 cubic unit at price of Rs.1530. (1.7 x 900).

Drivers do the same trick in the case of 6" metals and boulders also. These kind of unethical practices of drivers often affect the goodwill of the quarry owners also.

The above practice of lorry drivers is seldom resorted to in the co-operative society. This is because, they issue sales bill describing the measurement of the body of the lorry and the selling price of the product.

Condition of roads to quarries are extremely poor. It is nobody's responsibility to maintain such roads. Quarries are generally situated away from tarred roads. Conditions of country roads are very poor. Frequent running of carriers make conditions bad to worse. To transport materials, most of the owners have to depend on other lorry owners and that also create some problems.

People near the quarries are against the fast running of lorries. Lorry drivers in their haste to make maximum number of trips, run lorries so fast, resulting in many accidents. They also make conditions of the tarred roads worse by carrying excessive loads. It is estimated that in every quarry belt, lorries make more than 500 trips every day. The PWD tarred roads cannot bear this much of traffic.

5.18 STRUCTURE OF THE QUARRY

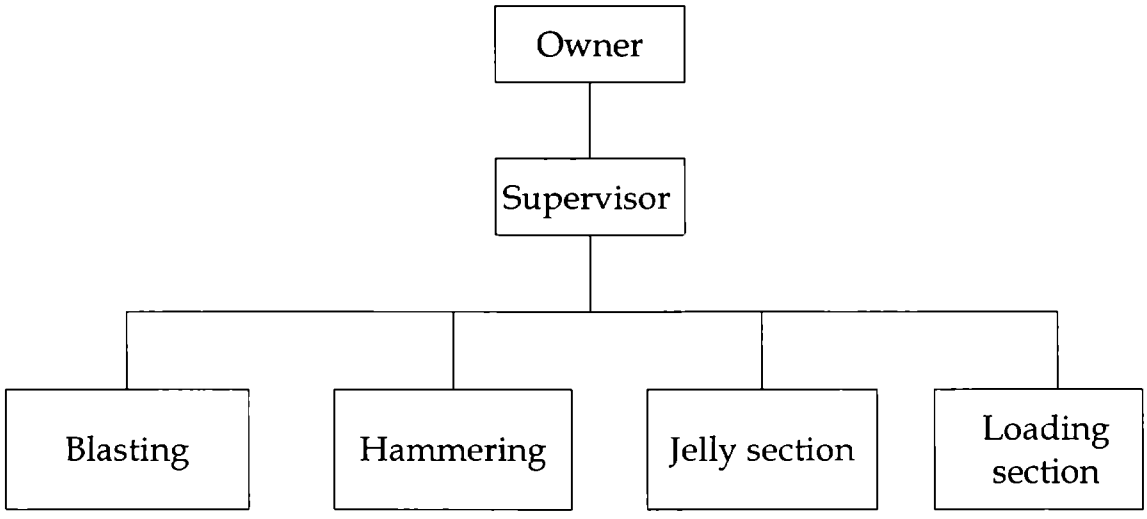
Some times the structure of the quarry creates difficulties. Owners do not make much investment in private quarries. This is largely

because of the fact that quarries are working in encroached areas and so fear of eviction is always there in the minds of the operators.

The structure of a private quarry is given below:

Diagram 5.5

Structure of a private quarry



All decisions in connection with the operation of a quarry will have to be make by the owner himself. If some thing goes wrong he will face dire consequences.

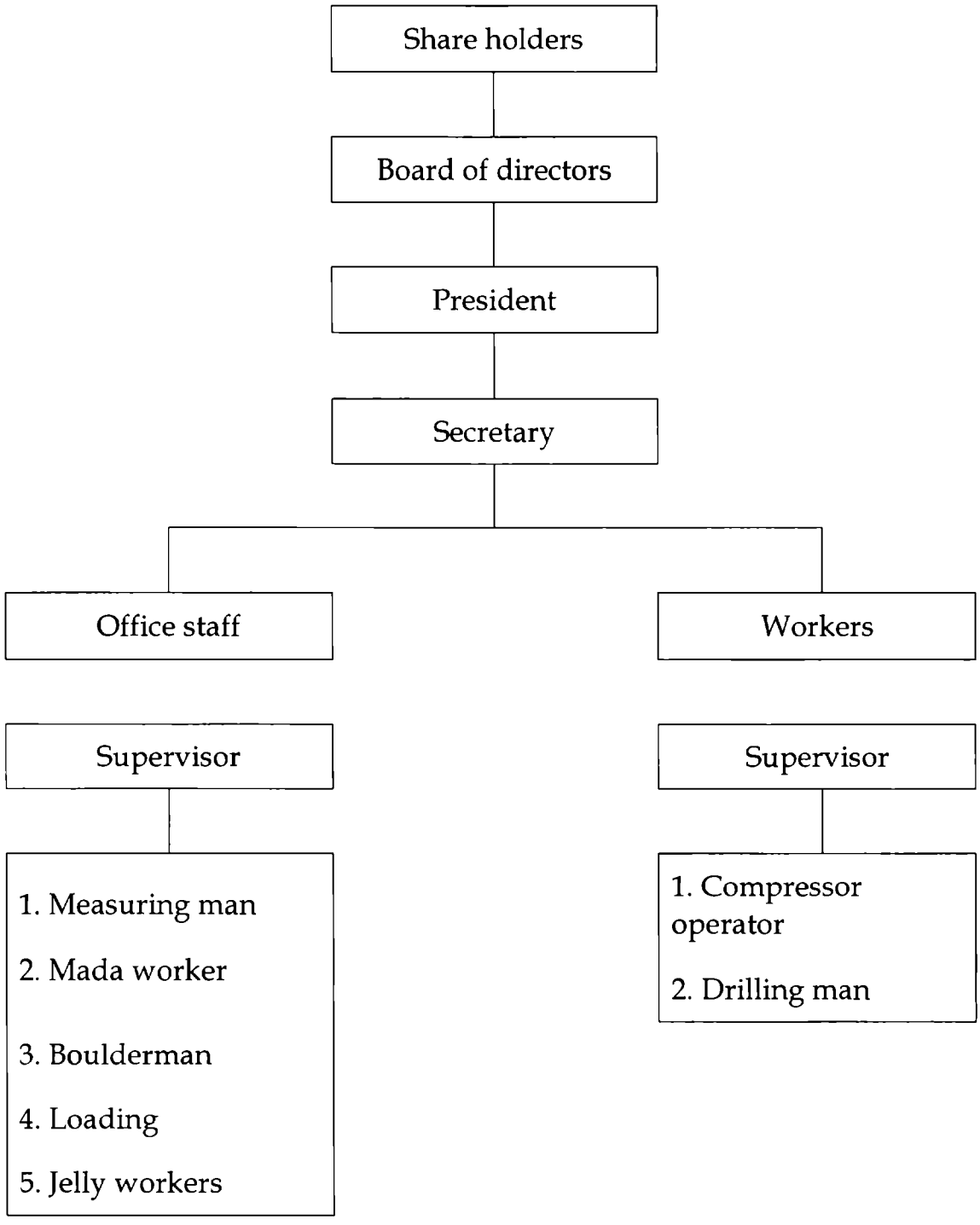
5.18.1 Structure of Co-operative sector

There is only one quarry in Trichur district operating under the co-operative sector. The society is called "Anappara Karinkal Thozhilali Co-Operative Society". This was started initially as a private quarry. But intermittent problems occurring in the operation of the quarry the owner was forced to quit the field. Then the employees of the quarry formed a Co-Operative society and got it registered on 14-5-1959. After

the formation of the society, it invested Rs.10 lakhs to purchase new areas of rock land to rejuvenate the functioning of the quarry.

Diagram 5.6 shows the structure of the Co-Operative society.

Diagram 5.6



The Co-operative Society functions on the line and staff model. Line people converts rocks into various quarry products like, boulders, 6" and, ½" metals etc. While staff helps the line people for the smooth functioning of the quarry.

All the line people in the society are also members of the society. They elect their representatives to the Board which manages the society. From the Board members, they elect the president, the secretary and the other staff.

The system has its advantages as well as also drawbacks. Since decisions are to be taken at a meeting of the Board of Directors, matters demanding immediate action are often delayed.

5.19 INSURANCE

Private quarry owners generally do not take accident insurance for their employees. They are of the opinion that if they take accident insurance coverage for their employees, they are not sure that the employees will remain in their quarry even for an year. In the present context, if any accident happens, the concerned quarry owner and the Quarry Owner's Association help the employee. But the help is very nominal and for a short period only. So in private quarries, employees, themselves take accident coverage insurance ranging from Rs.5000/- to Rs 50,000/-

In the Co-operative Society, all the employees working in the quarry are insured by the Society up to Rs:- 50,000/- and the premium is paid by the Society itself.

5.20 POLITICAL PROBLEM

Quarry industry is labour-intensive in nature. The people of Kerala, irrespective of income, literacy, or employment, are highly political-oriented. So people working in quarries, join trade unions like, INTUC, CITU, AITUC, BMS etc. Any unrest in the political field, automatically affects the working conditions of the quarry also. Another interesting thing noted is that if any problem affects the activities of the quarry, the trade unions will join together to solve it.

5.21 SAND MINING

Mining of sand from the banks of rivers is prohibited by the Kerala Government for environmental reasons. Almost all works, which need rock also require sand. Consequenly restrictions on sand mining has adversely affected the sales of quarry products. It also affected the income-generation capacity among the working force. It has adverse impacts on other sectors of the economy also.

5.22 DECLINE OF PRICES OF AGRICULTURAL COMMODITIES

For the last five years, Kerala's economy has been greatly affected by the fall in prices of agricultural commodities. The prices of rubber, coconut, tea, coffee, paddy, cashew, cocoa, pepper, etc. declined by 50 to 75 per cent. Consequently, producers fail to realize even the cost of production of these crops. This has adversely affected construction

activities in the state. Regular agricultural activities are also stopped to a great extent. Constant decline of prices of agricultural commodities resulted in considerable reduction in income of all those who are associated with agricultural activities. This, in turn, affected quarry operations also.

5.23 CONCLUSION

The above analysis leads to the following conclusions.

(1) The quarries are not operated on scientific lines.

(2) Quarry owners have to interface with several agencies for operating quarries. But these agencies are notorious for corruption.

(3) Many of the quarries are operated on encroached lands. So over exploitation of the quarries take place.

(4) Labourers working in quarries does not have any training.

(5) Most of the quarry operators do not have explosives licence.

(6) Royalty and seigniorage are very high. So large-scale evasion is there with respect to payment of both these.

(7) Quarries causes certain environmental problems

(8) Quarries are not scientifically selected.

(9) Owners of private quarries do not provide insurance cover to their employees.

(10) Private quarries do not extend any kind of social security benefits to their employees.

SECTION B

Demand And Supply of Granite Products

5.24 DEMANDS FOR GRANITE PRODUCTS IN KERALA

Demand for granite products has a tendency to increase. New products processed out of granite and new uses found for granite are the reasons for this. Hence an attempt is made to examine the rate of increase in demand. Demand for granite can broadly be classified into two categories viz., existing demand and new demand.

Regular demand for granite emenates from the repair of existing roads, railway tracks, air ports, buildings, sea walls etc. The demand on account of this will be enormous where one takes into consideration the number of panchayat roads, corporation roads, K.S.E.B. roads, forest roads, state high ways, national high ways, long stretch of costal belt, ports and the railways. New demands emerges from the following sources:

5.24.1 Doubling of Railway Track

Total length of the railway line in Kerala is estimated to be 1119 Km. This falls under three divisions viz. the Trivandrum division, the Madurai and the Palghat. The Trivandrum division has a length of 625 Km of which broad gage line accounts 624 km and the metre gage one kilometer metre. Of the 625 km of railway line 125 km constitute double

line. The remaining 500 km have to be doubled. Under the Madurai division, 111 km of line fall within the boundaries of Kerala and all of which form metregage. This have to be doubled and converted into broad gage lines. The Palghat division 383 km length of which 377 km were constitute to broad gage line and the rest (6 km) in meter. Double line is only 72km and the rest of it have to be converted into double line. In addition to the above, a new railway line is proposed from Kottayam to Sabarimala covering a distance of more than 112 Km. Table 5.40 shows the position of railway lines in Kerala.

Table 5.27
Table showing the coverage of Railways as on 31.3.2000

Division	Broadgage in Km	Metergage in Km	Total Km	To be doubled
Thiruvananthapuram	624	1	625	500
Madurai	-	111	111	111
Palghat	377	6	383	305
Proposed Sabarimala project	-	-	-	112

Source: Economics review, Kerala 2000, State Planning Board, Thiruvanathapuram.

5.24.2 Construction of New Houses

Kerala's population is 328 lakhs in 2001. Family size in Kerala is 5.3 in 1991. It is estimated that by 2001 15.94 lakh houses will be needed as against the existing number of 8.74 lakh houses. People in Kerala prefer individual houses to flat type houses. If this tendency continues the housing requirements may go up to 25 lakhs. Assuming that a small house needs 50 tonnes of granite 16,26,000 additionally houses will require a total of 81,300,000 tonnes of granite.

5.24.3 Construction of New State Express Highway

The govt. of Kerala has a proposal to construct a new express highway from Kasargod to Thiruvananthapuram covering a distance of 623 km. The requirements of completing one kilometre of express highway are shown in table 5.41

Table 5.28

Table showing required quantity to cover 1km of express highway

Size	Square quantity in MB	Lorry basis
Boulder	1000	200
36mm	1000	200
24mm	320	64
12mm	220	44
6m	90	18
Total	2630	526

Source: Data collected from N.H way Govt. contractors.

On the basis of the information provided in table 5.41 construction of 623 km of express highway will require (526 x 623) total of granite. This will be equivalent to 3,27,698 tonnes of granite

5.24.4 New National Highway, PWD roads, Panchayat, Municipal Corporation roads, bridges & culverts:

Kerala has a net work of 123889 km roads as on 31.3.2000. It accounts for 4.13 per cent of the total road length of the country.

Out of the 123889 km total road length, 81790 km are maintained by panchayats (66 per cent), 21731km (17.54 per cent) by State PWD. 11373 km (9.2 per cent) by corporations and municipalities. 1560 km

(1.26 per cent by national highways, 3798 km (3 per cent by irrigation department, 3456 km (2.8 per cent) by forest department and 18 km (0.15 per cent by K.S.E.B.

Total length of National Highways in the state during 99-2000 was 1560 Km. This constitute only 2.7 per cent of the total National Highways of the country. During this period Kollam Theni road covering a distance of 148Km was declared as N.H. Moreover, there is a proposal to convert some ports of national highways into four line roads. N.H. from Thiruvananthapuram to Chertalai and Alwaye to Thrissur. The Govt. of India has also declared to construct 7 line road from Cochin to Selam called "golden quadrilateral" project of Prime Minister.

5.24.5 Expansion of the existing Airports

Kerala has three airports. One in Thiruvananthapuram, one in Nedumbassery and one in Calicut. In addition there is a naval airport in Cochi. The maintenance of these units require 10,000 tonnes of granite and for expansion, 1,00,000 tonnes of granite.

5.24.6 Construction of Over bridges to avoid conjunction of traffic

Within the next 25 years Kerala will need 75 over bridges in different districts to control the increasing traffic problems. For each over bridge it requires a total of 10,000 tonnes of granite. Hence the total demand will come to 750000 tonnes.

5.24.7 New industrial ventures, Educational institutions, hospitals, hotel complex etc:

Within the next 25 years demand for new constructions in the fields mentioned above would require very large quantities of granite.

5.25 NEW USES OF GRANITE

In addition to the traditional demand and the new demand for different types of construction work granite will be required for value added process. CHARNOCKITE, which is harder than black granite is in high demand if value-added products are added. The following are the value added products of granite.

(a) slabs

(b) panels

(c) tiles

(d) monuments

(e) pen stand, flower vase, table tops, teapoys etc.

(f) high precision products like surface plates for engineering applications.

(g) Parelels, cubes, straight edges, measuring prisms, and other meteorological aids.

In addition to the above mentioned demands, there is a large variety of demands for stone. But one can make only a rough estimate

of the future demand, which may be higher or lower than the actual demands. The Indian granites have also secured a niche in the world market because of their welcome characteristics.

Indian granites are well placed by international standards in terms of polish and cuttings. They enjoy a place in the world market due to their larger variety and colour. Due to the above, the demand may go up by 100 times than the existing demand.

5.26 SUPPLY OF GRANITES:

Stones can be found any where, even in the sea. The relevant question is the availability and the cost associated with it. There is no accurate estimate either by the Geological Survey of India or the Mining and Geology Department of Kerala regarding the availability of granite in Kerala. They have identified quarries working throughout the length & breadth of the state. But they do not even have a quarry map either district-wise or state wise. The researcher had discussions with Dr. P.K. Thampi, Scientist, CESS, Thiruvandapuram, who opined, that there were no scientific studies so far conducted regarding the availability of stone. He also noted that almost all the Western ghats and similar places have full deposits of this rich mineral. He also added that these minerals can be exploited by the coming generations with out limit. But the researcher holds the view that granite supply will be legally exhausted very soon.

The term legal is very important in this context. This is because mere existence of granite will not ensure supply. In order to own and

exploit a quarry one needs clearance from four governmental bodies. So estimateion of reserves of granite on a regional scale has no relevance. Only individual deposits or areas are to be assessed. Even here the estimation of reserves cannot be done straight away by measuring the two dimensions and multiplying the assumed depth of persistence as in the use of other major mineral deposits. To analyse the actual availability and supply of granite the following factors are to be examined.

5.26.1 High density of population

Kerala is a highly populated state in India. To start a new quarry or a new crushing unit, a minimum of four different government departments are to be approached for sanction. Since a quarry should be at least 500 metres away from the dwelling areas it will be extremely difficult to find such areas in Kerala.

If such areas are found, that will be away from accessible areas, and hence cost of transportation will be very high. Such areas may found only in the forest region. To get sanction to operate a new quarry is not at all possible in such an area. Moreover the existing forest area quarryies are not at all eco-friendly. Operations of quarries in the forest area ultimately results in clearing or destroying the forest..

5.26.2 Vegetational coverage of Kerala:

Kerala is primarily an agricultural state with different kinds of vegetational crops. Moreover, Kerala is very beautiful to see, that is

why it is called gods own country". Even though high deposits of granites are found in low-land and high-land areas of Kerala, exploitation becomes very difficult due to its vegetational coverage.

From table 5.45 it is clear that total land distributed in Kerala is 3885497 hectors. Of the total land, 1081509 ha consists with forest area and that cannot be used for any other purpose. Barren and uncultivable land consists of 28341 hectors. A sizeable part of this is converted into roads or farm parts of poramboku land. Pastural and other grazing land which cannot be used for quarrying purposes due to ecological reasons.

Table 5.29

Classification of area in Kerala (District-wise 1998-99)

(In hect.)

District	Geogra-phical area	Forest	Land put to non agril. uses	Barren & uncultivable land	Permanent pastural & other grazing land	Land under tree crops	Cultivable waste	Fallow other than current fallow	Current fallow	Net area sown	Area sown more than once	Total cropped area
Thiruvananthapuram	218600	49861	20392	433	8	60	326	472	741	146207	50931	19713
Kollam	251838	81438	21060	277	8	241	652	957	2754	144411	67927	21238
Pathanamthitta	268750	155214	14838	429	10	80	193	321	3591	94075	15424	109498
Alappuzha	136058	-	22606	179	1	169	3477	2426	5074	102122	33296	135422
Kottayam	219550	8141	23077	1376	2	129	1874	2625	4924	177409	39382	216784
Idukki	514962	260907	14671	4251	257	6198	7799	461	1828	218502	28940	247536
Ernakulam	235319	8123	34510	905	26	424	3506	3726	4527	179529	42887	222459
Thrissur	299390	103619	27377	296	46	622	2807	3209	7450	153913	32448	186412
Palakkad	438980	136257	43704	3037	72	3660	13602	9326	10986	218337	91701	310037
Malappuram	363230	103417	31613	2541	14	1192	5672	2427	12357	203943	42333	246330
Kozhikode	233330	41386	22465	1344	24	678	709	650	2557	163511	64053	227570
Wayanad	212560	78787	10600	356	67	1033	1872	1136	2564	116142	78925	195070
Kannur	296797	48734	28553	3798	83	1990	5335	1449	3175	203680	67307	270987
Kasargod	196133	5625	18256	9119	64	3724	14886	2352	5494	136612	2277	138890
State	3885497	1081509	333822	28341	682	20200	62710	31537	68022	2258674	657831	2916505

Source: Farm guide 2001, Farm Information Bureau, Government of Kerala.

5.26.3 Presence of cash crops in Kerala:

More than 80 per cent of the high-land area (hilly areas other than forest areas) are covered by cash crops like rubber, tea, coffee, cardamom, cocoo, cashew, plantation etc. In these areas quite a large number of employees are also working. But to start a new quarry in this area is not at all possible because of these plantations.

5.26.4 High labour cost:

In Kerala labour force is coming down and the labour cost is increasing. An average male worker is able to earn Rs. 150 per day and a woman worker, Rs. 100 per day. In the nieghbouring States like Tamil Nadu and Karnataka the respective wages are Rs.100 and Rs.50 per day. As a result Kerala's quarry products cost higher than those of her neighbouring states.

5.26.5 Environmental Hazards

A large number of procedures are to be followed to start a quarry. The village officer, thahasildar, district collector, fire force department, mining and geology department, explosives department and pollution control board etc. are to be approached for this purpose. All these involves complicated procedures and hence are usually avoided. In Kerala 80 per cent of the non-mechanised quarries are working, without proper license or certificate.

5.26.6 Physiograpy of the area

The shape of Kerala resembles a scalane triangle with its base on the long cost(560km) and its apex on the western ghats. The width of the State ranges from a minimum of 11km to a maxium of 124 km. Table 5.46 shows the physiography of Kerala.

Table 5.30
Table shows the physiography of Kerala

Elevation in metres	Unit	Area percentage
0-10	Costal plain and lagoons	16.4
10-300	Low lands	54.17
300-600	mid lands	8.44
600-1800	High lands	20.35
>1800	Mountain peaks	0.64

Source: Geography of Kerala, published by Geological Survey of India. Bangalore 1999.

In all the above area one can find rocks, but due to reasons of vegetational coverage, plantation crops, forest areas, one cannot extract granite from all the places. Moreover, rocks of many of these areas are not suitable for industrial or commercial purposes due to the following reasons:

(a) moles (segregations of dusker minerals or inclusions)

(b) green lines or streaks (due to alteration of pyroxens in to chlorite)

(c) flowers (Concentration of quartz)

(d) introduction of secondary minerals (quarts, zeolites, etc.)

(e) pitted surfaces (due to the removal of soft micas)

(f) hair line cracks(developed due to refusal tectonic disturbances or due to blasting defects.)

(g) cracks

(h) pyrite

5.26.7 Structural features

The important structural features affecting commercial granites are faults, joints and weathering. While selecting an area for quarrying, it is essential to examine the tectonic disturbances of quartz, veins, chlorite veins etc. To get rocks free from all these, is very difficult.

5.26.8 Variables in colour, grains and size

Rocks of different areas or from the same area may differ in size quality, grain etc. Generally the granites of India, especially South India range from medium based to very hard varieties. The granites of South India are said to be two times harder than similar rocks of South Africa or Italy, due to the percentage of quartz, grain-size of quartz, hardness and abrasion resistance.(which is a measure of the stones resistance to wear). Due to these, crushing process is comparatively difficult and will cause extension wear and tear to the machinery.

5.26.9 Sufficient space for dumping rejects of quarry

To develop a quarry, large scale removal of the upper layer of the rock known as the rejects of the quarry or wastage is necessary. Besides large scale removal of earth is also necessary. To dump all these

wastage sufficient space must be found. In addition to the above, if any unsold stock of metal or sand powder remains, sufficient storing place shall also be provided. In non-mechanised industry, the land area will be only between 1/2 acre to 3 acre, in which storing is very difficult. Normal recovery of the quarry is 70 to 80 per cent and the remaining wastage has to be dumped in appropriate places.

5.26.10 Tendency of mechanisation

Mechanisation is highly possible in stone industry. But for the existing industry full mechanisation is not possible and that will result in large scale unemployment and conveyance problems. Moreover, crushing industries are interested in 1/2" metal, baby metal in supplying and sand powder. If there is too much mechanisation, there may be a shortage of rubbles and other large size metal.

5.27 Demand and supply of granite products in future

There are sufficient supply and demand for granite products in future also. But supply may be legally exhausted due to the reasons of high density of population, vegetational coverage, high labour cost, environmental hazards, physiological reasons, structural features, variables in colour, grains and size, lack of sufficient space for dumping rejects of quarry, tendency of mechanisation etc. The table shows the demand and supply of granite products of Kerala.

Table 5.31
Supply and demand of granite in Kerala (in lakh tonne) for various years

Year	Supply	Demand
1987	39.00	15.00
1988	38.70	16.00
1989	38.00	18.40
1990	37.33	18.80
1991	36.60	18.96
1992	35.50	19.35
1993	35.00	20.90
1994	34.60	21.00
1995	33.96	20.58
1996	33.29	21.00
1997	32.64	21.30
1998	32.00	22.00
1999	31.20	22.20
2000	30.60	23.00
2001	30.00	23.66

Source: Survey data.

Table reveals that in every year there is sufficient supply, but the rate of supply is reducing due to various reasons mentioned above. The actual supply is much higher than mentioned in Table 5.31. But all these deposits are not possible for commercial uses. The demand is increasing due to construction activities.

3.28 CONCLUSION

Hence the speed with which the consumption of granite is increasing, and the speed with which legal restrictions are increasing invariably will result in the downfall of the industry. (This has happened in the case of clay and sand). No new product to replace

granite is available in the immediate future. The cost element like labour and transportation will hike up the prices of granite. Other hindrance factors of supply like high density population, vegetational coverage, presence of cash crops, high labour cost, environmental hazards, physiographical features, structural features variations of colour and grain size, possible extent of mechanisation, lack of sufficient space for dumping wastage etc, will restrict the functioning of new quarries. This will result in transporting granite products from Tamnil Nadu and Karnataka, as many of the supply hindrance factors do not exist in these States. They have natural stones situated in non-living areas which can be extracted in another 1000 years. Thus many other products like rice, vegetable, chicken, sheep, buffalo, etc one more product will be found inter-state transport list of Kerala due to the legal restrictions. Besides, the geographical features of Kerala are highly favourable for its carrying.

There is sufficient demand and supply of granite products. But supply may be regally exhausted due to various constraints. Hence, we have to concentrate on value added products of our granite. In connection with this our neighbouring state Tamil Nadu, already implemented several noteworthy measures. In 1978, Tamil Nadu Minerals Limited was incorporated to exploit minerals including granite in a scientific way. In 1986, TAMIN Granites, a 100 per cent export oriented factory was setup. This factory is reported to be the second largest factory of its kind in Asia.

Japanese developed another technology a honey combed 4 mm granite slab (combined with aluminum foil) which is as strong as equivalent size granite slab of 20 mm thickness. Italy, Japan and France are the leaders of manufacturer of machineries, tools, consumables etc. for granite industries and possesses high technology and fabrication know-how. Further, Italy is the world centre for stones. India can join hands with these countries to develop valued added products.

CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

Man has recognised the utility of stone from the early days of his existence. With the passage of time he learned to chip stones into axes, spears and other useful things for his existence and survival. India has the most beautiful stones of different varieties and colour.

Natural stone was one of the oldest building materials, and its availability and durability have led to its general use in building and other construction activities from the dawn of civilization. As civilization advanced and population increased man found more and more uses for stones in construction and other activities. This led to quarrying activities throughout the state. Granite is by far the most common plutonic rock known or suspected to be of magmatic origin. Because of its use both for paving block and as building stone, the quarrying of stone was at one time a major industrial activity. The widespread use of macadam and concrete reduced the importance of granite. The depressions of 1930's really paralysed this industry and this situation continued till World War II. The post war building boom pushed the demand for structural stones and veneer led to rapid considerable revival of this industry.

In modern houses granite is also used as kitchen slabs, pillars, flooring and wall cladding. Use of granite enhances the aesthetic beauty and dignity of the building.

Qualities such as high compressive strength, durability, acid resistance, non-freezability, high temperature withstandability etc. gave granite practically unlimited range of uses. Indian granites have achieved fame, name and perpetual identity in the international construction industry. International market for granite comprises of four segments. They are: (i) raw blocks, (ii) tiles, (iii) slabs, and (iv) monuments. Each has its own production and quality control measures, specifications, price structure and export trade practices.

As granite trade flourished, a large number of middlemen creaped into this sector. They often procure orders on false promises and assurances and this in a way tarnished the image of those who are involved in granite trade.

The present study was conducted with the following objectives:

1) To study problems connected with quarry operations.

2) (a) To compare the financial performance of private quarries with co-operative quarries.

   (b) To ascertain the significant difference or differences if any, of the individual expenses in private quarries and co-operative quarry.

(c) To ascertain the significant difference or differences if any, of the individual expenses in the private quarries, i.e., (i) quarries paying royalty and seigniorage fully (ii) quarries paying royalty and seigniorage partially and (iii) quarries who do not pay royalty and seigniorage.

3) To study the socio-economic background of granite quarrying.

4) To study the monetary and welfare benefits and to ascertain the significant difference or differences, if any, in the individual incomes of employees in both sectors.

5) To suggest remedial measures wherever possible.

The following hypotheses were also formulated for the study:

1) There is significant difference in individual expenses in the case of private and co-operative sector quarries.

2) There is significant difference in cost among private quarries.

3) There is significant difference in monitory and welfare benefits of employees in private and co-operative sector quarries.

The study supports the hypotheses formulated and hence all the hypotheses are accepted.

Conclusion

A) FINANCIAL PERFORMANCE OF CO-OPERATIVE AND PRIVATE GRANITE QUARRIES.

1. Positive slope coefficient of all the three regression equations indicates that boulder production is increasing from year to year.

2. 6" metal slope coefficient is negative indicating that the production decreases with the year.

3. Gross profit of co-operative (11.8 per cent in 2000) and private sector (17.8 per cent in 2000) quarries are high. But net profit of the co-operative sector is low (0.7 per cent in co-operative sector, 5.4 per cent in private sector). This is largely because of the social security schemes such as death fund, educational fund, tools allowance etc. implemented in the co-operative quarry.

4. Percentage of cost of goods sold is higher in private sector (88.2 per cent in 2000) than in the co-operative sector (82. 2 per cent in 2000).

5. Percentage of daily wages remains more or less the same in both the sectors (86. 9 per cent on total cost in private sector and 85.8 per cent in co-operative sector).

6. Percentage of cost for blasting in co-operative sector (2.9 per cent in 2000) is low than in the private sector (7.7 per cent in 2000).

7. Operating expense ratio is high in the co-operative sector (17.1 per cent in co-operative sector and 6.4 per cent in private sector).

8. Inventory turnover (105.8 times) and liquidity ratio (5.8:1) are high in the co-operative quarries compared with the private quarries (84.81 times and 4:1).

9. There is significant difference in individual expenses between the private sector and co-operative sector quarries (Table No.3.29 to Table 3.33).

10. There is also significant difference in expenses among private sector quarries on account of payment of royalty and seigniorage in full, or in part or no payment (Table No. 3.43 to 3.60).

B) SOCIO-ECONOMIC BACKGROUND OF WORKERS

1. Majority of the employees in both sectors have only primary education. They possess land less than 10 cents and most of them suffer from physical weakness such as T.B., asthma, severe back pain, headache etc.

2. Private quarries do not extend any kind of social benefits to their employees such as bonus, provident fund, gratuity, insurance, holiday wages etc.

3. Co-operative sector employees have more saving habits (82. 56 per cent) than private sector quarries (58.67 per cent).

4. There exists wage difference between male and female workers (male workers Rs.180, female workers Rs.90 in 1999-2000).

5. Child labour is still prevalent in private quarries (5.71 per cent in 1999-2000).

6. There is significant difference in incomes and welfare benefits among the employees of private and the co-operative sector (Table No.4.11).

C) PROBLEMS CONNECTED WITH QUARRY OPERATIONS

(1) Quarries are not selected and operated on scientific lines. Before quarrying the granites nobody consults with the experts of mining and geology departments, and hence unscientific quarrying take place. There may be cracks, lines, layers, textural different in rocks which cannot be detected by a layman.

(2) Many of the quarries are operated on encroached lands and a good number of them do not have explosive licence. People who have encroached 'porambokku' land are not entitled to get explosives licence and they may be evacuated at any time. Hence to get a quick return from the quarries they conduct huge explosion. This will result in over exploitation in quarries.

(3) Royalty and seigniorage are very high which leads to large-scale evasion and corruption with respect to payment of both these (Rs.80 and Rs.120 in 2000 per load). If it is properly paid total cost per lorry will come out Rs.755.55 whereas, selling price is only Rs.648.1 per lorry.

(4) Labourers working in quarries do not have any training. They are getting the training by trial and error method from the 'Assans' who were traditionally working in the quarry.

(5) Private quarries do not extend any kind of social security benefits to employees like insurance, provident fund, gratuity etc. Whereas, co-operative quarry gives gratuity, holiday wages, leave with wages, provident fund, E.S.I. benefits, welfare fund scheme etc.

(6) Quarries causes certain environmental problems such as land degradation, noise pollution, air pollution, water pollution, health impact etc.

(7) The demand and supply position of granite products are satisfactory in Kerala. But the supply of granite products may be legally exhausted due to: (1) high density of population, (2) vegetational coverage, (3) presence of cash crops, (4) high labour costs, (5) environmental hazards, (6) physiographical features, (7) structural features, (8) variations in colour, grains and size, (9) insufficient space for dumping quarry rejects.

Recommendations

(1) Proper rules should be framed and implemented in private sector regarding: (i) E.S.I. scheme, (ii) holiday wages, (iii) Gratuity, (iv) leave with wages, (v) bonus. In co-operative sector they provide the following benefits:

a) Gratuity: Those who work for at least 240 days in a year are eligible to get 15 days wages as gratuity. This amount is paid at the time of retirement.

b) Holiday Wages: Those who work for 240 days in a year are eligible to get 13 days wages as holiday allowance.

c) Leave with wages: Those who complete 240 days in a year are eligible to get 15 days leave credit which can be encashed.

d) The society contributes 6.25 per cent of wages to the provident fund, as per the Provident Fund Act.

e) The society contributes 5.5 per cent of the total wage to the E.S.I scheme.

f) The society also contributes 8 per cent of the total wages to the welfare fund scheme.

(2) Security measures should be increased and made effective, specially in private sector in view of the danger involved in this work. In co-operative sector insurance facilities are provided.

(3) Royalty and seigniorage may be reduced to avoid manipulation. The existing amount for royalty and seigniorage is Rs.80 and Rs.120 per lorry.

(4) Cess may be imposed on mining of quarry and can be given to local bodies for development of roads in their respective areas.

(5) Quarrying may be operated on scientific basis. In the planning stage of quarrying, if there is a discussion with the experts from

geology departments several quarry failures may be avoided. They can easily detect the quarries having holes, low textures, lines, excessive quarts etc. The granite may have varying technical characteristics such as chemical composition, porosity, frost resistance etc., which can be found out only by an expert.

(6) Quarry lease may be exempted during the first two years as is done in the case of major minerals such as coal, iron ore, aluminium etc.

(7) Training should be given to labourers to exploit granites scientifically to avoid many of the existing failures of quarrying.

(8) We have to limit the quarrying of stones for construction activities, because the supply of rocks may legally exhaust. We can concentrate on value added products of granite to get more money and create more employment opportunities. In connection with this our neighbouring state Tamil Nadu, already implemented several noteworthy measures. In 1978, Tamil Nadu Minerals Limited was incorporated to exploit minerals including granite in a scientific way. In 1986, TAMIN Granites, a 100 per cent export oriented factory was setup. This factory is reported to be the second largest factory of its kind in Asia. Japanese developed another technology a honey combed 4 mm granite slab (combined with aluminum foil) which is as strong as equivalent size granite slab of 20 mm thickness. Italy, Japan and France are the leaders of manufacturer of machineries, tools, consumables etc. for granite

industries and possesses high technology and fabrication know-how. Further, Italy is the world centre for stones. India can join hands with these countries to develop valued added products.

(9) Abandoned quarry pits may be used (a) as water reservoir for irrigation and drinking purposes (b) for fish culture especially for ornamental fishes. (c) for pedal boats to attract the tourists.

APPENDIX – I

Markose K.T.,
Research Scholar,
School of Management Studies,
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I am doing my Ph.D in the School of Management Studies, Cochin University of Science and Technology on "Private and Co-operative Granite Quarries in Thrissur District – A Comparative Study". It is a study related to the financial performance of granite quarrying. The data collected will be kept strictly confidential and used only for academic purposes. Your earnest support and co-operation is solicited.

INTERVIEW SCHEDULE

1. Name of the quarry :
2. Owners name and address :

3. Type of quarry: Own quarry/poramboku quarry/forest quarry/ leased quarry
4. Qualification and experience :
   (a) Academic (Specify)
   (b) Technical / Professional
   (c) Years of experience in quarrying
   (d) Other qualifications, if any
5. Do you have any previous exposure to the field of quarrying : Yes/ No
6. Do you have any office at the quarry site? Yes/ No
   a) If yes, what is the nature of office:

7. Distance from the quarry to the place of consumption: (in k.m)
8. Distance from the quarry to pucca road :
9. Type of road from the pucca road to the quarry Tarred/ mettalled/ country road.
10. Mode of transportation : own lorry/ hired lorry/ Tractor/ any other (specify)

11. Type of product for sale:

(e) Rubbles,/ 6" metals/ ½" metals/ ¼" metals/ any other product

12. Price of product (In Rs. per truck/lorry)

Type of product	Year					
	1994-95	95-96	96-97	97-98	98-99	99-2000
Rubbles						
6" metals						
½" metals						
¼" metals						
Any other product						

13. What is the nature of your customer : permanent/ temporary/ casual

a) Do you give sales bills? Yes/ No.

14. What is the nature of competition? Healthy/ Unhealthy/ Direct/ Indirect

15. What is the type of sales? Cash/ Credit

If credit, time allowed: One month / 3-4 months / 4-6 months / more than 6 months

16. Do you allow commission to agents? Yes/ No

a) If yes, the rate of commission

17. Do you give special discount on bulk purchases? Yes/ No

a) If Yes, the rate of discount :

18. Do you think that sales can be increased by reducing selling price during off season?

19. What is your opinion about the existing price?: Good/Satisfactory/below cost.

20. Is there any exploitation by intermediaries? Yes/ No

a) If Yes, specify the type of exploitation

21. Have you availed loan in connection with quarrying? Yes / No

a) If yes, the source of loan :

Private money lenders / Co-op-Banks/ Nationalised Banks/ any other source (Specify)

b) Purpose of loan

For revenue expenditure / Capital expenditure / any other purpose

22. Daily wages of quarry workers:

(In Rs.)

Type of workers	Year					
	'94-95	'95-96	'96-97	'97-98	'98-99	'99-200
	M. F.	M. F	M. F	M. F	M. F	M. F
Supervisor						
Compressor operators						
Measuring worker						
Mada worker						
Drilling						
Boulder man						
Loading						
½ Jelly						

23. Do you give training to employees? :Yes/ No

24. Do you give Bonus? : Yes/ No

25. If yes, the percentage of bonus :

26. Do you give gratuity to the employees? : Yes/ No

If Yes, specify the days of gratuity :

27. Do you give holiday wages : Yes/ No

If Yes, specify the number of days :

28. Do you give leave with wages? : Yes/ No

If Yes, specify the number of days

29. Do you contribute to provident fund of employees? Yes/ No

If Yes, the percentage :

30. Do you give E.S.I benefits? : Yes/ No

31. If Yes, the amount of contribution per month

32. Do you contribute to employees' welfare fund? Yes/ No

If Yes, specify the amount contributed per month

33. Do you provide any insurance coverage to employees? Yes/ No

If Yes, the type of insurance and the amount contributed per month.

34. Do you give any scholar ships or educational loan to the children employees? Yes/ No

35. Do you have any accident relief fund for the employees? : Yes/ No

36. Are the employees entitled to any type of allowance? : Yes/ No

If Yes, specify the type and the amount of allowance.

37. Do you have any scheme to develop the saving habits of the employees?

Yes/ No

If Yes, specify the scheme

38. 55. Have you subleased your quarry? Yes/ No

If Yes, state the reason for subleasing

39. What type of drilling is followed?

hand drilling/ machine drilling/ any other (specify)

40. Availability of drilling machine : Sufficient/ in sufficient

41. Do you pay royalty and seigniorage based on production? Yes/ No

a) If yes what is the amount payable per load

b) If No, what is the reason for not paying Royalty & Seigniorage.

42. Do you have explosive license? : Yes/ No

a) If No, specify the reason for not applying

b) If Yes, state the method of purchasing the explosives.

Licensed shop/ illegal shop/ any other (specify)

43. Do you have to face any problem for not having explosive licence? Yes/ No

If Yes, specify the problem

44. Number of loss of working days due to explosive problems

45. Are you aware of environmental pollution problems of quarry? Yes/ No

46. Are you a member of the quarry owners association? Yes/ No

If Yes, the benefits you enjoy:

47. Do you have any problem regarding quarry management? Yes/ No

If Yes, specify the problem

48. Do you have any problem regarding the disposal of quarry wastage?

Yes/ No

If Yes, How do you deal with the wastage?

49. Do you fill the pits after quarrying? : Yes/ No

    If No, give the reason for not filling the pits

50. Have you resorted to technical consultation before starting the quarry?

    Yes/ No

51. Do you know anything about the technical characteristics of your quarry?

    Yes/ No

52. What is the attitudes of people in the neighbourhood of quarry?

    Healthy/ Not healthy

    If not healthy, specify the reason.

53. Did the restriction on sand mining affect the quarry? Yes/ No

54. Did the variation in the price of agricultural commodities affect your quarry? Yes/ No

55. Do you subscribe to any journal or magazine regarding the quarry Yes/ No

APPENDIX – II

SOCIO-ECONOMIC SURVEY

INTERVIEW SCHEDULE (EMPLOYEES)

1. Name of the employee:
2. a) Age b) Sex Male/Female
3. a) Religion: Hindu/Muslim/X'ian

   b) Caste
4. Educational qualification

   Up to 5th Std./6-10 Std./Higher secondary/Others (specify)
5. Family details

Name	Relationship with the respondent	Age	Educational qualification	Occupation
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

6. Total monthly income of the family:
7. Type of family: Nuclear/Joint
8. Ownership of house: Own / rented / staying with relatives

   a) Type of houses: Concrete / Tiled / Thached / Others (specify)
9. Landholdings: Below ten cents / 10- 20 cents / above 20 cents
10. Indebtedness: Yes / No

    a) If Yes, specify the amount

    b) Purpose of loan

    c) Sources of loan

d) Rate of interest

e) Type of security offered

11. Do you have any savings: Yes / No.

    If Yes, specify the amount and type of savings

12. Type and nature of work

13. Do you work everyday: Yes / No

    If No, what is the reason?

14. How long have you been working in this field:

    Below 5 years / 6- 10 years / 11-15 years / 16- 20 years / 21-25 years / 26 and above years.

15. Have you ever changed your employment: Yes / No

    If Yes, reason for change

16. Daily wage

17. Have you ever met with accident? Yes / No

    If Yes, a) How many times

    b) Nature of accidents

18. Are you suffering from any chronic illness? Yes / No

    If Yes, Nature of illness

19. How do you meet the expense of treatment?

20. Are you insured under any insurance scheme? Yes / No

    If Yes, type of insurance scheme and the amount contributed to it:

21. Are you a member of any trade union? Yes / No

    If Yes, which trade union

22. What is the reason for selecting quarry work?

23. Are you satisfied with this job?

24. Do you smoke? Yes / No

25. Do you consume alcohol? Yes / No

    If Yes, Regularly / Occasionally / Once in a while

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