CHAPTER VI

6.0 REMEDIAL MEASURES & CONCLUSIONS

6.1 BACKGROUND

6.2 REMEDIAL MEASURES ON EXISTING D.P.SETS

6.3 CONTROLS & MONITORING ON ENTRY OF NEW D.P.SETS

6.4 RESPONSIBILITIES OF VARIOUS ORGANISATIONS ON ENTRY OF NEW D.P.SETS.

6.5 RECOMMENDATIONS TO GOVT.OF MAHARASHTRA & OTHER ORGANISATIONS

6.6 CONCLUSIONS AT MAHARASHTRA STATE LEVEL

6.7 CONCLUSIONS AT ALL INDIA LEVEL
6.0 REMEDIAL MEASURES & CONCLUSIONS

6.1. BACKGROUND

As already seen from case studies in Chapter V point no.4.7, although the condition of agricultural productivity w.r.t. diesel engines is very critical, the appropriate remedial measures can change the total situation in the state slowly but surely.

The remedial measures can be classified in two groups as follows:

6.2] Remedial measures on existing D.P.sets
6.3] Remedial measures on entry of new D.P.Set

From 500 units surveyed in four districts of Maharashtra, it has been observed that only 23% units were economically viable. All balance 77% units however were economically non-viable. These 77% units although non-viable in the existing conditions, they can be elevated to higher efficiency levels by undertaking rectification programmes. The similar conditions are also existing over the total population of D.P.Sets all over Maharashtra contributing to the low agricultural productivity.
They can be also located, identified and rectified for increasing their efficiencies.

In this Chapter along with remedial measures, recommendations to the Govt. of Maharashtra and other organisation and also conclusions drawn at state and national levels have been highlighted.

6.2 REMEDIAL MEASURES ON EXISTING D.P.SETS

As already seen in Chapter II point no.2.4 there are various remedial measures which can improve the existing conditions of D.P.sets.

The remedial measures can be classified as under:
A] Non-monetary remedial measures.
B] Low cost remedial measures.
C] Moderate cost remedial measures.
D] High cost remedial measures.

It is not possible to workout the resultant benefits in monetary terms for all the remedial measures. However, the cost economics of various remedial measures can be worked out. In Chapter II Annexure II-G2 through case study, it has been clearly pointed out the wasteful cost due to wrong selection of components of a D.P.sets.
These measures can be termed as preventive measures and do not involve additional investment to attain higher efficiency from pumpsets. Such measures include following:

a] Locate the centrifugal pump near the static water level. The vertical distance between pump and free level of water in the well, while pumping should be small as possible from 2m to 5m.

b] Locate the centrifugal pump near the source of water so that the length of horizontal suction pipe is small.

c] Keep the height of suction pipe less than 7m and keep its lower end submerged in water by at least 1m.

d] Prevent leakage in suction line, specially from flange joints, couplings etc.

e] Reduce the delivery pipe to the minimum possible level so as to avoid free fall of water or unnecessary static head.

f] Keep the discharge pipe short and direct as far as possible in order to minimise frictional losses.

g] Maintain firm foundation for pump, and diesel engine wherever possible.

h] Maintain correct alignment of pump and diesel engine to get low transmission slip and losses.
i] Keep the coupling concentric to centreline tight.

j] Do not make gland packing of pump too tight.

k] Follow the instruction manual of the pump and diesel engine before starting and during operation and maintenance of engine.

l] Take services of factory trained mechanics of authorised distributors and use genuine parts sold by authorised distributors only.

The economics of operational and maintenance advantages of these remedial measures are obvious and need no elaboration or economic evaluation.

6.2.2 Low cost remedial measures

These measures include following:

a] Use footvalves or reflux valve with low frictional losses.

b] Use large radius bend in place of elbow and short radius bend and avoid unnecessary and poor pipe fittings.

c] Replace the worn out bearings of pump and diesel engine.

d] Replace the filter elements periodically for supply of clean air, lubricating oil and diesel.

e] Replace the worn out piston rings, piston, fuel injector, leaky valves and other vital components
in the diesel engines by quality genuine parts.

The economics of replacing worn out parts to avoid low efficiency, power from pump and diesel engine is obvious. Moreover detailed analysis would require information about the parts to be replaced and the drop in efficiency etc. However the economics of poor quality foot valves and short radius bends for some typical cases can be worked out.

6.2.3 Moderate cost remedial measures

The measures are as under:

a] Improvement in the piping system i.e. replacement of existing undersized G.I. pipes by good quality rigid PVC pipe of proper diameter in suction and delivery lines.

b] Overhauling of diesel engine by using quality parts.

c] Replacement of non-matching inefficient centrifugal pump by a matching pump with high efficiency.

Such measures would cost about Rs. 600 to Rs. 1500 for complete pumping system but they would yield benefits worth Rs. 1000 to Rs. 2000 per year. The life period of D.P. Sets also can be achieved as prescribed by a manufacturer.
6.2.4 High cost remedial measures

The high cost remedial measures would include replacement of old and inefficient diesel engine by a new diesel engine of proper KW [HP] with low SFC ISI mark and of A category.

Such measures would prove advisable in certain specific conditions. Even if cash outflow is high the benefits will be also adequate to support the economics of such remedial measures.

6.2.5 A proposal for rectification programme

In order to pinpoint possible savings due to rectification programmes, a model in the form of proposal for rectification of 500 inefficient D.P. sets has been worked out.

This proposal can safely be extended to all inefficient D.P. sets working in Maharashtra to achieve total annual savings of Rs.19 crores as already worked out in Chapter IV point no.4.4.7 [D].

The proposal has been worked out to indicate the possible savings of diesel and in turn increasing the efficiency of D.P. Sets.
A] The rectification measures to be taken

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type</th>
<th>Description</th>
<th>Estimated saving of diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RM1</td>
<td>Replacement of existing footvalve by low resistance footvalve and minor overhaul of diesel engine</td>
<td>20%</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>Replacement of existing footvalve by low resistance and major overhaul of diesel engine</td>
<td>30%</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>RM1+ replacement of inefficient centrifugal pump by an efficient &amp; matching centrifugal pump with required discharge and head</td>
<td>40%</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>RM2+ replacement of inefficient centrifugal pump by an efficient and matching centrifugal pump with required discharge and head</td>
<td>40%</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>Complete replacement of diesel engine pump and footvalve without change in baseplate, suction and delivery pipes</td>
<td>40%</td>
</tr>
</tbody>
</table>
B) Proposed rectification plan

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Type of rectification</th>
<th>No.of rectifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RM1</td>
<td>225</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>75</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>100</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>50</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>50</td>
</tr>
</tbody>
</table>

C) Cost of project & grant/assistance needed

The costs of this project can be grouped as follows:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Category of cost</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Direct costs</td>
<td>i] Materials, spares etc. needed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii] Transport to site and back</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii] Technical labour</td>
</tr>
<tr>
<td>02</td>
<td>Indirect costs</td>
<td>i] Advertisements &amp; literature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii] Personal contacts of farmers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii] Arranging farmers' meet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iv] Presurvey of areas</td>
</tr>
</tbody>
</table>
v] Actual site visits and study  
vii] Follow up visits  
viii] Supervision and monitoring  
ixi] Preparation of monthly and final reports

D] Cost analysis

<table>
<thead>
<tr>
<th>Sr. Rectification No. measure</th>
<th>Direct Costs Rs./Case</th>
<th>Indirect Costs/ Case Rs.</th>
<th>Total Costs/ Case Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Material</td>
<td>Labour + Transport</td>
<td></td>
</tr>
<tr>
<td>01</td>
<td>RM1</td>
<td>700</td>
<td>200</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>1600</td>
<td>300</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>1800</td>
<td>300</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>3000</td>
<td>400</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>8500</td>
<td>300</td>
</tr>
</tbody>
</table>

E] Sources of funds

a] Direct Costs: Through grants from PCRA or Govt.of Maharashtra + Farmers' contribution

b] Indirect Costs: By rectifying agency

The need for funds from different sources will be met either from the grant from Govt.of
Maharashtra or Petroleum Conservation Research Association, Bombay or any other such agency at state or national level. The distribution of costs and funds in the form of grants are as follows:

### F] Distribution of Costs

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Rectification</th>
<th>No. of Rectifications</th>
<th>Grant from PCRA Rs./Case</th>
<th>Contribution from Farmer Rs./Case</th>
<th>Govt. of Maharashtra/PCRA Rs./Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RM1</td>
<td>225</td>
<td>500</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>75</td>
<td>1000</td>
<td>800</td>
<td>600</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>100</td>
<td>1000</td>
<td>900</td>
<td>700</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>50</td>
<td>1500</td>
<td>1800</td>
<td>900</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>50</td>
<td>3000</td>
<td>6000</td>
<td>800</td>
</tr>
</tbody>
</table>

### G] Total Outlay of Project

The need for grant from Govt. of Maharashtra/PCRA will be as follows:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of Rectification</th>
<th>No. of Rectifications</th>
<th>Grant Rs./Case</th>
<th>Total Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RM1</td>
<td>225</td>
<td>X 500</td>
<td>1,12,500</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>75</td>
<td>X 1000</td>
<td>75,000</td>
</tr>
<tr>
<td>Sr.No.</td>
<td>Type of rectification</td>
<td>No. of rectifications</td>
<td>Grant Rs./Case</td>
<td>Total Rs.</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>100</td>
<td>X 1000</td>
<td>1,00,000</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>50</td>
<td>X 1500</td>
<td>75,000</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>50</td>
<td>X 2000</td>
<td>1,00,000</td>
</tr>
</tbody>
</table>

4,62,500

Such grant may be paid to rectifying agency at periodic intervals e.g. quarterly or monthly on the basis of actual work done in the field by rectifying agency. Necessary data sheets and copies of bills issued to farmers will be enclosed with every periodic report and claim for grant by rectifying agency.

H) Potentials for conservation of diesel and benefits of the project

The consumption of diesel in diesel pumpsets used in project areas and potentials per saving diesel are estimated as follows:

i) Annual usage of D.P.set [Av.700 hrs.]

ii) Consumption of diesel \( ^n \) litres/hour. [Av.1.40]

iii) Annual consumption [Av.] 1000 litres
1) **Expected savings in Diesel**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Type of No. rectification saving</th>
<th>% of</th>
<th>No. of D.P.Sets</th>
<th>Annual consumption saving lit/hr.</th>
<th>Expected saving lit/hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>RM1</td>
<td>20</td>
<td>225</td>
<td>2,25000</td>
<td>45,000</td>
</tr>
<tr>
<td>02</td>
<td>RM2</td>
<td>30</td>
<td>75</td>
<td>75000</td>
<td>22,500</td>
</tr>
<tr>
<td>03</td>
<td>RM3</td>
<td>30</td>
<td>100</td>
<td>1,00000</td>
<td>30,000</td>
</tr>
<tr>
<td>04</td>
<td>RM4</td>
<td>40</td>
<td>50</td>
<td>50000</td>
<td>25,000</td>
</tr>
<tr>
<td>05</td>
<td>RM5</td>
<td>40</td>
<td>50</td>
<td>50000</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>500</td>
<td>4,80000</td>
</tr>
</tbody>
</table>

**J) Inferences**

a) The potential for conservation of diesel is estimated at 1,42,500 litres/year in 500 D.P.sets. The value of diesel & lubricating oil that could be saved every year in those 500 D.P.Sets will be Rs.6,41,250 at diesel rate of Rs.4.50/litre.

b) The grant of Rs.4,62,500 from Govt.of Maharashtra/PCRA will lead to saving of diesel and lubricating oil worth Rs.6,41,250 per year.

c) The improvement in efficiency will also lead to higher discharge hence higher yields from improved more profitable crop pattern, and
higher incomes resulting into agricultural productivity.

d) The rectifications carried out will function as permanent demonstrations of rectification measures. The other farmers with defective D.P.sets learn about the actions taken by their co-farmers and will be motivated to go for rectification of their D.P.sets in reducing consumption of diesel and improving performance of D.P.set to reduce cost of irrigation.

e) Govt. of Maharashtra can organise such rectification programmes through unemployed youth in the state which can reduce the unemployment problem to certain extent. The youth in Maharashtra thus can be motivated for entrepreneurial spirit in the state.

6.2.6 Remedial measures on other agricultural parameters

A] Crop pattern

By changing crop pattern practices, which can give faster and more yields and bringing more incomes can be tried out. The change in either Kharip or Rabi or both crops will definitely improve the situation. Also summer and perennial crops can be studied and on experimental basis can be tried out.
B] **Use of fertilizers/Insecticides/Pesticides**

It is observed that many farmers fear about increase in cost of cultivation due to usage of fertilizers insecticides and pesticides suggested and recommended by Agronomists, extension field officers. However the yields drastically can increase due to application of such modern techniques although initially expenditure is felt. The farmers do sometimes make use of these inputs however wrong doses, at wrong time may damage the situation and hence proper guidance is necessary to make appropriate use of same. This will be contributing factor to improve agricultural productivity.

C] **Conservation & additional source of water**

In majority of the cases in Maharashtra wherever surface irrigation is not possible through canal, lake, dam water, farmers have to depend only on well water. Due to non-availability of water in Summer season the farmer cannot grow crops as he desires. Also in some of the wells, drawdowns are very fast making inadequate water available for his routine crops which can affect the crop yields. Moreover, invariably the farmers hesitate
in bringing water from remote source such as dam, lake due to extra expenditure on pipes. On all these problems proper solution is to be found out in order increase water supply in adequate and timely manner. The design and construction of well is also to be reviewed for optimum water availability for new wells and for old wells revitalisation of wells by digging more depth could be studied. They may also think modern methods of a sprinkler or drip irrigation system to conserve water and also supply only controlled and required quantity of water for crops for better yields.

D] **Use of standby D.P. sets**

In electrified villages wherever electric pumpsets are installed, in case electricity failures some of the farmers do not keep standby D.P. set which restricts their irrigation requirements to fields. The farmers therefore after installation of electric motor pumpset should not sell their old D.P. set but they should keep some for emergencies.

E] **Use of non-conventional energy sources**

In order to reduce diesel operational costs use of gobar-gas can be tried out to save 80% of
diesel. The gobar-gas plants are subsidised by Department of non-conventional energy sources through KVIC. The agricultural activity can thus be improved.

F] Making use of extension services of various organisations

Many farmers hesitate and are sceptical about the new techniques introduced by Govt. agencies, reputed manufacturers of various agriculture inputs. Many times seminars, educational programmes, training courses are organised and farmers do not take any advantage of such opportunities. The knowledge imparted in such programmes is definitely very helpful to farmers in improving their farm practices, making use of finance very judiciously and economically, understanding various subsidies & special schemes of Govt. of Maharashtra and other F.I.s.

6.3 CONTROLS & MONITORING OF NEW D.P.SETS

There should be specific action plan for the controls and monitoring systems for the entry of quality and efficient D.P.Sets in Maharashtra. The important controls to be exercised are as follows:
a] The project study undertaken in four districts has revealed that there is a very critical situation of low agricultural productivity due to negative contribution from use of D.P.set for irrigation to fields. The corrective measures, have already discussed as far as existing D.P.sets are concerned how best they can be elevated to improve performance standards and increased life, output, yields, incomes etc.

b) Prevention is better than cure and there is urgent need to stop the entry of new D.P.sets which are being sold to farmers every year, on cash basis and through bank loans. Considering very ambitious VIII plan for 1991-1995, it would be dangerous to allow the entry of D.P.sets which are of D & E category as these D.P.sets will ruin the goals taken at National & Maharashtra state level for growth in population of D.P.sets, minor irrigation potential, finance increased agricultural production and ultimately improved agricultural productivity.

c] This though looks difficult can be organised very systematically by an action plan, along with time bound activities, ignoring vested interests of political lobbys.
Basically all the concerned organisations will have to play a very vital role individually and also jointly. The starting point of this is to implement of new IS10804 Standard very religiously in order to make use of bank finance and refinance of NABARD very effective and result oriented.

d] As already discussed in Chapter III point no.3.4.4 IS10804 Standard for complete pumping system is to be implemented in 3 parts.

i] To study the site conditions of a farmer.

ii] To supply all components of D.P.sets as per respective IS marks.

iii] To install and commission D.P.sets in conformity with the standard.

If a bank official approves of all such procedure then and then only finance is to be sanctioned for buying D.P.set. Actually in practice this does not happen and bank official, dealers, and manufacturers ignore their duties and an illeterate farmer becomes prey in getting an efficient pumping system probably not matching with his field requirements and lands into chaotic situation of low productivity.
NABARD & financial institutions also in achieving their refinancing and disbursement targets respectively, do not find time in going through such rituals. They therefore keep total silence on stricter controls on refinancing and disbursements. Many times financial institutions play ignorant about IS10604 complete pumping system standard. Sometimes they feel it is too technical to digest and implement. They thus find some or the other excuse and avoid to look into predicament due to entry of inefficient D.P.sets. So both NABARD and F.I.s are knowing each others’ problems and just live with them. This gives very good opportunity to all cheap brands of D.P.sets manufacturers and their dealers to push their poor quality products.

6.4 RESPONSIBILITIES OF VARIOUS ORGANISATIONS ON ENTRY OF NEW D.P.SETS

6.4.1 Manufacturers and their dealers

i) They must comply to all norms of IS10804 religiously by satisfying bank officials with a certificate of satisfactory performance, about implementation of the standard.

ii) If a dealer defaults in implementing the
standard his manufacturer must intervene and take the responsibility of correcting the defaults.

iii) The practical difficulties or any doubts about norms should be informed to concerned organisations for suitable amendment in the standard.

iv) They must keep the trained staff to give best possible results from complete pumping system.

6.4.2 Financial institutions

i) They should strictly adhere to norms stipulated in the standard and obtain undertaking about performance from dealer by actual site inspection.

ii) They should review the modus operandi of norms and give suitable feedback to NABARD.

iii) They should educate the field staff in agricultural financing especially field officers.

6.4.3 Marketing federation, Bombay & their district offices

i) In case, they are not able to install and commission D.P.set due to adequate manpower they should give this responsibility to respective manufacturer or dealers.
ii] While approving brands of D.P. sets an undertaking from all manufacturers should be taken for records and taking corrective actions in case of defaults.

6.4.4 Bureau of Indian Standards (BIS)

i] After understanding the problems faced by manufacturers/dealers in implementing IS10804 suitable amendments in the standard will have to be considered by BIS and advise NABARD suitably.

ii] The multipurpose applicability of diesel engines will have to be assessed and accordingly the standards will have to be modified to take care of fuel consumption with respect to pumpset and agroindustrial application.

6.4.5 National Bank for Agricultural & Rural Development (NABARD)

i] NABARD Pune should study the problems faced by all above referred organisations and see suitable advise/decision from NABARD Bombay to streamline the implementation.

ii] NABARD Bombay should encourage their Pune
office by taking prompt actions and giving decisions on revision of unit costs due to additional expenditure in visits to farmers and supply of quality material.

iii) NABARD should promote the concept of IS10804 on television radio newspapers advertisements etc.

The whole hearted cooperation and coordination of all above organisations will certainly create an atmosphere in the state about quality and encourage Govt.of Maharashtra to reframe their policy guidelines avoid entry to inefficient D.P.Sets. This will ultimately, benefit the Govt.of Maharashtra to increase agricultural production and improve agricultural productivity of the state. The necessary urge,dedication and concentrated the efforts will achieve the success.

6.5 RECOMMENDATIONS TO GOVT. OF MAHARASHTRA & OTHER ORGANISATIONS

The above remedial measures will definitely help in reducing the inflow of poor quality of D.P.sets. In order to have total direct control on the manufacturing activities of cheap brands D.P.sets, the following recommendations have been made.
6.5.1 First of all Govt. of Maharashtra must locate the places of manufacturing activities of D & E categories of D.P.sets and stop such manufacturing atleast within the state with immediate effect. Also all dealers in the state selling assembled D.P.sets manufactured outside the state should also be located and stopped their selling activities. This situation after stopping manufacturing and selling of spurious D.P.sets should be watched for certain specific period.

6.5.2 Even after this, if such spurious manufacturing and selling are not stopped then some regulation or control in the form of Govt. Ordinance must be issued & implemented through to all concerned Govt. Depts. District Collectors, Zilla Parishad, Block Development Offices etc. enabling them to take them disciplinary actions against such assemblers.

6.5.3 The ISI licenced manufacturers in B & C categories should however be collectively invited and addressed by Govt. of Maharashtra's Industries Department along with NABARD/BIS officials to bring Quality Consciousness. A time bound action programme for elevating the standards of their products upto A category level should be announced and importance with proper review meetings.
6.5.4 Even after such allotted periods, the improvement in desired quality standards are not seen then the through BIS their Indian Standard licences should be withdrawn and production should be stopped till further certification from BIS is obtained.

6.5.5 To do all this, a level committee or taskforce at Govt. level should be set-up incorporating concerned officials of various departments, NABARD, BIS, FIS, MARKFED, leading manufacturers and other dignitaries in the field. They should take responsibility to achieve perfection in quality norms from such manufacturers.

6.5.6 Moreover from 1992, it will be mandatory on the part of all manufacturers to bring their units to ISO System Standards for entitlement of exports to European countries, therefore only ISO Standards approved manufacturers will have such avenue of exports. The motivation therefore to small scale sectors will also be useful simultaneously considering future benefits of exports.

6.5.7 BIS should also work alongwith Govt. of Maharashtra to bring B & C category manufacturers to quality standards of A category manufacturer as far as possible and must give feedback to Govt. about their capacity and possibilities to attain such standards.
6.5.8 While approving brands at Markfed & LDB levels instead of price consideration quality standards should be assessed with following criteria.

i] Performance of complete pumping system C.P.S. as per A category C.P.S. conforming norms of IS10804/1986.

ii] Adequate network of distributors for pre and post sales and service facilities.

iii] Insistence on manufacturers to make available genuine spare parts manufactured by them in their own cartons for easy identification and to avoid use of spurious parts.

6.5.9 Govt.of Maharashtra therefore, must have urge to undertake such actions. Govt. should not hesitate to take bold decisions even if they are against political lobbies and vested interests for welfare of farmers and increasing agricultural productivity.

6.5.10 Govt. of Maharashtra have been sending their officials to various countries for exchanging developments in agricultural, science and technology. Similarly they should send a study to Japan to understand present policies of Japanese Govt. in the field of small h.p. diesel engines, use for agricultural applications. It is interesting note
that in Japan for agricultural applications only 3 manufacturers have been given licences to manufacture i.e. Yanmar, Kubota & Mitsubishi. Japanese International Standards (JIS) has been the responsible agency to maintain and elevate their quality standards. It is also heartening to note that due to such stringent quality norms, Japanese manufacturers have dominated the diesel engine market all over the world and also through their various joint ventures in parts of South East Asia.

6.5.11 Japan can thus become an ideal example to progressive state like Maharashtra, to understand their philosophy in manufacturing, engineering, R & D activities and ultimately marketing to increase agricultural economic standards.

6.5.12 Considering the old and obsolete technology of petrol and Lister designs, Govt. of Maharashtra must encourage manufacturers of mono diesel pumpset, biogas engines to run on gobar-gas and natural gas in the state by giving incentives, subsidies and protecting their interest suitably.

6.5.13 If technological transfers or joint ventures are necessary for new design of diesel engines then an action plan should be chalked out for speedy but effective implementation. A manufacturing package
can be offered to existing Petter & Lister small scale diesel engine manufacturers all over Maharashtra.

6.5.14 Thus from conservation of scarce raw materials and petroleum products point of views, the new designs of fuel efficient, compact models of diesel engine packages will give a great relief to Govt. of Maharashtra to boost up industrial as well as agricultural productivity in the state.

6.5.15 Apart from above Govt. of Maharashtra can undertake programme for revitalisation of wells for optimum discharge of water from the wells. Also new wells should be planned and constructed in the water-shed zones to maximise water availability.

6.5.16 By further intensive and extensive developments of CADA projects with surface irrigation as additional source of water can be planned for bringing more land under irrigation.

6.5.17 Drip and sprinkler irrigation systems should be encouraged in the state and farmers must be motivated in both excess and scarce water availability areas for effective growth in agricultural production.
6.5.18 Govt. of Maharashtra can undertake demonstration and propaganda methods along with other organisations and reputed manufacturers in the fields to educate farmers. They should strengthen their network of various departments for effective penetration of quality knowledge to the farmers. The newspaper advertisements, hoardings, radios, television media should be systematically tapped for creating quality atmosphere in the state.

6.5.19 To do all this as stated above, Govt. of Maharashtra, other states govt.s, Govt. of India & other organisations should take Indian Diesel Engine Manufacturers Association [IDEMA] into confidence. The present experience of IDEMA is as follows:

a) Govt. of Maharashtra, other State Govts., Govt. of India & other organisations have been very passive and inactive to the representations made by IDEMA from time to time, on specific issues and problems faced by the industry. Due to such poor response IDEMA and their members are not in a position to understand whether Govt. and other organisations are keen is solving their problems.

b) Some of the important areas being tackled by IDEMA are as follows:

i) To fix up the higher floor prices of diesel engines for export market to earn more foreign
exchange and maintain and brighten the product image of Indian Diesel Engine Manufacturers.

ii) Revisions in unit cost of diesel engines and D.P.sets from time to time for meeting the quality requirements of IS10804 standard for complete pumping system.

iii) To help industry in timely supply of raw materials especially pig iron.

iv) To subsidise the rates of diesel and lubricating oil for diesel engines for agricultural use to reduce present gap in rates of diesel and electricity charges.

v) To allocate funds for D.P.sets financing by NABARD & financial institutions, separately without merging with electric motor pumpsets in order to forecast the future of the industry.

vi) Registration and records of total manufacturing of diesel engines and D.P.sets in the country.

c) IDEMA is worried if above issues are not seriously look into or delayed by Govt. and other organisations there will be following repercussions.

i) Some cheap brand manufacturers have been quoting very low export prices and securing export orders. This is reducing country's foreign exchange earnings. Moreover this practice is spoiling the Indian image due to poor quality & services. Quality
manufacturers have to just watch this situation and keep quiet.

ii] Due to inadequate unit costs quality manufacturers are not in a position to sell their D.P.sets by following IS10804 norms. This has resulted in reducing the market share of efficient D.P.sets all over India and increasing market share of inefficient D.P.sets.

iii] Due to shortages of pig iron, foundries and also other raw materials who are supplying castings to industry are charging exhorbitent rates. This makes quality manufacturers to increase their prices very frequently.

iv] Farmers although wish to buy quality pumpsets due to more price difference buy cheap brands of D.P.sets.

v] Due to huge gap between diesel and electricity rates, farmers are hesitant to buy D.P.sets due high operational costs. If diesel is supplied at subsidized rates the present gap could be reduced. This will also help farmer to increase agricultural productivity.

vi] Due to merging of D.P.sets funds in the electric pumpsets planning of future business has become difficult.

vii] At present there is no system for
registration of either production or sales of diesel engines for agriculture use, which is existing for electric pumpsets. It is possible to device such system for diesel engine to create a sound data base for strategic planning of the oldest and biggest industry in India serving the farmer community.

d] Due to all such non-conducive atmosphere, quality manufacturers are thinking of diversification, leaving aside their pioneering efforts, R&D activities and long experience in this field. This has, therefore, made conducive atmosphere for poor quality manufacturers to replace all quality manufacturers. One can imagine what will happen to country's agricultural productivity if only such inefficient Diesel engines and pumpsets are used for agriculture.

e] IDEMA is confident that inspite of electrification programmes undertaken by State Electricity Boards & REC, farmers are experiencing limitations of electric pumpsets. Due to frequent failure of electricity in villages, burning of electric motors due to voltage fluctuations and absence of portability for electric pumpsets to shift other water source
[in case well dries down], farmer has to depend upon a standby D.P. sets for timely irrigation to his crops. Hence annual market of diesel engines of 3.5 lacs units has been stagnant. It will increase in years to come due to uncertainty of electricity. IDEMA fears if quality manufacturers are not cared and motivated properly at this stage there will be a great loss to nation if they diversify in frustration.

f) The researcher also feels that the urge and fear expressed by IDEMA is very right. Govt. will have to therefore react their problems without further delay. An action plan of Govt. of India along with IDEMA will definitely to change the scenario of agriculture in the country. IDEMA has got the strength of quality manufacturers to coordinate the efforts with the Govt. by elevating agricultural productivity and also total quality standards of their industry.

6.5.20 The Govt. should therefore work hand in hand with IDEMA on top priority and show all state level Govts., Govt. of India and other organisations the favourable effects of actions taken by them on the agriculture in particular and also industry in general.
6.6 CONCLUSIONS AT MAHARASHTRA STATE LEVEL

6.6.1 It is quite clear from case studies that the present predicament due to inefficient D.P. sets is going to take Govt. of Maharashtra and other concerned organisations to a point of no return.

6.6.2 There is however every possibility to change the situation drastically in case of new D.P. sets and gradually in case of existing D.P. sets if proper remedial measures are taken in a specific time frame.

6.6.3 Maharashtra being a progressive state in all fronts Ministry of Industry, Agriculture & Irrigation can work hand in hand in order to take suggested measures by banning all assembled engine manufacturing in the state. Also by elevating quality standards and developing infrastructural arrangement for marketing effectively their products with action programme for their existing products.

6.6.4 Govt. of Maharashtra can follow Japan's example for their philosophy in manufacturing & their applications for agricultural management to boost up agricultural productivity.

6.6.5 To do all this IDEMA should be motivated and taken into confidence by Govt. of Maharashtra and other organisations immediately and work hand in hand for
bringing about desired favourable changes in the agricultural and industrial sectors in the state.

6.6.6 Govt. of Maharashtra's bold actions in this direction can attract the other states and also Govt. of India to practice their remedial measures for better agricultural production.

6.6.7 The final conclusions at MACRO level of the total research work has been summarised in the last point no.6.7 of this Chapter.

6.7 CONCLUSIONS AT ALL INDIA LEVEL

The detailed analysis of the research subject has revealed many facts affecting the agricultural productivity w.r.t. diesel engines in Maharashtra. In the previous chapters a sincere attempt is made to project a real sensible picture of the state of affairs of farmers in Maharashtra. The methodology followed in the research study and also results obtained for the State of Maharashtra can be safely extended also to other states in India for detailed investigations and micro levels studies, in the respective states. An overview of the various conclusions can be summarised as follows:

6.7.1 Considering an ambitious plans of Govt. of India and also other connected organisations in the field of
agriculture, this research may throw light on the subject issue for taking corrective remedial measures.

6.7.2 The measures will be basically to

a] Rectify the defects in the existing D.P. sets by the different cost effective remedial actions. This will save the wasteful cost worth Rs. 700 crores per year which can be used for other agricultural activities.

b] Strictly monitor the entry of new D.P. sets coming into market to improve agricultural productivity of the nation. This can avoid burden of wasteful costs and also conserve scarce petroleum products.

6.7.3 A timebound action plan both at National and state levels without considering the political lobbys and vested interests can bring unimaginable savings in wasteful costs from inefficient D.P. sets.

6.7.4 All countries in the world including developed countries like U.S.A. are following example of Japan on the quality consciousness through quality circles, quality assurance, quality systems etc. with productivity as basic target.

6.7.5 In Japan, it is worthwhile to note that these are only three manufacturers namely Yanmar, Kubota &
Mitsubishi who are manufacturing diesel engines for agricultural applications. There is no 4th manufacturer or assembler who can produce engines of any inferior varieties than those 3 manufacturers.

6.7.6 It is also interesting to note that performance-wise all 3 brands exactly conform to Japanese International Standards (JIS) and do not differ in quality set by JIS. Therefore Govt. and all farmers in Japan have no problems in selecting specific brand of diesel engine as they are confident that the results will be same from any brand they choose.

6.7.7 It is heartening to note that Japanese brands have dominated not only South East Asian market but also all world through their consistency and right approach of the quality consciousness.

6.7.8 It is not very difficult in India also, if real urge and the dedicated efforts are put in by Govt. and also all officials concerned with this burning problem of nation.

6.7.9 Govt. of India should also take very bold steps in order to maintain quality considerations right from production to the ultimate result in the fields.

6.7.10 There is also need to educate the people for differentiating between good and bad quality.
However considering the pace of population growth, illiteracy and poverty one should not expect this to happen unless Government themselves ban manufacture of poor quality D.P.sets.

6.7.11 As it has been rightly pointed out in concluding remarks in the report of Royal Commission on agricultural in India 1928 in Chapter I point no.1.1.1[A] that it is the responsibility of the Govt. and Govt. only to change the situation of farmers.

6.7.12 The report also recommended, alongwith the urge of farmers themselves to elevate their living standards. Govt. will have to also change the village life of a farmer by various village upliftment programmes farmers' welfare programmes etc.

6.7.13 Similarly in the context of the research, it can be concluded that basically it is the sole responsibility of Govt. of India and then subsequently of the individual State Govts. and also connected organisations both at Central & State levels to implement remedial measures.

6.7.14 The Govt. of India should also take IDEMA into confidence at national level as already explained in conclusions of Maharashtra in point no.6.5 of this
chapter, for changing total scenario of diesel engine industry in the country.

6.7.15 The organisations like Confederation of Engineering Industries [CEI], Engineering Export Promotion Council [EEPC], Export & Import Bank of India [EXIM Bank] should also be consulted to understand and cross check the problems of IDEMA.

6.7.16 At the end, it is humble desire of the researcher that all concerned officials connected with this national issue should read and support the research results, remedial measures and conclusions if they feel right.

6.7.17 The researcher is confident that though not overnight, but gradually there will be a definite change in the right direction from Govt. of India on the lines of Japan for the Indian agricultural prosperity and peace to mankind in the country.

*** THE END ***