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OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

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PERFORMANCE EFFICIENCY OF AGRICULTURAL MARKET COMMITTEES (AMCS) IN INDIA – DATA ENVELOPMENT ANALYSIS (DEA) APPROACH

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ABSTRACT

Efficient performance of Agricultural Market Committees (AMCs) is considered to be the sine quo non for the economic development of an agrarian country like India. Though the number of AMCs has been sturdily increasing in India, still the farmers are being exploited by one form or another in transacting the agricultural commodities. In view of this, several apprehensions and concerns were raised fearing about the performance of AMCs in discharging the regulatory provisions for efficient transaction of agricultural commodities. Various enactments have been formulated by Government from time to time to revamp the agricultural marketing system in the country and presently, Model act 2005 (The State Agricultural Produce Marketing (Development and Regulation) Act, 2005) has been under implementation. In this context of exploring the agricultural marketing system with a farmer's ended approach, the present study aims at analyzing the performance efficiency ao AMCs in Rayalaseema region of AP in India through Data Envelopment Analysis (DEA) approach. The analytical findings revealed that 40% of selected DMUs are being operated at Scale Efficiency <1. The remaining 60% DMUs are being operated at CRS and this guides the Government to continue the existing support even in the future.

JEL CODES
Q13, C44, C67.

KEYWORDS
Agricultural Market Committees, Data Envelopment Analysis, Efficiency.

INTRODUCTION

Efficient performance of agricultural markets is considered as the *sine qua non* of economic development of any country. This is not an exception with reference to India. It is a known fact that, regulated agricultural markets have been established in India with the prime objective of transacting agricultural produce efficiently and thereby, to safeguard the interests of the farming community. Since 1966 and upto the current year, there have been a study progress in the establishment of regulated agricultural markets in the country. In India, the organized marketing of agricultural commodities has been promoted through a network of regulated markets. Most State Governments and Union Territory(UT) administrations have enacted legislations (Agricultural Produce Marketing (Regulation) Act (APMC Act)) to provide for the regulation of agricultural produce markets. While by the end of 1950, there were 286 regulated markets in the country, their number as on 31st, March 2011 stood at 7566 consists of 2433 principal markets and 5133 sub-yards. Some wholesale markets are outside the purview of the regulation under APMC Acts. Similar trends were noticed in the state of Andhra Pradesh in general and Rayalaseema region of Andhra Pradesh in particular. In Andhra Pradesh, with 23 districts, there are 905 regulated markets which consists of 329 principal markets and 576 sub-yards and in Rayalaseema region comprising of 4 districts, these figures are 56 and 156 reported as on 31st, March 2011.

So far, so forth, these regulated markets in Rayalaseema region of Andhra Pradesh are serving the farming community in view of the laid out promises at the time of their establishment. The contributions of these regulated markets are clearly manifested through various outcomes in the forms of viz, regulating the marketing practices, systematizing the marketing costs, settlement of disputes between farmers and traders, prompt payment of sales proceeds, checking the malpractices of marketing middlemen etc., with a view to safeguard the interests of the farmers in transacting their produce and thereby, to realize significant producer's share in consumer's rupee. To keep up these promises, the Government from time to time revised the marketing regulations and presently Model Act, 2005 (The State Agricultural Produce Marketing (Development and Regulation) Act, 2005) has been enacted to make the farmers dynamic and more competitive in the context of liberalized trade regime. However, coming to the practicality, there exists a wide gap between the promises made and actual performance shown by these regulated markets. The earlier mentioned regulatory provisions offered by these regulated markets are being exploited in one form or other against the interests of the farming community. Thus, it became evident that, these regulated markets in the Rayalaseema region of Andhra Pradesh in India are not efficient enough in discharging the regulatory provisions and hence, the farmers could not enjoy the true benefits of market regulation. It is in this context, the researchers made an attempt to analyse the technical efficiency in the functioning of regulated markets in Rayalaseema region of Andhra Pradesh in India. No studies have been conducted earlier in India in general and in Rayalaseema region of Andhra Pradesh in particular with reference to analyzing the efficiency of the functioning of regulated markets by using Data envelopment Analysis(DEA) and in this context, this research study is certainly a contributing one. This study is conducted with the following specific objectives:

1) To study whether the regulatory provisions contribute to the technical efficiency of the functioning of regulated markets, and if they contribute, how they influence the efficiency.
2) To analyse the trends in the efficiency in the functioning of regulated markets.

METHODOLOGY

For analyzing the efficiency of regulated markets in India, Rayalaseema region of Andhra Pradesh state has been purposively selected, as the investigators hail from this region. (DEA) model was used to assess the technical efficiency of regulated markets in Rayalaseema region of Andhra Pradesh in India. DEA is one of the most popular approaches used in the literature to appraise the performance of Decision Making Units (DMUs). It permits the selection of efficient markets with in the region. DEA was used in prior studies on the efficiency of financial institutions to examine the impact of some specific changes such as financial reforms, the impact of financial practices and the impact of different ownership groups. DEA assesses the efficiency frontier on the basis of all input and output information from the region. (Rogers, 1998). Thus, the relative efficiency of markets operating in the same region can be estimated (Fried et al. 2002). Hence, identification of performance indicators in regulated markets is useful for identifying a benchmark for the whole region. Moreover, the DEA methodology has the capacity to analyse multi-inputs and multi-outputs to assess the efficiency of institutions (Coelli, Rao & Battese 1998).

DEA MODEL

Several DEA models have been presented in the literature. The basic DEA model evaluates efficiency based on the productivity ratio which is the ratio of outputs to inputs. This study applied Charnes, Cooper and Rhode's (CCR) (1978) model and Banker, Charnes and Cooper (BCC) (1984) model. The production frontier has constant returns to scale in CCR model. The basic CCR model formulation (dual problem/ envelopment form) is given by :

THE BASIC CCR MODEL FORMULATION (DUAL PROBLEM/ ENVELOPMENT FORM)

$$\text{Min}\theta - \varepsilon\left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+\right)$$

Subject to :

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{i0} \qquad (i=1, \ldots\ldots\ldots\ldots, m)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{r0} \qquad (r=1, \ldots\ldots\ldots\ldots, s)$$

$$\lambda_j \geq 0 \qquad (j=1, \ldots\ldots\ldots\ldots, n)$$

Source :Zhu (2003, p.13)

where, **θ** denotes the efficiency of DMU*j* , while y_{rj} is the amount of r^{th} output produced by DMU*j* using x_{ij} amount of i^{th} input. Both y_{rj} and x_{ij} are exogenous variables and λ_j represents the benchmarks for a specific DMU under evaluation (Zhu 2003). Slack variables are represented by s_i and s_r. According to Cooper, Seiford and Tone (2004) the constraints of this model are :

i. the combination of the input of firm *j* is less than or equal to the linear combination of inputs for the firm on the frontier;
ii. the output of firm *j* is less than or equal to the linear combination of inputs for the firm on the frontier; and
iii. the main decision variable $\boldsymbol{\theta}_j$ lies between one and zer0.

Further, the model assumes that all firms are operating at an optimal scale. However, imperfect competition and constraints to finance may cause some firms to operate at some level different to the optimal scale (Coelli, Rao & Battese 1998). Hence, the Banker, Charnes and Cooper (1984) BCC model is developed with a production frontier that has variable returns to scale. The BCC model forms a convex combination of DMUs (Coelli, Rao & Battese 1998). Then the constant returns to scale linear programming problem can be modified to one with variable returns to scale by adding the convexity constraint $\boldsymbol{\Sigma\lambda_j = 1.}$ The model given below illustrates the basic BCC formulation (dual problem/envelopment form) :

THE BASIC BCC MODEL FORMULATION (DUAL PROBLEM/ENVELOPMENT FORM)

$$\text{Min}\theta - \varepsilon\left(\sum_{i=1}^{m} s_i^- + \sum_{r=1}^{s} s_r^+\right)$$

Subject to :

$$\sum_{j=1}^{n} \lambda_j x_{ij} + s_i^- = \theta x_{i0} \qquad (i=1, \ldots\ldots\ldots\ldots, m)$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - s_r^+ = y_{r0} \qquad (r=1, \ldots\ldots\ldots\ldots, s)$$

$$\lambda_j \geq 0 \qquad (j=1, \ldots\ldots\ldots\ldots, n)$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

Source :Zhu (2003, p.13)

This approach forms a convex hull of intersecting planes (Coelli, Rao & Battese 1998). These planes envelop the data points more tightly than the constant returns to scale (CRS) conical hull. As a result, the variable returns to scale (VRS) approach provides technical efficiency (TE) scores that are greater than or equal to scores obtained from the CRS approach (Coelli, Rao & Battese 1998). Moreover, VRS specifications will permit the calculation of TE decomposed into two components: scale efficiency (SE) and pure technical efficiency (PTE). Hence, this study first uses the CCR model to assess TE then applies the BCC model to identify PTE and SE in each DMU. The relationship of these concepts is given below :

RELATIONSHIP BETWEEN TE, PTE AND SE

$TE_{CRS} = PTE_{VRS} * SE$

where TE_{CRS} = Technical efficiency of constant return to scale

PTE_{VRS} = Technical efficiency of variable return to scale

SE = Scale efficiency

Source : Coelli, et al., (1998).

The above relationship, which is unique, depicts the sources of inefficiency, i.e., whether it is caused by inefficient operation (PTE) or by disadvantageous conditions displayed by the scale efficiency (SE) or by both. If the scale efficiency is less than 1, the DMU will be operating either at decreasing return to scale

(DRS) if a proportional increase of all input levels produces a less-than-proportional increase in output levels or increasing return to scale (IRS) at the converse case. This implies that resources may be transferred from DMUs operating at DRS to those operating at IRS to increase average productivity at both sets of DMUs (Boussofiane et al.,1992).

DATA AND VARIABLES FOR THE STUDY

Efficiency of a AMC depends on the facilities available with the AMC such as drying platforms, storage units, market functionaries etc., which leads to good amount of arrivals and in turn AMC earns countable market fees creating employment. DEA assumes that, the inputs and outputs have been correctly identified . Usually as the number of inputs and outputs increase, more DMUs tend to get an efficiency rating of 1 as they become too specialized to be evaluated with respect to other units. On the other hand, if there are too few inputs and outputs, more DMUs tend to be comparable. In any study, it is important to focus on correctly specifying inputs and outputs. DEA is commonly used to evaluate the efficiency of a number of AMCs and it is a multi-factor productivity analysis model for measuring the relative efficiency of a homogeneous set of regulated markets (DMUs). For every inefficient AMC, DEA identifies a set of corresponding efficient AMC that can be utilized as benchmarks for improvement of performance and productivity. DEA is developed based on two scale of assumptions viz., Constant Return to Scale (CRS) model and Variable Return to Scale (VRS) model. CRS means that the producers are able to linearly scale the inputs and outputs without increasing or decreasing efficiency. This is a significant assumption. The assumption of CRS may be valid over limited ranges but its use must be justified. As an aside, CRS tends to lower the efficiency scores while VRS tends to raise efficiency scores.

For enabling the study of evaluation of AMC's we have observed the resources or inputs and productivity indicators or outputs as follows:

Inputs : X_1 - Arrivals(in Qtls), X_2 - Amenities & facilities(in MTs.)

X_3 - Market functionaries(in Nos.), (X_4) - Notified market area(in Kms)

Outputs : Y_1 - Valuation(Rs. in Lakhs), Y_2 - Market fees(Rs. in Lakhs)

Y_3 - Staff position(in Nos.)

The study involves the application DEA to assess the efficiency of 56 AMCs in Rayalaseema region of Andhra Pradesh State in India during the years 2005-06, 2006-07, 2007-08 and 2008-09. The data used for assessment was obtained from the Annual Reports published by Directorate of Marketing and Inspection<www.agmarknet.nic.in> and From the Annul Administrative Reports of the selected AMCs. DEA model is executed separately for each year using input-orientation with radial distances to the efficient frontier. By running these programmes with the same data under CRS and VRS assumptions, measures of overall technical efficiency (TE) and 'pure' technical efficiency(PTE) are obtained.

RESULTS AND DISCUSSION

The main theme of the present study is to assess the performance of AMCs in four districts viz., Anantapur, Chittor. Kadapa and Kurnool which are located in Rayalaseema region of Andhra Pradesh state in India. The study intends to assess the efficiency of better facilities and thereby improving infrastructure of AMCs to provide suitable marketing avenues for farming community.

Performance of DMUs at Regional level: The findings of DEA portrayed through Table 1 revealed that, nearly 20 percent of the selected DMUs have shown a shift in the return to scale pattern i.e from IRS to CRS implying that, there is increased resource use efficiency ie., with reference to the exploitation of resources usage. Hence, these DMUs have shown an increased pace of RTS in the recent year 2008-09 compared to the earlier periods. Some DMUs (18%) are being operated at CRS throughout the reference period implying stabilized significant performance. About 34 percent of the total selected DMUs are exhibiting IRS throughout the selected reference period that is 2005-06 to 2008-09. This implies that, these DMUs further require many resources to achieve CRS. However it is disheartening to say that, the selected DMUs like Badvel, Dharmavaram, Kadiri, Madanapalli and Nandikotkur are showing dismal performance regarding the operational efficiency of the resources, as the RTS had shown a shift from IRS to DRS.

Performance of DMUs at District level: District-wise and year-wise Mean Technical Efficiencies have been worked out (Tables 2 and 3). Among selected districts, Kurnool had exhibited highest scale efficiency for the selected reference period followed by Kadapa, Chittoor and Anantapur Districts. This implies that, the selected AMCs in Kurnool District are being operated with a higher resource use efficiency compared to other districts. A close perusal of Table 3 reveals the same picture i.e., Kurnool district dominates other districts regarding operational efficiencies of selected AMCs. That is, in all the selected reference periods, Kurnool district occupy the predominant position with reference to the resource use efficiency of the selected AMCs compared to AMCs of other districts.

The above discussion was briefed through Table 4. The findings revealed that, in Rayalaseema region of Andhra Pradesh, the number of inefficient AMCs is higher compared to efficient AMCs considering the scale efficiency of resources. However, it is heartening to say that, the number of efficient AMCs have been increasing since 2005-06 to 2008-09. The informal discussions held with AMC Officials revealed the following interesting points for this heartening performance:

- Farmers are showing positive attitude for transacting their produce in the AMCs compared to local markets on account of the competitive price being realized in the AMCs.
- Strengthening of infrastructure in the market yards like grading, processing, marketing information network, storage facilities etc.
- More encouragement by the Government in the form of implementing pledge loan scheme, Rythu Bandhu Padhakam etc.
- Regulation of marketing practices and marketing costs.

CONCLUSIONS

The analytical findings revealed that, nearly 40 percent of the selected DMUs are being operated with scale efficiency less than one. To be more precise, 34 percent of DMUs are exhibiting IRS and remaining six percent DMUs are exhibiting DRS. From this, it can be concluded that, the resources that are being utilized at DMUs exhibiting DRS must be diverted towards DMUs exhibiting IRS. This transfer of resources makes the inefficient DMUs to achieve scale efficiency equal to one i.e. to realize CRS. The remaining 60 percent of DMUs are being operated at CRS and this guides the Government to continue the existing support even in the future.

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TABLES

TABLE 1: CRS, VRS, SCALE EFFICIENCY AND RTS OF SELECTED DMUs

Name of the AMC	2005-06				2006-07				2007-08				2008-09			
	CRS	VRS	SCALE	RTS	CRS	VRS	SCALE	RTS	CRS	VRS	SCALE	RTS	CRS	VRS	SCALE	RTS
ADONI	0.8919	0.8958	0.9956	irs	0.7703	0.8174	0.9424	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
ALLAGADDA	0.6702	0.8372	0.8005	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
ALUR	0.7494	0.9394	0.7977	irs	0.4812	0.8795	0.5471	irs	0.7911	0.891	0.8879	irs	0.7854	0.891	0.8815	irs
ANANTAPUR	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
ATMAKUR	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
BADVEL	0.7854	0.7965	0.9861	irs	0.6232	0.6423	0.9703	irs	0.7013	0.7327	0.9571	**DRS**	0.7853	1.0000	0.7853	**DRS**
BANAGANAPALLI	1.0000	1.0000	1.0000	**crs**	0.944	1.0000	0.9440	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
BANGARUPALEM	0.6389	0.9689	0.6594	irs	0.6228	0.9878	0.6305	irs	0.587	0.9351	0.6277	irs	0.7807	0.9985	0.7819	irs
CHITTOOR	0.3950	0.6181	0.6391	irs	0.4064	0.618	0.6576	irs	0.5423	0.6178	0.8778	irs	0.7263	0.7481	0.9709	irs
DHARMAVARAM	0.3916	0.5339	0.7335	irs	0.377	0.6089	0.6191	irs	0.5238	0.574	0.9125	irs	0.6505	0.6561	0.9915	**DRS**
DHONE	0.9621	0.9765	0.9853	irs	0.9234	0.9715	0.9505	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
GOOTY	0.6045	1.0000	0.6045	irs	0.418	1.0000	0.4180	irs	0.8103	1.0000	0.8103	irs	0.8438	1.0000	0.8438	irs
GUNTAKAL	0.3011	0.7724	0.3898	irs	0.5286	0.7641	0.6918	irs	0.4344	0.7623	0.5699	irs	0.422	0.7326	0.5760	irs
HINDUPUR	0.3743	0.6625	0.5650	irs	0.5137	0.7117	0.7218	irs	0.3929	0.6543	0.6005	irs	0.6829	0.7869	0.8678	irs
JAMMALAMADUGU	0.4502	0.7981	0.5641	irs	0.5599	0.8675	0.6454	irs	0.7324	0.8541	0.8575	irs	1.0000	1.0000	1.0000	**crs**
KADAPA	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	0.7848	0.8139	0.9642	irs	1.0000	1.0000	1.0000	**crs**
KADIRI	0.6303	0.6363	0.9906	irs	0.2278	0.3946	0.5773	irs	0.4783	0.4877	0.9807	irs	0.577	0.585	0.9863	**DRS**
KALYANADURGAM	1.0000	1.0000	1.0000	irs	0.5808	0.9377	0.6194	irs	1.0000	1.0000	1.0000	**crs**	0.9342	0.9952	0.9387	irs
KAMALAPURAM	0.5962	1.0000	0.5962	irs	0.7347	1.0000	0.7347	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
KODURU	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
KOILAKUNTLA	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
KUPPAM	0.1554	0.7108	0.2186	irs	0.2117	0.7411	0.2857	irs	0.3168	0.7003	0.4524	irs	0.419	0.7451	0.5623	irs
KURNOOL	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
LAKKIREDDIPALLI	1.0000	1.0000	1.0000	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	0.8064	1.0000	0.8064	irs
MADAKASIRA	0.3458	1.0000	0.3458	irs	0.3029	1.0000	0.3029	irs	0.6713	1.0000	0.6713	irs	0.9361	1.0000	0.9361	irs
MADANAPALLI	0.3037	0.3276	0.9270	irs	0.512	0.5215	0.9818	irs	0.7367	1.0000	0.7367	**DRS**	0.4859	0.4868	0.9982	**DRS**
MULAKALACHERUVU	0.3486	0.7586	0.4595	irs	0.3614	0.7905	0.4572	irs	0.4177	0.7586	0.5506	irs	0.438	0.7586	0.5774	irs
MYDUKURU	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
NAGIRI	1.0000	1.0000	1.0000	**crs**	0.6848	1.0000	0.6848	irs	1.0000	1.0000	1.0000	**crs**	0.9343	1.0000	0.9343	irs
NANDIKOTKUR	0.5541	0.6965	0.7955	irs	0.8768	0.9409	0.9319	irs	1.0000	1.0000	1.0000	**crs**	0.9984	1.0000	0.9984	**DRS**
NANDYAL	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
PAKALA	0.7701	0.9427	0.8169	irs	0.7707	0.9628	0.8005	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
PALAMANERU	0.3857	0.8868	0.4349	irs	0.3844	0.8933	0.4303	irs	0.4463	0.8736	0.5109	irs	0.4096	0.8657	0.4731	irs
PATTIKONDA	0.8925	1.0000	0.8925	irs	0.9239	1.0000	0.9239	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
PENUKONDA	0.2567	0.5934	0.4326	irs	0.3864	0.6063	0.6373	irs	0.6936	0.7405	0.9367	irs	0.6129	0.6765	0.9060	irs
PILERU	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	0.881	1.0000	0.8810	irs	1.0000	1.0000	1.0000	**crs**
PRODDUTUR	0.4894	0.5662	0.8644	irs	0.5399	0.6024	0.8962	irs	0.523	0.5428	0.9635	irs	0.7269	0.731	0.9944	irs
PULIVENDULA	0.5304	0.6300	0.8419	irs	0.6253	0.7556	0.8276	irs	0.5777	0.6465	0.8936	irs	1.0000	1.0000	1.0000	**crs**
PUNGANURU	0.7953	1.0000	0.7953	irs	0.9678	1.0000	0.9678	irs	1.0000	1.0000	1.0000	**crs**	0.7337	0.7621	0.9627	irs
PUTTUR	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
RAJAMPET	0.6714	0.7382	0.9095	irs	0.5301	0.7228	0.7334	irs	0.4881	0.7064	0.6910	irs	0.8144	0.9101	0.8948	irs
RAYACHOTY	0.6892	0.8107	0.8501	irs	0.7575	0.8272	0.9157	irs	0.9173	0.9282	0.9883	**DRS**	1.0000	1.0000	1.0000	**crs**
RAYADURGAM	0.5379	0.6361	0.8456	irs	0.3513	0.6007	0.5848	irs	0.5402	0.6697	0.8066	irs	0.7674	0.7868	0.9753	irs
ROMPICHERLA	0.4790	1.0000	0.4790	irs	0.4559	0.9767	0.4668	irs	0.7957	1.0000	0.7957	irs	0.8045	1.0000	0.8045	irs
SATYAVEDU	0.9388	0.9419	0.9967	**DRS**	0.9014	0.9086	0.9921	**DRS**	0.9487	1.0000	0.9487	**DRS**	1.0000	1.0000	1.0000	**crs**
SIDDAVATAM	0.5756	1.0000	0.5756	irs	0.6565	1.0000	0.6565	irs	0.9127	1.0000	0.9127	irs	1.0000	1.0000	1.0000	**crs**
SOMALA	0.6423	0.9774	0.6572	irs	0.6105	0.9656	0.6322	irs	0.9324	1.0000	0.9324	irs	0.9929	1.0000	0.9929	irs
SRIKALAHASTI	0.8570	0.9163	0.9353	irs	1.0000	1.0000	1.0000	**crs**	0.8821	0.9427	0.9357	irs	1.0000	1.0000	1.0000	**crs**
TADIPATRI	0.8280	0.9661	0.8571	irs	0.7211	0.9568	0.7537	irs	0.9507	1.0000	0.9507	irs	0.9021	0.9681	0.9318	irs
TANAKALLU	0.4801	0.9383	0.5117	irs	0.543	0.9222	0.5888	irs	0.7028	1.0000	0.7028	irs	0.961	1.0000	0.9610	irs
TIRUPATHI	1.0000	1.0000	1.0000	**crs**	0.7045	0.9139	0.7709	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
TOTTAMBED	0.9245	0.9657	0.9573	irs	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
URAVAKONDA	0.5463	0.8646	0.6319	irs	0.5103	0.8495	0.6007	irs	0.6203	0.8449	0.7342	irs	0.5778	0.8043	0.7184	irs
VALMIKEPURAM	0.2101	0.3676	0.5715	irs	0.2276	0.3896	0.5842	irs	0.2438	0.3735	0.6527	irs	0.3151	0.3604	0.8743	irs
VEPANGERI	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**	1.0000	1.0000	1.0000	**crs**
YEMMIGANURU	0.7193	0.8295	0.8671	irs	0.8488	0.8827	0.9616	irs	0.9267	0.9544	0.9710	irs	1.0000	1.0000	1.0000	**crs**
Mean Efficiency	0.7030	0.8661	0.7996		0.6978	0.8738	0.7864		0.8019	0.8929	0.8869		0.8540	0.9152	0.9273	
Standard Deviation	0.2628	0.1745	0.2172		0.2565	0.1673	0.2103		0.2265	0.1627	0.1530		0.1990	0.1489	0.1274	

TABLE 2: DISTRICT-WISE AND YEAR-WISE MEAN TECHNICAL EFFICIENCIES

YEAR	Anantapur District			Chittoor District			Kurnool District			Kadapa District		
	CRS	VRS	SCALE	CRS	VRS	SCALE	CRS	VRS	SCALE	CRS	VRS	SCALE
2005-06	0.5613	0.8157	0.6852	0.6760	0.8622	0.7657	0.8700	0.9312	0.9279	0.7323	0.8616	0.8490
2006-07	0.4970	0.7963	0.6243	0.6748	0.8773	0.7549	0.8974	0.9577	0.9334	0.7523	0.8682	0.8650
2007-08	0.6784	0.8256	0.8212	0.7753	0.9053	0.8370	0.9765	0.9871	0.9882	0.8031	0.8521	0.9357
2008-09	0.7591	0.8455	0.8948	0.7916	0.8803	0.8912	0.9820	0.9909	0.9900	0.9278	0.9701	0.9567

TABLE 3: YEAR-WISE MEAN TECHNICAL EFFICIENCIES OF SELECTED DMUS IN SELECTED DISTRICTS

Year	Mean Technical Efficiency(CRS)				Mean Technical Efficiency(VRS)				Mean Technical Efficiency(Scale)			
	ATP	CHTR	KNL	KDP	ATP	CHTR	KNL	KDP	ATP	CHTR	KNL	KDP
2005-06	0.5613	0.6760	0.8700	0.7323	0.8157	0.8622	0.9312	0.8616	0.6852	0.7657	0.9279	0.8490
2006-07	0.4970	0.6748	0.8974	0.7523	0.7963	0.8773	0.9577	0.8682	0.6243	0.7549	0.9334	0.8650
2007-08	0.6784	0.7753	0.9765	0.8031	0.8256	0.9053	0.9871	0.8521	0.8212	0.8370	0.9882	0.9357
2008-09	0.7591	0.7916	0.9820	0.9278	0.8455	0.8803	0.9909	0.9701	0.8948	0.8912	0.9900	0.9567

Note: ATP – Anantapur; CHTR – Chittoor; KNL – Kurnool; KDP – Kadapa.

TABLE 4: DESCRIPTIVE STATISTICS OF SELECTED DMUs

Description	2005-06			2006-07			2007-08			2008-09		
	CRS	VRS	SCALE	CRS	VRS	SCALE	CRS	VRS	SCALE	CRS	VRS	SCALE
No. of AMCs evaluated	56	56	56	56	56	56	56	56	56	56	56	56
No. of efficient AMCs	16	23	16	15	23	15	23	33	23	27	36	27
No. of Inefficient AMCs	40	33	40	41	33	41	33	23	33	29	20	29
Mean Score	0.7030	0.8661	0.7996	0.6978	0.8738	0.7864	0.8019	0.8929	0.8869	0.8540	0.9152	0.9273
Standard Deviation	0.2628	0.1745	0.2172	0.2565	0.1673	0.2103	0.2265	0.1627	0.1530	0.1990	0.1489	0.1274
Maximum Score	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Minimum Score	0.1554	0.3276	0.2186	0.2117	0.3896	0.2857	0.2438	0.3735	0.4524	0.3151	0.3604	0.4731

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