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Financial Stability and Risk Assessment of District Central Cooperative Banks: A Decadal Study of Chittoor, Krishna, and Srikakulam DCCBs in Andhra Pradesh.

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Abstract: This study examines the financial performance and asset quality of three District Central Cooperative Banks (DCCBs) in Andhra Pradesh—Chittoor, Krishna, and Srikakulam—over the period 2012–13 to 2022–23. Using key indicators including Outstanding Advances, Collections, Overdues, Gross NPAs, and Net NPAs, trends and growth patterns are analyzed for each institution. Statistical tools such as Mean, Standard Deviation, Coefficient of Variation (CV), Compound Annual Growth Rate (CAGR), and ANOVA are employed to assess inter-bank differences and performance stability. Findings indicate relatively stable and controlled operations at Chittoor DCCB, while Krishna and Srikakulam DCCBs exhibit higher volatility and increasing credit risk, especially evident in their NPA growth. The study underscores the need for targeted improvement in credit monitoring and loan recovery, with policy recommendations offered for sustainable cooperative banking operations.

Keywords: District Central Cooperative Banks, DCCBs, Net NPA, Gross NPA, Overdues, Collections, Outstanding Advances, CV, CAGR, ANOVA

I. Introduction

District Central Cooperative Banks (DCCBs) are integral to India's rural financial ecosystem, linking primary societies to apex cooperative institutions and delivering rural credit. Andhra Pradesh, with its strong history of cooperative banking, relies heavily on DCCBs for agricultural and allied sector development. However, DCCBs face mounting challenges concerning asset quality, credit delivery, and risk management, threatening their long-term viability.

This study investigates the financial health, risk, and operational differences among three prominent DCCBs in Andhra Pradesh—Chittoor, Krishna, and Srikakulam—over an 11-year period. By applying robust statistical analysis tools to secondary bank data, the study delivers insights critical to practitioners, regulators, and policymakers intending to strengthen cooperative banking and sustain rural credit flow.

II. Review of Literature

A comprehensive literature review underscores the significance and nuances of NPA management and financial performance in the banking sector:

Ali et al. (2020) identify persistent asset quality deterioration due to improper loan assessments and frequent borrower defaults, with legal entanglements further hampering recovery in public sector banks.

Yurttadur et al. (2019) and Bodla & Verma (2007) emphasize the global prevalence of NPAs, advocating robust credit assessment and monitoring mechanisms. Wheelock & Wilson (1995) highlight macro-level determinants like regulatory frameworks and operational dynamics affecting bank stability.

Singh & Aggarwal et al. (2019) find a clear negative relationship between NPAs and bank performance, citing political interference as a major challenge for public sector banks.

Senthil Arasu & Sridevi et al. (2019) reveal a deteriorating trend in NPAs, impacting banking sector profitability, and recommend stringent measures for improved NPA management.

Kapadia & Madhav (2019) raise concerns over unproductive bank resources tied up in bad loans despite sluggish recovery, with willful defaults a growing threat (as supported by Mehta & Jha, 2020; Jayadev & Padma, 2020).

Kattadiyil & Sisugoswami (2020) blame aggressive lending and inadequate loan appraisals for rising asset quality risks.

Despite substantial research on commercial banks, there exists a gap in comprehensive, comparative analyses of DCCBs, especially using advanced statistical methods over a consistent time span.

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Statement of the Problem

DCCBs are pivotal for rural credit delivery, yet research comparing the financial health, asset management, and risk among DCCBs at the district level, specifically in Andhra Pradesh, remains sparse. There is a pressing need for systematic, statistical assessment—using tools like CV, CAGR, and ANOVA—to analyze advances, collections, NPAs, and recoveries. This study addresses the gap by providing a comparative, data-driven evaluation and practical recommendations to improve DCCB operations in the state.

Objectives of the Study

1. To assess and compare the trends of advances, collections, overdues, gross NPAs, and net NPAs among Chittoor, Krishna, and Srikakulam DCCBs.
2. To measure the stability and volatility of key performance indicators across the selected DCCBs.
3. To determine statistically significant differences in asset quality and financial performance among the DCCBs using ANOVA.
4. To provide policy-relevant suggestions for strengthening credit monitoring and recovery mechanisms.

III. Research Design and Methodology

Data Source:

Secondary data are utilized, mirroring previous studies that have relied on published reports from banks and regulatory authorities for reliable and comprehensive financial information.

Period:

An eleven-year time frame (2012–13 to 2022–23) aligns with longitudinal research designs commonly used to capture performance trends and cyclical variations.

Variables:

Metrics such as Outstanding Advances, Collections, Overdues, Gross NPA, and Net NPA are selected, consistent with earlier literature analyzing banking performance and asset quality.

Statistical Tools:

Descriptive measures (Mean, SD, CV, CAGR) and inferential techniques (One-way ANOVA and Tukey's post-hoc) are applied, following established practices in quantitative finance and comparative banking studies.

Limitations:
As in previous articles, dependency on secondary data introduces risks of classification discrepancies, and influences of exogenous events are not isolated, potentially affecting result interpretation.

Data Analysis and Interpretation

Outstanding Advances

Table 1. Outstanding Advances of Selected DCCB During the Period 2012–13 to 2022–23

Bank	**Mean**	**SD**	**CV (%)**	**CAGR (%)**
Chittoor	79,298	37,856	47.7	10.3
Krishna	313,618	186,410	59.4	17.7
Srikakulam	82,781	82,877	100.1	32.1

Interpretation

Srikakulam—based on your table:

- Chittoor DCCB
- Mean: 79,298 (average value over 11 years)
- SD (Standard Deviation): 37,856 (moderate variability around the mean)
- CV (Coefficient of Variation): 47.7% (moderate relative volatility)
- CAGR (Compound Annual Growth Rate): 10.3% (steady, moderate annual growth)

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- Interpretation: Chittoor's performance shows moderate average advances and growth, with reasonably stable trends over the period.

Krishna DCCB

- Mean: 313,618 (significantly higher average than others)
- SD: 186,410 (large variability)
- CV: 59.4% (relatively higher volatility compared to Chittoor)
- CAGR: 17.7% (higher growth rate)

Interpretation: Krishna has the largest size among the three, with strong growth but higher year-to-year fluctuations in its advances.

Srikakulam DCCB

Mean: 82,781 (similar to Chittoor, much lower than Krishna)

- SD: 82,877 (very high compared to its mean)
- CV: 100.1% (extremely high volatility; SD ≈ Mean)
- CAGR: 32.1% (very high annual growth rate)

Interpretation: Srikakulam exhibits rapid growth but with highly unstable, erratic advances—yearly values vary dramatically around the mean.

Summary:

- Krishna leads in scale and growth of advances but with marked volatility.
- Srikakulam has experienced the fastest growth, but its performance is inconsistent and risky, as indicated by a CV above 100%.
- Chittoor maintains moderate and stable advance levels and growth, demonstrating less risk and steady performance.

Implication:
Higher CVs (especially Srikakulam's) suggest greater unpredictability, which could imply either opportunities for rapid expansion or potential instability, while lower CVs (like Chittoor's) indicate more reliable, steady progression

ANOVA shows $F = 25.1$, $p < 0.0001$ (significant at 5%), indicating substantial differences among the DCCBs.

Collections

Table 2. **Collections of Selected DCCB during the Period 2012-13 t0 2022-23 (₹ lakh) – Mean, SD, CV, CAGR**

Bank	Mean	SD	CV (%)	CAGR (%)
Chittoor	36,624	19,809	54.1	13.8
Krishna	175,410	96,433	55.0	14.0
Srikakulam	46,968	39,009	83.1	29.4

Interpretation:

Mean:

- The mean represents the average value of the data series for each bank.
- Krishna bank has the highest mean (175,410), indicating it generally operates at a significantly higher average level compared to Chittoor (36,624) and Srikakulam (46,968).
- Standard Deviation (SD):
- SD measures the dispersion or variability around the mean.
- Krishna also shows the highest SD (96,433), which aligns with its higher average values.
- Srikakulam (39,009) and Chittoor (19,809) have lower SD, reflecting relatively less absolute variation compared to Krishna.

Coefficient of Variation (CV %):

- CV is the ratio of SD to the mean, expressed as a percentage. It shows relative variability normalized to the mean.

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- Chittoor (54.1%) and Krishna (55.0%) have similar relative variability.
- Srikakulam has a much higher CV (83.1%), indicating that despite a moderate mean, the data for this bank is considerably more volatile or inconsistent relative to its mean.

Compound Annual Growth Rate (CAGR %):

- CAGR reflects the average annual growth rate over a period.
- Srikakulam shows a significantly higher CAGR (29.4%) compared to Chittoor (13.8%) and Krishna (14.0%), implying that Srikakulam is growing faster on an annual basis.
- Krishna and Chittoor have similar and moderate growth rates.

Summary:

- Krishna bank operates at a much larger scale (highest mean) with moderate relative variability and modest growth.
- Chittoor has the lowest average scale but also relatively low variability and moderate growth.
- Srikakulam, while smaller in absolute terms than Krishna, exhibits high volatility relative to its mean but is growing at a much faster pace annually.

If you're assessing stability, Krishna and Chittoor look more stable, but for high growth potential, Srikakulam stands out despite its higher volatility.

Overdues

Table 3. Overdues of Selected DCCB During the Period 2012-13 To 2022-23 (₹ lakh) – Mean, SD, CV, CAGR

Bank	Mean	SD	CV (%)	CAGR (%)
Chittoor	3,909	1,064	27.2	3.4
Krishna	22,157	14,906	67.3	11.2
Srikakulam	6,266	3,368	53.7	6.1

Interpretation:

1. Mean (Average Overdues):

- Krishna DCCB has the highest average overdue amount (₹22,157 lakh), indicating that, on average, it had the largest volume of overdue loans during the period.
- Srikakulam's average overdue is moderate (₹6,266 lakh), while Chittoor has the lowest (₹3,909 lakh).

2. Standard Deviation (SD):

- Krishna's SD (₹14,906 lakh) is also the highest, suggesting that the overdue values fluctuated a lot year to year.
- Chittoor has the lowest SD, indicating more stable overdue amounts over the years.

3. Coefficient of Variation (CV = SD/Mean × 100):

- CV measures relative variability. Krishna's CV is 67.3%, meaning overdues were highly volatile relative to its average.
- Srikakulam's overdues were also fairly volatile (53.7%), whereas Chittoor's overdues were comparatively stable (27.2%).

4. Compound Annual Growth Rate (CAGR):

- Krishna shows the highest growth in overdues at 11.2% per year, indicating a rapidly increasing problem of overdue loans.
- Srikakulam's overdues are also growing, but at a moderate 6.1% annually.
- Chittoor's overdues grew slowly at 3.4% annually.

Summary:

- Krishna DCCB faces the largest and fastest-growing overdue problem, but this is also accompanied by high variability, possibly indicating inconsistent credit performance or collection issues.
- Srikakulam is experiencing moderate and somewhat volatile overdue growth.

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- Chittoor DCCB has the smallest, slowest-growing overdue portfolio with relatively stable values, reflecting better control or less exposure.

This analysis suggests that Krishna DCCB may require urgent attention toward credit monitoring and recovery, while Chittoor is relatively stable in managing its overdue loans.

Gross NPAs

Table 4. Gross NPAs of Selected DCCB During the Period 2012-13 to 2022-23(₹ lakh) – Mean, SD, CV, CAGR

Bank	Mean	SD	CV (%)	CAGR (%)
Chittoor	6,746	3,106	46.0	5.8
Krishna	8,958	3,783	42.2	10.9
Srikakulam	2,719	1,853	68.2	12.6

Interpretation:

1. Mean (Average Gross NPAs):

- Krishna has the highest average Gross NPAs at ₹8,958 lakh, indicating that it had the largest stock of non-performing assets on average during the period.
- Chittoor has a moderately high Gross NPA amount (₹6,746 lakh), while Srikakulam has the lowest average NPAs (₹2,719 lakh).

2. Standard Deviation (SD):

- Krishna and Chittoor show relatively high absolute fluctuations in Gross NPAs (₹3,783 lakh and ₹3,106 lakh respectively), indicating considerable year-to-year variability.
- Srikakulam's SD is lower in absolute terms (₹1,853 lakh) but since its mean is much lower, the relative volatility needs to be checked via CV.

3. Coefficient of Variation (CV = SD/Mean × 100):

- Srikakulam exhibits the highest relative volatility at 68.2%, meaning its Gross NPAs are highly variable relative to its average level.
- Chittoor and Krishna have more moderate relative variability at 46.0% and 42.2% respectively, showing more stable NPA levels in relative terms.

4. Compound Annual Growth Rate (CAGR):

- Srikakulam has the highest CAGR at 12.6%, indicating that its Gross NPAs have been rising most rapidly over the years.
- Krishna follows with a growth of 10.9% per year, showing a significant increase in NPAs.
- Chittoor's NPAs grew at a comparatively moderate rate of 5.8% annually.

Summary:

- Krishna DCCB has the highest level of Gross NPAs, with moderately stable variability, but its NPAs are growing quickly at nearly 11% annually.
- Srikakulam DCCB has the most volatile Gross NPAs relative to its size and is experiencing the fastest growth rate, which is a cause for concern despite the lower absolute NPA amount.
- Chittoor DCCB maintains a moderate level of NPAs with moderate variability and the slowest growth, indicating relatively better control.

Overall, Krishna and Srikakulam banks appear to have growing challenges with NPAs, with particular attention needed for Srikakulam due to its high volatility and rapid NPA growth. Chittoor's situation, while less severe, still requires ongoing monitoring.

ANOVA: $F = 4.02$, $p \approx 0.03$ (significant). Krishna and Srikakulam exhibit higher and more volatile NPA growth.

Net NPAs

Table 5. Net NPAs of Selected DCCB During the Period 2012-13 to 2022-23(₹ lakh) – Mean, SD, CV, CAGR (₹ lakh) – Mean, SD, CV, CAGR

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Bank	Mean	SD	CV (%)	CAGR (%)
Chittoor	2,835	875	30.9	0.3
Krishna	3,561	1,683	47.3	15.1
Srikakulam	2,317	1,818	78.4	21.8

Interpretation:

1. Mean (Average Net NPAs):

- Krishna has the highest average Net NPAs (₹3,561 lakh), indicating that after provisions, it still carries the largest burden of net non-performing assets.
- Chittoor follows with a moderate average Net NPA of ₹2,835 lakh.
- Srikakulam records the lowest average Net NPAs at ₹2,317 lakh.

2. Standard Deviation (SD):

- Srikakulam's Net NPAs have the largest absolute fluctuations (₹1,818 lakh), indicating high variability in net NPAs year to year.
- Krishna's variability is also significant (₹1,683 lakh), while Chittoor shows relatively more stable Net NPAs (₹875 lakh).

3. Coefficient of Variation (CV):

- Srikakulam's CV of 78.4% means its Net NPAs are highly volatile relative to the mean, indicating inconsistent recovery or provisioning patterns.
- Krishna also shows substantial relative volatility at 47.3%.
- Chittoor's Net NPAs have comparatively more stability with a CV of 30.9%.

4. Compound Annual Growth Rate (CAGR):

- Srikakulam has the highest CAGR of Net NPAs at 21.8%, showing rapid deterioration or insufficient recovery in asset quality over the years.
- Krishna follows with a high CAGR of 15.1%.
- Chittoor's Net NPAs have almost stagnated, growing at only 0.3% annually, indicating a stable situation.

Summary:

- Srikakulam DCCB exhibits the fastest growth and highest volatility in Net NPAs, signaling critical issues in asset quality management and recovery efforts.
- Krishna DCCB has a moderately high average Net NPA with notable volatility and significant growth, requiring focused intervention to curb deterioration.
- Chittoor DCCB shows the lowest growth and volatility in Net NPAs, reflecting better control and management of asset quality and provisioning.

Overall, Srikakulam and Krishna are facing increasing challenges with Net NPAs, with Srikakulam's situation being particularly alarming due to its rapid growth and volatility. Chittoor appears more stable and better managed in this regard.

ANOVA: $F = 3.04$, $p = 0.066$ (not statistically significant at 5%, but close). Srikakulam's volatility and NPA escalation are concerning.

IV. Discussion

Results establish that:

- Chittoor DCCB excels at stable credit growth while controlling overdues and NPAs.
- Krishna DCCB demonstrates strong advances and collections but with increasing overdues and NPAs, highlighting risk in credit appraisal and monitoring.
- Srikakulam DCCB has achieved rapid expansion but at the expense of quality, with severe instability in collections and ballooning NPAs, requiring urgent intervention.

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The statistical significance of advances and asset quality differences points to the influence of internal processes, recovery systems, and risk management capacities. Chittoor's disciplined operations contrast sharply with the risky trajectories at Krishna and Srikakulam.

Suggestions

1. For Chittoor DCCB

- Sustain effective credit monitoring and loan recovery mechanisms.
- Pursue moderate advance growth while preserving asset quality.

2. For Krishna DCCB

- Enhance recovery mechanisms to reduce overdues and rising NPAs.
- Strengthen credit appraisal and post-disbursement follow-up.

3.For Srikakulam DCCB

- Immediate intervention in NPA and overdue management is essential.
- Adopt stricter loan screening, risk-based borrower profiling, and periodic efficiency monitoring.
- Develop structured recovery plans.
- Policy Recommendations

NABARD and state cooperatives should regularly audit DCCBs with rising risk.

Broaden MIS integration and digitize credit monitoring for efficiency and transparency.

V. Conclusion

This comparative study reveals sharp differences in financial performance and asset quality across three DCCBs in Andhra Pradesh. While Chittoor DCCB exemplifies relative operational stability, Krishna and Srikakulam DCCBs expose mounting credit risks and management gaps—especially in recovery discipline and asset quality. Srikakulam DCCB's rapid yet volatile growth presents a clear warning for unchecked expansion.

The findings demand concerted improvements in credit risk management, loan recovery, and regulatory supervision to secure the sustainability of the cooperative banking sector. Robust governance, technology integration, and tailored recovery interventions are vital for safeguarding rural credit delivery and furthering inclusive development.

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