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ASSESSING THE ROLE OF CLIMATE CHANGE AND TRANSPORTATION COSTS IN FLUCTUATING TOMATO PRICES IN KARNATAKA.

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ABSTRACT

This study centres on the surging tomato costs in Karnataka, a basic issue with far-reaching suggestions for Indian family units. Tomatoes are a kitchen staple in Indian cooking, and their cost vacillations essentially affect the budgets of endless families. This inquiry digs into the root causes of this instability and proposes a set of strong moderating measures.

Quantitative examination takes center organize in this ponder, advertising a nuanced understanding of the perplexing tomato generation, dispersion, and utilization scene in Karnataka. This explanatory show draws from assorted sources, counting government reports, advertise information, and comprehensive agrarian studies. The show envelops key viewpoints, such as the effect of climate change on tomato development, the role of mediators inside the supply chain, and the inclinations and utilization designs of conclusion shoppers.

In reaction to these multifaceted challenges, the ponder proposes a comprehensive set of relieving measures. These measures are equipped towards stabilizing tomato costs in Karnataka and guaranteeing more unsurprising results for this basic product.

Keywords: Tomato prices, Karnataka, price volatility, supply chain, mitigating measures, climate-resilient agriculture, government intervention.

Introduction:

India's economy is mostly based on agriculture. Rural Indians' social and economic lives are entwined with agriculture. Agriculture continues to be the nation's principal economic engine despite extensive modernization. The national income is significantly influenced by the agricultural sector. Even though it has decreased to 17% of the GDP, agriculture still accounts for a sizable portion of the industrialized world. Nearly 60% of the population, many of whom live in rural India, are employed by it. The agriculture industry received a boost from the first five-year plan. From the second five-year plan onward, the sector was, nevertheless, considerably ignored. In a short amount of time, the nation experienced its bitter flavor. The

administration then recognized its error and concentrated all of its efforts on advancing the green revolution. After the green revolution, India's agricultural production reached self-sufficiency, and in the new century, it is moving toward international competition. The unprepared Indian farmer is now exposed to the turbulent global markets because of globalization initiatives. The agricultural industry has suffered greatly as a result of depleting water supplies, unpredictable rainfall, still-underdeveloped technologies, institutional support, and market swings. The farming community has experienced some discontent as a result of this unhappiness, and on occasion it has reached a point where the farmers are considering giving up not only their livelihood as farmers but also their entire way of life.

The state of Karnataka is split into 10 agro-climatic zones based on factors such as the frequency of rainfall, the types of soil, their texture, depth, and physico-chemical characteristics, as well as their elevation, topography, major crops, and plant types. According to the 2011 Census, roughly 30% of all state employees are still employed in agricultural and related sectors, which will contribute 8.73% to Karnataka's Gross State Value Added (GSVA). Seventy percent of all coffee produced in India is produced in Karnataka. The horticulture and floriculture industries are dominated by Karnataka. The state exports more flowers and gherkins than any other state in the nation. In India, Karnataka is the second-biggest producer of maize, safflower, grapes, pomegranate, raw silk, sandalwood, ragi (finger millet), tomato, and the greatest producer of coffee, raw silk, sandalwood, grapes, pomegranate, and onions.

The edible fruit of the Solanum lycopersicum plant, also known as the tomato plant, is the tomato. Western South America and Central America are where the species first appeared. A key source of umami flavor is tomatoes. In Indian households, tomatoes are a staple seasonal food that are consumed every day. Proteins, water, carbs, potassium, sodium, vitamins A and C, calcium, phosphorus, and iron are all present. Since tomatoes are the king of the Indian kitchen and an essential part of every Indian household, their rising prices have a negative impact on each family's monthly budget. The few headlines mentioned above have significantly impacted every single household in India and are undoubtedly posing a danger to the Indian economy.

Statement of the problem

Tomatoes are a vital component of both agricultural production and household consumption in Karnataka, playing a significant role in the state's economy and nutrition. Among the numerous factors contributing to this instability, climate change and transportation costs have emerged as

significant determinants. Climate change has led to unpredictable weather patterns, affecting crop yields and leading to supply shortages. Transportation costs have seen a notable increase due to rising fuel prices, infrastructural inefficiencies, and logistical challenges. This research seeks to address this gap by assessing the role of climate change and transportation costs in the fluctuating prices of tomatoes in Karnataka. The study aims to provide valuable insights that can inform policymakers, stakeholders, and farmers, ultimately contributing to a more stable and resilient agricultural sector in the region.

Research Objectives

1. Investigate the Influence of Climate on Tomato Prices.
2. Assess the Impact of Transportation Costs on Tomato Prices.

Research Methodology

The study will employ a descriptive and exploratory research design. Descriptive research will quantify the relationship between climate variables, transportation costs, and tomato prices, while exploratory research will provide insights into the underlying mechanisms and contextual factors. The data will be collected from farmers by framing the structured questionnaire and interview method and secondary data will be collected from the reports of Indian Meteorological Department, Karnataka State Agricultural Marketing Board, National Horticulture Board and Ministry of Road Transport and Highways, journals, websites. Stratified random sampling will be used to ensure representation from different regions of Karnataka. A sample of 360 respondents is selected to ensure a comprehensive understanding of the issue. A Correlation analysis will be calculated to examine the relationship between climate variables, transportation costs, and tomato prices.

Hypothesis for objective-1: There exists a strong positive relationship amongst climate conditions, weather-related factors, adverse climate conditions, climate-related events, quality of tomatoes (QT) and the prevailing climate on market value.

Data Analysis and Interpretation

Correlations							
		Market value	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**
Pearson Correlation	**Market value**	1.000	.646	.215	.472	.258	.560
	CF1	.646	1.000	.185	.313	.201	.282
	CF2	.215	.185	1.000	.172	.384	.362
	CF3	.472	.313	.172	1.000	.379	.485
	CF4	.258	.201	.384	.379	1.000	.469
	CF5	.560	.282	.362	.485	.469	1.000
Sig. (1-tailed)	**Market value**	.	.000	.000	.000	.000	.000
	CF1	.000	.	.000	.000	.000	.000
	CF2	.000	.000	.	.001	.000	.000
	CF3	.000	.000	.001	.	.000	.000
	CF4	.000	.000	.000	.000	.	.000
	CF5	.000	.000	.000	.000	.000	.
N	**Market value**	360	360	360	360	360	360
	CF1	360	360	360	360	360	360
	CF2	360	360	360	360	360	360
	CF3	360	360	360	360	360	360
	CF4	360	360	360	360	360	360
	CF5	360	360	360	360	360	360

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.770[a]	.593	.587	.704
a. Predictors: (Constant), CF5, CF1, CF2, CF3, CF4				

ANOVA[b]					
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	255.141	5	51.028	103.085	.000[a]
Residual	175.234	354	.495		
Total	430.375	359			
a. Predictors: (Constant), CF5, CF1, CF2, CF3, CF4					
b. Dependent Variable: Market value					

Coefficients[a]					
Model	**Unstandardized Coefficients**	**Standardized Coefficients**	**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
1(Constant)	-.294	.177		-1.667	.096
CF1	.540	.039	.507	13.948	.000
CF2	-.015	.041	-.014	-.379	.705
CF3	.166	.042	.160	3.943	.000
CF4	-.075	.040	-.077	-1.894	.059
CF5	.418	.047	.381	8.896	.000
a. Dependent Variable: Market value					

It is observed from the above Table that a relationship between climatic factors on market value is analysed using stepwise regression. Independent variables together explain about 59.3 percent of variation on market value. Since the p-value is less than 0.05 for dimensions of climatic factors; therefore, the hypothesis is concluded as: there is a significant relationship among climatic factors on market value. F value of 103.08 is significant indicating the model is fit indicating that the predictor variables (climatic factors) influence the dependent variable (market value).

Hypothesis for objective -2: There is a strong positive relationship amongst higher or lower transportation costs, source of tomatoes, quality of transportation, refrigeration, freshness of tomatoes, better quality, shelf-life of tomatoes on market value.

Correlations							
		Market value	**TC1**	**TC2**	**TC3**	**TC4**	**TC5**
Pearson Correlation	**Market value**	1.000	.290	.607	.390	.426	.455
	TC1	.290	1.000	.381	.563	.402	.610
	TC2	.607	.381	1.000	.376	.572	.658
	TC3	.390	.563	.376	1.000	.417	.660
	TC4	.426	.402	.572	.417	1.000	.436
	TC5	.455	.610	.658	.660	.436	1.000
Sig. (1-tailed)	**Market value**	.	.000	.000	.000	.000	.000
	TC1	.000	.	.000	.000	.000	.000
	TC2	.000	.000	.	.000	.000	.000
	TC3	.000	.000	.000	.	.000	.000
	TC4	.000	.000	.000	.000	.	.000
	TC5	.000	.000	.000	.000	.000	.
N	**Market value**	360	360	360	360	360	360
	TC1	360	360	360	360	360	360
	TC2	360	360	360	360	360	360
	TC3	360	360	360	360	360	360
	TC4	360	360	360	360	360	360
	TC5	360	360	360	360	360	360

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.635[a]	.403	.395	.852

a. Predictors: (Constant), TC5, TC4, TC1, TC3, TC2

ANOVA[b]					
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	173.506	5	34.701	47.823	.000[a]
Residual	256.869	354	.726		
Total	430.375	359			
a. Predictors: (Constant), TC5, TC4, TC1, TC3, TC2					
b. Dependent Variable: Market value					

Coefficients[a]					
Model	**Unstandardized Coefficients**	**Standardized Coefficients**	**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
1(Constant)	-.083	.220		-.375	.708
TC1	-.036	.063	-.031	-.567	.571
TC2	.683	.079	.529	8.589	.000
TC3	.260	.073	.207	3.554	.000
TC4	.078	.062	.067	1.265	.207
TC5	-.044	.079	-.040	-.558	.577
a. Dependent Variable: Market value					

It is observed from the above Table that a relationship between market integration on market value is analysed using stepwise regression. Independent variables together explain about 33.6 percent of variation on market value. Since the p-value is less than 0.05 for dimensions of climatic factors; therefore, the hypothesis is concluded as: there is a significant relationship among climatic factors on market value. F value of 35.821 is significant indicating the model is fit indicating that the predictor variables (climatic factors) influence the dependent variable (market value).

Findings:

There exists a strong positive relationship amongst climate conditions, weather-related factors, adverse climate conditions, climate-related events, quality of tomatoes (QT) and the prevailing climate on market value.

There is a significant relationship between cost of transportation which includes Higher/ Lower transportation costs, distance between the source of tomatoes and the market, quality of transportation infrastructure among cost of transportation on market value.

Discussion and Conclusion

The study, titled " Assessing the Role of Climate Change and Transportation costs in Fluctuating Tomato Prices in Karnataka," presents a comprehensive analysis of various factors influencing tomato prices in Karnataka. The response rate for the survey was 72.2%, indicating a substantial level of engagement from farmers in the region. The study's hypotheses offer valuable insights into the various factors that impact tomato prices. Hypotheses 1, 2, and 4 focus on the relationships between climate conditions, transportation, and market dynamics on tomato prices. These findings can guide farmers in making informed decisions regarding transportation and market access.

Ultimately, the findings of this study have significant implications for both farmers and policymakers. It suggests that a one-size-fits-all approach to agricultural policy may not be effective in addressing the unique challenges faced by tomato farmers in Karnataka. Instead, tailored interventions that consider local demographics, market dynamics, and emerging issues such as crop health and refrigeration are necessary to promote sustainable and profitable tomato farming in the region. As tomato prices continue to be a critical issue for farmers, these research findings serve as a foundation for evidence-based policy reforms and mitigation measures to ensure the prosperity of tomato growers in Karnataka.