IMPACT OF TRANSPORT OVER SOME SELECTED SOCIO-ECONOMIC INDICATIORS: SIGNIFICANT RESULTS FOR ODISHA

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Abstract: The author's goal in present article is to focus scientifically the impact of transport over some selected socio-economic indicators in Odisha context like agriculture & animal husbandry, forestry, fisheries, mining & quarrying, manufacturing units, electricity, gas & water supply, construction, hotel & restaurant trade, storage, communication, banking & insurance, real estate, public administration, other services, total GSDP and consumer price index by taking mathematical models like linear, quadratic, cubic, logarithmic, inverse, compound, power, growth and exponential into account by taking GSDP figures at current prices of above socio-economic indicators during the period 2003 to 2013 A.D. for forecasting purpose.

Key words:

GSDP, Socio-economic indicators, Transport, mean, standard deviation, correlation, mathematical models, STP.

INTRODUCTION:

The platform of management science and operation research can be a useful background for top level decision-making. The main culprit is our growing awareness that in today's complex and rapidly changing world, there are just so many more consideration that should be weighed in making major decision. The context of top-level decision is of course a product of the strategic planning, programming and budgeting system.

The basic need of transport planning is to design the entire transportation structure into sophisticated economic zone by restructuring the infrastructural facilities into productive force. The central orientation is to inculcate all scientific and modernized roadways and railways for the benefit of society in the form of development of various socio-economic indicators [1]. Strategic Transport Planning (STP) increases competition, efficiency, transparency, accessibility and adequate availability of transport services in Odisha by escalating substantial revenue and economic growth.

STP is the basis of Odisha and has got international flavor. It gears to balance towards infrastructural development in roads, railways in integrated style for the development of human responses and it ends the societal distress, destitute, despair and despondency by acting as a tonic to re-structure the system, reorient the objective and reform the logistic connectivity's in Odisha.

MAIN FOCUS:

In this paper, it has been judged human welfare in the global era as captured by a set of socio-economic indicators. Impact of transport over some socio economic indicators are projected through various mathematical models. Emphasis is given on desirable and feasible STP on the face of complex challenges in 21st century.

The prime focus here is to disclose the impact of transport over some selected socio-economic indicators like agriculture & animal husbandry, forestry, fisheries, mining & quarrying etc. [1] by taking mathematical models like linear, quadratic, cubic etc. [2,3] into account by taking GSDP figures at current prices of above socio-economic indicators during the period 2003-2013 A.D. for forecasting purpose.

Results and Interpretation:

The relationship as well as impact of transport over the selected socio-economic parameters have been presented in the following. [5, 7]

Table-1: Mean and Standard Deviation of transportation and allied aspects with some social parameters during the period from 2003-04 to 2012-13

Social Parameters	Mean	Std. Deviation
Transportation (Rs. In Lakh)	1141511.20	598623.78
Road Length (In Kms.)	2440.26	1341.80
Amount spent in Road (Rs. In Crore)	917.47	673.57
No. of Vehicles (In 000)	2314.81	688.09
Agriculture & Animal Husbandry (Rs. In Lakh)	2513458.40	961149.29
Forestry (Rs. In Lakh)	341347.00	83787.00
Fisheries (Rs. In Lakh)	172483.60	63959.46
Mining & Quarrying (Rs. In Lakh)	1399819.40	759168.63
Manufacturing units (Rs. In Lakh)	1879955.50	897408.71
Electricity, Gas & Water Supply (Rs. In Lakh)	377646.50	97613.81
Construction (Rs. In Lakh)	1368434.00	529561.15
Hotel, Restaurant & Trade (Rs. In Lakh)	1760100.20	898683.65
Storage (Rs. In Lakh)	15302.00	8551.02
Communication (Rs. In Lakh)	149768.10	61709.34
Banking & Insurance (Rs. In Lakh)	490424.70	260188.39
Real Estate (Rs. In Lakh)	856150.50	378146.79

Public Administration (Rs. In Lakh)	620812.90	296440.90
Other Services (Rs. In Lakh)	1441740.40	693536.10
Total GSDP (Rs. In Lakh)	14405854.40	6427863.16
Population (In Lakh)	403.47	16.19
Consumer Price Index	400.38	83.57

Sources: Collected and compiled from Economic Survey (2012-13),

Table-1 above presents the mean and standard deviation (SD) of transport and allied aspects and some social parameters of Odisha state during the period 2003-04 to 2012-13. The figures for transportation, length of roads constructed, amount spent in road construction and number of vehicles are in lakh, kms, crore and thousand respectively whereas the same for social parameters are in lakh. On application of reliability analysis to the considered data, the Cronbach's Alpha [9] has been calculated as 0.748 which signifies the adoptability of the data for further analysis [8].

Table-2: Correlation between transportation and allied aspects with some social parameters

Social Parameters	Total Transport	Road Length	Amount spent in Roads	No. of vehicles
Agriculture & Animal Husbandry	0.696	0.872*	0.897*	0.903*
Forestry	0.689	0.883*	0.840*	0.952*
Fisheries	0.735*	0.851*	0.822*	0.913*
Mining & Quarrying	0.735*	0.877*	0.861*	0.908*
Manufacturing units	0.745*	0.808*	0.822*	0.902*
Electricity, Gas & Water Supply	0.718*	0.380	0.294	0.545
Construction	0.778*	0.849*	0.856*	0.916*
Hotel & Restaurant Trade	0.790*	0.861*	0.845*	0.919*
Storage	0.764*	0.831*	0.812*	0.915*
Communication	0.761*	0.859*	0.836*	0.914*

Banking & Insurance	0.747*	0.838*	0.804*	0.901*
Real Estate	0.752*	0.851*	0.824*	0.921*
Public Administration	0.726*	0.851*	0.845*	0.915*
Other Services	0.734*	0.890*	0.879*	0.910*
Total GSDP	0.758*	0.869*	0.863*	0.922*
Population	0.779*	0.877*	0.878*	0.919*
Consumer Price	0.549	0.917*	0.925*	0.916*

*N.B.:- GSDP – Gross State Domestic Product, * - Significant at 5% level (P<0.05)*

Table-2 presents the correlation coefficients between the transportation and allied aspects with some social parameters, The correlation coefficients more than 0.71 are significant and have been marked with "*" [10]. Accordingly, agriculture and animal husbandry is weakly correlated with transportation but significantly correlated with road length, amount spent in road construction and number of vehicles. Similar trend is observed in case of forestry and consumer price. But the contrasting trend is observed in case of electricity, gas and water supply. But in other social parameters like fisheries, mining and quarrying, manufacturing units, construction, hotel and restaurant trade, storage, communication, banking and insurance, real estate, public administration, other services, total GSDP and population are significantly correlated with transportation as well as allied aspects. Although it establishes acceptable linear relationship between selected social parameters with transportation and its allied aspects, still it is of further inquisitiveness to look for the best suited mathematical relationship. Since all the correlation coefficients are positive, if indicates one increases when the other increases. Here, transport has been taken as the in independent variable (X) and social parameters have been taken as dependent (Y). Now the data have been put to the following mathematical models for the cited purpose [11, 12].

Linear $\qquad\qquad Y = C + a_1 * X$ $\qquad\qquad\qquad\qquad\qquad$ (1)

Quadratic $\qquad\qquad Y = C + a_1 * X + a_2 * X^2$ $\qquad\qquad\qquad$ (2)

Cubic $\qquad\qquad Y = C + a_1 * X + a_2 * X^2 + a_3 * X^3$ $\qquad\quad$ (3)

Logarithmic $\qquad Y = C + a_1 * \ln(X)$ $\qquad\qquad\qquad\qquad$ (4)

Inverse $\qquad\qquad Y = C + a_1 / X$ $\qquad\qquad\qquad\qquad\qquad$ (5)

Compound $\qquad\quad Y = C * a_1^X$ $\qquad\qquad\qquad\qquad\qquad$ (6)

Power $\qquad\qquad Y = C * X^{a_1}$ $\qquad\qquad\qquad\qquad\qquad$ (7)

Growth $\quad\quad\quad\quad Y = e^{C + a_1 * X}$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (8)

Exponential $\quad\quad\quad Y = C * e^{a_1 * X}$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (9)

N.B:- X = Transport and Y = Social Parameter,

C = Constant, a_1, a_2, a_3 = Coefficients

Table 3: Mathematical relationship between transportation (X) and some social parameters (Y) during the period 2003-04 to 2012-13.

Social Parameters	Mathematical Models	R^2
Agriculture & Animal Husbandry	$Y = 2920.380 * X^{0.485}$	0.574
Forestry	$Y = 287292.219 - 0.200 * X + 3.772 * 10^{-7} * X^2 - 1.261 * 10^{-13} * X^3$	0.552
Fisheries	$Y = 111563.120 - 0.107 * X + 2.568 * 10^{-7} * X^2 - 8.924 * 10^{-14} * X^3$	0.625
Mining & Quarrying	$Y = 10.620 * X^{0.843}$	0.678
Manufacturing units	$Y = 45.254 * X^{0.762}$	0.698
Electricity, Gas & Water Supply	$Y = 68589.791 + 0.718 * X - 5.689 * 10^{-7} * X^2 - 1.578 * 10^{-13} * X^3$	0.547
Construction	$Y = 376.690 * X^{0.589}$	0.732
Hotel & Restaurant Trade	$Y = 32.466 * X^{0.781}$	0.751
Storage	$Y = 0.314 * X^{0.772}$	0.691
Communication	$Y = 87.971 * X^{0.534}$	0.656

Banking & Insurance	$Y = 47.481 * X^{0.661}$	0.621
Real Estate	$Y = 355.138 * X^{0.558}$	0.631
Public Administration	$Y = 220.947 * X^{0.568}$	0.568
Other Services	$Y = 207.769 * X^{0.633}$	0.620
Total GSDP	$Y = 2105.397 * X^{0.633}$	0.681
Consumer Price	$Y = 3811.563 - 0.009 * X$ $+ 1.176 * 10^{-8} * X^2 - 3.836 * 10^{-15} * X^3$	0.996

R^2- Coefficient of Determination, The highest value of R^2 has been considered only.

Table 3 presents all the R^2-values are more than 0.5 and it indicates more than 50% of the data in consideration is explained by the cited mathematical models arising out of different regression equations cited above [Eq.(1)… Eq. (9)]. Thereby the obtained mathematical relationship between transport and some social parameters are acceptable [4, 6]. This indicates acceptable impact of transport over the cited social parameters in the forms of mathematical relationship mentioned in Table 3. The variation in transport will give variation in the cited social parameters in the forms of mathematical equations mentioned against each. This conforms to the trend of correlationship existing between two in every case. Taking the available figures on transport and social parameters from 2003-13 into the account, the future may be forecasted by referring the mathematical equations in Table 3.

Conclusion:

It is concluded from above that transport has significant impact on social parameters like Agriculture & Animal Husbandry, Forestry, Fisheries, Mining & Quarrying, Manufacturing units, Electricity, Gas & Water Supply, Construction, Hotel & Restaurant Trade, Storage, Communication, Banking & Insurance, Real Estate, Public Administration, Other Services, Total GSDP, Population, Consumer Price during the period 2003-13. As it is envisaged, the development in transport system has considerable effect on the social parameters for their development. Hence, the augmentation of transport system has caused the development in social sector.

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