Land Use Impact and Its Role in Road Safety Using Multiple Regression Analysis

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June 19, 2022

LAND USE IMPACT AND ITS ROLE IN ROAD SAFETY USING MULTIPLE REGRESSION ANALYSIS

by

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ABSTRACT

Increase of the land use activity and business activity centers mainly suffer from static and dynamic fluencies involved with land use impact. With, the illegal land encroachment evaluation of both transportation and land use are hindered constantly leading to salient special transformations such as agglomeration and centralization over space and transportation network. At the moment in most of the cities public parking site selection and illegal vendor spots are done by traditional methods for just visiting the sites. In this method considering all of the effective parameters in the site selection is almost impossible and site selection is just done by considering some Limited factors. Thus, important variables are enhanced for larger variance in the defined model.This study potentially tries to evaluate the relation between the spaces in road beside the right of way and their influence in risk generation on stretch considered with peak hour validation traffic data. Thus, deriving the relationship this study tries to accommodate the generalized impact and quiet efficiently turns them into valuable predictions.This paper tries to propose a new method to describe, compare, and classify the traffic congestion points using the online map data and further correlate the relationship between traffic congestion and land use.

We considered different types of land use through performing a linear regression analysis.. Even though the data might not seem accurate quick results can be obtained from such. The manipulative factors can be reasonably gathered and quantified from the absolute methods. But these methods tries to approach the decisive proceedings with the conjugated spectrum. Those conditions will be highly provocative in making the model tight gapped honing the skill set of the system

1. INTRODUCTION

The development of urban area in the city with proper utility of land composition has become Complex process. Mobility of the network is efficiently drag down due to influence of inexorable effects. The layout of transport Network and level of service it offers for others objectified in same pattern

The data of the point of interest and the real-time traffic was extracted from base line softwares.

The congestion points were identified based on real-time traffic. Then, the cluster analysis using the attributes of congestion time was conducted to identify the main traffic congestion areas. The result of a linear regression analysis between the congestion time and the land use showed that the influence of the high proportion of commercial land use on the traffic congestion was significant.

Investigative relationships between city planning and street network variables and traffic accidents at the zone level.. For each zone, cross-sectional data on traffic accidents, zone area, land-use developments, and street network variables were collected. Multivariate regression analyses were conducted to develop mathematical relationships that could have practical applications for use by city planners and traffic safety engineers. The results indicated that coherence factors were significantly related to the number of accidents in each urban zone. Indicators for estimating urban zone accidents were also derived, to remind city planners and traffic safety engineers of the potential impacts of some planning variables and urban characteristics on traffic safety in urban areas. While the specific results relate to the study city, they at least sound cautions about the need to consider the safety trade-offs implied in some urban form choices.

2. OBJECTIVES OF THE STUDY

The objectives of the study as follows

- Study of present scenario and recommendations to improve the link
- To evaluate factors causing congestion and accident risk
- To gather video graphical and practical spatial data
- Collecting the details about the existing traffic conditions and geometric conditions

- To suggest the improvements over the existing conditions
- Identification of user preferred paths within space control frames, which are compatible with the system and the non-user
- Identification of parking location centers using survey for a week

3. STUDY AREA CHARACTERISTICS

Hyderabad is the capital of the Indian state of Telangana and occupying 650 square kilometers along the Bank of Musi River. It is situated in the southern part of Telangana in Southeastern India. It is located at **17° 23' 13.7040''N & 78° 29' 30.0624'' E** . It is one of the largest metropolitan areas in India with an average altitude of 542 meters, Hyderabad lies on predominantly sloping terrain of grey and pink granite dotted with small hills. The city has numerous lakes. As of 2018 there are over 5.3 million vehicles operating in the city of which 4.3 million are two wheelers and 1.04 million are of four wheelers. The large number of vehicles coupled with relatively low road coverage and roads occupy only 9.5% of the total city area which has led to widespread traffic congestion.

The area chosen for study area is a 10km stretch of road from JNTU METRO to AMEERPET METRO in Hyderabad city to examine the land use and enrockment of other phenomenal factors. During peak hour traffic flow this stretch of road used to inundate at some locations leads to traffic congestion and frequent accidents are occurring due to deterioration of pavement. This stretch of road is part of NH 9 which has frequent movement of vehicles. In this project, the land use features of the road are evaluated with respect to standards given as per IRC. The 10 kilometres of road is 8 lane divided road, each lane of 3.5m and right of way lies between 50-60 m.

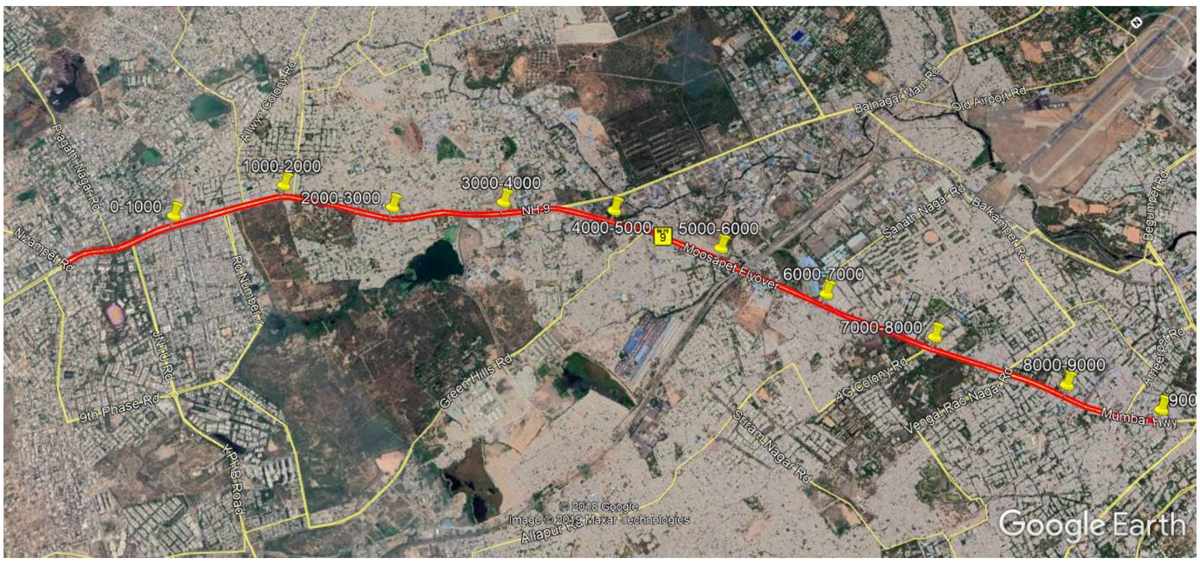
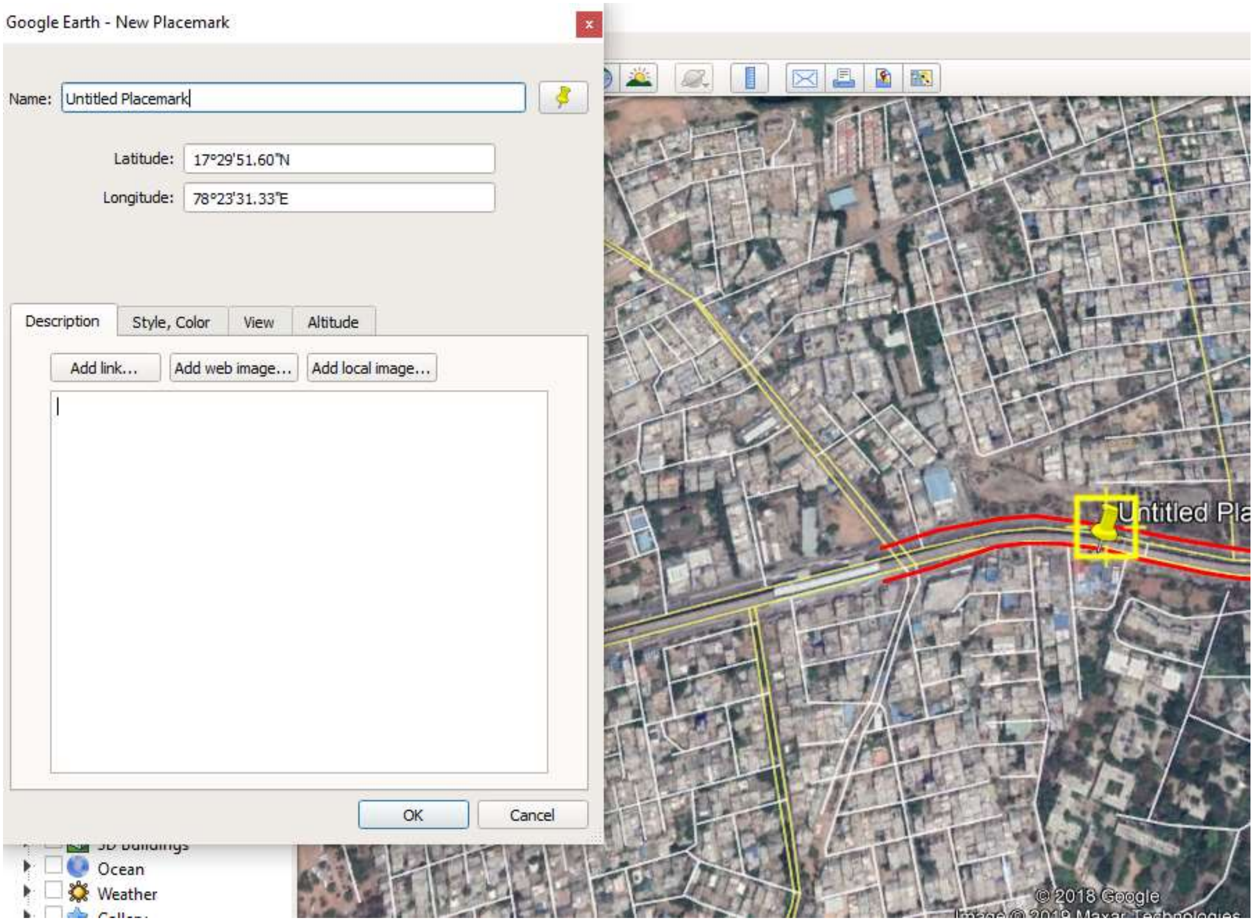


Fig.3.3 Satellite view of 10 km road stretch in Hyderabad

4 DATA COLLECTION & DIGITALIZATION

- Road stretch of 10kms is digitalized in Google Earth Pro to evaluate the geometric features of road by converting the kml file into layer in ArcGIS.
- Google Earth Pro is used to obtain the longitudinal profile of the road by right clicking on KML file > show elevation profile.

- Each 1000m is spotted and fixated



MINITAB

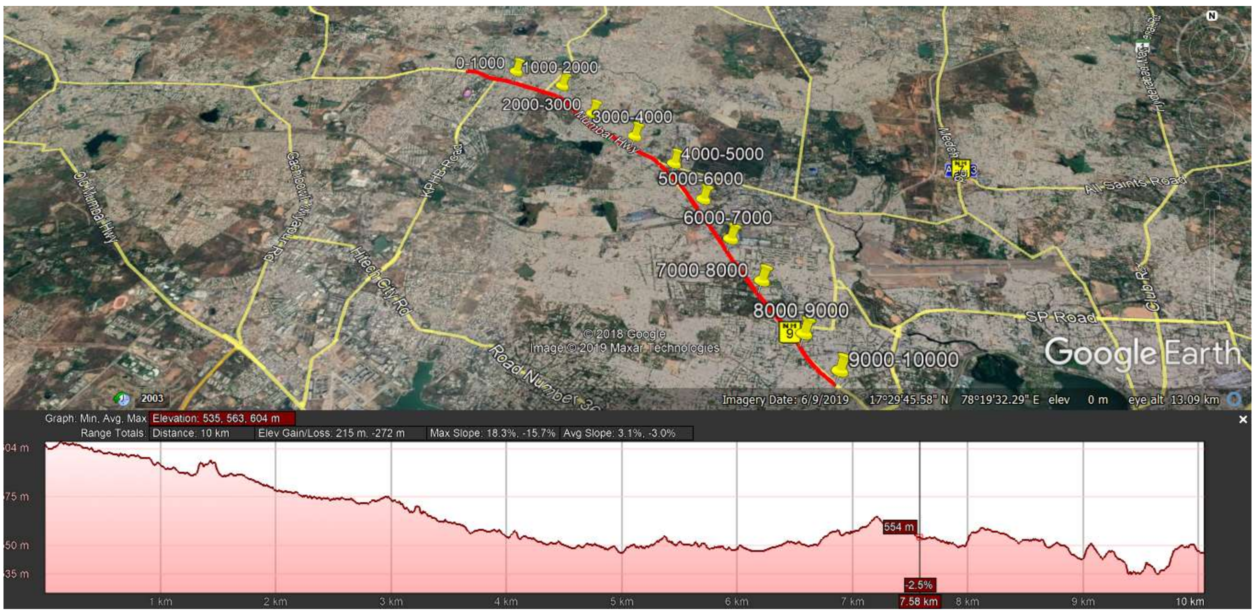
- Used for correlation, ranking and IVF values to properly analyse the data in extension to excel regression.

XL-STAT

- To formulate PCA for relevant factors

ANALYSE-IT

- To fit the model beside regression line
- To have distribution and correlation data
- To get multivariate components to formulate equation



5 METHODOLOGY

Data Collection has been the criteria since the beginning of this project. Some of the data has to be gathered, some data is verified and formulated. some data scanned through the traffic and police department which will help in further sensing the model stipulation.

The below tabulated places are specified as such

- Towing zones
- Traffic congestion places
- Accident prone area
- One way restriction
- Important places
- Alternative routes
- School zones
- Major u turns
- Linking roads
- Diversions
- Timing restrictions
- Sections with incharge officers
- Emergency hospitals
- Authorised parking spots.

Together data access hotspots can be verified and collaborated with model

The study is divided into 10 Parts for mathematical simplicity.

Accident data and hotspot areas was supported by acquiring data from the traffic police department. Which is further overlapped with area to derive Hotspots.

The deficiencies in infrastructure are categorised as

Static

Pedestrian walks

Bus stops

Improper shoulders

Unusual kerb system

Regular gradient system

Faulty drainage

Static land encroachment

Dynamic

Illegal parking

Dynamic pedestrian path

Roadside vendors

The data is aquired at places on both sides of the road which are calculated through the display infographic data

LOCATION	PEDESTRIAN WALKS	BUS STOPS	IMPROPER SHOULDERS	UNUSUAL KERB SYSTEM	IRREGULAR GRADIENTS	FAULTY DRAINAGE	STATIC LAND ENCROACHMENT
1	60.23	125.69	77.45	36.25	94.52	44.85	12.39
2	44.59	114.26	89.25	12.25	111.56	36.25	9.56
3	52.68	148.59	79.46	14.28	78.56	36.25	36.45
4	22.19	96.75	48.25	16.85	65.45	19.5	18.29
5	19.54	102.48	56.75	29.45	54.25	55.64	3.6
6	33.54	89.99	88.74	16	67.45	35.67	12.45
7	47.55	132.44	88.74	44.56	99.45	84.25	22.78
8	91.28	128.29	75.12	9	44.31	19.64	36.45
9	59.27	107.55	99.12	16.78	87.22	77.25	45.65
10	17.24	168.59	112.25	12.45	91.87	68.25	21.45

Towing Zones

- Kalamandir Bus Stop to South India Shopping Mall
- JNTU to Rythubazar
- Nizampet Junction to Brundavan Colony
- Road No-4 KPHB
- Rythubazar via Rajeev Rotary via ROB
- V.V.Nagar Kaman to Vaddepally Enclave Road

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Traffic Congestion Places

Places causing more traffic congestions	▪ KPHB Service Road, JNTU to KPHB Road No.1 ▪ KPHB Road No.4 ▪ KPHB Road No.1 ▪ Kalamandir Bus stop to Alluri Trade Centre Service Road ▪ Rythbazar Area ▪ Kukatpally Village Bus Stop Area ▪ Nizampet X Road to Bachupally
Stretches where traffic is at peak	▪ KPHB Service Road, JNTU to KPHB Road No.1 ▪ KPHB Road No.4 ▪ KPHB Road No.1 ▪ Kalamandir Bus stop to Alluri Trade Centre Service Road ▪ Rythbazar Area ▪ Kukatpally Village Bus Stop Area ▪ JNTU to ROB & Verce Versa
Places that attract more traffic during festivals	▪ BJP Office, Kukatpally (v) during (Brathukamma Festival) ▪ Ramalayam Kaman, Kukatpally (V) (Sreeramanavami Festival) ▪ KPHB Service Road and Main Road during Deepavali & Dussera Festival Shopping Traffic ▪ IDL Tank & Pragathi Nagar Tank (During Ganesh Immersion)

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Accident Prone Areas

Accident Prone areas	Reasons and precautionary measures
• Nizampet (Pedestrians Crossing Accidents) • JNTU (Pedestrians Crossing Accidents) • KPHB Main Roads (Pedestrians Crossing Accidents) • Kukatpally Village Bus Stop (Pedestrians Crossing Accidents) • V.V. Nagar junction (Pedestrians Crossing Accidents) • Godrej Y Junction (Pedestrians Crossing Accidents) • Ushamallapudi Kamman (Pedestrians Crossing Accidents) • Rythu Bazaar (Pedestrians Crossing Accidents) • ROB (Pedestrians Crossing Accidents)	• Enforcement work • Drunken Driving • Stoppers to be kept in Accidents prone areas or speed • breakers may be lying • Night time Radium stickers may be kept on Stoppers • Road markings and studs may be erected • Stop look & proceed boards may be erected • For speed limit- speed sensors may be used • Educate the Drivers

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One Way Restrictions

- HMT Hills to KPHB PS Exit only

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Important Places & Junctions

Important Places in PS Limits	Important Junctions in PS Limits
• JNTU • Rythu Bazar • KPHB Area • Kukatpally Village • Metro Mall	• Godrej Y junction • GT Bank junction • JNTU junction • Nizampet junction

• Forum Mall • Kukatpally, Balanagar • Metro Station • Nizampet • Court Complex, Prashanth nagar	• Rajeev Rotary (Forum Mall Junction) • Bachupally Junction

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Alternate Routes

Main Route	Alternate Route
• Nizampet Junctin to Miyapur Junction	• Traffic coming from Hyderabad City side to go to Miyapur Junction take right turn from Nizampet Junction, Nizampet village, Subash Chandra Bose nagar SMR vinay city, HDFC bank left Bollaram route Miyapur Junction
• JNTU Junction to Miyapur Allwy Colony	• Traffic coming from Kukatpally side to going to Miyapur Junction JNTU Junction left turn ROB right turn near Indu project Hafeezpet Metro railway station, Hafeezpet fly over right turn Miyapur Allwyn Colony
• Road No – 1 KPHB to Nizam pet Junction	• Traffic coming from Hyderabad City side to go to Bombay route take diversion at GT Bank Jn. (UMCC Jn.) or at KPHB out gat (Remedy Hospital Jn.) via yellammabanda, Gajulamarama Jeedimetla main road leading towards Gandimaisamma Jn. or from Remedy Hospital jn to 3rd phase, 5th phase and leading road towards Malaysian town ship rotary from there traffic will go to NH 9 Bombay road via Gokul Plots and Vasanthnagar colony and catch the NH 9 road after Nizampet Jn
• IDL Tank to high tech city	• Kukatpally Y Jn to Metro shopping mall coming from Y-junction going to kukatpally way take left turn from IDL Tank towords High Tech city. (via) IDL Company & Rail way Under Bridge (RUB)

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School Zones

Sl No	Name of the School.	Location
01	PNM High School	Kukatpally
02	Narayana Techno School	Addagutta, HMT Hills
03	Velocity High School	Addagutta, HMT Hills
04	Rao's High School	Addagutta

05	ZPHS High School	Hydernagar, Nizampet Road
06	Sangamitra High School	Nizampet Road
	Bhaskar Model School	Nizampet Road
08	ZPHS High School	Bachupally
09	Geethanjali School	Nizampet Road

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Major “U” Turns

- NKNR U Turn
- Hydernagar U Turn
- Balaji Nagar U Turn
- Yes Mart U Turn near GT Bank
- Remedy Hospital U Turn
- Pragathinagar U Turn
- Govt. College U Turn
- Rythu Bazaar U Turn
- Ghana Sweet House U Turn / Almond house U Turn
- Malaysian Township U Turn
- Beneath ROB U turn

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Linking Roads

- Nizampet to Bachupally.
- Nizampet via Vasanth Nagar to Hi-tech city.
- Hi-tech Railway Station via 4th phase to Moosapet.
- Hi-tech City via 4th phase Road No. 1 to NH-44
- Usha Mallapudi kamman via Jagadgirigutta to Jeedimetla

- Nizampet to Gandi Maisamma via Pragathinagar (NH-44 to SH-6)

Top

Diversions

- Godrej Y Junction to Balanagar, Fathenagar, YSR Nagar
- Road No.1 - 4th Phase Moosapet
- Nizampet, Gokul Plots, Hi-tech City

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eSeva Centers

1. Near BJP Office, Kukatpally
2. Near Rythu Bazar, KPHB Colony 3rd Phase Road

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Timing Restrictions

- No Entry 07:00 hours to 11:00 hours and 15:00 hours to 22:00 hours at Hydernagar to Godrej Y junction and JNTU to ROB

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Sectors and In-charge Officers

Sector - I	Sector – II
Ambedkar 'Y' Junction	JNTU Junction

Sector - III	Sector - IV
Nizampet Junction	Rajeev Rotary

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Emergency Hospitals

- Prasad Hospital, Road No-1, KPHB, Kukatpally, Phone No. 040-2315 2315 R. Veeranarayana Cell No. 9246562440
- Prime Hospital, KPHB Rd. No-1, Phase-1, Kukatpally, Phone No.040-4456 8888. Sri Kundan Cell No. 9177700111
- Sankhya Hospital, 1st road, KPHB, Kukatpally Phone No. 040-67044444, Sri K. Bharath Kumar Cell No. 9248013366
- Remedy Hospital, Road No-4, KPHB Colony and Kukatpally, Phone No. 040-23158787
- Prathima Hospital Plot No 27, Opposite Arjun Theatre, Phase 2, KPHB Colony, Hyderabad Phone No.040-66046479
- Omni Hospital, Kukatpally Busstop
- Ramdev Rao Hospital, Kukatpally
- Sri Sri Holystic Hospital, Nizampet X Road
- Landmark Hospital, Nizampet X Road

Authorized Parking Area

- Service Road Vasan Eye Care to 1st Road Kaman only left side

6 MODELLING AND DATA ANALYSIS

ANALYSIS OF THE DATA :

The path of land use impact and its role in road safety is a very complex place. So when we are looking to predict value of a Variable, oftentimes we can get better predictions if we use more than one other variable to make that prediction and that leads us to multiple regression.

So as always let's start with the problem and a data set that we are gonna use. This includes on illegal parking beside road as vendors obstructing it. Let's consider illegal parking points and vendors on the considered stretch of road
Each 1km of the road is attained for the further adulation. We are able to use Google maps and Google Earth pro for division and digitisation of the road network.

So, we are looking to estimate how much risk is generated based on the

1) Number of vehicles parked

2) No of illegal parking spots

3) Area occupied for such land use.

To conduct analysis, we take a random sample of 10 stretch (considered consecutively and record 4 pieces of information)

1) Number of vehicles parked

2) No of illegal parking spots

3) Area occupied for such land use.

4) Total percentage of risk generated

We have labelled them X1, X2, X3 and Y

Here Y is the distinct variable...

Multiple regression is an extension of simple linear regression. In simple linear regression we have a one to one relationship. So, we have a dependent variable and we are going to it lies and independent variable explain the variation in that dependent variable for make predictions about that dependent variable. Now in multiple regression we have a many to one relationship so we still have one dependent variable but you can have two or more.

MULTIPLE REGRESSION PREP:

As discussed previously, conducting multiple regression analysis requires a fair amount of pre-work before actually running the regression. Here are the steps:

- **Generate a list of potential variables; independent(s) and dependent**
- **Collect data on the variables**
- **Check the relationships between each independent variable and the dependent variable using scatter plots and correlations**

- **Check the relationships among the independent variables using scatterplots and correlations**
- **Conduct simple linear regressions for each Independent variable/Dependent variable pair**
- **Use the non-redundant independent variables in the analysis to find the best fitting model**
- **Use the best fitting model to make predictions about the dependent variable.**

DATA SYNTHESIZATION

The data synthesized is allotted as shown below

NO OF VEHICLES PARKED (X_1)	NO OF PARKING LOCATIONS (X2)	AREA OCCUPIED (IN SQ.M) (X_3)	RISK GENERATED (IN %) (Y)
89	4	38.4	7
66	1	31.9	5.4
78	3	37.8	5.6
111	6	38.9	7.4
44	1	35.7	4.8
77	3	35.7	6.4
80	3	30.3	7
66	2	35.1	5.6
109	5	35.4	7.3
76	3	32.5	6.4

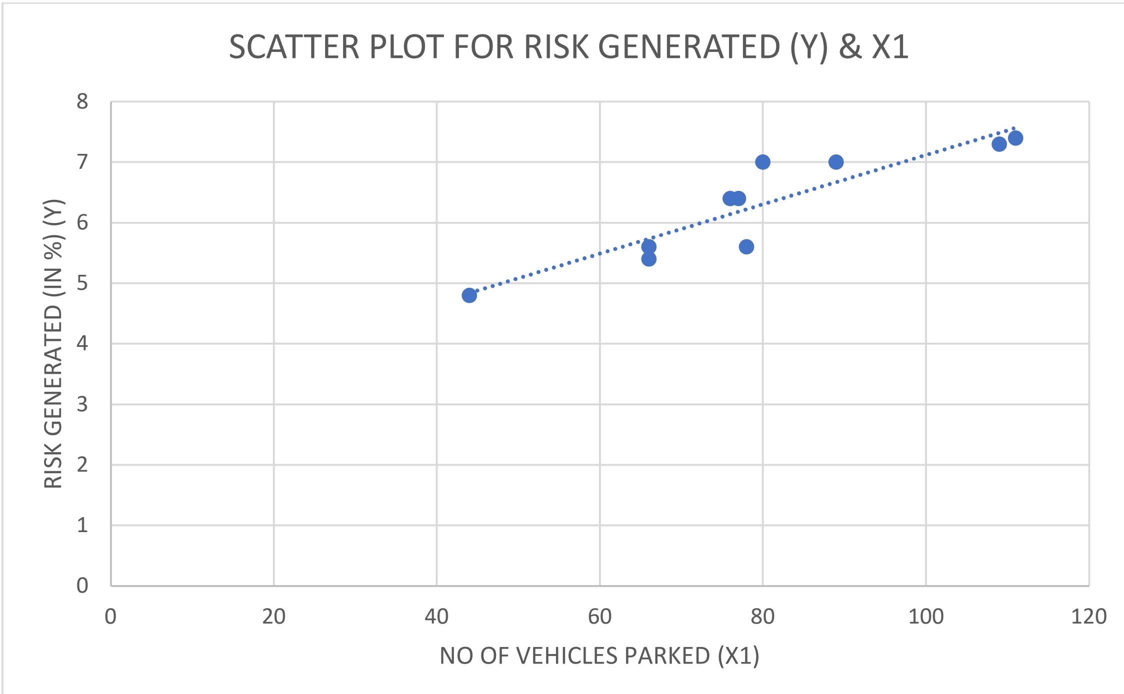
DATA AND VARIABLE NAMING

The data means that the first stretch contains 89 number of vehicles parked in 4 different spots with indicated land use and how much risk is being generated.
In this case, we would like to be able to predict the risk generated using No of vehicles parked, no of illegal parking spots and area occupied.

In what way does risk percentage on the three measures.
Here risk generated is a dependent variable and number of vehicles parked, number of illegal parking spots, land use are independent variables.

NOTE : Some prefer predictor variables and response variables instead of independent and dependent variables respectively.

RELEVANCY CHECK FOR INDEPENDENT VARIABLE TO DEPENDENT VARIABLE USING SCATTER PLOTS :



Regression Statistics	
Multiple R	0.906828709
R Square	0.822338308
Adjusted R Square	0.800130596
Standard Error	0.401227742
Observations	10

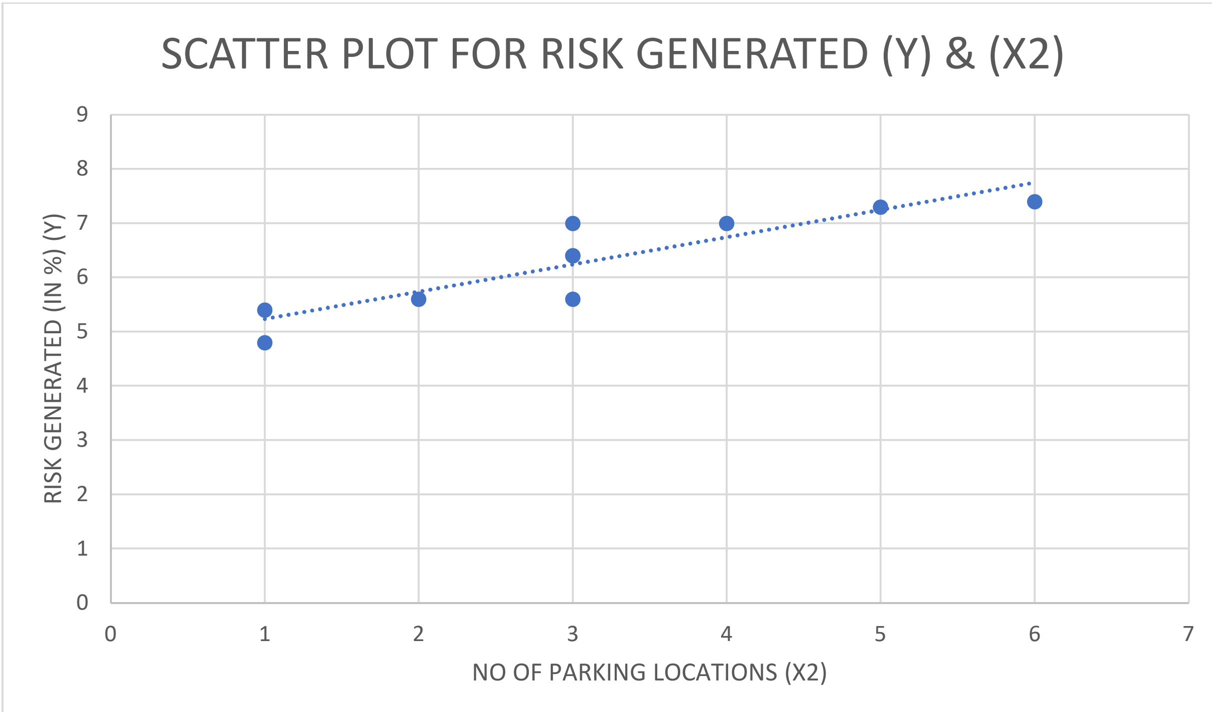
ANOVA

	df	SS	MS	F	Significance F
Regression	1	5.961130391	5.961130391	37.02940329	0.000294241
Residual	8	1.287869609	0.160983701		
Total	9	7.249			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.050166741	0.547323326	5.572879131	0.000526668	1.788036888	4.312296594	1.788036888	4.312296594
X Variable 1	0.040701423	0.006688616	6.085178986	0.000294241	0.025277448	0.056125398	0.025277448	0.056125398

The scatter plot developed has linear relationships which can be seen visually to /the trend line and it appears to be a relatively strong linear relationship. We can say that the first independent variable and dependent variable to have strong linear relationship.

We are using excel format to obtained the specific check for collinearity and overfitting.



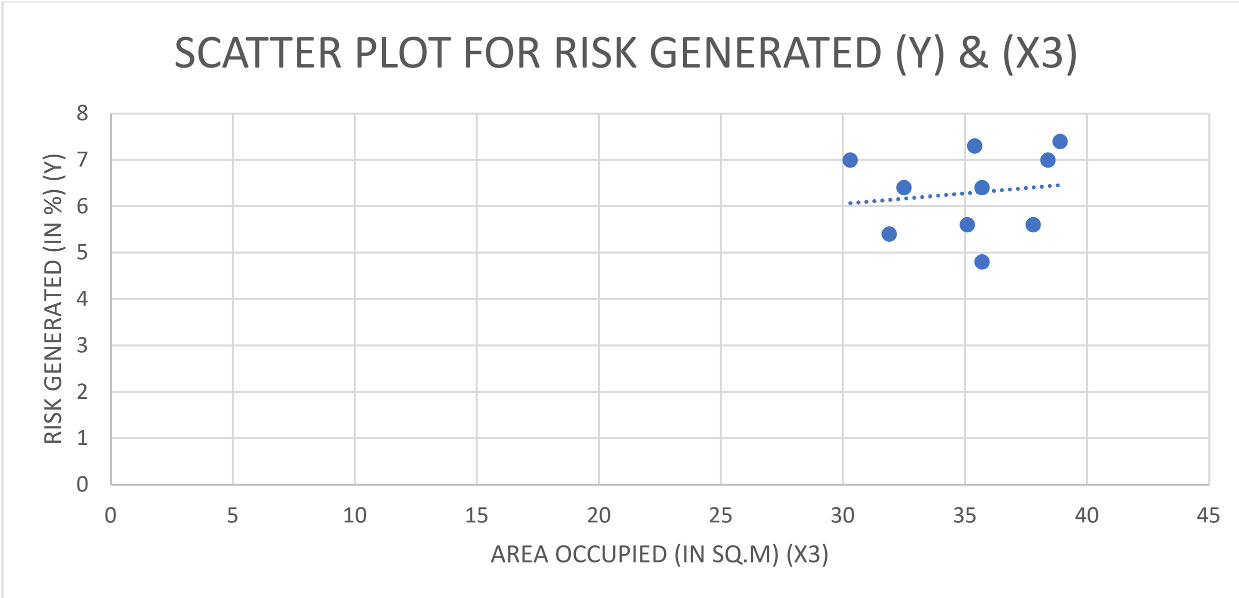
From the obtained below scatter plot, again appears to have a very strong linear relationship between our second independent variable and our dependent variable.

Regression Statistics	
Multiple R	0.893343604
R Square	0.798062796
Adjusted R Square	0.772820645
Standard Error	0.427762024
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.785157205	5.785157205	31.61627588	0.000496854
Residual	8	1.463842795	0.182980349		
Total	9	7.249			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.731877729	0.308359949	15.34530583	3.22972E-07	4.020798411	5.442957048	4.020798411	5.442957048
X Variable 1	0.502620087	0.089389084	5.622835217	0.000496854	0.296488491	0.708751684	0.296488491	0.708751684



SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.144212732							
R Square	0.020797312							
Adjusted R Square	-0.101603024							
Standard Error	0.941955432							
Observations	10							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	0.150759715	0.150759715	0.169912213	0.691014018			
Residual	8	7.098240285	0.887280036					
Total	9	7.249						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.696306234	3.877731163	1.211096395	0.260418026	-4.245757863	13.63837033	-4.245757863	13.63837033
X Variable 1	0.045314011	0.109931007	0.412204092	0.691014018	-0.208187346	0.298815368	-0.208187346	0.298815368

And then finally we have our third independent variable has a linear relationship to the dependent variable on the left-hand side on the y axis but it appears there isn't one. Scatter plot is not in any discernible pattern the data points for all over the place that don't from a line of sort. We can say based on the visual examination even though the trend line appears to be good it doesn’t form a linear relationship.

SCATTER PLOT SUMMARY:

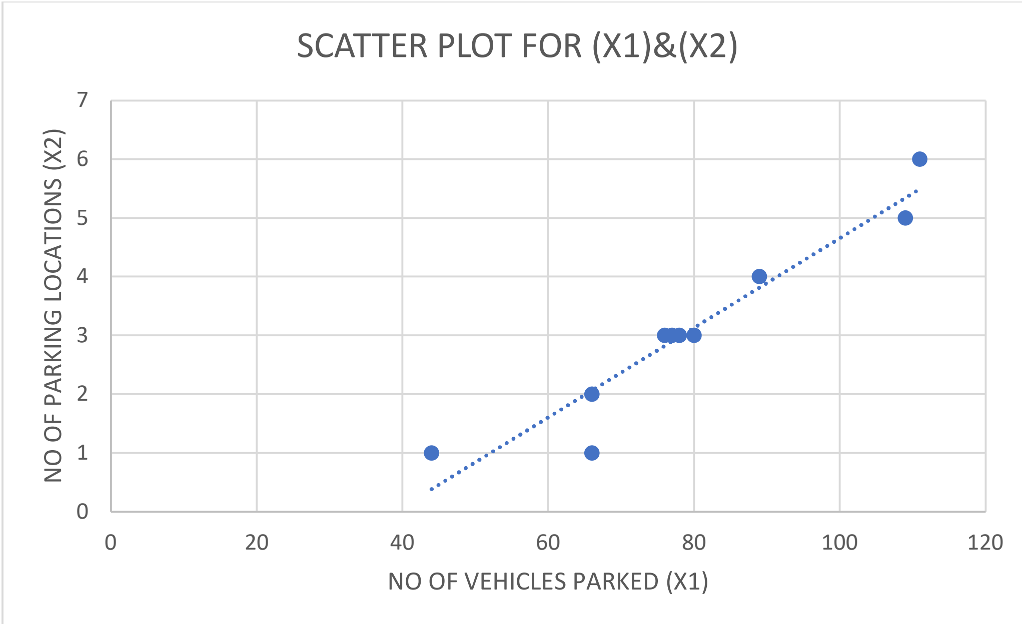
Dependent variable vs independent variables

- (y) appears highly correlated with (x1)
- (y) appears highly correlated with (x2)
- (y) DOES NOT appear highly correlated with (x3)

Since (x3) does NOT APPEAR CORRELATED with the dependent variable we would NOT use that variable in the multiple regression

NOTE: for now, we will keep (x3) in and then take it out later for concerning purposes

MULTICOLLINEARITY CHECK FOR INDEPENDENT VARIABLE TO INDEPENDENT VARIABLE USING SCATTER PLOTS :



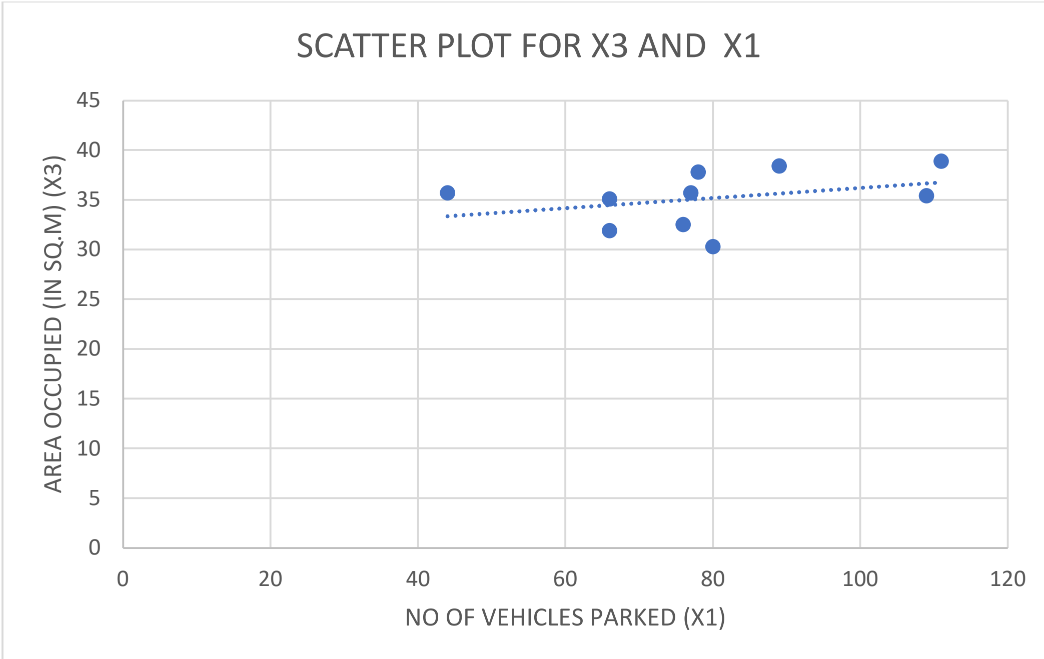
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.955898207
R Square	0.913741381
Adjusted R Square	0.902959054
Standard Error	0.496905721
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	20.92467763	20.92467763	84.74435566	1.56903E-05
Residual	8	1.975322365	0.246915296		
Total	9	22.9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-2.96998666	0.677839699	-4.38154724	0.002343925	-4.533087809	-1.40688551	-4.53308781	-1.40688551
X Variable 1	0.076256114	0.008283603	9.205669756	1.56903E-05	0.057154091	0.095358137	0.057154091	0.095358137



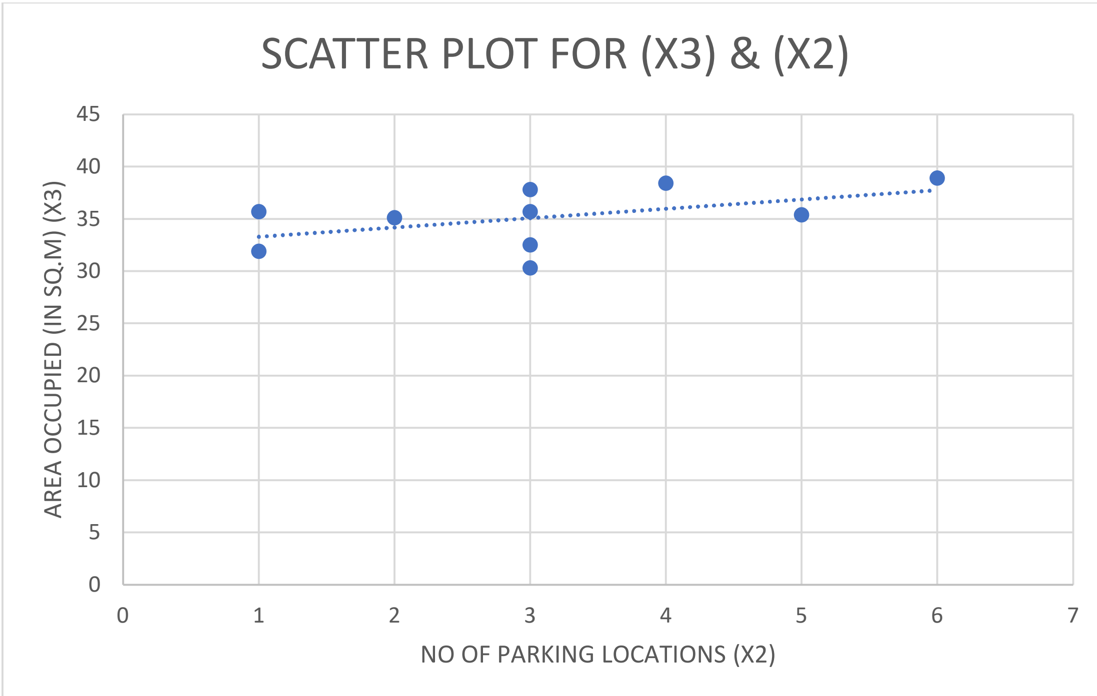
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.355796234
R Square	0.12659096
Adjusted R Square	0.01741483
Standard Error	19.82068077
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	455.5249098	455.5249098	1.159511331	0.312964059
Residual	8	3142.87509	392.8593863		
Total	9	3598.4			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-8.00286022	81.59544379	-0.09807974	0.924281865	-196.162291	180.1565706	-196.162291	180.1565706
X Variable 1	2.490840495	2.313174623	1.076806079	0.312964059	-2.843349752	7.825030742	-2.84334975	7.825030742



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.498242165
R Square	0.248245255
Adjusted R Square	0.154275912
Standard Error	2.626656267
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	18.22641485	18.22641485	2.641768543	0.142741208
Residual	8	55.19458515	6.899323144		
Total	9	73.421			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	32.40436681	1.893472416	17.11372531	1.3814E-07	28.03801159	36.77072203	28.03801159	36.77072203
X Variable 1	0.892139738	0.548890232	1.625351821	0.142741208	-0.373603406	2.157882882	-0.37360341	2.157882882

From the required scatter plot summary output

- **For (x2/x1)**

R=0.955

P-value= 0.001

Causes Highly correlated issues with regression

- **For (x3/x1)**

R=0.356

P-value= 0.313

PLAUSIBLE

- **For (x3/x2)**

R=0.498

P-value0.143

PLAUSIBLE

Regression Statistics	
Multiple R	0.911309078
R Square	0.830484235
Adjusted R Square	0.782051159
Standard Error	0.418981721
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	2	6.020180219	3.01009011	17.14704719	0.002005558
Residual	7	1.228819781	0.175545683		
Total	9	7.249			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.563671919	1.053831611	3.381633157	0.011732525	1.071756133	6.055587704	1.071756133	6.055587704
X Variable 1	0.027516882	0.023781493	1.157071294	0.285197461	-0.028717412	0.083751176	-0.02871741	0.083751176
X Variable 2	0.172898143	0.298109685	0.579981636	0.580107541	-0.532019249	0.877815535	-0.53201925	0.877815535

Regression Statistics	
Multiple R	0.926710022
R Square	0.858791464
Adjusted R Square	0.818446168
Standard Error	0.382402308
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	2	6.225379324	3.112689662	21.28603705	0.001058067
Residual	7	1.023620676	0.146231525		
Total	9	7.249			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	5.048142996	1.575174961	3.204814146	0.014965421	1.323446083	8.772839908	1.323446083	8.772839908
X Variable 1	0.043963877	0.00682114	6.44523919	0.000351849	0.027834445	0.060093309	0.027834445	0.060093309
X Variable 2	-0.064192994	0.047753094	-1.344268792	0.22079256	-0.177111118	0.04872513	-0.177111118	0.04872513

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.958380435
R Square	0.918493059
Adjusted R Square	0.895205361
Standard Error	0.290527554
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	2	6.658156181	3.329078091	39.4411279	0.00015459
Residual	7	0.590843819	0.08440626		
Total	9	7.249			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	8.807201991	1.284382683	6.857147879	0.000240433	5.770119551	11.84428443	5.770119551	11.84428443
X Variable 1	0.614819741	0.070021514	8.780440521	5.00764E-05	0.44924517	0.780394311	0.44924517	0.780394311
X Variable 2	-0.125764663	0.039105612	-3.216025909	0.014734382	-0.218234742	-0.033294583	-0.218234742	-0.033294583

Let's consider two variables

So, we will put X1 and X2 into regression

X 1 and X 3 into regression

X2 and X3 into regression.

As this is a subset of two variables, the interpretation is basically same.

Regression analysis (Y) v/s (X_1) and (X_2)

We have an F value of 17.147 with a p value of 0.01 which are significant.

We will ignore F value and P value for the individual variables.

We have standard error of the regression of 0.418, R square 0.830, adjusted R square 0.782. So thats significantly lowers.

Let's look at the co-efficient, (X_2) Coefficient is 0.027; T value is 1.15; P value is 0.285.

Those are not significant. Not below 0.05.

The (X_2) value co-efficients

The (X_2) co-efficient value is 0.172, T value 0.793,P value 0.580 not significant either..

As (X_1)and (X_2)are extremely correlated almost on a straight line [r=0.956] so, these two variables are multi-collinear.

Even though overall model is significant individual co-efficients are not.

The R^2 adjusted and R^2 predicted falls off differently which is very low.

Regression analysis: (Y) versus (X1) and (X3)

P value is 0.014 F value is 21.28 which are significant, standard error is 0.382 ; R^2 is 0.858; R square adjusted is 0.818.

0ur ANOVA table of raw data is significant our R square adjusted is very high and R square predicted doesn't differ much like previously.

From our coefficients..

For (X1) T value of 6.445; P value is 0.0149 which is fine

For(X3)

We have got(-ve co-efficient) which means that if we hold that constant and we increase the value (X3) by ‘1’.

Then the ‘Y’ value will decrease by 0.064

It doesn’t have any real relationship to the dependent variable.

If (X3) is held constant, then (Y) is expected to increase by 0.04% for each vehicle.

If (X1) is held constant, (Y) is expected to decrease by 0.064 for each increase in (X3) value.

These events reveal that this specific variable relation model is not viable

Regression analysis: (Y) v/s (X2),(X3)

F value is 39.44; P value is 0.0002 which are significant

Standard error is 0.2905, R^2 0.918; R^2 adjusted 0.895

The same problems persist with the negative co-efficients. This variable model unit is viable too.

So, that’s summarize all the models

F	P	S	R^2	R^2 adjusted	X1	X2	X3
37.029	0.0005	0.401	0.823	0.8001	*	-	-
31.61	0.26	0.427	0.79	0.77	-	*	-
0.16	0.26	0.94	0.02	-0.1	-	-	*
17.14	0.011	0.418	0.83	0.782	*	*	-
21.2	0.014	0.382	0.858	0.818	*	-	*
39.44	0.0002	0.29	0.918	0.85	-	*	*
22.63	0.006	0.313	0.918	0.878	*	*	*

from the above table we expect to get same F value for 1 variable and 2 variable model same near S value

~~case (1) has S 0.401 away from the regression line.~~

R^2 adjusted 0.8001 R^2 predicted 0.823

The last row has best fit with S value

Due to high variance influence factor fourth column isn’t viable either

Finally, the overall model

Regression analysis: (Y) v/s (X1), (X2), (X3)

We have standard error 0.313; R^2 0.918; R^2 adjusted 0.878; huge difference in these.

From co-efficient

The P values are not significant

High variance influence factor is high here

Considering all these values, first row has the best fit.

7 SUMMARY AND CONCLUSIONS

SUMMARY

Comprehensive study on infrastructure geometrics their deficiencies illegal parkings, Static and dynamic encroachments, maturity of the factors considered doesn't contribute much to the context. multiple facet activities of different intensities and influences for generating the traffic which are highly varying its characteristics in time and space frames. parking study conducted in less time can be applied in a model to get the percentage of risk obtained. does dynamic approach can be formulated to an algorithm of Technical sorts and implemented in a traffic system.

FINDINGS

The quantified equation is Y=3.0501+0.04(X1)

An increase in 1 unit of vehicle will increase risk criteria by 0.0403 That's how we interpret. The standard deviation is about 2.31 tracked from T-distribution table with 95%(PI).

RECOMMENDATIONS

The junctions and points near to the metro stations were seriously under risk category due to increase of vendors, pedestrians, Vehicular activity. Thus leading to more risk. further evaluation concludes that this maybe hypothesized to a threshold value.

CONCLUSIONS

Relevance between land encroachment in structure geometric deficiencies and risk can be strategically quantified within stipulated time through dynamic data collection

SCOPE FOR THE FURTHER STUDY

algorithm based technical devices with 24 hour data acquisition through infrared sensors can be stipulated and risk affected areas can be sorted out the thematically does indulging the counter measures to the particular site.

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