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METHODS FOR DESIGNING EXPERIMENTS TO STUDY THE ACTUAL CAUSES OF THE HOUSING CRISIS

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Abstract. In this paper, I use the edge design analysis, contrast method analysis and regression analysis to study the actual reasons that led to the housing crisis. Also, applications of the housing crisis in KSA have been obtained, for example, the extent of this phenomenon with two levels (+, -).

1. Introduction

Having an appropriate house is perhaps the main issues for all individuals. The Universal Declaration of Human Rights stressed the privilege of each human to have an appropriate house. Subsequently, numerous investigations have since featured the significance of having reasonable homes that serve the necessities, everything being equal. This would help guarantee social and financial soundness for everybody and empower people to be more dynamic local area individuals. Because of a few significant socioeconomics, social, social and financial changes, numerous nations have confronted lodging issues and issues around the arrangement of appropriate houses over the most recent couple of many years. As of late, oil incomes have empowered the Gulf Cooperation Council nations to observe quick improvement that has changed them from helpless nations into cutting edge ones. Numerous advancements have additionally been seen. Because of such turn of events, the legislatures in Gulf Cooperation Council nations have progressed the urban areas and increased the living expectations through making upgrades to the monetary, social and metropolitan climate. Saudi

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Arabia, as the biggest nation of the Gulf Cooperation Council nations with complete land space of the Kingdom is around 1,960,582 sq. km. Likewise, as perhaps the most populated ones arriving at the quantity of 34710 million, as per Ministry of Municipal , Rural Affairs(See figure 1). This fast increment has caused lodging issues and lodging shortages([1]).

Table 1.1: Saudi Arabia urbanization trends 2015–2035

	2015	2020	2025	2030	2035
Total population	31,557	34,710	37,290	39,480	41,317
Urban population	26,249	29,256	31,843	34,143	36,170
Level of urbanization (%)	83.2	84.3	85.4	86.5	87.5
Five largest urban Agglomerations					
Riyadh	6,218	7,231	7,953	8,547	9,058
Jeddah	4,035	4,610	5,022	5,388	5,710
Makkah	1,796	2,042	2,219	2,379	2,521
Al-Madinah	1,299	1,489	1,625	1,744	1,848
Dammam	1,080	1,253	1,376	1,478	1,566
Total population of the five largest agglomerations	14,428	16,625	18,195	19,536	20,703
Five largest agglomerations as % of urban population	54.97	56.82	57.14	57.22	57.24
Five largest agglomerations as % of total population	45.72	47.90	48.79	49.48	50.12

Source: United Nations, 2018a.

FIGURE 1. KSA Urbanization from 2015-2035

Notwithstanding, the nation has accomplished observable advancement in numerous areas and fields inside a brief timeframe. This is credited primarily to the expanded incomes delivered by oil trades. The lodging area is one of the areas that has seen huge improvement throughout the most recent couple of many years, both the lodging approaches of Saudi Arabia are portrayed by the giving of enormous help to this area to make the securing of houses simpler for the residents. All things considered, because of fast metropolitan turn of events, close by monetary and social changes, including movement to urban communities, diverse Region of Saudi Arabia have encountered major and continuous changes to the metropolitan climate and the occupants' ways of life.

These progressions have accordingly influenced the requirements, wants and goals of the occupants and additionally, the interest for lodging. Presently, the lodging areas in Saudi Arabia are confronting various difficulties, including, in addition to other things: a prerequisite to give an immense number of houses. There has been a reduction in the quantity of houses offered on reasonable installment plans. Expanded houses and property costs. Proprietorship rates waiting be raised as they have diminished throughout the most recent decade. More interest being created in the primary locale and urban areas. As inhabitants are the principle partners and major parts as far as the lodging issue, the investigation of their perspectives, lodging necessities and the variables influencing their current and future lodging choices would be useful in outlining

future insights and plans. In light of the study's aftereffects of General Authority for Statistics,2018, the absolute number of homes busy with Saudi families made up (3591098) in 2018, contrasted with (3504690) in 2017. The quantity of people living in such abodes recorded (21420372), with a normal size of Saudi families coming to (5,96), contrasted with (5,97) in 2017([2]). Nonetheless, the normal size can be gotten by partitioning the quantity of people by the complete number of families. It merits referencing here that the lodging issue in Saudi Arabia has pulled in the consideration of specialists from various fields and foundations ([3]). Nonetheless, during this examination, it was noticed that there has been a lessening throughout the most recent couple of years in the quantity of scholastic investigations being attempted that attention on the examination of this issue according to the perspective of the inhabitants and their longings. Along these lines, this is the primary inspiration for the determination of the subject of this exploration.

A goal of this examination is to find the actual causes of the housing crisis in Saudi society. To accomplish this objective, this examination used subjective and quantitative information to decide the genuine purposes behind of the housing crisiss. This paper starts by the method using in different examples.

2. Method

Target population and study sample

The main technique used in this survey is that it is based on only statistics and statistical analysis that included 16 questions about housing crisis. The number of people who participated to answer these questions has reached 410 individual.

Data collection

By then learn the achievement levels for the concentrated on understudy using the sensible model. This is displayed in Table 1, which clarifies the information gathered. I have collected data using the techniques of application of edge design and supersaturated designs to study the housing crisis. Also, to analyse the data from both techniques and applying this data in the app of SPSS.

TABLE 1. The reasons of the housing crisis in data

Reasonsr	signal	Yes/No
The banking sector	+	Yes
	−	No
The lack of the citizen's culture of the importance of house owning	+	Yes
	−	No
The religion contributed in the housing crisis by prohibiting the works of the banks	+	Yes
	−	No
Earth association and family extended roots	+	Yes
	−	No
The increasing prices of the real estate compared wit individual's income	+	Yes
	−	No
The unemployment	+	Yes
	−	No
The natural factors and climate (earth quick)	+	Yes
	−	No
Landowners monopolization of the lands and not investing in them	+	Yes
	−	No
The poor system of the current housing plans	+	Yes
	−	No

TABLE 1. (cont.)

The limited availability of the residential lands and their usability	+	Yes
	−	No
The lack of the governmental service facilities	+	Yes
	−	No
The rural exodus that has conquered the cities	+	Yes
	−	No
The lack of the housing units offered	+	Yes
	−	No
The absence of the supervision over offices and real estate companies	+	Yes
	−	No
The increasing of building materials and man-power prices	+	Yes
	−	No
Real estate developer's' exploitation of residential lands	+	Yes
	−	No
Y(Response)	Number	The individual's income

How to select a sample

A pre-plan comprising of six components and twelve preliminaries is chosen by edge design method. Then, a pre-plan comprising of 16 components and 14 preliminaries is chosen by supersaturated design method . These plans are considered taking all things together the information that has been placed in the past advances and if there should arise an occurrence of acquiring the entire plan is put the estimation of the reaction and the quantity of the individual who addressed the survey.

Consolidating and adjusting distinctive examination technique

The plan picked in the past advance is dissected utilizing the edges , supersaturated design and regression analysis methods . On the off chance that the elements that we get from the edge plan technique are equivalent to supersaturated designs , these elements are the genuine reasons for housing crisis.

3. Application of data analysis

3.1. **Use of the edge plans in screening tests.** Statistical significance was analyzed using edge design analysis using the SPSS computer software to determine the actual causes that led to of the housing crisis in Saudi society. [4] have presented the edge plans. The edge relies upon a model-autonomous test that can be utilized for dynamic factors. To know the dynamic factors, the estimations are organizes into a gathering of E sets. In this methodology the estimations contrasts in just a single part. It is normal in screening tests, and suggests that practically all distinctions

$$z_{i,j} := y_i - y_j, \quad (i,j) \in E,$$

More details about this method can be found in [5]. In order to address these ethical concerns, the following example are taken.

Example 3.1. Let $n = 6$ and the lack of the governmental service facilitie x_1, the rural exodus that has conquered the cities x_2, the lack of the housing units offered x_3, the absence of the supervision over offices and real estate companies x_4, the increasing of building materials and manpower prices x_5 and real estate developer's' exploitation of residential lands x_6.

TABLE 2. One replicate for Example 3.1.

Run	x_1	x_2	x_3	x_4	x_5	x_6	Y
1	+	+	-	+	+	+	840
2	-	+	+	+	+	+	10000
3	+	-	+	+	+	+	2000
4	-	-	-	+	-	+	900
5	-	-	-	+	+	-	2000
6	-	-	-	-	+	+	10000
7	-	+	-	+	+	+	9000
8	-	-	+	+	+	+	15000
9	+	-	-	+	+	+	5000
10	-	-	-	-	-	+	0
11	-	-	-	+	-	-	3000
12	-	-	-	-	+	-	3000

Presently an investigation information in Table 2 (utilizing liner regreesion) with the program bundle SPSS. According to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 2) is under 0.05, which is there is dynamic factor the poor system of the current housing plans x_3 and allow an evaluated liner show $Y = 14900 - 6550x_3 + \epsilon$, with $R - sg = 87.9\%\epsilon$ of mean 8450 and standard deviation $\sigma = 6325.77$. Also from the result, the residual is normal because p-value (0.130) is more than 0.05(See Figure 3).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.879[a]	.773	.501	4468.55681

a. Predictors: (Constant), x6, x5, x4, x3, x2, x1

b. Dependent Variable: y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	340330000.0	6	56721666.67	2.841	.136[b]
	Residual	99840000.00	5	19968000.00		
	Total	440170000.0	11			

a. Dependent Variable: y

b. Predictors: (Constant), x6, x5, x4, x3, x2, x1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	14900.000	4079.216		3.653	.015
	x1	-700.000	1869.331	-.100	-.374	.723
	x2	2550.000	1869.331	.365	1.364	.231
	x3	6550.000	1869.331	.937	3.504	.017
	x4	-2750.000	1869.331	-.393	-1.471	.201
	x5	-1400.000	1869.331	-.200	-.749	.488
	x6	-350.000	1869.331	-.050	-.187	.859

Descriptive Statistics

	Mean	Std. Deviation	N
y	8450.0000	6325.77699	12
x1	-.5000	.90453	12
x2	-.5000	.90453	12
x3	-.5000	.90453	12
x4	.5000	.90453	12
x5	.5000	.90453	12
x6	.5000	.90453	12

FIGURE 2. Final model for Example 3.1

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.224	12	.100	.893	12	.130

a. Lilliefors Significance Correction

FIGURE 3. Test of normal for Example 3.1

Example 3.2. Let $n = 6$ and the poor system of the current housing plans x_1, the limited availability of the residential lands and their usabilityx_2 , the lack of the governmental service facilitie x_3, the rural exodus that has conquered the cities x_4, the lack of the housing units offered x_5 and the absence of the supervision over offices and real estate companies x_6.

TABLE 3. One replicate for Example 3.2.

Run	x_1	x_2	x_3	x_4	x_5	x_6	Y
1	+	+	-	+	+	+	1000
2	-	+	+	+	+	+	4000
3	+	-	+	+	+	+	6800
4	-	-	-	+	-	+	4000
5	-	-	-	+	+	-	7000
6	-	-	-	-	+	+	55000
7	-	+	-	+	+	+	2400
8	-	-	+	+	+	+	7000
9	+	-	-	+	+	+	4855
10	-	-	-	-	-	+	2000
11	-	-	-	+	-	-	3000
12	-	-	-	-	+	-	4000

Now an analysis data in Table 3 (using liner regression) with the software package SPSS. According to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 4) is under 0.05 that revealed there are active variables the poor system of the current housing plans x_1, the limited availability of the residential lands and their usabilityx_2 the rural exodus that has conquered the cities x_4, and the lack of the housing units offered x_5 and give an estimated liner model $Y = 18075 - 764.5x_1 - 2078.25x_2 + 885.5x_4 + 151.5x_5 + \epsilon$, with $R - sg = 94.6\%\epsilon$ of mean 4296.25 and standard deviation $\sigma = 2007.43$. Also from the result, the residual is normal because p-value (0.965) is more than 0.05(See Figure 5).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.973[a]	.946	.881	693.27412

a. Predictors: (Constant), x6, x5, x4, x3, x2, x1

b. Dependent Variable: y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	41924711.25	6	6987451.875	14.538	.005[b]
	Residual	2403145.000	5	480629.000		
	Total	44327856.25	11			

a. Dependent Variable: y

b. Predictors: (Constant), x6, x5, x4, x3, x2, x1

Descriptive Statistics

	Mean	Std. Deviation	N
y	4296.2500	2007.43745	12
x1	-.5000	.90453	12
x2	-.5000	.90453	12
x3	-.5000	.90453	12
x4	.5000	.90453	12
x5	.5000	.90453	12
x6	.5000	.90453	12

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1807.500	632.870		2.856	.036
	x1	-764.500	290.017	-.344	-2.636	.046
	x2	-2078.250	290.017	-.936	-7.166	.001
	x3	521.750	290.017	.235	1.799	.132
	x4	885.500	290.017	.399	3.053	.028
	x5	1510.500	290.017	.681	5.208	.003
	x6	260.500	290.017	.117	.898	.410

FIGURE 4. Final model for Example 3.2

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.110	12	.200*	.976	12	.965

FIGURE 5. Test of normal for Example 3.2

Example 3.3. Let $n = 6$ and the natural factors and climate (earth quick) x_1, landowners monopolization of the lands and not investing in themx_2 , the poor system of the current housing plans x_3, the limited availability of the residential lands and their usability x_4, The lack of the governmental service facilities x_5 and The rural exodus that has conquered the cities x_6.

TABLE 4. One replicate for Example 3.3.

Run	x_1	x_2	x_3	x_4	x_5	x_6	Y
1	+	+	-	+	+	+	3000
2	-	+	+	+	+	+	2500
3	+	-	+	+	+	+	10000
4	-	-	-	+	-	+	5000
5	-	-	-	+	+	-	800
6	-	-	-	-	+	+	6000
7	-	+	-	+	+	+	5000
8	-	-	+	+	+	+	14000
9	+	-	-	+	+	+	7000
10	-	-	-	-	-	+	10000
11	-	-	-	+	-	-	5600
12	-	-	-	-	+	-	10000

Now an analysis data in Table 4 (using liner regression) with the software package SPSS. According to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 6) is under 0.05 that revealed there is active variable x_1 the lack of the governmental service facilities and give an estimated liner model $Y = -703.33 - 4022x_1 + \epsilon$, with $R - sg = 86.6\%\epsilon$ of mean 5061.66 and standard deviation $\sigma = 4777.55$. Also from the result, the residual is normal because p-value (0.983) is more than 0.05(See figure 7).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.866[a]	.750	.451	3541.07856

a. Predictors: (Constant), x6, x5, x4, x3, x2, x1

b. Dependent Variable: y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	188373780.0	6	31395630.00	2.504	.166[b]
	Residual	62696186.67	5	12539237.33		
	Total	251069966.7	11			

a. Dependent Variable: y

b. Predictors: (Constant), x6, x5, x4, x3, x2, x1

Descriptive Statistics

	Mean	Std. Deviation	N
y	5061.6667	4777.50379	12
x1	-.5000	.90453	12
x2	-.5000	.90453	12
x3	-.5000	.90453	12
x4	.5000	.90453	12
x5	.5000	.90453	12
x6	.5000	.90453	12

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-703.333	3232.548		-.218	.836
	x1	-4022.000	1481.339	-.761	-2.715	.042
	x2	-1022.000	1481.339	-.193	-.690	.521
	x3	768.000	1481.339	.145	.518	.626
	x4	1243.000	1481.339	.235	.839	.440
	x5	3518.000	1481.339	.666	2.375	.064
	x6	2493.000	1481.339	.472	1.683	.153

FIGURE 6. Final model for Example 3.3

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.130	12	.200*	.980	12	.983

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

FIGURE 7. Test of normal for Example 3.3

Moreover, from the model and research, it can be concluded that the examination with the edge plans and regression analysis given results that are associated and just like the investigation that is performed with the whole data. In this manner, the poor system of the current housing plans, the poor system of the current housing plans , the limited availability of the residential lands and their usability, the rural exodus that has conquered the cities , and the lack of the housing units offered and the lack of the governmental service facilities are the factor that driven to the housing crisis in Saudi society.

3.2. **Application of the supersaturated designs in screening experiments.** Statistical significance was analyzed using supersaturated designs with the SPSS computer software to determine the actual causes that led to of the housing crisis in Saudi society. [6]who presented a technique for examining SSDs that utilizing another agreements based strategy. Supersaturated plans are partial factorial plans in which the run size (n) is too little to even consider assessing every one of the fundamental impacts. Under the impact sparsity supposition, the utilization of supersaturated plan can give the minimal effort distinguishing proof of the trivial few, potentially ruling components (screening). In order to address these ethical concerns, the following example are taken.

Example 3.4.

In this example, we assume $n = 16$ that shown in Table 5. Examination of these information (Forward

TABLE 5. Supersaturated design(SSD) for Example 3.4.

Run	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	Y
1	-	+	-	-	-	-	+	-	+	-	+	-	+	+	-	+	0
2	+	+	-	-	-	+	+	+	+	+	+	+	-	-	+	+	9400
3	+	+	-	+	+	+	+	+	+	+	+	-	+	-	-	+	7000
4	+	+	-	+	+	+	+	-	+	-	-	+	+	+	+	+	1500
5	+	-	-	-	+	+	-	-	+	+	+	+	+	-	+	+	0
6	-	+	-	+	-	+	-	+	+	+	-	-	-	-	-	+	0
7	+	-	-	+	-	+	-	-	-	-	-	-	+	-	+	-	12000
8	+	-	-	+	-	+	-	-	-	-	-	-	+	-	+	-	12000
9	-	-	-	+	+	+	-	-	+	-	-	-	-	-	-	-	8700
10	-	-	-	-	+	-	-	-	-	+	-	+	+	+	-	-	0
11	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	+	9000
12	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	+	6000
13	+	-	-	+	+	+	-	+	+	+	-	-	+	+	+	+	0
14	-	-	+	-	-	-	+	-	-	-	-	+	-	-	-	-	34000

determination) with program bundle SPSS. According to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 8) is under 0.05 that uncovers as dynamic factors $x_3, x_{16}, x_7, x_{14}, x_{15}$ and x_8, an assessed direct demonstrate is:

$$y = 15113.78 + 8046.65x_3 - 6461.90x_{16} + 4094.22x_7 - 2459.401x_{14} + 2116.295x_{15} + 2003.552x_8 + \varepsilon$$

with ϵ of mean 7114.28 and standard deviation $\sigma = 9062.67$. Also from the result, the residual is normal because p-value (0.384) is more than 0.05(See figure 9).

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	13108.333	2665.969		4.917	.000
	x3	8391.667	2665.969	.672	3.148	.008
2	(Constant)	13801.316	2218.846		6.220	.000
	x3	7698.684	2218.846	.617	3.470	.005
	x16	-4157.895	1620.416	-.456	-2.566	.026
3	(Constant)	14346.916	1713.747		8.372	.000
	x3	7153.084	1713.747	.573	4.174	.002
	x16	-5546.696	1330.712	-.609	-4.168	.002
	x7	3769.604	1281.103	.427	2.942	.015
4	(Constant)	12262.879	1435.585		8.542	.000
	x3	6145.118	1306.215	.492	4.705	.001
	x16	-5301.515	984.804	-.582	-5.383	.000
	x7	3987.542	947.628	.452	4.208	.002
	x14	-3092.003	1009.568	-.320	-3.063	.014
5	(Constant)	13198.152	1246.564		10.588	.000
	x3	7000.924	1134.906	.561	6.169	.000
	x16	-5411.547	810.228	-.594	-6.679	.000
	x7	4293.187	789.450	.487	5.438	.001
	x14	-3116.455	829.236	-.322	-3.758	.006
	x15	1815.531	785.493	.206	2.311	.050
6	(Constant)	15113.788	1250.538		12.086	.000
	x3	8046.657	986.299	.645	8.158	.000
	x16	-6461.908	765.795	-.709	-8.438	.000
	x7	4094.220	624.037	.464	6.561	.000
	x14	-2459.401	702.915	-.254	-3.499	.010
	x15	2116.295	627.726	.240	3.371	.012
	x8	2003.552	816.383	.220	2.454	.044

Descriptive Statistics

	Mean	Std. Deviation	N
Y	7114.2857	9062.67554	14
x1	.1429	1.02711	14
x2	-.1429	1.02711	14
x3	-.7143	.72627	14
x4	.1429	1.02711	14
x5	.1429	1.02711	14
x6	.5714	.85163	14
x7	-.1429	1.02711	14
x8	-.2857	.99449	14
x9	.1429	1.02711	14
x10	-.1429	1.02711	14
x11	-.4286	.93761	14
x12	-.2857	.99449	14
x13	.1429	1.02711	14
x14	-.4286	.93761	14
x15	-.1429	1.02711	14
x16	.2857	.99449	14

FIGURE 8. Final model for Example 3.4

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.152	14	.200*	.937	14	.384

FIGURE 9. Test of normal for Example 3.4

Example 3.5.

TABLE 6. Supersaturated design(SSD) for Example 3.5.

Run	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	Y
1	-	+	+	+	+	-	-	-	-	-	-	-	-	+	-	-	22000
2	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	15000
3	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	9000
4	+	-	+	-	-	-	-	+	+	-	-	-	+	+	-	-	3000
5	+	+	-	+	+	+	-	+	+	+	+	+	+	-	+	+	3200
6	+	-	-	-	+	+	-	+	-	-	-	-	-	-	+	-	1000
7	-	+	-	-	+	+	+	+	+	-	-	+	+	+	+	+	1000
8	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	+	6000
9	+	-	-	+	+	+	-	+	+	+	-	-	-	+	+	+	990
10	+	+	+	-	+	-	-	-	-	+	-	-	+	-	+	+	5600
11	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	12344
12	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	2000
13	+	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	8700
14	+	+	-	+	+	+	+	+	-	+	+	+	-	+	+	+	2600

Analysis of these data based on forward selection on Table 6, according to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 10) is under 0.05 that there are two active variables $x_2 and x_{15}$. The estimated linear model:

$$y = 8348.688 - 4875.313x_{15} + 3325.75x_2 + \varepsilon.$$

with ϵ of mean 6602.42 and standard deviation $\sigma = 6251.82$. Also from the result, the residual is normal because p-value (0.590) is more than 0.05(See figure 11).

Descriptive Statistics

	Mean	Std. Deviation	N
Y	6602.4286	6251.86467	14
x1	.4286	.93761	14
x2	.2857	.99449	14
x3	-.1429	1.02711	14
x4	.0000	1.03775	14
x5	.7143	.72627	14
x6	.1429	1.02711	14
x7	-.1429	1.02711	14
x8	.4286	.93761	14
x9	.0000	1.03775	14
x10	.0000	1.03775	14
x11	-.2857	.99449	14
x12	.0000	1.03775	14
x13	.0000	1.03775	14
x14	.0000	1.03775	14
x15	.1429	1.02711	14
x16	.2857	.99449	14

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7180.125	1313.303		5.467	.000
	x15	-4043.875	1313.303	-.664	-3.079	.010
2	(Constant)	6348.688	1035.998		6.128	.000
	x15	-4875.313	1035.998	-.801	-4.706	.001
	x2	3325.750	1069.974	.529	3.108	.010

a. Dependent Variable: Y

FIGURE 10. Final model for Example 3.5

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.180	14	.200*	.952	14	.590

FIGURE 11. Test of normal for Example 3.5

Example 3.6.

TABLE 7. Supersaturated design(SSD) for Example 3.6.

Run	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	Y
1	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	1000
2	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	3000
3	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	0
4	-	-	-	-	-	-	-	-	-	+	-	+	-	-	+	+	0
5	-	-	+	-	-	-	+	-	-	-	-	-	+	-	-	-	0
6	+	+	-	-	+	+	-	+	+	+	-	+	+	-	+	+	0
7	-	+	-	-	+	+	+	+	+	+	+	-	-	+	+	+	12670
8	-	+	-	-	+	+	-	+	+	+	+	-	+	+	+	+	0
9	-	+	-	+	+	+	-	+	-	+	+	-	+	+	+	+	10000
10	-	+	-	-	+	+	-	+	+	+	-	+	-	+	+	+	0
11	+	-	-	-	+	-	-	-	-	-	-	-	+	+	+	+	5500
12	+	-	+	+	+	+	-	-	-	-	-	-	-	+	+	+	0
13	+	-	-	-	+	+	-	+	+	+	+	+	+	+	+	+	10000
14	-	+	-	+	+	+	-	+	+	+	-	+	+	+	+	+	10000

Analysis of these data based on forward selection on Table 7, according to the findings of the final model it tends to be seen that the p-value from the Analysis of Variances table (Figure 12) is under 0.05 that there is active variable x_{11}. The estimated linear model: with ϵ of mean 3762.42 and standard deviation $\sigma = 4854.58$. Also from the result, the residual is normal because p-value (0.197) is more than 0.05(See figure 13).

Descriptive Statistics

	Mean	Std. Deviation	N
Y	3726.4286	4854.58642	14
x1	-.4286	.93761	14
x2	-.1429	1.02711	14
x3	-.5714	.85163	14
x4	-.4286	.93761	14
x5	.2857	.99449	14
x6	.1429	1.02711	14
x7	-.2857	.99449	14
x8	.0000	1.03775	14
x9	-.1429	1.02711	14
x10	.1429	1.02711	14
x11	-.4286	.93761	14
x12	-.1429	1.02711	14
x13	.1429	1.02711	14
x14	.1429	1.02711	14
x15	.4286	.93761	14
x16	.4286	.93761	14

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	5058.750	1195.239		4.232	.001
	x11	3108.750	1195.239	.600	2.601	.023

a. Dependent Variable: Y

FIGURE 12. Final model for Example 3.6

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.236	14	.033	.917	14	.197

a. Lilliefors Significance Correction

FIGURE 13. Test of normal for Example 3.6

Moreover, from the model and research, it can be concluded that the examination with the Supersaturated design and regression analysis given results that are associated and just like the investigation that is performed with the whole data. In this manner the lack of the citizen's culture of the importance of house owning, the religion contributed in the housing crisis by prohibiting the works of the banks, the natural factors and climate (earth quick), landowners monopolization of the lands and not investing in them, The absence of the supervision over offices and real estate companies, the increasing of building materials and manpower prices and real estate developer's' exploitation of residential lands and the lack of the governmental service facilities are the factor that driven to the housing crisis in Saudi society.

4. Discussion

During this examination, it was noticed that there has been a lessening in the course of the most recent couple of years in the quantity of scholarly investigations being embraced that emphasis on the examination of this issue according to the perspective of the inhabitants and their cravings. One of the points of this consider was to consider the genuine causes that driven to the spread of the actual causes of the housing crisis .Statistical signi

cance was dissected utilizing edge design, Supersaturated design with the regression examination utilizing the SPSS computer computer program to decide the actual causes that driven to the actual causes of the housing crisis in Saudi society. I can say that the examination with the edge plans and Supersaturated design given results that are associated and just like the investigation that is performed with the whole data. In this manner, tthe lack of the governmental service facilities is the factor that driven to the housing crisis in Saudi society. On this premise, it is suggested that Saudi wellbeing experts create an operational arrange to consider the maladies and crises that the housing crisis. On this basis, it is recommended that Saudi goverment develop an operational plan to study these causes. In future investigations, it might be possible for data to use supersaturated designs, where many factors are investigated using only a few experimental runs. Furthermore, there is a requirement for more research thinks about that address different parts of diabetes in the Saudi setting, for example, the extent of this phenomenon with three levels (+,0,-).

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