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Analysis of Consumer Considerations Regarding Disaster Risk in Making Residential Choice Decisions in Padang City

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ABSTRACT

Considering that the city of Padang is the capital city of West Sumatra province which apart from being the center of government, is also the center for economic activities, education, trade and other informal sectors, the need for housing for the community needs attention. Because proper housing is a basic need for humans to carry out life and daily activities. The geographical condition of the city of Padang is in the area along the earthquake path following the 6,500 km subduction zone to the west of Sumatra Island. Apart from earthquakes, there are many disasters that have the potential to occur in the city of Padang such as tsunamis, landslides, floods, flash floods, tornadoes, and others. These potential disasters must be considered by consumers in making decisions in choosing housing that is appropriate and has a small disaster risk. The purpose of this research is to identify the reasons for consumers in making decisions about choosing housing in the city of Padang and also to analyze consumer considerations regarding disaster risk in making decisions about choosing housing in the city of Padang. The study was conducted on 60 respondents with 33 indicators which were divided into six general variables, namely price, location, building architecture, ease of transportation, environmental facilities and infrastructure and psychology then two disaster risk variables, namely disaster-free locations and building structures. In this study, the most influential variables in consumer decision making in choosing housing in the city of Padang sequentially were disaster-free locations, building structures, building architecture, environmental facilities and infrastructure, psychology, price, location and ease of transportation. And also the six general variables regarding consumer considerations in making decisions on choosing housing in Padang City simultaneously or as a whole have an influence on the two disaster risk variables studied, namely disaster-free locations and building structures.

Keywords: *Disaster risk, Decision Making, Housing*

INTRODUCTION

Considering that the city of Padang is the capital of West Sumatra province which apart from being the center of government, is also the center for economic activities, education, trade and other informal sectors, the need for housing for the community needs to be considered [1]. On the other hand, it is a good opportunity for entrepreneurs/developers to provide residential facilities by building the required housing [2]. However, the public as consumers must consider disaster risk in making decisions about choosing housing, especially in the city of Padang [3].

The geographical condition of the city of Padang is located in an area along the earthquake path following a 6,500 km long subduction zone to the west of Sumatra Island [4]. Apart from

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earthquakes, there are many disasters that have the potential to occur in the city of Padang, such as tsunamis, landslides, floods, flash floods, tornadoes, etc. [5]. Consumers must pay attention to these potential disasters when making decisions in choosing housing that is appropriate and has a small risk of disaster [6]. Several factors that consumers must consider regarding disaster risk when making housing selection decisions are disaster-free residential locations and earthquake-resistant building specifications [7]. These two factors are taken into consideration because it is based on the Disaster Risk Index issued by the National Disaster Management Agency in 2018 which states that the city of Padang is included in the "High" risk class for several disasters [8].

Consumers have many criteria and considerations in choosing the desired housing [9]. The results of previous research show that the biggest factors that influence consumers in making housing selection decisions are other factors such as location, price and environment [10]. Therefore, this research focuses on obtaining information regarding consumer considerations regarding disaster risk in making decisions about choosing housing in the city of Padang [11].

METHOD

The data collection method in this research is by using a questionnaire given to respondents. The questionnaire in this research provides or distributes a list of questions to respondents about consumers' reasons for choosing housing and how much consideration consumers have regarding disaster risks in making decisions about choosing housing. The questions in the questionnaire use a scale of 1-5 to represent the respondents' opinions. Where the values for the scale are:

a. Very Large: 5
b. Large: 4
c. Medium: 3
d. Small: 2
e. Very Small: 1

There are 8 variables in this research, namely price, location, building, environmental facilities and infrastructure, and ease of transportation, psychology, disaster-free location and building structure. From these 8 variables, 33 research indicators were obtained as can be seen in table 1 below.

Table 1: Research variables and indicators

No	Indicator
	Price
1	Matching price with purchasing power.
2	Price match with building quality.
3	Light down payment.
4	Long credit term.
	Location
5	Residential location close to public transportation facilities.
6	Residential location close to health facilities.
7	Residential location close to work place.
8	Residential location close to school or campus.
9	Residential location close to entertainment and recreation areas.
	Building Architecture

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No	Indicator
10	Guaranteed building quality.
11	Attractive house design.
12	Good environmental sanitation.
13	Good air circulation system.
	Ease of Transportation
14	Availability of public transportation in the area around the residential location.
15	Easy to access public transportation.
16	Affordable public transportation fares available.
17	Public transportation that pays attention to safety.
	Environmental Facilities and Infrastructure
18	Lively neighborhood conditions
19	Good environmental road conditions.
20	Good condition of the water channels (sewers outside the house).
21	Good management of household waste disposal.
22	Good condition of public facilities (parks and worship place).
	Psychology
23	Give rise to satisfaction and comfort within yourself
24	The need to increase self-confidence
25	Increasing self-pride for an achievement
	Disaster Free Location
26	Tsunami-free residential location.
27	Landslide-free residential location.
28	Flood-free residential location.
29	A residential location that is free from the impact of tornadoes.
	Building structure
30	Stable soil structure.
31	Type and size of foundation used.
32	The size of the steel bar used in structural work.
33	Materials used.

The research was conducted in the city of Padang, the population in this study was the number of consumers who had purchased non-subsidized commercial houses in the city of Padang which included all types of houses. The sampling method is proportional stratified random sampling. This technique is similar to simple random sampling, but the sample determination takes into account the levels in the population. In this research, a sample survey was conducted on 60 respondents. Where for most research, a sample size of greater than 30 and less than 500 is appropriate for most research (Sugiyono, quoted from Roscoe, 2018).

RESULTS AND DISCUSSION

Descriptive Analysis

Descriptive analysis aims to describe the distribution of dominant variables based on the mean value of respondents' perceptions of the assessment of consumer considerations in making decisions about choosing housing in the city of Padang with standard deviation values. If the mean value is high and the standard deviation value is small then the influence of the variable is higher and conversely if the standard deviation value is high and the mean value is low then the level of influence is smaller. The relationship between mean values and standard deviation

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can be seen in Table 2 below:

Table 2: Descriptive analysis

No	Reasons Consumers Choose Housing	Mean	Standard deviation
1	Landslide-free residential location ($X_{7.2}$)	4,55	0,891
2	Flood-free residential location ($X_{7.3}$)	4,53	0,791
3	Tsunami-free residential location ($X_{7.1}$)	4,50	0,983
4	Stable soil structure ($X_{8.1}$)	4,43	0,871
5	Good air circulation system ($X_{3.4}$)	4,42	0,720
6	A residential location that is free from the impact of tornadoes ($X_{7.4}$)	4,33	0,933
7	Type and size of foundation used ($X_{8.2}$)	4,30	0,869
8	Matching price with purchasing power ($X_{1.1}$)	4,27	0,880
9	Good environmental road conditions. ($X_{5.2}$)	4,27	0,756
10	Give rise to satisfaction and comfort within yourself ($X_{6.1}$)	4,27	0,899
11	Good condition of the water channels (sewers outside the house) ($X_{5.3)}$	4,23	0,767
12	The size of the steel bar used in structural work ($X_{8.3}$)	4,23	0,927
13	Good environmental sanitation ($X_{3.3}$)	4,20	0,898
14	Lively neighborhood conditions ($X_{5.1}$)	4,17	0,785
15	Materials used ($X_{8.4}$)	4,17	0,942
16	Guaranteed building quality ($X_{3.1}$)	4,12	1,043
17	Price match with building quality ($X_{1.2}$)	4,07	0,936
18	Attractive house design ($X_{3.2}$)	4,05	0,982
19	Good management of household waste disposal ($X_{5.4}$)	4,03	0,843
20	Residential location close to health facilities. ($X_{2.2}$)	4,02	1,112
21	Residential location close to public transportation facilities ($X_{2.1}$)	4,00	1,150
22	The need to increase self-confidence ($X_{6.2}$)	3,95	0,982
23	Good condition of public facilities (parks and worship place) ($X_{5.5}$)	3,85	1,087
24	Residential location close to school or campus ($X_{2.4}$)	3,77	1,184
25	Light down payment ($X_{1.3}$)	3,75	1,035
26	Residential location close to work place ($X_{2.3}$)	3,72	1,354
27	Increasing self-pride for an achievement ($X_{6.3}$)	3,68	1,033
28	Availability of public transportation in the area around the residential location. ($X_{4.1}$)	3,60	1,012
29	Easy to access public transportation ($X_{4.2}$)	3,60	1,012
30	Public transportation that pays attention to safety ($X_{4.4}$)	3,48	1,172
31	Long credit term ($X_{1.4}$)	3,47	1,200
32	Affordable public transportation fares available. ($X_{4.3}$)	3,42	1,139
33	Residential location close to entertainment and recreation areas ($X_{2.5}$)	3,25	1,159

From the table above, it can be seen that the five most dominant variables are landslide-free residential locations ($X_{7.2}$), flood-free residential location ($X_{7.3}$), tsunami-free residential locations ($X_{7.1}$), stable soil structure ($X_{8.1}$) and a good air circulation system ($X_{3.4}$). Therefore,

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it was found that the consumer considerations that most influence residential decision making are disaster-free residential locations, building structures and building architecture.

Classical Test Theory Assumptions

The normality test in this study used the Kolmogorov Smirnov test. The results of the normality test for disaster-free locations can be seen in table 3 below:

Table 3: Kolmogorov Smirnov Normality Test for Disaster Free Locations

		Unstandardized Residual
N		60
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	2.76730352
Most Extreme Differences	Absolute	.153
	Positive	.077
	Negative	-.153
Kolmogorov-Smirnov Z		1.188
Asymp. Sig. (2-tailed)		.119

Meanwhile, the results of the normality test on the building structure can be seen in table 4 below:

Table 4: Kolmogorov Smirnov Normality Test on Building Structures

		Unstandardized Residual
N		60
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	1.82409212
Most Extreme Differences	Absolute	.109
	Positive	.109
	Negative	-.056
Kolmogorov-Smirnov Z		.847
Asymp. Sig. (2-tailed)		.470

Based on the results of the Kolmogorov Smirnov normality test carried out on the dependent variable disaster-free location (Y_1) it is known that the significance value is 0.119 > 0.05. Meanwhile, the results of the Kolmogorov Smirnov normality test were carried out on the building structure variable (Y_2) it is known that the significance value is 0.470 > 0.05. then it can be concluded that the residual values are normally distributed.

And a multicollinearity test was carried out to test whether in the regression model a correlation was found between the independent variables. Multicollinearity test results for the disaster-free location variable (Y_1) and to building structures (Y_2) has the same tolerance and Variance Inflation Factor (VIF) results which can be seen in table 5 below:

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Table 5: Multicollinearity Test

Variabel	Tolerance	VIF	Category
Price	0,489	2,047	Multicollinearity does not occur
Location	0,407	2,458	Multicollinearity does not occur
Building Architecture	0,324	3,085	Multicollinearity does not occur
Ease of Transportation	0,524	1,910	Multicollinearity does not occur
Environmental Facilities and Infrastructure	0,287	3,485	Multicollinearity does not occur
Physiology	0,462	2,167	Multicollinearity does not occur

The table above shows that the regression model does not experience multicollinearity interference. This is because the tolerance value for the six independent variables is more than 0.10. Meanwhile, the calculation of the VIF value shows that all independent variables have a value of less than 10. So it can be concluded that there is no multicollinearity between the independent variables in the regression model.

Factor Analysis

Factor analysis was carried out for 60 respondents who filled out the questionnaire in this study. Factor analysis which has been carried out using the IBM SPSS Statistics 20 application, can be seen in table 6 that the 33 variables can be divided into 7 factors.

Table 6: Factor Analysis

No	Factor	Variable
1	Factor 1	Matching price with purchasing power ($X_{1.1}$)
2		Price match with building quality ($X_{1.2}$)
3		Guaranteed building quality ($X_{3.1}$)
4		Attractive house design ($X_{3.2}$)
5		Good environmental sanitation ($X_{3.3}$)
6		Type and size of foundation used ($X_{8.2}$)
7		The size of the steel bar used in structural work ($X_{8.3}$)
8		Materials used ($X_{8.4}$)
9	Factor 2	Good air circulation system ($X_{3.4}$)
10		Lively neighborhood conditions ($X_{5.1}$)
11		Good environmental road conditions ($X_{5.2}$)
12		Good condition of the water channels (sewers outside the house) ($X_{5.3}$)
13		Good management of household waste disposal ($X_{5.4}$)
14		Give rise to satisfaction and comfort within yourself ($X_{6.1}$)
15	Factor 3	Residential location close to public transportation facilities ($X_{2.1}$)
16		Availability of public transportation in the area around the residential location ($X_{4.1}$)
17		Easy to access public transportation ($X_{4.2}$)

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18		Affordable public transportation fares available ($X_{4.3}$)
19		Public transportation that pays attention to safety ($X_{4.4}$)
20	Factor 4	Light down payment ($X_{1.3}$)
21		Tsunami-free residential location ($X_{7.1}$)
22		Landslide-free residential location ($X_{7.2}$)
23		Flood-free residential location ($X_{7.3}$)
24		A residential location that is free from the impact of tornadoes ($X_{7.4}$)
25		Stable soil structure ($X_{8.1}$)
26	Factor 5	Residential location close to health facilities ($X_{2.2}$)
27		Residential location close to work place ($X_{2.3}$)
28		Residential location close to school or campus ($X_{2.4}$)
29	Factor 6	Residential location close to entertainment and recreation areas ($X_{2.5}$)
30		Good condition of public facilities (parks and worship place) ($X_{5.5}$)
31	Factor 7	Long credit term ($X_{1.4}$)
32		The need to increase self-confidence ($X_{6.2}$)
33		Increasing self-pride for an achievement ($X_{6.3}$)

From table 6 above it can be seen that by using the factor analysis method, consumers in making decisions about choosing housing mainly consider the building architectural variables (X3) and building structures (X8). This is proven by the building architecture and building structure variables being in factor 1 which is the factor that most influences consumers in making decisions about choosing housing in the city of Padang. The factor analysis method also aims to show correlation or strong relationships between variables that are in the same factor. This means that the two variables, namely the building architecture and building structure variables, have a strong correlation or relationship.

Multiple Linear Regression Analysis

T-Test

Confidence level,95%, $\alpha = 0,05$.

$t_{table} = t\ (\alpha/2\ ;\ n\text{-}k\text{-}1)$

$t_{table} = t\ (0,05/2\ ;\ 60\text{-}6\text{-}1)$

$t_{table} = t\ (0,025\ ;\ 53) = 2,006$

Data processing was carried out using the IBM SPSS Statistics 20 application for the t test on the disaster-free location variable, the results can be seen in table 7 below:

Table 7: T-Test Results for Disaster Free Locations

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.427	2.484		3.795	.000
	Price	.293	.192	.263	1.520	.134
	Location	.052	.141	.070	.368	.715
	Building Architecture	.113	.207	.116	.544	.589

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	Ease of Transportation	.108	.132	.137	.820	.416
	Environmental Facilities and Infrastructure	-.002	.200	-.002	-.010	.992
	Physiology	-.034	.224	-.027	-.150	.881

a. Dependent Variable: Disaster free locations

From these results, the multiple linear regression equation obtained can be written, namely:
$Y_1 = 0{,}263X_1 + 0{,}070X_2 + 0{,}116X_3 + 0{,}137X_4 + (-0{,}02)X_5 + (-0{,}27)X_6$

Table 8: Summary of t Test for Disaster Free Locations

Variable	t_{hitung}	t_{tabel}	Sig.	Category
Price	1,520	2,006	0,134	There is no influence
Location	0,368	2,006	0,715	There is no influence
Building Architecture	0,544	2,006	0,589	There is no influence
Ease of Transportation	0,820	2,006	0,416	There is no influence
Environmental Facilities and Infrastructure	-0,010	2,006	0,992	There is no influence
Physiology	-0,150	2,006	0,881	There is no influence

Meanwhile, the results of the t test on building structures can be seen in table 9 below:

Table 9: Results of the t test on the location of building structures

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.647	1.637		1.006	.319
	Price	.166	.127	.148	1.307	.197
	Location	.027	.093	.036	.291	.772
	Building Architecture	.375	.136	.383	2.751	.008
	Ease of Transportation	.093	.087	.117	1.070	.290
	Environmental Facilities and Infrastructure	.246	.132	.276	1.862	.068
	Physiology	-.022	.148	-.017	-.146	.885

a. Dependent Variable: Building Structures

From these results, the multiple linear regression equation obtained can be written, namely:

$Y_2 = 0{,}148X_1 + 0{,}036X_2 + 0{,}383X_3 + 0{,}117X_4 + 0{,}276X_5 + (-0{,}017)X_6$

Table 10: Summary of t test on building structures

Variable	t_{count}	t_{table}	Sig.	Category
Price	1,307	2,006	0,197	No Influence
Location	0,291	2,006	0,772	No Influence

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Building Architecture	2,751	2,006	0,008	There is influence
Ease of Transportation	1,070	2,006	0,290	No Influence
Environmental Facilities and Infrastructure	1,862	2,006	0,068	No Influence
Physiology	-0,146	2,006	0,885	No Influence

From the data contained in table 8 and table 10, namely the table of t test results on the disaster-free location and building structure variables above, it can be seen that only the building architecture variable (X_3) which has a significant influence on the building structure variable (Y_2). This is proven by the sig value, namely 0.008 < 0.05 and also the tcount value, namely 2.751 > ttable, namely 2.006. For more details, you can see the t test curve in Figure 1 below:

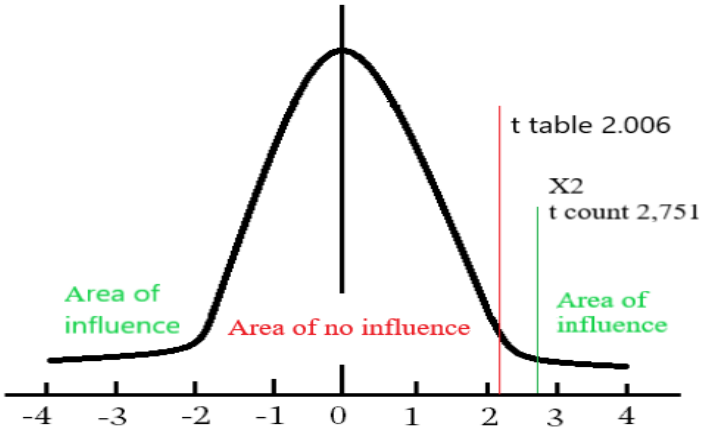

Figure 1: T-Test Curve

F-Test

Confidence level 95%, α = 0,05

F_{table} = F (k ; n-k)

F_{table} = F (6 ; 60-6)

F_{table} = F (6 ; 54) = 2,27

Data processing was carried out using the IBM SPSS Statistics 20 application for the F test on the disaster-free location variable, the results can be seen in table 11 below:

Table 11: F Test Results for Disaster Free Locations

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130.763	6	21.794	2.556	.030[b]
	Residual	451.820	53	8.525		
	Total	582.583	59			

a. Dependent Variable: Disaster Free Locations

b. Predictors: (Constant), Physiology, Location, Price, Ease of Transportation, Building Architecture, Environmental Facilities and Infrastructure

From the data contained in table 11, namely the table of F test results on the disaster-free location variable above, it can be seen that there is a simultaneous influence of the variable X on the disaster-free location variable (Y_1). This is proven by the sig value, namely 0.030 < 0.05 and also the Fcount value, namely 2.556 > Ftable, namely 2.27.

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Meanwhile, the results of the F test on building structures can be seen in table 12 below:

Table 12: F Test Results on Building Structures

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	392.622	6	65.437	17.667	.000[b]
	Residual	196.311	53	3.704		
	Total	588.933	59			

a. Dependent Variable: Building Structures
b. Predictors: (Constant), Physiology, Location, Price, Ease of Transportation, Building Architecture, Environmental Facilities and Infrastructure

From the data contained in table 12, namely the table of F test results on the building structure variables above, it can be seen that there is a simultaneous influence of variable X on the building structure variable (Y_2). This is proven by the sig value, namely 0.000 < 0.05 and also the F valuecount namely 17.667 > Ftablenamely 2.27.

Coefficient of Determination

The coefficient of determination value for which the independent variable is more than 2 is used as adjusted R square. The results of the coefficient of determination for the disaster-free location variable can be seen in table 13 below:

Table 13: Coefficient of Determination of Disaster Free Locations

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.474[a]	.224	.137	2.920

a. Predictors: (Constant), Physiology, Location, Price, Ease of Transportation, Building Architecture, Environmental Facilities and Infrastructure

From the table above it can be seen that the coefficient of determination (adjusted R^2) obtained is 0.137. This means that only 13.7% of consumers' considerations regarding disaster-free locations can be explained by the variables of price, location, building architecture, ease of transportation, environmental facilities and infrastructure and psychology for consumers in choosing housing in the city of Padang. Meanwhile, the results of the coefficient of determination for the building structure can be seen in table 14 below:

Table 14: Determination Coefficient of Building Structure

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.816[a]	.667	.629	1.925

a. Predictors: (Constant), Physiology, Location, Price, Ease of Transportation, Building Architecture, Environmental Facilities and Infrastructure

From the table above it can be interpreted that the coefficient of determination (adjusted R^2) obtained is 0.629. This means that 62.9% of consumer considerations regarding building

structures can be explained by the variables price, location, building architecture, ease of transportation, environmental facilities and infrastructure and psychology for consumers in choosing housing in the city of Padang.

CONCLUSION

The results of this research show that housing consumers who buy houses from developers in the city of Padang really pay attention to choosing a disaster-free location and also the building structure of the house they want to buy and live in. The sequence of consumer considerations that most influence decisions regarding housing selection in Padang City in this research is disaster-free residential location, building structure, building architecture, environmental facilities and infrastructure, psychology, price, location and ease of transportation. Six general variables regarding consumer considerations in making housing selection decisions in Padang City simultaneously or as a whole have an influence on the two disaster risk variables studied, namely disaster-free location and building structure.

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