No	Customer Age	Smartphone Brand-A Satisfaction
1	Young	Yes
2	Senior	Yes
3	Young	Yes
4	Middle-aged	No
5	Middle-aged	Yes
6	Young	No
7	Middle-aged	Yes
8	Young	Yes
9	Young	Yes
10	Middle-aged	Yes
11	Young	Yes
12	Senior	Yes
13	Young	Yes
14	Senior	No
15	Young	Yes

No	Customer Age	Smartphone Brand-A Satisfaction	sum
1	0	1	1
2	2	1	3
3	0	1	1
4	1	0	1
5	1	1	2
6	0	0	0
7	1	1	2
8	0	1	1
9	0	1	1
10	1	1	2
11	0	1	1
12	2	1	3
13	0	1	1
14	2	0	2
15	0	1	1
sum	10	12	

Hypothesis Testing

H0 : Customer Age has no relationship to Smartphone Brand-A Satisfaction

H1 : otherwise

Chi-square :

Customer Age	Yong	0
	Middle-aged	1
	Senior	2
Smartphone Brand-A Satisfaction	No	0
	Yes	1

P(Age=0)	0.5333333333
P(Age=1)	0.2666666667
P(Age=2)	0.2
P(SBS=0)	0.2
P(SBS=1)	0.8

			mul
E(Age=0,SBS=0)	0.5333333333	0.2	1.6
E(Age=0,SBS=1)	0.5333333333	0.8	6.4
E(Age=1,SBS=0)	0.2666666667	0.2	0.8
E(Age=1,SBS=1)	0.2666666667	0.8	3.2
E(Age=2,SBS=0)	0.2	0.2	0.6
E(Age=2,SBS=1)	0.2	0.8	2.4

count 15

Observation	SBS=0	SBS=1
Age=0	1	7
Age=1	1	3
Age=2	1	2

Expectation	SBS=0	SBS=1
Age=0	1.6	6.4
Age=1	0.8	3.2
Age=2	0.6	2.4

Calculate Chi-Square

[O(Age,SBS)-E(Age,SBS)]^2 / E(Age,SBS)

0,0	0.225	1 1.6
1,0	0.05	1 0.8
2,0	0.2666666667	1 0.6
0,1	0.05625	7 6.4
1,1	0.0125	3 3.2
2,1	0.06666666667	2 2.4
Sum	0.6770833333	

p-value (#row-1)*(#col-1)

df (3-1)*(2-1) = 2

ค่า chi-square อยู่ระหว่าง 0.9 (0.211) และ 0.5 (1.386)

(1.386-0.211) = 1.175

(1.386-0.6770833) = 0.7089166667

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

(0.5-0.9) = -0.4

(0.5-0.9)*(1.386-0.6770833)/(1.386-0.211) = -0.2413333333

p-value : (0.5-(-0.24133)) = 0.7413333333

if % significant = 5% 0.05

p-value = 0.7413 > 0.05 drop / remove

Chi-square > p-value ; Accept Null Hypothhesis (H0)

Therefore : **Age** has **no relationship** to **Smartphone Brand-A Satisfaction, Age** can be **removed**

Q1: Customer Age มีผลต่อ Brand-A satisfaction หรือไม่ (ทดสอบความสัมพันธ์ระหว่าง “Customer Age” vs “Smartphone Brand-A Satisfaction” โดยใช้หลักสถิติ Chi-square)

ตอบ Customer Age **ไม่มีผลต่อ** Brand-A satisfaction

Q2: ควร Remove Feature (variable) “Customer Age” หรือไม่

ตอบ **ควร** Remove Feature (variable) “Customer Age”