

# Effects of Image Quality on Facebook Marketplace Bidding

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# Agenda

**Research Question**



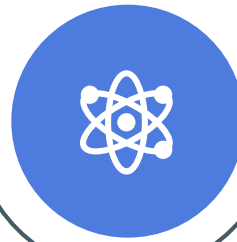
**Survey**



**Power Analysis**



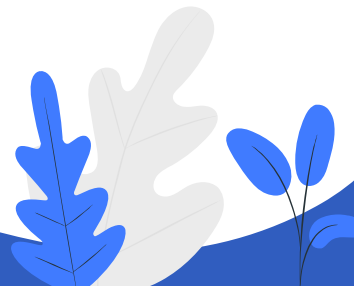
**Experiment**



**Conclusions**

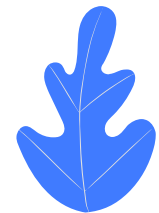
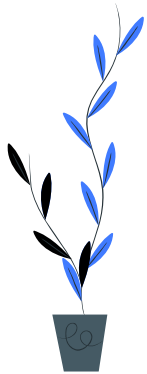


# Research Question

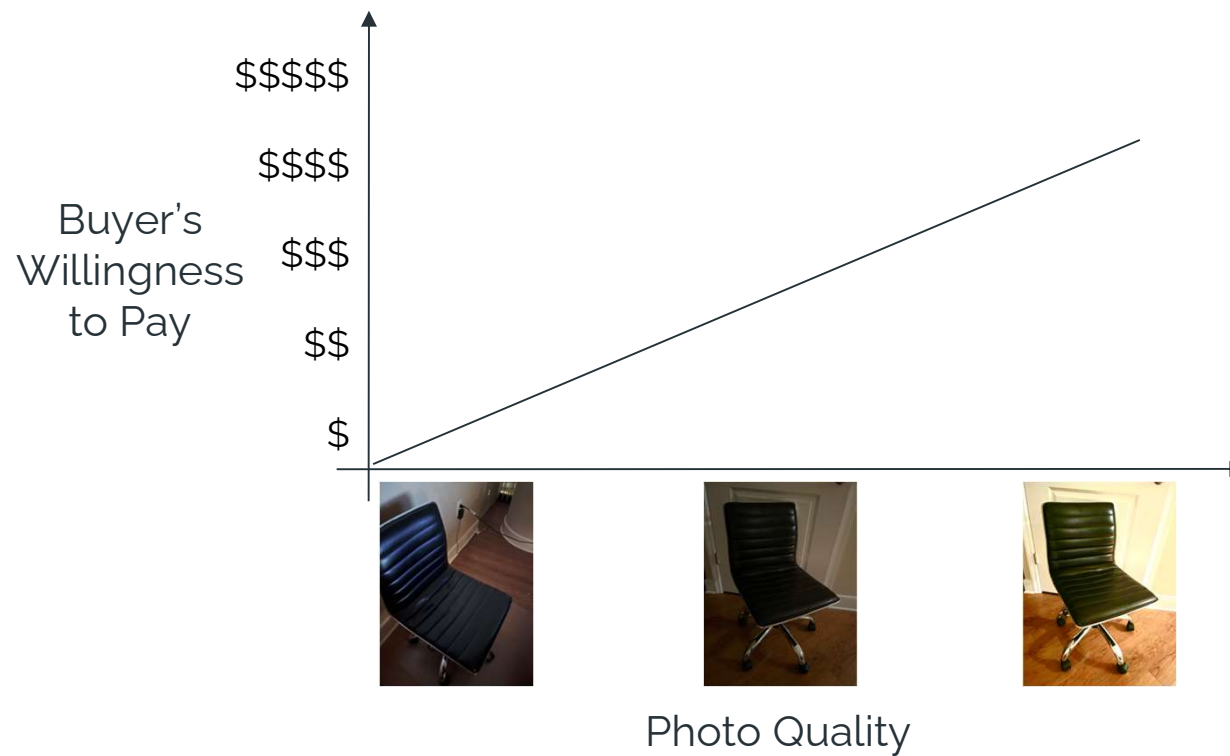


# **Does increasing photo quality on Facebook Marketplace cause an increase in the amount online buyers are willing to offer for a good?**

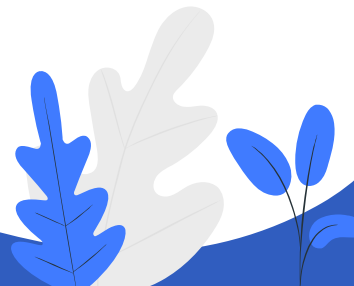
- Online selling of used goods has increased with the rise of platforms like Facebook Marketplace and PoshMark
- Individual sellers want to maximize the money they make from selling products online



# Higher quality photos increase a buyer's willingness to pay



# Survey



# Treatment for Survey

## Control

Decreased image's exposure & brilliance.  
Increased noise reduction.



## Treatment

Increased image's exposure, brilliance, highlights, shadows, contrast, brightness, saturation.



# Survey

Assume that you're interested in buying this item. Use text box below to type in how much you would offer for this item.



**Weight Scale**

Original Retail Price: **\$25**

qualtrics<sup>XM</sup>

Your offer (\$):

x 10  
items



# Survey Results

Simple Model, no covariates:  $\log(\text{offer} + 1) \sim \text{photo\_quality}$

Demographic HTEs:  $\log(\text{offer} + 1) \sim \text{photo\_quality} + \text{retail\_price} + \text{vacuum\_offer} + \text{age} + \text{gender} + \text{marital\_status} + \text{employment} + \text{photo\_quality} * \text{gender} + \text{photo\_quality} * \text{marital\_status}$

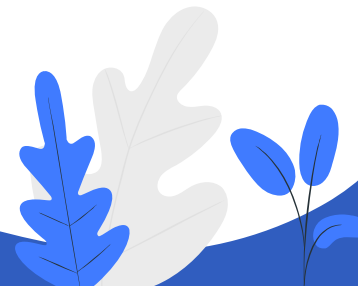
Price HTE:  $\log(\text{offer} + 1) \sim \text{photo\_quality} + \text{retail\_price} + \text{vacuum\_offer} + \text{age} + \text{gender} + \text{marital\_status} + \text{employment} + \text{photo\_quality} * \text{retail\_price}$

## Findings

- Significant treatment effects across all models
- Addition of covariates did not help in reducing treatment standard errors
- Retail price covariate is statistically significant so expensive items have higher bid amounts

	Dependent variable:		
	$\log(\text{max bid} + 1)$		
	[simple] (1)	[demographic HTEs] (2)	[price HTE] (3)
photo_quality	0.105*** (0.034)	0.065* (0.036)	0.109*** (0.038)
factor(gender)6_female		0.083*** (0.031)	0.056** (0.022)
factor(gender)9_declined		-0.059 (0.382)	-0.047 (0.126)
factor(marital)2_married		-0.062 (0.040)	-0.045* (0.026)
factor(marital)3_declined		0.440** (0.178)	0.056 (0.127)
retail_price		0.020*** (0.0003)	0.021*** (0.0004)
vacuum		0.008*** (0.0003)	0.008*** (0.0003)
Constant	2.823*** (0.025)	0.953*** (0.204)	0.935*** (0.205)
Age	No	Yes	Yes
Employment	No	Yes	Yes
Gender Interaction	No	Yes	No
Marital Interaction	No	Yes	No
Retail Price Interaction	No	No	Yes
Note:	*p<0.1; **p<0.05; ***p<0.01		

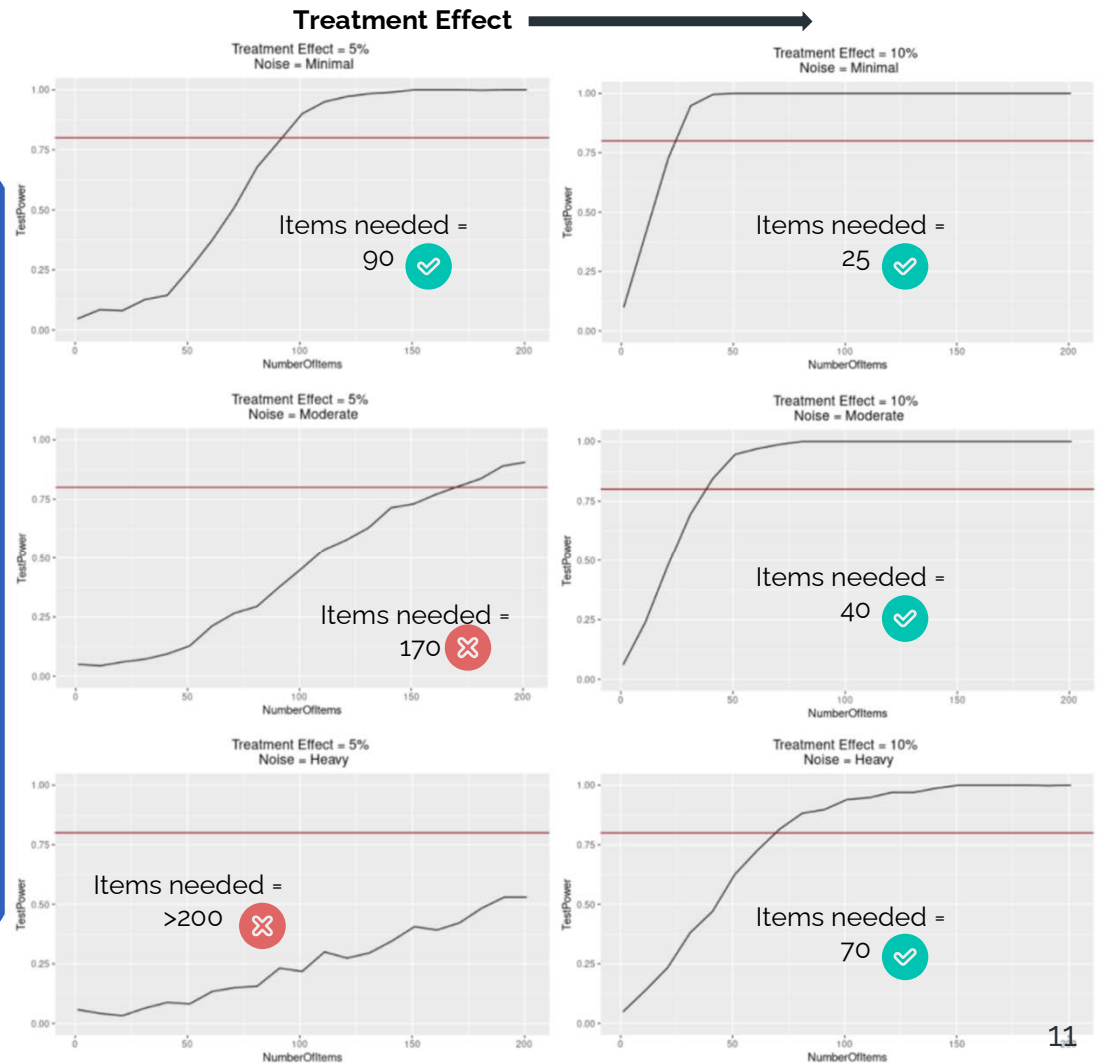
# Power Analysis



# Power Analysis

- 6 scenarios with varying treatment effect and noise
- Items needed to achieve 80% power ranged from 25 to over 200
- Chose 90 items for experiment to satisfy most scenarios & be feasible
- Increased treatment "dosage" after survey

Noise



# Increased Difference in Photo Quality

## Control

- Did not center the item.
- Included more background in the image.
- Decreased image's exposure & brilliance. Increased noise reduction.

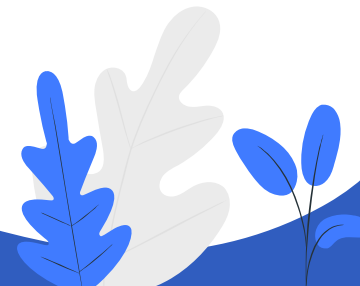


## Treatment

- Increased image's exposure, brilliance, highlights, shadows, contrast, brightness, saturation.



# Experiment



# Experiment: Randomized Block Design



Washington, DC



Denver, CO



Austin, TX



San Jose, CA

Block 1

Area Rug

Randomize



Treatment



Control



Treatment



Control

Block 2

Steamer

Randomize



Control



Control



Treatment



Treatment

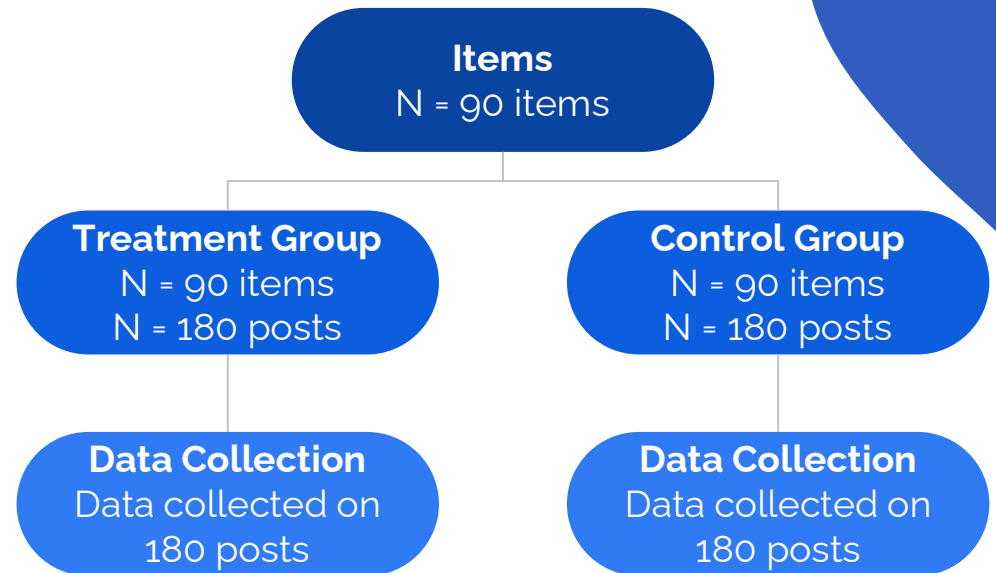
1 item per block, 90 Blocks total

# Experiment Design

$N_1$	$N_A$	R	X
		$Y_{1,2,3,4}$	
	$N_B$	R	X
		$Y_{1,2,3,4}$	
	$N_A$	R	X
		$Y_{1,2,3,4}$	
$N_2$	$N_B$	R	O
		$Y_{1,2,3,4}$	
	$N_A$	R	X
		$Y_{1,2,3,4}$	
$N_{90}$	$N_B$	R	O
		$Y_{1,2,3,4}$	

## Key:

$N_1, N_2, \dots, N_{90}$  = Items  
 $N_A, N_B, N_C, N_D$  = Sellers  
 R = Randomized  
 X = Treatment  
 O = Control  
 $Y_{1,2,3,4}$  = Outcomes measured

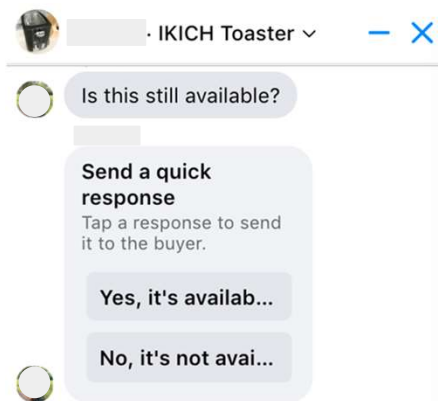


# Experiment: Data Collection



99% of postings with at least 1 view

28,129 views total



48% of postings with at least 1 message

1,146 messages total

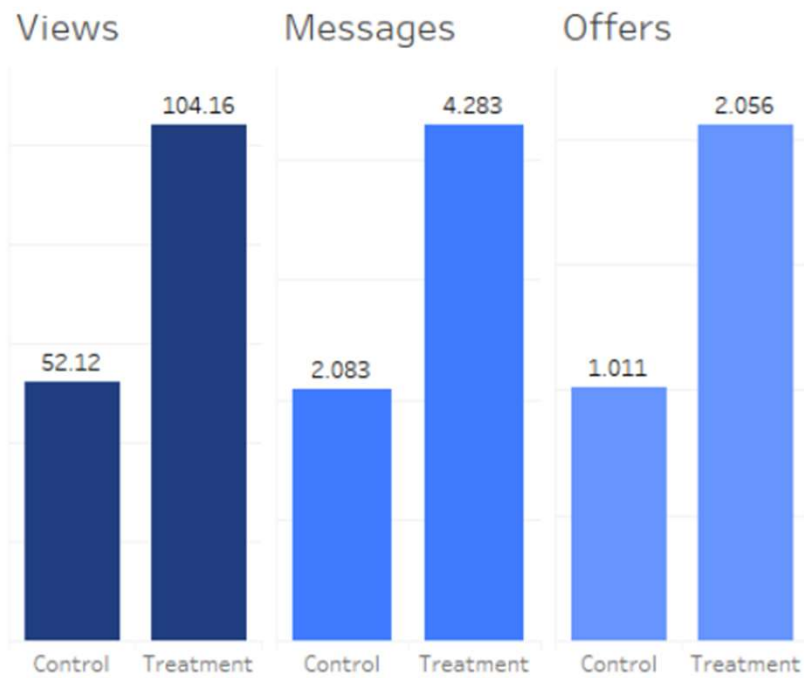


35% of postings with at least 1 bid

552 bids total



# Results



# Models

Baseline, no covariates:  $\log(\max\_bid+1) \sim \text{treatment}$

Baseline & Blocked Item&Seller:  $\log(\max\_bid+1) \sim \text{treatment} + \text{seller} + \text{item}$

Baseline & Blocked Item&Seller & High/Low Retail Interaction with Treatment:

$\log(\max\_bid+1) \sim \text{treatment} + \text{seller} + \text{item} + \text{high/low\_retail} * \text{treatment}$

## Findings

- Good photo quality treatment effect:  
 $\exp(0.4)-1 = \sim 50\%$  increase in bid
- Addition of covariates and interaction terms reduces robust standard errors

	Dependent variable:		
	$\log(\max \text{ bid} + 1)$		
	[Simple] (1)	[Seller&Item] (2)	[Seller&Item&High/LowRetail] (3)
treatment	0.434*** (0.167)	0.416*** (0.143)	0.298** (0.132)
factor(seller)Jaclyn		0.186 (0.215)	0.197 (0.216)
factor(seller)John		0.223 (0.203)	0.224 (0.204)
factor(seller)Sanjay		0.324 (0.201)	0.325 (0.202)
treatment:high_retail			0.258 (0.303)
Constant	0.887*** (0.112)	0.209 (0.800)	0.135 (0.845)
Item	No	Yes	Yes
Note:	*p<0.1; **p<0.05; ***p<0.01		

# Models

Treatment & Blocked Seller & Blocked Item & High/Low Retail Interaction with Treatment:

**views** ~ treatment + seller + item + high/low\_retail\*treatment

**messages** ~ treatment + seller + item + high/low\_retail\*treatment

**offers** ~ treatment + seller + item + high/low\_retail\*treatment

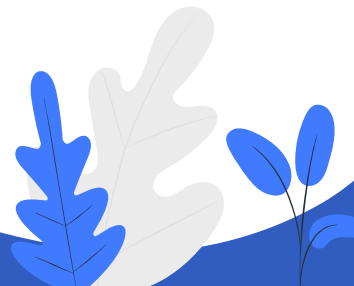
## Findings

- Good photo quality treatment effect

	Low Retail Price	High Retail Price
# of Views	+21	+86
# of Messages	+1	+3.6
# of Offers	+0.4	+1.9

Dependent variable:			
	[# of Views] (1)	[# of Messages] (2)	[# of Offers] (3)
treatment	20.900*** (6.250)	1.020*** (0.326)	0.436*** (0.161)
treatment:high_retail	65.400** (26.900)	2.640* (1.550)	1.420 (0.914)
Constant	-11.500 (30.700)	-0.857 (1.690)	-0.249 (1.060)
Item	Yes	Yes	Yes
Seller	Yes	Yes	Yes
Note: *p<0.1; **p<0.05; ***p<0.01			

# Conclusion



## **Questions and Concerns**

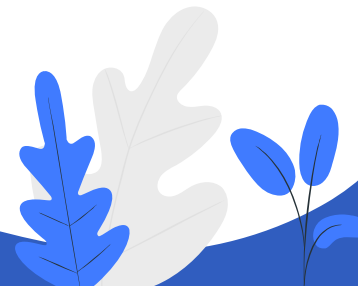
- How to account for Facebook's algorithms? Did certain items get boosted?
- John was banned from Facebook Marketplace for 2 hours. What effect did this have?
- What impact did posting items in 3 different phases have?



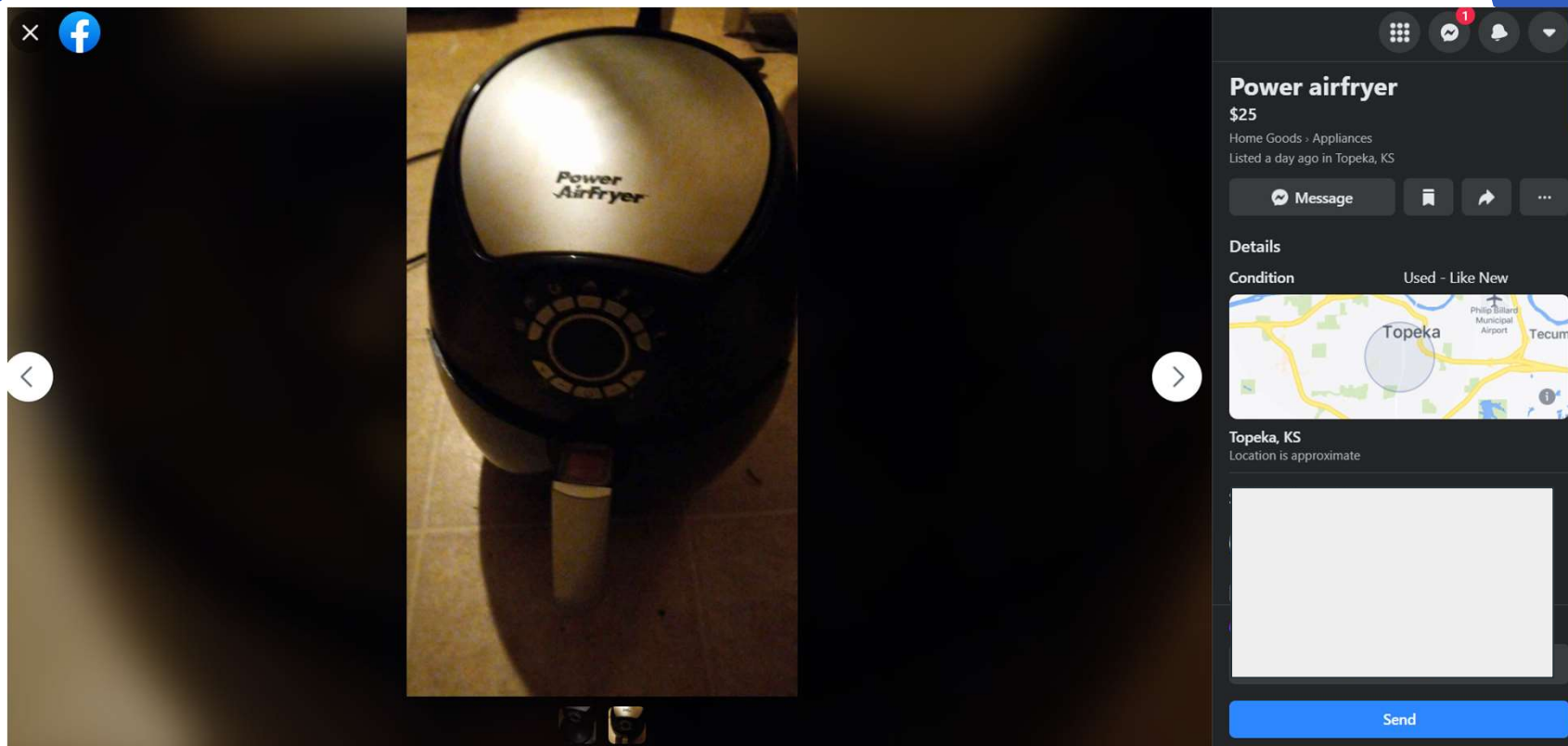
**Thanks!**  
**Any questions?**

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# Appendix

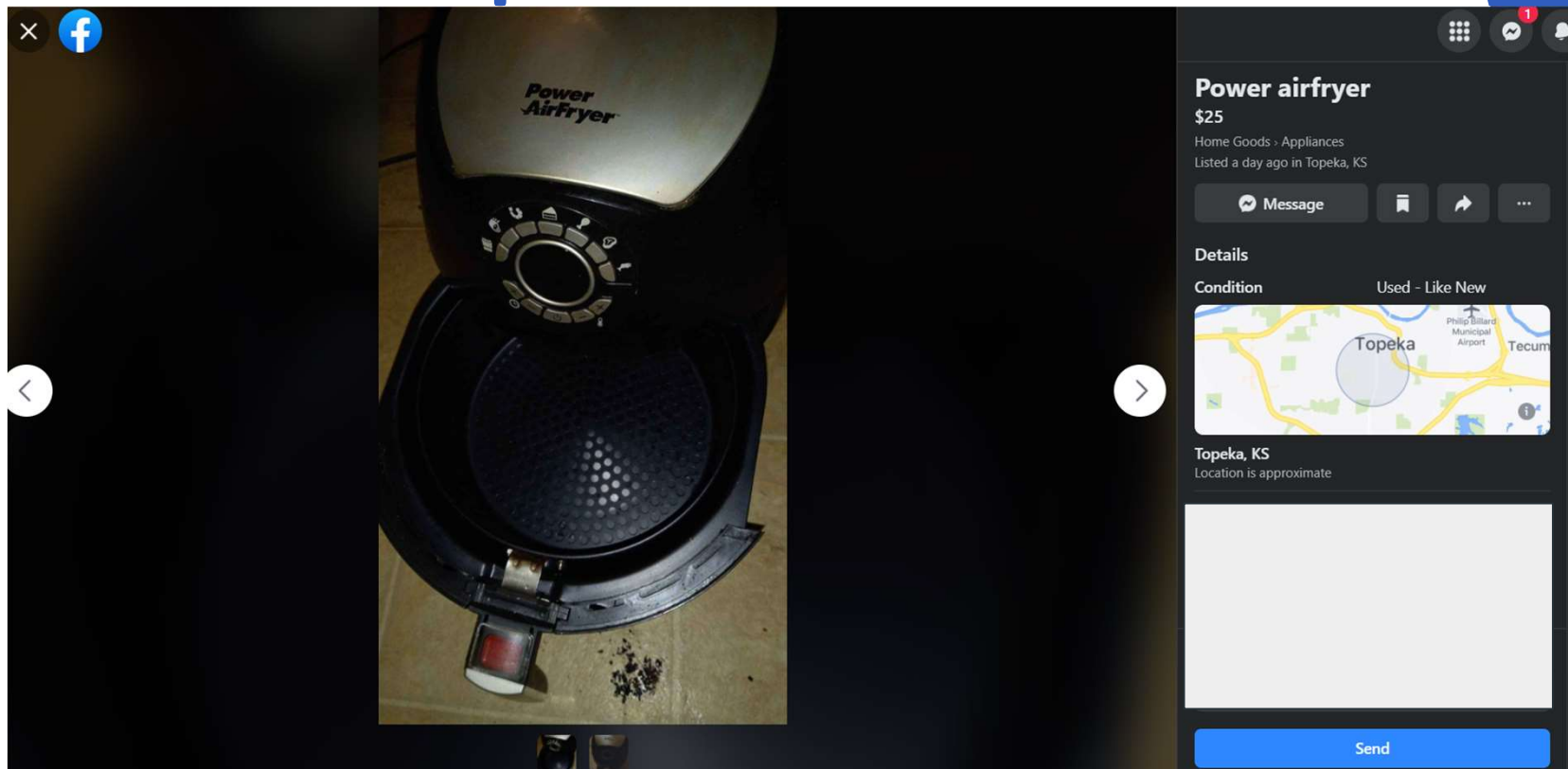


## Example Bad Pictures on FB

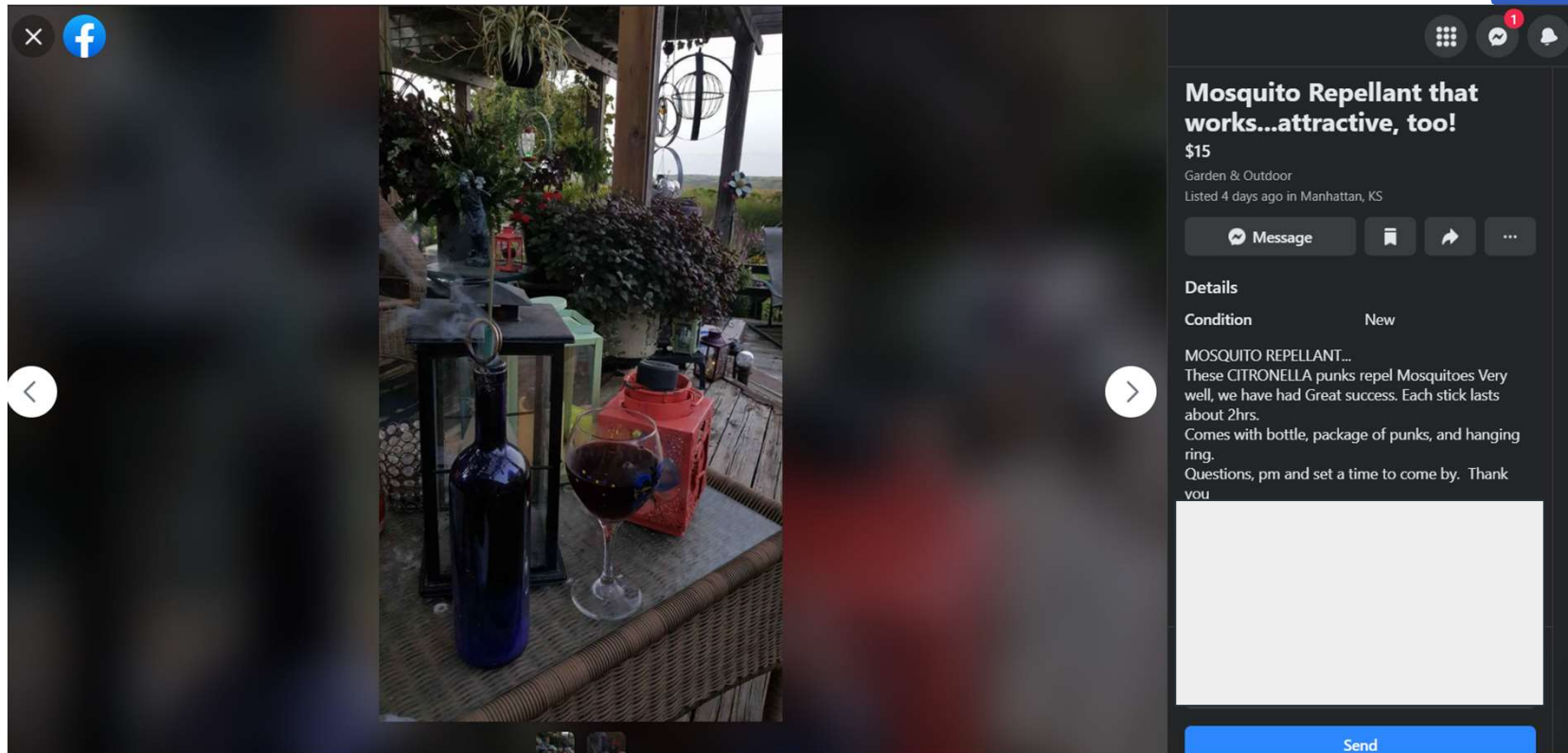




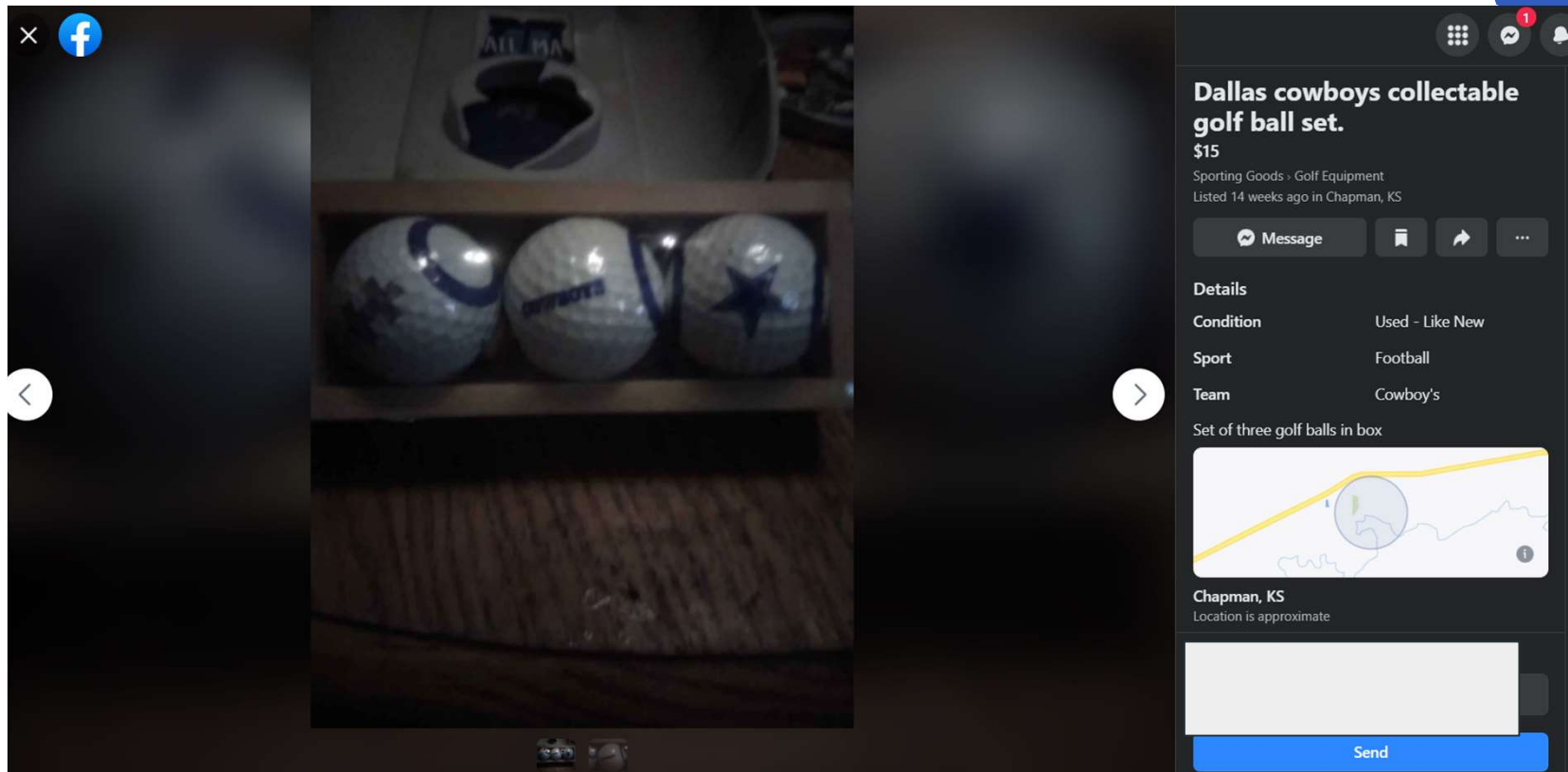
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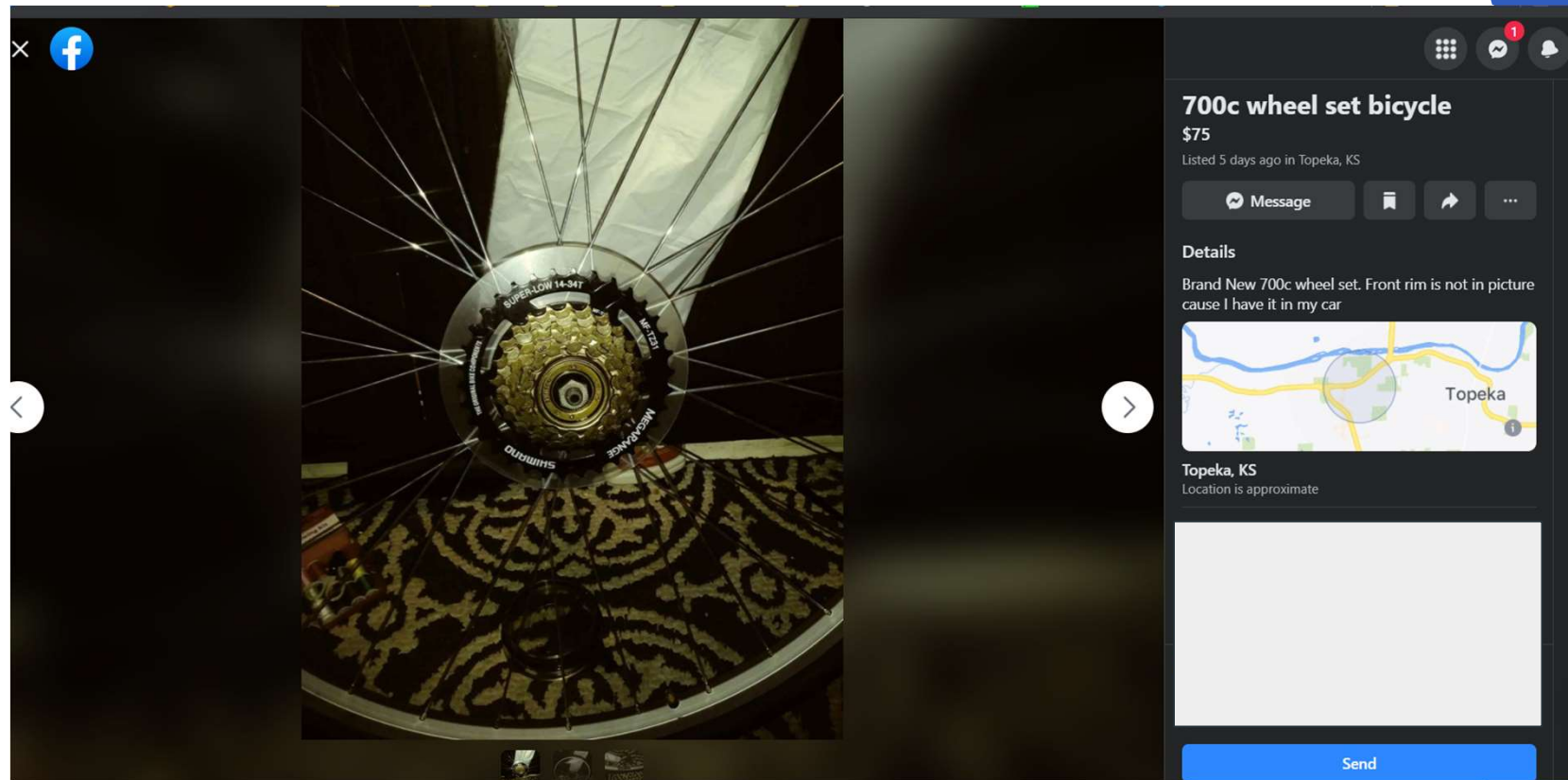
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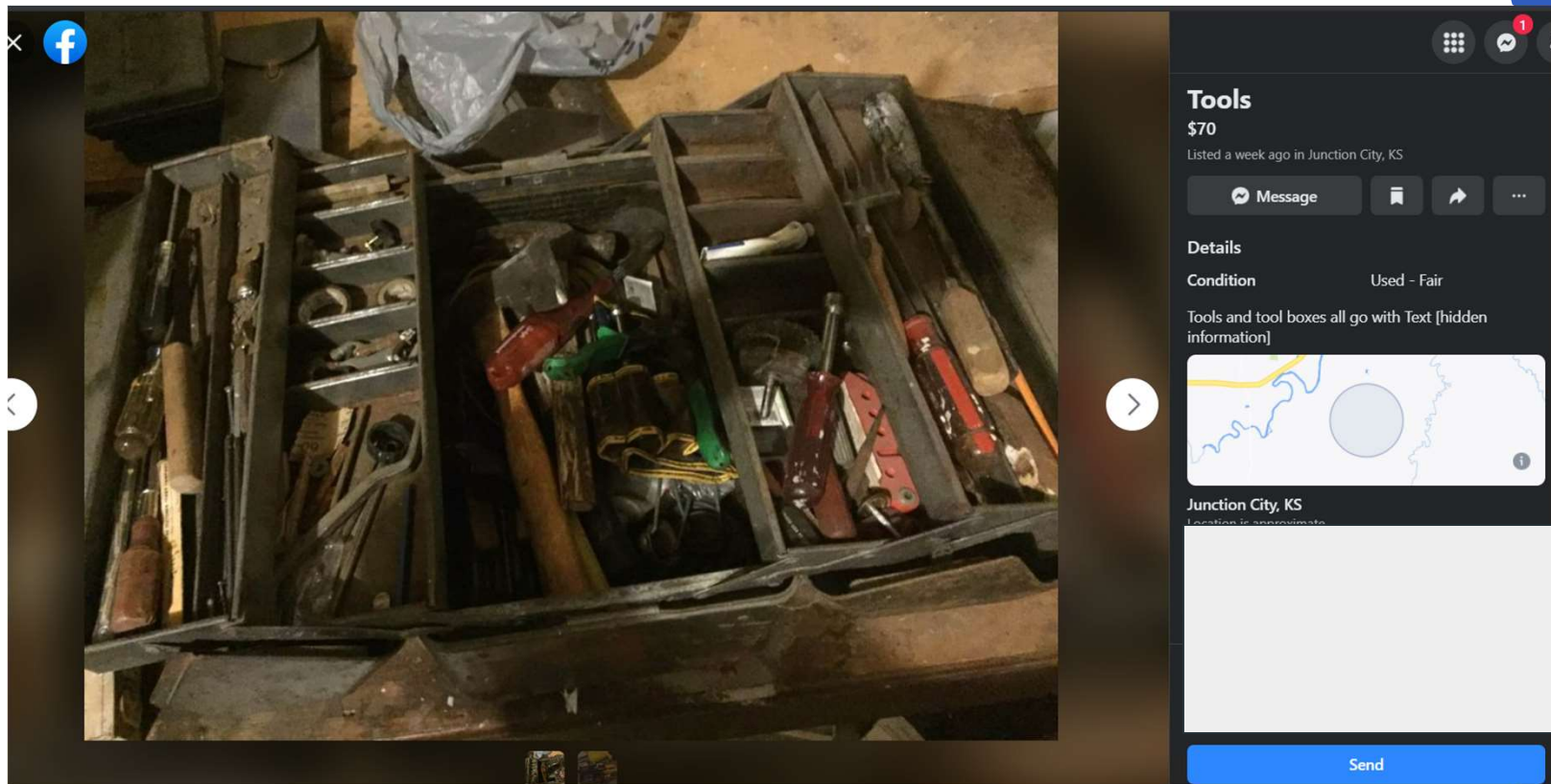
## Example Bad Pictures on FB



## Example Bad Pictures on FB



## Example Bad Pictures on FB





## Example Bad Pictures on FB



## Example Bad Pictures on FB

