DECREASING DAILY DISCRETIONARY EXPENSES BY 45%

MBC 638 DATA ANALYSIS & DECISION MAKING- SYRACUSE UNIVERSITY

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DEFINE

45%

Goal is to decrease daily discretionary expense by 45%

SQL 1.8 Measure

MEASURE

Baseline (measure phase)	
Mean	90.086$
Median	60$
Standard Deviation	72.89$
Range	333$

ANALYZE

❖ Lunch at work, Amazon Prime purchases, Date with friends and daily Soy latte are directly driving our daily discretionary expenses.

❖ Regression strong model with R of 1 and R squared of 1& P-value of 0 for all X
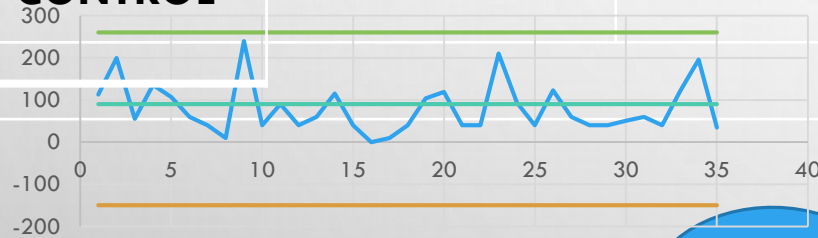
❖ There is correlation b/n X & Y variables

IMPROVE

4 initiatives to decrease daily expense: make soy latte at home, restrict amazon prime purchase once a week and for not more than 100$, make lunch at home and restrict date with friends to be held only biweekly.

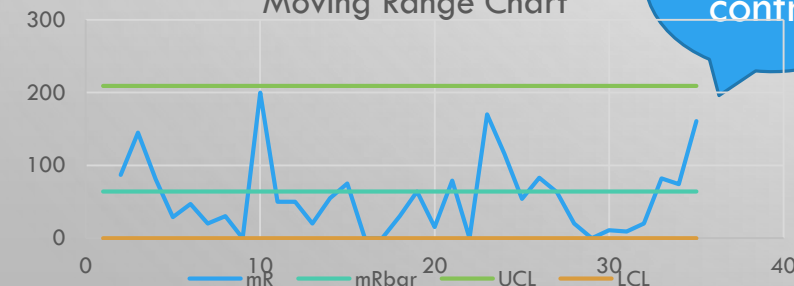Daily discretionary expense decreased by 67% after Improve phase

SQL 2.2 Improve

CONTROL

Individual Chart

In control

Moving Range Chart

CONCLUSION

- SQL for improve phase 2.2 Is changed from that of measure phase which is 1.8. THAT MEANS, There has been material change resulting from improvement initiatives.
  All of our input variables are MOST SIGNIFICANT VARIABLES INFLUENCING our output. All of them have a p-value of 0 in the measure phase.
  The goal was to decrease daily discretionary expense by 45%, but we are able to decrease it by about 67% which is much higher than our goal.

- We accepted the null hypothesis which is <u>H-O: Daily expense in measure phase is greater than or equal to daily expense in improve phase.</u>

- Next Step: ➡ Since our improvement initiatives worked so well, we should make sure to follow them to stay in control.

OVERVIEW

- MY HUSBAND AND I HAVE A LOT OF DAILY DISCRETIONARY EXPENSES THAT WE WANT TO AVOID AND/OR DECREASE.

- GOAL IS TO DECREASE DAILY EXPENSE BY AVOIDING AND/OR DECREASING (DAILY SOY LATTE, AMAZON PRIME PURCHASES, LUNCH AT WORK & DATE WITH FRIENDS)

- CURRENT DAILY EXPENSE BASELINE IS 90.086$ DAILY EXPENSE. THIS IS OUR Y THE VARIABLE WE ARE TRYING TO INFLUENCE.

- GOAL IS TO DECREASE DAILY EXPENSE BY 45% WHICH IS TO MAKE THE DAILY EXPENSE FROM 90.086$ TO ABOUT 41$

- CURRENT **SQL** BASELINE FOR MEASURE PHASE IS **1.8**. DPMO IS 400,000. THAT IS, EVERY DAY ABOVE 90.086$ IS CONSIDERED A DEFECT FOR THIS PURPOSE.

Baseline	
Daily average	90.086$
SQL	1.8
DPMO	400,000
Yield	62%

DESCRIPTIVE STATISTICS BASELINE

Measure	Value	Value Improve	Measure	Value	Value Improve
Max	343	100	Mean	90.086	30.57
Min	10	0	Median	60	30.5
Range	333	100	Mode	40	0

Measure	Value	Value Improve
Standard Deviation	72.89	34.9
Baseline SQL	1.8	2.6

DEFINE

Measured 5 weeks of data to establish baseline. That is, 35 data points, in addition, I measured 2 weeks of data for the improvements hypothesized in this project.

APPROACH

MEASURE

MEASUREMENT PLAN IS TO TRACK INPUT VARIABLES (X) THAT WILL BE UTILIZED IN ANALYZE PHASE TO UNDERSTAND WHAT ARE THE KEY DRIVERS OF Y(DAILY DISCRETIONARY EXPENSES). HYPOTHESIZED VARIABLES THAT WILL BE TRACKED INCLUDE

- SOY LATTE
- LUNCH AT WORK
- AMAZON PRIME PURCHASES
- DATE WITH FRIENDS

MEASURE: MEASUREMENT PLAN

Measure	Data Type	Source	How Collected	Who Will Collect	When Will It Be Collected
Soy Latte	Continuous	Receipt	Transcribed to Excel	Yodit	Daily at 9PM
Amazon Prime Purchases	Continuous	Receipt	Transcribed to Excel	Yodit	Daily at 9PM
Lunch at work	Continuous	Receipt	Transcribed to Excel	Yodit	Daily at 9PM
Date with friends	Continuous	Receipt	Transcribed to Excel	Yodit	Daily at 9PM

COMMENT ON SAMPLE SIZE

MEASURE

- DUE TO TIME CONSTRAINT I WAS ONLY ABLE TO COLLECT 65 SAMPLE OF DATA FOR THIS PROJECT, HOWEVER, IF THERE WASN'T TIME CONSTARINT, I WOULD NEED A SAMPLE SIZE OF AT LEAST 204 FOR 95% CONFIDENCE.

$$\propto = .05 \qquad \sigma = .07289 \quad E = .01$$
$$Confidence\ Level = .95\ (1 - \propto)$$

$$n = \left(z * \frac{\sigma}{E} \right) \hat{} 2$$

$$n = \left(1.96 * \frac{.07289}{.01} \right)^2$$

$$n \approx 204$$

HYPOTHESIS TESTING

CONDUCTED HYPOTHESIS TESTING FOLLOWING COMPLETION OF OUR IMPROVEMENT PHASE TO SEE WHETHER THE DECISION TO

1. MAKE SOY LATTE AT HOME

2. RESTRICT AMAZON PURCHASES TO ONLY ONCE A WEEK AND NOT FOR MORE THAN 100$

3. TO MAKE LUNCH AT HOME

4. TO RESTRICT DATE WITH FRIENDS TO BE ONLY ONCE IN 15 DAYS

INFLUENCE OUR OUTPUT (Y) AND DECREASE DAILY EXPENSE

WE FOUND THAT IN RUNNING THE TEST (ACCOUNTING FOR CONTINUOUS DATA, AND A LARGE SAMPLE SIZE) THAT WE HAD A VERY HIGH P-VALUE AND COULD NOT REJECT OUR HYPOTHESIS.

NULL HYPOTHESIS: THE AVERAGE DAILY EXPENSE IN MEASURE PHASE IS GREATER THAN OR EQUAL TO THE AVERAGE DAILY EXPENSE IN IMPROVE PHASE

ALTERNATIVE HYPOTHESIS: THE AVERAGE DAILY EXPENSE IN MEASURE PHASE IS LESS THAN OR EQUAL TO THE AVERAGE DAILY EXPENSE IN IMPROVE PHASE. I USED AN ALPHA OF .05 AND RECEIVED A 1- P-VALUE (UPPER RIGHT TAIL TEST) OF ABOUT .97, MEANING THAT I MUST ACCEPT THE NULL HYPOTHESIS AND ACCEPT THAT THE AVERAGE DAILY EXPENSE IN MEASURE PHASE IS GREATER THAN OR EQUAL TO THE AVERAGE DAILY EXPENSE IN IMPROVE PHASE .

Improve	
Mean	30.57142857
Standard Error	9.32779981
Median	30.5
Mode	0
Standard Deviation	34.90143106
Sample Variance	1218.10989
Kurtosis	0.434378368
Skewness	1.068689604
Range	100
Minimum	0
Maximum	100
Sum	428
Count	14

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HYPOTHESIS TESTING

P is very large in this instance so we would confidently accept our Null Hypothesis meaning that the average daily expense in measure phase is greater than or equal to the average daily expense in improve phase

H-O	The average daily expense in measure phase is greater than or equal to the average daily expense in improve phase				
H-A	The average daily expense in measure phase is less than or equal to the average daily expense in improve phase				
H-O	Mew 1 is greater than or equal to Mew 2				
H-A	Mew 1 is less than or equal to Mew 2				
alpha=	0.05				
	This is an upper/right tail test		Z=	0.05-2*12.2*2*35+34.9*2*14	
	n1+n2= 35+14= 49 large sample		0.05-	(854+977.2)	
	Mew 1= 90.086			0.05-1831.2	
	Mew 2= 30.214		Z=	-1831.15	
	S1=12.2		P=	0.0336	
	S2=34.9		1-P=	0.9664	
	n1=35			0.9664	
	n2=14				
	Z= x-1-2s12n1+s22n2				

CORRELATION

Analyzed Correlation for the measure phase (35 observations) between Soy latte, Amazon Prime Purchases, Lunch at work and Date with friends to possible relationships including strength and direction of those relationships.

ANALYZE

	Soy Latte	Amazon Prime Purchases	Lunch at Work	Date with Freinds	Total Daily Expense Amount
Amazon Prime Purchases	0.125922703	1			
Lunch at Work	-0.107588601	-0.395850407	1		
Date with Friends	0.068473397	0.606209281	-0.578803889	1	
Total Daily Expense Amount	0.131499982	0.981120447	-0.248949953	0.621580513	1

- THERE IS A STRONG CORRELATION BETWEEN AMAZON PRIME PURCHASES (X) AND TOTAL DAILY EXPENSE AMOUNT (Y)

- THERE IS ALSO CORRELATION BETWEEN DATE WITH FRIENDS, SOY LATTE AND TOTAL DAILY EXPENSE AMOUNT

- THIS MAY INDICATE THAT WE HAVE CONSIDERED THE CORRECT X (INPUTS) VARIABLES TO INFLUENCE OUR Y (OUTPUT)

REGRESSION ANALYSIS

Conducted a regression analysis for the measure phase (35 observations) that I run a correlation analysis on.

OVERALL MODEL HAD AN R OF 1 AND ADJUSTED R SQUARED OF 1 CORRESPONDING TO A STRONG MODEL.

ANALYZE

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	1
Standard Error	2.18611E-14
Observations	35

	Coefficients	Standard Error	t Stat	P-value
Intercept	3.01981E-14	2.38211E-14	1.267700643	0.21465631
Soy Latte	1	2.24255E-15	4.4592E+14	0
Amazon Prime	1	6.72493E-17	1.487E+16	0
Lunch at Work	1	2.70355E-16	3.69884E+15	0
Date with Freinds	1	4.34121E-16	2.30351E+15	0

- LOOKING AT P VALUES OF X VARIABLES NOTICE THAT ALL INPUT VARIABLES (SOY LATTE, AMAZON PRIME PURCHASES, LUNCH AT WORK AND DATE WITH FRIENDS) HAVE 0 P-VALUE WHICH IS VERY STRONG AND LESS THAN ALPHA OF 0.05.

- CONCLUDING FROM THIS MODEL THAT ALL OF OUR INPUT VARIABLES (X-VARIABLES): SOY LATTE, AMAZON PRIME PURCHASES, LUNCH AT WORK AND DATE WITH FRIENDS ARE MOST SIGNIFICANT VARIABLES IN INFLUENCING OUR OUTPUT.

CONCLUSION-ANALYZE PHASE

ANALYZE

- OVERALL CONCLUSION FROM HYPOTHESIS TESTING, CORRELATION AND REGRESSION ANALYSIS IS THAT OUR INPUT VARIABLES (X VARIABLES) INFLUENCE OUR OUTPUT (Y VARIABLE) SIGNIFICANTLY.

- THE AVERAGE DAILY EXPENSE IN MEASURE PHASE IS GREATER THAN THE AVERAGE DAILY EXPENSE IN IMPROVE PHASE WHICH MEANS WE HAVE MADE IMPROVEMENT.

- THE FOUR INITIATIVES THAT ARE IMPLEMENTED HELPED DECREASE DAILY EXPENSE AND SO WE SHOULD KEEP DOING THAT TO STAY IN CONTROL.

- OUR GOAL WAS TO DECREASE DAILY DISCRETIONARY EXPENSE BY 45%, BUT WE END UP DECREASING IT BY ABOUT 67%. IT WAS VERY SUCCESSFUL.

APPROACH FOR IMPROVE PHASE

IMPROVE

WE LOOKED AT OPPORTUNITIES TO DECREASE OUR DAILY EXPENSES AND OUTLINED THE FOLLOWING 4 INITIATIVES TO BE IMPLEMENTED IN OUR IMPROVE PHASE

    1. MAKE LATTE AT HOME, NO PURCHASE

    2. RESTRICT AMAZON PRIME PURCHASES TO ONLY ONCE A WEEK AND FOR NOT MORE THAN 100$

    3. MAKE LUNCH AT HOME AND NO DAILY LUNCH PURCHASE AT WORK.

    4. RESTRICT DATE WITH FRIENDS TO BE ONLY ONCE BIWEEKLY.

TRACKED MY DATES FOR THE DAYS THE FOUR INITIATIVES IMPLEMENTED 15 DAYS (IMPROVE PHASE). I THEN RUN A REGRESSION AND CORRELATION ANALYSIS TO SEE IF THEY INFLUENCED THE OUTPUT AND THAT OUR DAILY EXPENSE DECREASED BY 67% WHICH IS MUCH GREATER THAN OUR GOAL.

IMPROVE PHASE RESULTS

BOTH CORRELATION AND REGRESSION ANALYSIS INDICATED RELATIONSHIP BETWEEN THESE INITIATIVES AND OVERALL DAILY EXPENSES. AND SO THE INITIATIVES HELPED REDUCE DAILY EXPENSE SIGNIFICANTLY (BY 67%).

IMPROVE

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	1
Standard Error	9.8726E-15
Observations	14

	Coefficients	Standard Error	t Stat	P-value
Intercept	4.44089E-15	3.96408E-15	1.120283196	0.291596429
Soy latte	0	0	65535	#NUM!
Amazon Prime Purchases	1	8.02795E-17	1.24565E+16	#NUM!
Lunch at Work	1	1.61631E-16	6.18692E+15	3.8335E-139
Date with Freinds	1	2.23911E-16	4.46605E+15	7.2037E-138

|	Soy Latte	Amazon Prime Purchases	Lunch at Work	Date with Freinds	Total Daily Expense Amount
	1				
Amazon Prime Purchases	#DIV/0!	1			
Lunch at Work	#DIV/0!	-0.250135109	1		
Date with Freinds	#DIV/0!	-0.140391427	-0.210700949	1	
Total Daily Expense Amount	#DIV/0!	0.850501909	0.188520045	0.085314665	1

CONTROL PHASE

DPMO IN MEASURE PHASE WAS 400**K** FOR SQL OF 1.8. AND IN IMPROVE PHASE IT WAS **143K** FOR SQL OF 2.6.

 THERE HAS BEEN MATERIAL CHANGE FOR CORRESPONDING PERIODS OF TIME. THIS IS CONSISTENT WITH OUR FINDINGS THAT THE IMPROVE PHASE ACTIVITIES DID INFLUENCE OUR OUTPUT. WE WANT TO USE CONTROL CHARTS TO MEASURE VARIANCE OVER TIME AND ENSURE THAT WE CAN IDENTIFY ANY MATERIAL TREND
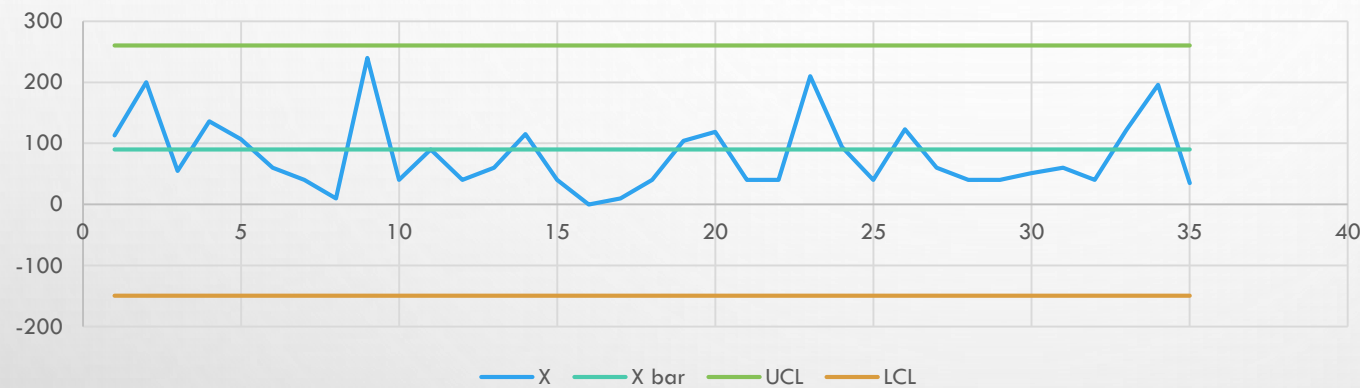
Individual Chart
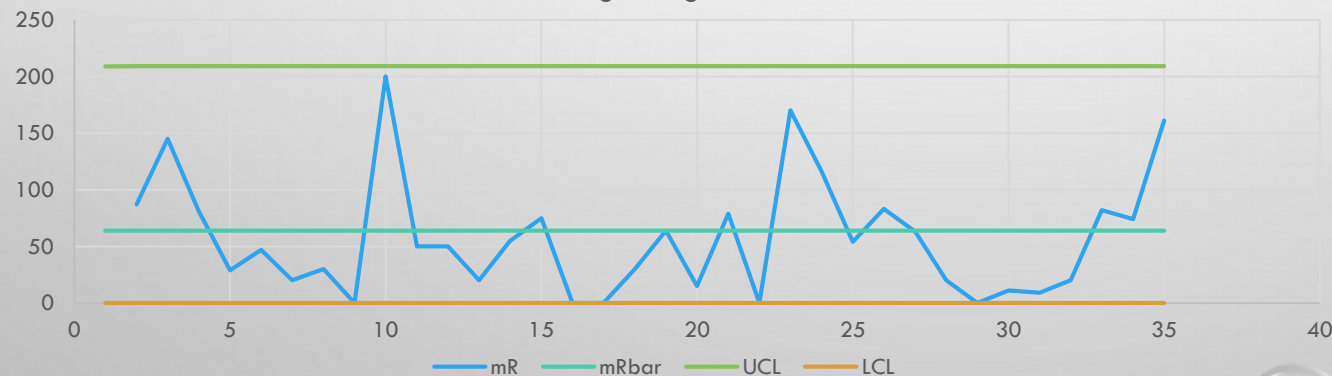
THE INDIVIDUAL AND MOVING RANGE CONTROL CHARTS REFLECTS DAILY DISCRETIONARY EXPENSE FOR ABOUT 35 DAYS AND BOTH OF THEM SHOW THE MOVEMENT IS INCONTROL.

Moving Range Chart

NEXT STEPS

The most significant finding of this project has been the 4 initiatives that have been taken at the improve phase for 15 days helped reduce daily expense significantly ($\approx$ by 67%)

1. Make Soy Latte at home

2. Amazon prime purchase restricted to be held only once a week and not spending more than 100$

3. Make lunch at home

4. Restrict date with friends to be held biweekly

- Make sure this change stays. Make the 4 initiatives a habit so that it will be done easily.

- Capture if there is any other x-variables that we may want to add to influence our y.