Analysis Report

This report is structured as follows.

Contents

Sample Characterization

The initial sample was composed by 314 respondents. From those, 179 reported to understand what a chatbot is and 178 had ever interacted with a chatbot to make a complaint. Those question were used as inclusion criteria for further analysis and therefore only 140 respondents formed the sample size of this study. The table below characterizes the final sample. Only 8 respondents were older than 28 years of age (not Gen Z). 54% of the sample was female and more than half of the sample had a bachelor's degree.

		Count	Column N %
How old are you?	Less than 13 Years Old	0	0.0%
	13 - 20	46	34.8%
	21 - 28	78	59.1%
	29 - 36	6	4.5%
	37 Years Old or Older	2	1.5%
What is your gender?	Male	56	42.4%
	Female	71	53.8%
	Non-binary / third gender	2	1.5%
	Other	2	1.5%
	Prefer not to say	1	0.8%
What is your highest undertaken education level?	Primary School or Equivalent	4	3.0%
	High School Diploma or Equivalent	29	22.0%
	Bachelor's Degree	71	53.8%
	Master's Degree	27	20.5%
	Other	1	0.8%

The table below shows the language statistics.

		Count	**Column N %**
What is the language you used when interacting with chatbots?		152	48.408
	.	1	.318
	adadsad	1	.318
	Ch/En	1	.318
	chinese	6	1.911
	Chinese	20	6.369
	Chinese & English	1	.318
	chinese and english	1	.318
	chinese and English	1	.318
	Chinese and English	1	.318
	Chinese English	1	.318

	Chinese or english	1	.318
	Chinese or English	1	.318
	CHINESE OR ENGLISH	1	.318
	Chinese, English, Japanese	1	.318
	Chinese/ English /French	1	.318
	Chinese/English	3	.955
	CN/EN	1	.318
	Depending on whether I'm communicating to retailers in my home country, if I'm abroad I usually just use English.	1	.318
	english	8	2.548
	English	70	22.293
	ENGLISH	2	.637
	English and Chinese	1	.318
	English and Chinese, which depends on the service provider	1	.318
	English and Spanish	1	.318
	English Chinese	2	.637
	English or Chinese	2	.637
	English/Chinese	1	.318
	French	1	.318
	I haven't interacted with chatbots	1	.318
	mandarin	1	.318
	Mandarin	2	.637
	mandrain and English	1	.318
	polish	1	.318
	Polish	1	.318
	Polish and English	1	.318
	Polish, English	3	.955
	polish/english	1	.318
	Polish/english	1	.318
	Polish/English	2	.637
	Spanish	2	.637
	Spanish and english	1	.318
	中文	7	2.229
	中文 英文	1	.318
	汉语	3	.955

Descriptive Statistics

The table below shows the proportion of responses for each categorical question of the survey.

A significant majority, 75.7% and 79.3% respectively, identify cost efficiency and 24/7 availability as key reasons for the increasing use of chatbots. This trend is consistent across all generations, with 100% of Generation Z respondents agreeing.

In terms of industry preference for voicing complaints via chatbots, healthcare (82.1%) and government services (84.3%) show the highest percentages, indicating a strong preference for using chatbots in these sectors.

When it comes to skipping chatbot interaction in favor of human representatives, 71.4% cite complex issues as the main reason, highlighting a preference for human assistance in more intricate scenarios.

The data suggests a high acceptance of chatbots for their efficiency and constant availability, especially in structured and routine inquiries. However, there is a clear preference for human interaction in complex situations, indicating the perceived limitations of chatbots in handling more nuanced or complicated issues.

				Generation Z			
		Count	%	No		Yes	
				Count	%	Count	%
What do you think is the reason behind the increasing use of chatbots by companies? (Multiple answers available) Cost efficiency	Others	34	24.3	0	0.0	31	25.0
	Cost efficiency	106	75.7	8	100.0	93	75.0
What do you think is the reason behind the increasing use of chatbots by companies? (Multiple answers available) 24/7 Availability	Others	29	20.7	0	0.0	27	21.8
	24/7 Availability	111	79.3	8	100.0	97	78.2
What do you think is the reason behind the increasing use of chatbots by companies? (Multiple answers available) Scalability of the Volume of Customers Served	Others	82	58.6	4	50.0	73	58.9
	Scalability of the Volume of Customers Served	58	41.4	4	50.0	51	41.1
What do you think is the reason behind the increasing use of chatbots by companies? (Multiple answers available) Data collection and Analysis	Others	84	60.0	2	25.0	75	60.5
	Data collection and Analysis	56	40.0	6	75.0	49	39.5
What do you think is the reason behind the increasing use of chatbots by companies? (Multiple answers available) Consumer Satisfaction	Others	114	81.4	6	75.0	101	81.5
	Consumer Satisfaction	26	18.6	2	25.0	23	18.5
Which of the following methods would you most likely use to make a complaint? (Multiple answers available) Online chat or chatbot	Others	53	37.9	4	50.0	45	36.3
	Online chat or chatbot	87	62.1	4	50.0	79	63.7
	Others	55	39.3	1	12.5	51	41.1

		Count	%	Generation Z			
				No		Yes	
				Count	%	Count	%
Which of the following methods would you most likely use to make a complaint? (Multiple answers available) Phone call	Phone call	85	60.7	7	87.5	73	58.9
Which of the following methods would you most likely use to make a complaint? (Multiple answers available) Email	Others	72	51.4	4	50.0	62	50.0
	Email	68	48.6	4	50.0	62	50.0
Which of the following methods would you most likely use to make a complaint? (Multiple answers available) In-person visit	Others	108	77.1	6	75.0	98	79.0
	In-person visit	32	22.9	2	25.0	26	21.0
Which of the following methods would you most likely use to make a complaint? (Multiple answers available) Other	Others	135	96.4	7	87.5	122	98.4
	Other	5	3.6	1	12.5	2	1.6
Under what circumstances would you choose to skip the chatbot interaction and directly contact a human representative for your complaint? (Multiple answers available) Complex Issues	Others	40	28.6	0	0.0	34	27.4
	Complex Issues	100	71.4	8	100.0	90	72.6
Under what circumstances would you choose to skip the chatbot interaction and directly contact a human representative for your complaint? (Multiple answers available) Urgency	Others	53	37.9	3	37.5	45	36.3
	Urgency	87	62.1	5	62.5	79	63.7
Under what circumstances would you choose to skip the chatbot interaction and directly contact a human representative for your complaint? (Multiple answers available) Sensitive or Personal Matters	Others	104	74.3	5	62.5	92	74.2
	Sensitive or Personal Matters	36	25.7	3	37.5	32	25.8
Under what circumstances would you choose to skip the chatbot interaction and directly contact a human representative for your complaint? (Multiple answers available) Previous Unsuccessful Attempts with Chatbot	Others	56	40.0	0	0.0	50	40.3
	Previous Unsuccessful Attempts with Chatbot	84	60.0	8	100.0	74	59.7
Under what circumstances would you choose to skip the chatbot interaction and directly contact a human representative for your complaint? (Multiple answers available) Preference for Human Interaction	Others	88	62.9	4	50.0	80	64.5
	Preference for Human Interaction	52	37.1	4	50.0	44	35.5
What advantages of chatbots do you see as the most valuable as a consumer? (Multiple answers available) 24/7 customer service	Others	35	25.0	1	12.5	31	25.0
	24/7 customer service	105	75.0	7	87.5	93	75.0
	Others	39	27.9	1	12.5	33	26.6

		Count	%	Generation Z			
				No		Yes	
				Count	%	Count	%
What advantages of chatbots do you see as the most valuable as a consumer? (Multiple answers available) Immediate Response	Immediate Response	101	72.1	7	87.5	91	73.4
What advantages of chatbots do you see as the most valuable as a consumer? (Multiple answers available) Efficiency in Handling Routine Inquiries	Others	82	58.6	2	25.0	75	60.5
	Efficiency in Handling Routine Inquiries	58	41.4	6	75.0	49	39.5
What advantages of chatbots do you see as the most valuable as a consumer? (Multiple answers available) Data Security and Privacy	Others	112	80.0	6	75.0	100	80.6
	Data Security and Privacy	28	20.0	2	25.0	24	19.4
What advantages of chatbots do you see as the most valuable as a consumer? (Multiple answers available) Multilingual Support	Others	113	80.7	5	62.5	101	81.5
	Multilingual Support	27	19.3	3	37.5	23	18.5
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Transportation (Airplane, Bus, Train)	Others	90	64.3	4	50.0	82	66.1
	Transportation (Airplane, Bus, Train)	50	35.7	4	50.0	42	33.9
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Telecommunications (Mobile Service Providers, Internet Providers, TV and Radio Providers)	Others	71	50.7	2	25.0	64	51.6
	Telecommunications (Mobile Service Providers, Internet Providers, TV and Radio Providers)	69	49.3	6	75.0	60	48.4
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Retail (Clothing Stores, Grocery Stores, Electronics Stores, Home Goods Stores)	Others	52	37.1	3	37.5	45	36.3
	Retail (Clothing Stores, Grocery Stores, Electronics Stores, Home Goods Stores)	88	62.9	5	62.5	79	63.7
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Healthcare (Hospitals, Clinics, Pharmacies)	Others	115	82.1	7	87.5	101	81.5
	Healthcare (Hospitals, Clinics, Pharmacies)	25	17.9	1	12.5	23	18.5
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Government Services (Public Safety, Social Services, Administrative)	Others	118	84.3	6	75.0	105	84.7
	Government Services (Public Safety, Social Services, Administrative)	22	15.7	2	25.0	19	15.3
In which industry of products or services did you rely on chatbots to voice a complaint? (Multiple answers available) Bank and Financial Services (Banks, Credit Unions, Investment Firms)	Others	94	67.1	5	62.5	82	66.1
	Bank and Financial Services (Banks, Credit Unions, Investment Firms)	46	32.9	3	37.5	42	33.9

In order to calculate a score for overall satisfaction with chatbots, the four items that represented this concept were subject to reliability analysis though Cronbach's Alpha. The reliability was good ($\alpha = 0.825$). The table below shows the mean and standard deviations of each item of the scale as well as of the overall calculated scale (average of all items).

Item Statistics				Alpha
	Mean	SD	N	
On a scale from 1 to 5, how satisfied were you with the level of assistance provided by the chatbot in addressing your complaint?	3.17	0.962	131	
On the scale of 1-5 how clear and relevant were the solutions to your complaint provided by the chatbot?	2.95	1.040	131	
On the scale of 1 to 5, how satisfied are you with the chatbot's ability to provide a personalized interaction during the complaint process?	3.01	0.981	131	
On a scale from 1 to 5, how well did the chatbot adapt its language to suit your particular inquiry?	3.26	1.027	131	
Satisfaction Composite Scale	3.087	0.814	131	0.825

The final scale was subject to Shapiro Wilk's test of normality. The test showed that the scale was normally distributed, $F = 0.981$, $p = 0.067$ and thus could be subject to parametric statistical tests.

Independent Samples T-tests

The tables below contain results from Independent Samples T-tests examining satisfaction with chatbots among different groups.

In the first analysis, satisfaction levels with chatbots were compared between Generation Z and other generations. Generation Z (N=124) reported a mean satisfaction score of 3.100 with a standard deviation of 0.806. The non-Generation Z group (N=8) had a slightly lower mean satisfaction score of 2.875, with a higher standard deviation of 0.964. The Independent Samples T-test showed a t-value of 0.759 with 130 degrees of freedom, resulting in a significance (2-tailed) of 0.449. The mean difference in satisfaction scores was 0.226 with a standard error difference of 0.297. These results indicate no significant difference in satisfaction with chatbots between Generation Z and other generations.

Group Statistics

	Generation Z	N	Mean	Std. Deviation	Std. Error Mean
Satisfaction with Chatbots	Yes	124	3.100	.806	.072
	No	8	2.875	.964	.340

Independent Samples Test

	t-test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Satisfaction with Chatbots	.759	130	.449	.226	.297

In a second analysis, satisfaction with chatbots was examined based on the preferred method of making a complaint. The group preferring online chat or chatbot (N=79) had a mean satisfaction score of 3.161 with a standard deviation of 0.807. The group preferring other methods (N=45) had a mean score of 2.994 with a standard deviation of 0.802. The t-test for equality of means showed a t-value of 1.110 with 122 degrees of freedom and a significance (2-tailed) of 0.269. The mean difference between the groups was 0.166 with a standard error difference of 0.150. These results suggest that there is no significant difference in satisfaction with chatbots between those who prefer using them for complaints and those who prefer other methods.

Group Statistics

	Which of the following methods would you most likely use to make a complaint?	N	Mean	Std. Deviation	Std. Error Mean
Satisfaction with Chatbots	Online chat or chatbot	79	3.161	.807	.091
	Others	45	2.994	.802	.119

Independent Samples Test

	t-test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Satisfaction with Chatbots	1.110	122	.269	.166	.150

Two-way ANOVAs

This section presents the results of two-way ANOVAs. These models tested main effects and interaction effects. In other words, they tested the following:

- Whether belonging to Generation Z has any effects on the satisfaction with the use of chatbots and other indicators.
- Whether using chatbots over other methods has any effects on the satisfaction with the use of chatbots and other indicators.
- Whether the influence of chatbot use on chatbot satisfaction (and other indicators) is different between Generation Z and others.

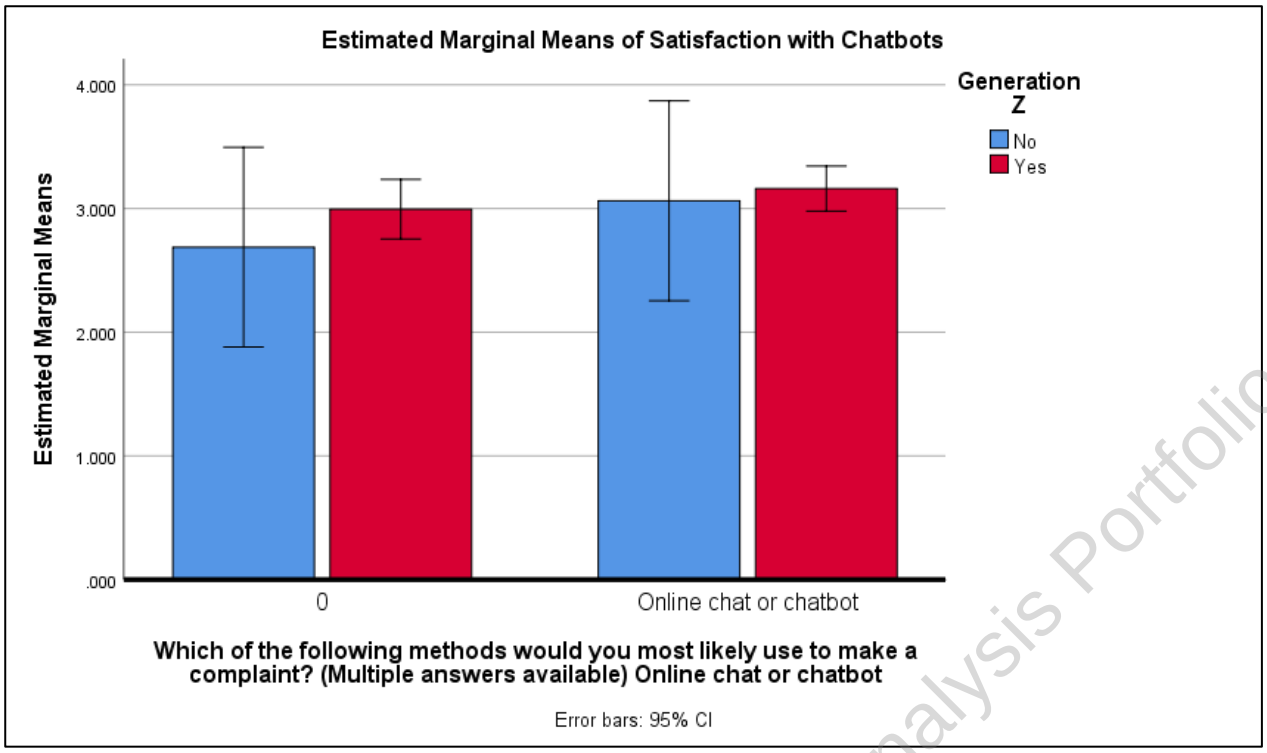
The first table (below) presents the results of the model for Overall Satisfaction. The results showed no significant main effect of Generation Z status (F=0.462, p=0.498) or the use of chatbots (F=0.824, p=0.366) on satisfaction levels. Additionally, the interaction between Generation Z status and chatbot usage did not significantly influence satisfaction (F=0.121, p=0.728). The model as a whole did not present a significant difference in satisfaction with chatbots across different groups.

Tests of Between-Subjects Effects

Dependent Variable: Satisfaction with Chatbots

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.463[a]	3	0.488	0.732	0.535
Intercept	265.011	1	265.011	397.743	0.000
Generation Z	0.308	1	0.308	0.462	0.498
Use of Chatbots	0.549	1	0.549	0.824	0.366
Generation Z * Use of Chatbots	0.081	1	0.081	0.121	0.728
Error	85.285	128	0.666		
Total	1344.750	132			
Corrected Total	86.748	131			

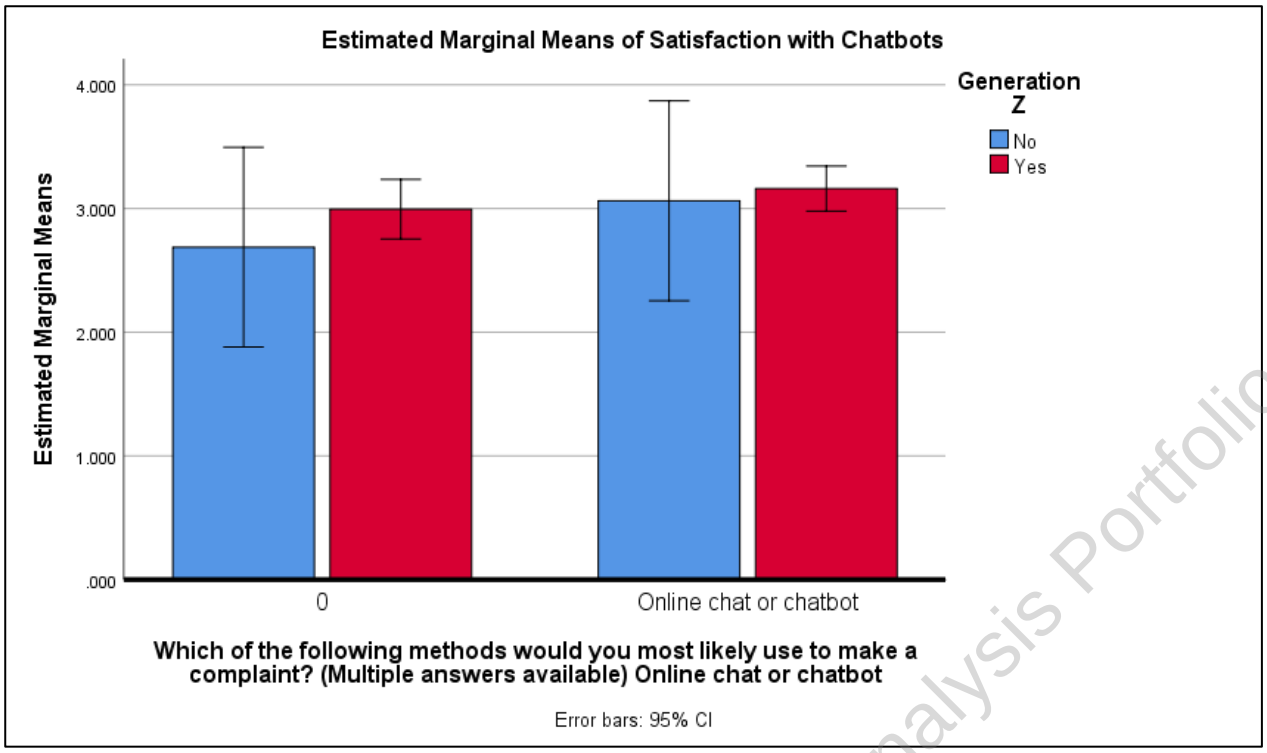
The graph below shows the mean scores for generations comparing those that use chatbot versus those that prefer other methods with 95% confidence levels.



The next analysis assessed how much effort individuals felt was needed to articulate their concerns to the chatbot. The analysis did not find significant differences based on Generation Z status or chatbot usage. Both the main effects and the interaction effect (Generation Z status * Use of Chatbots) were not significant, indicating that the perceived effort to communicate with chatbots is relatively uniform across different groups. This analysis, and the other to come, used robust standard errors to account for the non-normal nature of the dependent variables (ordinal variables).

Parameter Estimates with Robust Standard Errors

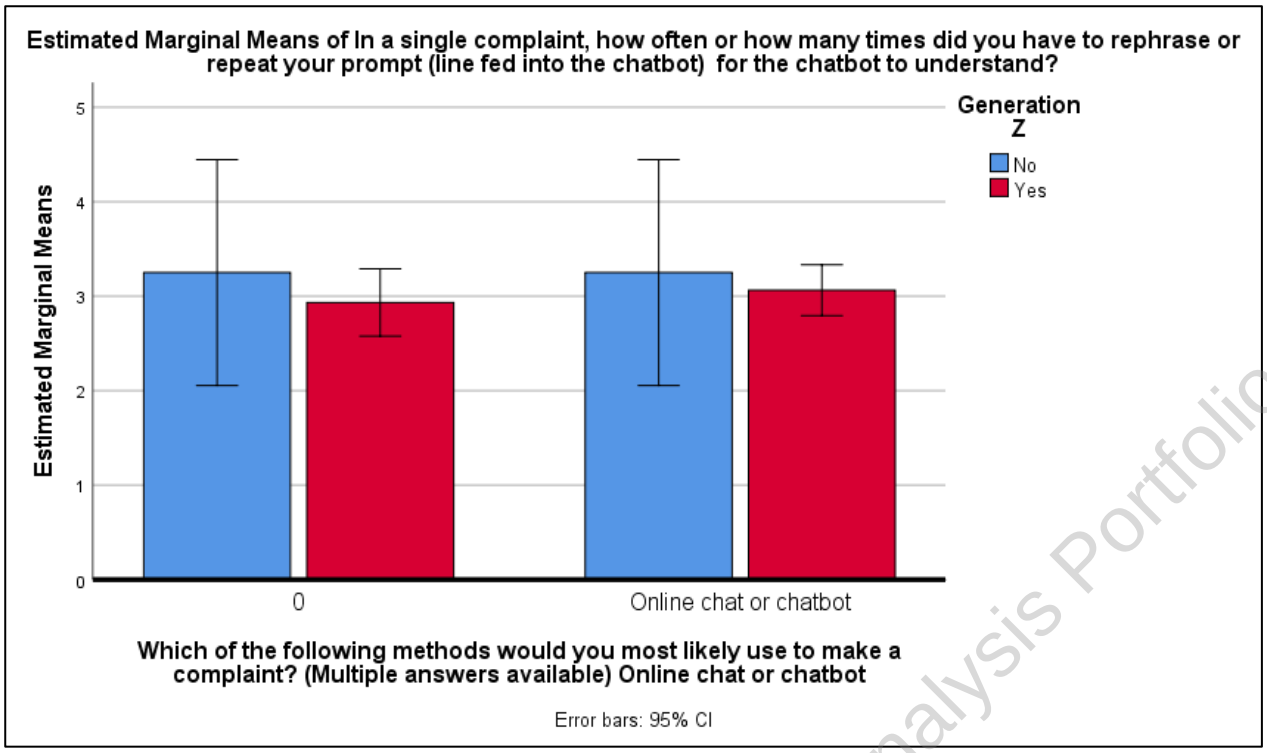
Dependent Variable:	On a scale from 1 to 5, how much effort did you feel was needed to articulate your concerns in a way that the chatbot could understand?				
Parameter	B	Robust Std. Error[a]	t	Sig.	Partial Eta Squared
Intercept	3.468	0.101	34.449	0.000	0.903
[Gen Z = No]	0.282	0.562	0.501	0.617	0.002
[Gen Z = Yes]	0[b]				
[Use of Chatbots = No]	0.154	0.164	0.937	0.351	0.007
[Use of Chatbots = Yes]	0[b]				
[Gen Z = No] * [Use of Chatbots = No]	-0.654	0.645	-1.014	0.313	0.008
[Gen Z = No] * [Use of Chatbots = Yes]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = No]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = Yes]	0[b]				



The focus of the next analysis was on the frequency of needing to rephrase or repeat prompts for the chatbot to understand. Similar to the previous tables, the results indicated no significant effects based on Generation Z status, use of chatbots, or their interaction. This suggests a consistent experience across different user groups in terms of how often they need to adjust their communication for the chatbot to comprehend (table below).

Parameter Estimates with Robust Standard Errors

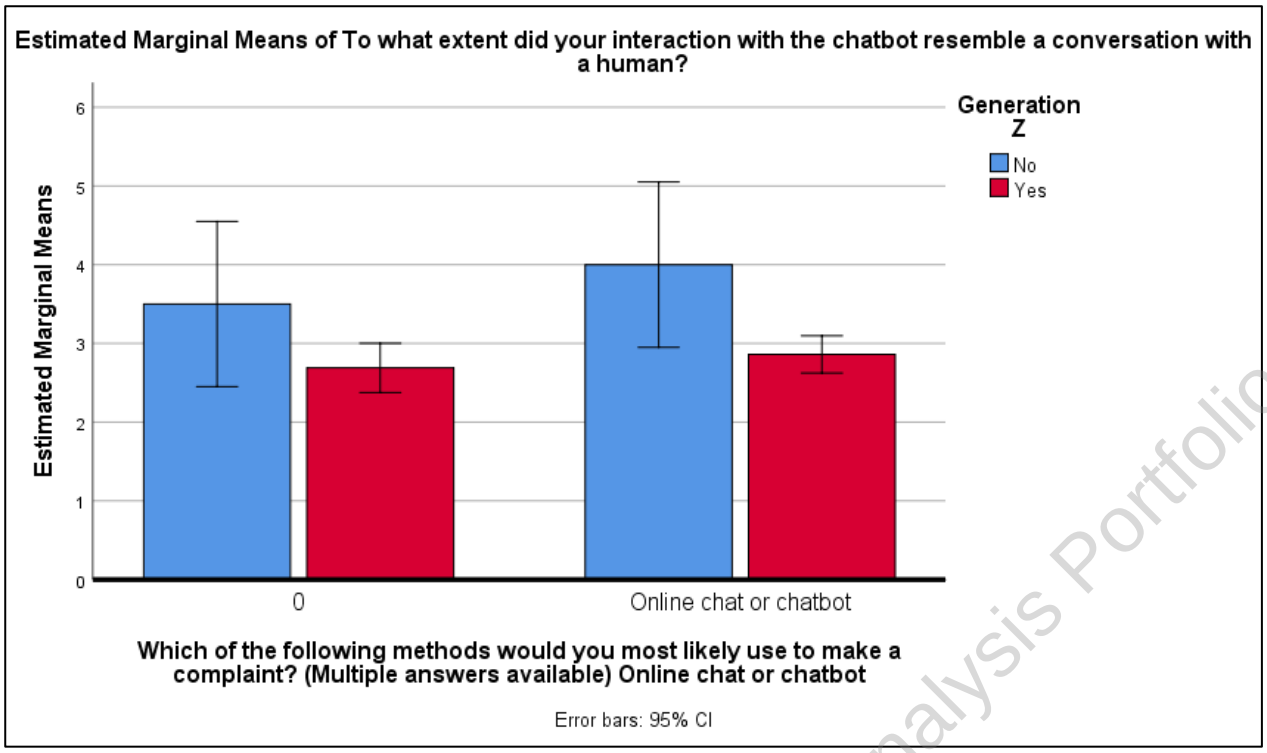
Dependent Variable:	In a single complaint, how often or how many times did you have to rephrase or repeat your prompt (line fed into the chatbot) for the chatbot to understand?				
Parameter	B	Robust Std. Error[a]	t	Sig.	Partial Eta Squared
Intercept	3.063	0.140	21.932	0.000	0.790
[Gen Z = No]	0.187	0.996	0.187	0.852	0.000
[Gen Z = Yes]	0[b]				
[Use of Chatbots = No]	-0.130	0.216	-0.601	0.549	0.003
[Use of Chatbots = Yes]	0[b]				
[Gen Z = No] * [Use of Chatbots = No]	0.130	1.330	0.098	0.922	0.000
[Gen Z = No] * [Use of Chatbots = Yes]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = No]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = Yes]	0[b]				



Next, the analysis examined the extent to which interactions with chatbots resembled conversations with humans. Interestingly, a significant effect was found for non-Generation Z individuals (B=1.139, p=0.021), suggesting they perceive a higher resemblance of chatbot interactions to human conversations compared to their Generation Z counterparts. However, the use of chatbots and the interaction between Generation Z status and chatbot usage were not significant.

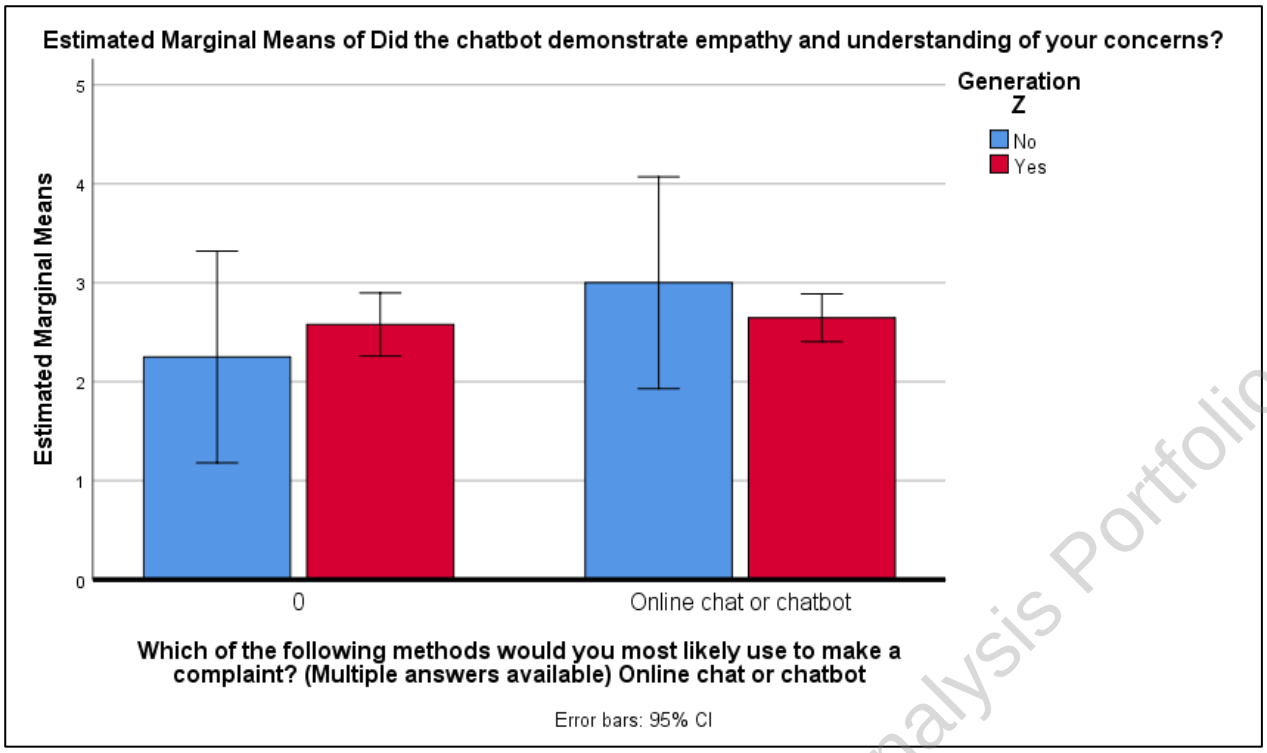
Parameter Estimates with Robust Standard Errors

Dependent Variable:	To what extent did your interaction with the chatbot resemble a conversation with a human?				
Parameter	B	Robust Std. Error[a]	t	Sig.	Partial Eta Squared
Intercept	2.861	0.127	22.602	0.000	0.800
[Gen Z = No]	1.139	0.488	2.334	0.021	0.041
[Gen Z = Yes]	0[b]				
[Use of Chatbots = No]	-0.172	0.194	-0.887	0.377	0.006
[Use of Chatbots = Yes]	0[b]				
[Gen Z = No] * [Use of Chatbots = No]	-0.328	0.770	-0.426	0.671	0.001
[Gen Z = No] * [Use of Chatbots = Yes]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = No]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = Yes]	0[b]				



The final table assessed the perception of empathy and understanding demonstrated by the chatbot. The results showed no significant differences based on Generation Z status, use of chatbots, or their interaction. This indicates a similar perception of chatbot empathy and understanding across different demographic and usage groups.

Dependent Variable:	Did the chatbot demonstrate empathy and understanding of your concerns?				
Parameter	B	Robust Std. Error[a]	t	Sig.	Partial Eta Squared
Intercept	2.646	0.126	21.053	0.000	0.776
[Gen Z = No]	0.354	0.951	0.373	0.710	0.001
[Gen Z = Yes]	0[b]				
[Use of Chatbots = No]	-0.068	0.192	-0.353	0.725	0.001
[Use of Chatbots = Yes]	0[b]				
[Gen Z = No] * [Use of Chatbots = No]	-0.682	1.206	-0.566	0.572	0.002
[Gen Z = No] * [Use of Chatbots = Yes]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = No]	0[b]				
[Gen Z = Yes] * [Use of Chatbots = Yes]	0[b]				



In summary, across these various aspects of chatbot interaction, the only significant finding was that non-Generation Z individuals perceive a higher resemblance of chatbot interactions to human conversations. Other factors, including the effort to communicate, the need to rephrase or repeat prompts, and the perception of empathy and understanding, did not significantly differ based on Generation Z status or the frequency of chatbot usage.

A regression model was attempted to find any extra significant result, without success.