



Key Attributes Influencing The Customer's Purchase Decision Of Electric Two Wheelers In Hyderabad

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Purpose

To empirically investigate how various attributes like financial attributes, technical attributes, infrastructure attributes influence the purchase decision of the customer to buy electric two wheelers.

Design/methodology/approach

The information reported in this study was gathered through a self-administered online survey of Hyderabad city customers. Data from 200 online customers in the Hyderabad city is evaluated.

Findings

The results of a survey sample analysis of 200 customers who unequivocally stated that financial attributes, technical attributes, infrastructure attributes positively influence their purchase decision to buy two wheelers.

Originality

The study contributes to investigate how various attributes like relative purchase price, Range, battery life, A daily distance, charging time, charging point network influence the customer's purchase decision of two wheelers.

Research limitation/Implications

The research has several limitations. First data were collected in Hyderabad city in the Telangana state of India. As a result, these findings may not be applicable to other areas of India. The authors want to apply the same study approach to other parts of the nations in order to investigate the similarities and differences between them. Second the sample size is confined to 200 of the respondents who preferred buy electric vehicles for domestic purpose. Third the study is restricted to urban area only. The author overlooked the semi-urban and rural areas.

Practical Implications

Based on the findings, manufacturers should guarantee that electric scooters/ bikes have high-quality performance in terms of expanding driving range and decreasing recharging time. Policymakers should create roadmaps for electric scooters/bikes, beginning with the transition from traditional scooters/bikes to electric scooters/bikes. Furthermore, creating public charging infrastructure, which is the essential foundation for running electric scooters/bikes, should be prioritised. Finally, producers should conduct research and development to create a product that will increase the reputation of commuters, because commuters with more face consciousness are more inclined to pursue brand-name and high-priced items in order to improve their reputation.

Social Implications

People purchase electric scooters/bikes for a variety of reasons, including the fact that they are a fun, compact, rapid, and inexpensive mode of transportation when compared to other vehicles. Another reason people buy is that it is a more ecologically responsible method to go around; the sensation of being eco-friendly while cruising around brings comfort. We all know that electric scooters/bikes are constantly advertised as an

environmentally benign mode of transportation. When compared to other forms of transportation, electric scooters/bikes are relatively ecologically friendly since their rechargeable battery does not contaminate the air throughout a trip, resulting in zero emissions.

Keyword: - Electric scooters/bikes, Customer purchase decision, financial attributes, technical attributes, infrastructure attributes, Eco friendly.

INTRODUCTION

Electric Vehicles (EVs) are becoming a possible conduit for improving air quality, energy security, and economic opportunity as the Indian automobile market expands rapidly. The Indian government understands the need of pursuing sustainable mobility solutions in order to minimise reliance on imported energy sources, reduce glasshouse gas emissions, and mitigate the negative effects of transportation, particularly global warming. Carbon dioxide emissions can be lowered by implementing preventative efforts to mitigate the catastrophic climate change that threatens the planet's biodiversity. Major efforts have been made to reduce the use of fossil fuels in power production, transportation propulsion, energy consumption, and carbon sequestration. EVs might be a viable option for reducing carbon dioxide emissions (R.T. Doucette, M.D. McCulloch, 2011).

The Indian economy is expected to recover in 2022 as commercial activity picks up, and the car sector is slated to start a new period of expansion, innovation, and investment. But the path to EV's future is fraught with difficulties. Although the Indian government is actively encouraging the use of electric vehicles, insufficient infrastructure, a shortage of high-performing EVs, and a high initial cost are preventing its widespread acceptance. Capital cost has always been a significant deciding factor in EV purchases, with 63% of buyers stating that an EV is out of their price range. Increased EV penetration is severely hampered by the dearth of suitable charging infrastructure in our nation. Compared to conventional gas stations, charging stations are more difficult to find. This is typically due to high investment costs and challenging infrastructure development. People can charge where they typically park, at home or at work, but this presents its own set of difficulties, including managing multi-tenant buildings, managing grid connections, and ensuring that charging slots are available. It is projected that there would be a nickel deficit, and scaling up lithium production would be difficult. This would generate a supply shortfall, which may lead to manufacturers using mineral inputs of inferior quality, deteriorating the battery's performance. Numerous possible market obstacles prevent the two-wheeler consumer sector from being more widely adopted by the EV industry, including an inadequate charging network. These challenges are projected to become even more prominent in the upcoming years due to the lack of a strong manufacturing ecosystem for the materials related to the EV revolution and the concentration of the supply chain in several areas.

In order to encourage manufacturers to produce components locally and create a structured policy framework, the government implemented several measures in line with the "Make in India" campaign. India is heavily dependent on China for its supply chains for lithium, which restricts the widespread adoption of EVs. A well-established EV infrastructure is likely to be developed across the nation as a result of recent policies, such as the battery swapping policy, which were introduced in an effort to support the transition to green energy generation and decentralisation of energy distribution. These policies also instil customer confidence in using EVs on Indian roads. The absence of charging infrastructure has been circumvented by the battery swapping approach for delivering power, although both methods are likely to coexist in the future. A conventional pedal-powered bike that may be powered by an internal combustion engine or a fuel cell to create a different sort of vehicle. The comparison of the conventional chain bike and the series hybrid cycle is the major objective of the study. The purpose of the study was to determine the powertrain of a series hybrid bike's efficiency needs. It was determined that a series hybrid bike could go as far as a conventional chain bike (Tournon et al., 2019).

Green goods have become much more prevalent as a result of growing environmental concerns at what seems like all societal levels. Since the beginning of the twentieth century, electric vehicles (EVs) have been created. Due to their expensive price, battery issues, and subpar performance, gasoline-powered vehicles gradually displaced them from the market (Bradley and Frank, 2009; Hoyer, 2008; Jorgensen, 2008). After years of battery technology advancement, EVs have become more affordable and appealing to motorists who are worried about environmental issues (Scown et al., 2013). EV demand has increased significantly, although in many countries, it still only makes up a small fraction of the overall new car market. More customers must switch to EVs if transportation energy use is to be significantly reduced. A series of financial incentives have been implemented by several nations to encourage consumer adoption (Peters et al., 2008). The primary drivers of environmentally conscious behaviour are human beliefs like environmental concern (Ellen et al.,

1991). We should investigate what factors influence consumers' willingness to pay more for EVs as they are unlikely to make concessions on traditional product qualities while purchasing green items. To fill this study vacuum, we specifically investigate how a confluence of economic and psychological factors influences customers' desire to pay, focusing on purchase intention. To assist businesses, enhance customers' green buy intentions for their goods, we would want to make a contribution to the area by putting out a framework for the adoption of electric vehicles (EVs) and other green technologies (Perkowski, 2017).

PURPOSE OF THE STUDY

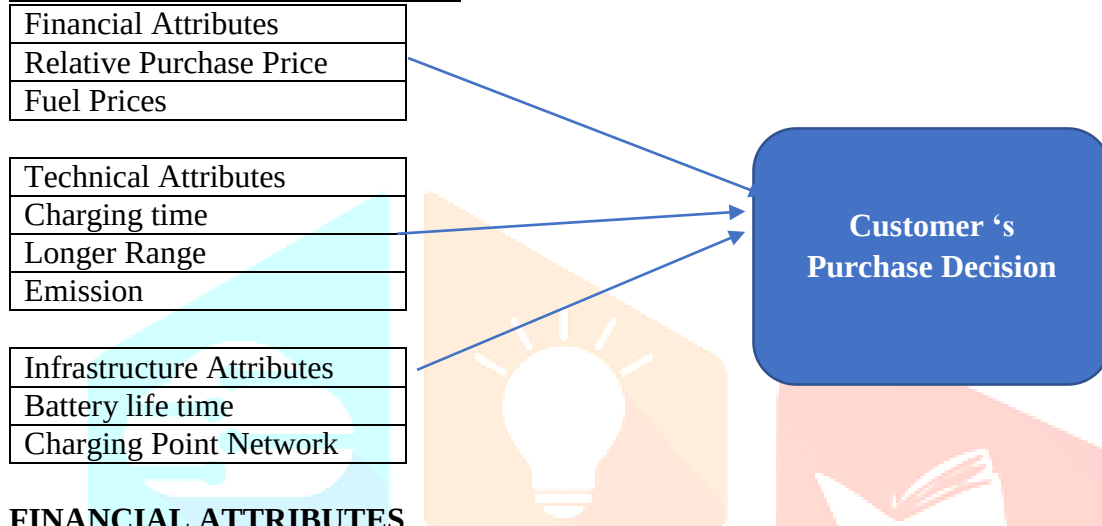
To empirically investigate how various attributes like financial attributes, technical attributes, infrastructure attributes influence the purchase decision of the customer to buy electric two wheelers.

LITERATURE REVIEW

Figure -1: Theoretical Framework of the Study

Key Attributes Influencing the Customer's Purchase

Decision of Electric Two Wheelers



FINANCIAL ATTRIBUTES

Customers are more likely to choose for conventional goods if they believe the price of an environmentally friendly product is excessively expensive (Joergens, 2006). Purchase price remains the crucial factor, country-specific socio-economic characteristics of consumers influence their intention to purchase an electric car in Europe. The incentives, in particular government financial interventions, are likely to be critical in accelerating widespread uptake of ZEVs, as electric car prices are still perceived by European consumers to be too high (Jonatan J. Gómez Vilchez et al., 2019). One of the main obstacles preventing customers from acquiring green products is the higher price of green goods. However, as long as customers are prepared to pay the higher prices, the price itself does not significantly influence whether or not they choose to purchase green items (Tanner and Wolfig Kast, 2003). However, there are other factors that influence demand for alternative-fuel cars in addition to fuel supply and cost (Achtnicht et al., 2012). In terms of the influence of the reference buy, we discovered that the automobile class has a direct effect on the alternative chosen as well as the importance of the purchase price in the decision. EV preference is stronger in smaller car classes than in bigger car classes, as predicted. Aside from that, we discovered that respondents who picked a smaller automobile class had greater marginal utility of purchase price than those who chose a bigger car class. Because the purchase price rises throughout automobile classes, the influence on marginal utility might indicate an income effect (Jensen et al., 2013). All of the studies that have been reviewed include the purchase price. For this feature, several studies employed a pivoted design: price levels are customised and pivoted on the price of a reference car specified by each respondent. In all research, the purchase price was found to have a negative and extremely significant relationship on EV utility. With a few exceptions, most research investigate this as a linear connection.

H1: The relative purchase prices have significant influence on customer's purchase decision of electric two wheelers.

H2: The rise of fuel charges has significant influence on customer's purchase decision of electric two wheelers.

TECHNICAL ATTRIBUTES

The greater a consumer's impression of the price of electric vehicles and the longer charging periods, the less eager a consumer is to purchase a new electric car (Junquera et al., 2016). A latent class random utility model was generated and the results were used to assess the willingness to pay for five electric vehicle attributes: driving range, charging time, fuel cost savings, pollution reduction, and performance. Respondents prioritised driving range, fuel cost reductions, and charging time. People were willing to pay (wtp) between \$35 and \$75 for a mile of additional driving range, with incremental willing to pay (wtp) per mile dropping as distance increased. They were ready to pay between \$425 and \$3250 per hour in reduced charging time (for a 50mile charge). Respondents included in around 5 years of fuel savings when calculating the purchase price of an electric vehicle. We tested our model across a variety of electric car configurations and discovered that persons with the greatest values for electric vehicles were ready to pay a

premium above their willing to pay (wtp) for a gasoline vehicle ranging from \$6000 to \$16,000 for the most desirable electric automobiles. At the same time, our findings indicate that battery costs must fall dramatically before electric vehicles can enter the general market without government subsidies (Hidrué et al., 2011). Based on discrete choice data from Germany, we studied consumer preferences for electric vehicles by estimating choice models, defining consumer profiles, and assessing preference trends. Our study is based on a sample of persons who took part in a discrete choice experiment, with one in every four respondents having previously driven a BEV car. Overall, despite supply-side hurdles like as specific car features that may be improved and an inadequate charging infrastructure, German buyers are persuaded by new BEV technology after testing it. Similar behaviour is predicted in other European nations at this stage (Darup, A. et al., 2018). Although BEV emissions are absent when driving, several studies still establish various amounts of CO2 emission for EV in the choice experiment, reflecting power generation emissions. Choice tests using either absolute CO2 emissions per kilometre or percentage compared to a gasoline car discovered that for environmentally conscious persons, the same amount of emission results in more disutility (Hackbarth, A., & Madlener, R., 2013).

H3: Faster battery charging time, the more likely the customer is to purchase an electric two wheelers.

H4 Longer range of the vehicle, the more likely the customer is to purchase an electric two wheelers.

H5 Zero emission of the vehicle, the more likely the customer is to purchase an electric two wheelers.

INFRASTRUCTURAL ATTRIBUTES

Infrastructure qualities are concerned with the charging infrastructure's availability. There is still no agreement on how it should be implemented: some studies show the density of charging stations relative to gas stations; others use the distance from home to the nearest charging station, while others present the presence of a charging station in various locations: at home, at work, or in shopping malls (Rasouli and Timmermans, 2013). Most studies show a considerable beneficial effect, probably because additional charging stations save customers time and money while also easing range anxiety. The impact was discovered to be non-linear, with declining marginal usefulness. Several groups choose charging stations in certain activity areas (Achtnicht et al., 2012). Long-distance commuters appreciate charging facilities in the workplace substantially more than others, and desire a larger density of charging stations (Jensen et al., 2013). Nevertheless, distinguish slow charging posts from rapid charging stations, as these two serve different objectives, as mentioned above. Slow charging stations are generally found at businesses or shopping malls where parking is available for extended periods of time, whereas rapid charging stations are mostly found on highways (even in cities, but only for emergencies) to enable longer EV travels. Most crucially, unlike CV, which requires frequent gas station trips for refuelling, EV lets customers to rely on home charging as long as their daily journey is within the EV's range (Tamor, Moraal, Reprogle, & Milacic, 2015).

H6 The higher the battery life more likely the consumer is to purchase an electric two wheelers

H7 The more convenient the charging station network is, the more likely the consumer is to purchase an electric two wheelers.

METHODOLOGY

Using the discrete choice model technique, the research was based on a quantitative analysis that intended to examine the assumptions that support the conceptual model of this study. Customers have preferences for various automobiles based on the subjective utility that they assign to certain vehicle qualities. The empirical study attempted to examine the statistical validity of the preceding hypotheses, establishing if the connections between the variables, based on primary data acquired from a sample, are based on preference statements. Structural Equation Modelling approaches were utilised for this objective. The results were acquired using

the IBM Amos 28 software. Data were gathered using a web-based survey aimed at adults over the age of 18 who live in Hyderabad city, are potential automobile purchasers, and can complete an online questionnaire. The questionnaire was developed using the theoretical framework outlined above and available literature, and a pretest was administered to a sample of 18 respondents. The questionnaire is divided into four sections 1) financial attributes 2) technical attributes 3) infrastructural attributes 4) Customer's Purchase Decision

RESULT AND DISCUSSION

Cronbach Alpha

The statistical analysis for the present study was carried out in SPSS software and the results are displayed in the section. Initially, the reliability test for the collected dataset is carried out and it is shown in table 1. The Cronbach's alpha test for the 17 items used for the data collection is tested and the score was 0.942 which mean the collected set was good enough to proceed with the analysis.

Table-1

Variables	Numbers of Items	Cronbach Alpha
Price	2	0.674
Fuel Prices	2	0.764
Charging Time	2	0.832
Range	3	0.773
Emission	2	0.820
Charging Points	2	0.784
Purchase Decision	2	0.911

The frequency distribution for the study population is created and listed in table 2 after the reliability test. The study population is based in Hyderabad, Telangana, as it was noted during the data collecting. The given data provides information about a sample of 200 individuals in terms of their gender, education, age, and occupation.

Gender: Males account for 50.5 percent of the population, while females account for 49.5%.

Education: Much of the sample (65.3%) has completed post-graduate education, while 33.7% have completed undergraduate education. Only a very small percentage (1.0%) falls under the "Others" category, and none of the individuals in the sample hold a CA, ICWA, CS, or PhD degree.

Age: The largest age group in the sample is individuals between 21 and 30 years old (89.5%), while the other age groups make up smaller percentages. No individuals in the sample are over 50 years old.

Occupation: Most of the sample (51.6%) consists of students, while 47.4% are employed in private jobs. Only a small percentage (1.0%) are professionals, and none are employed in government jobs.

Overall, the sample seems to consist mostly of young, educated individuals, with a fairly even split between males and females. The majority of individuals are students or employed in private jobs, with only a small percentage in professional roles.

Table-2

Gender	Frequency	Percentage
Female	99	49.5%
Male	101	50.5%
Total	200	100%
Education		
Under graduate	67.4	33.7%
Post Graduate	130.6	65.3%
CA, ICWA, CS, PhD	0	0.0%
Others	2	1.0%
Total	200	100%
Age		
Less than 20 Years	10.6	5.3%
21 to 30 Years	179	89.5%
31 to 40 Years	6.4	3.2%
41 to 50 Years	4	2%

51 to 60 Years	0	0.0%
Total	200	100.0%
Occupation		
Private Job	94.8	47.4%
Govt Job	0	0.0%
Professional (Doctor, Consultant, Entrepreneur)	2	1.0%
Student	103.2	51.6%
Total	200	100.0%

Table -3

ANOVA							
		Sum of Squares	Df	Mean Square	F	Sig.	
H1: Relative Purchase Price à Purchase Decision	Between Groups	82.513	8	10.314	9.654	0.00	
	Within Groups	202.994	190	1.068			
	Total	285.507	198				
H2: Fuel Price à Purchase Decision	Between Groups	121.088	8	15.136	17.491	0.00	
	Within Groups	164.419	190	0.856			
	Total	285.507	198				
H3: Charging time à Purchase Decision	Between Groups	122.131	8	15.266	17.754	0.00	
	Within Groups	163.377	190	0.86			
	Total	285.508	198				
H4: Driving Range à Purchase Decision	Between Groups	95.631	12	7.969	7.807	0.00	
	Within Groups	189.877	186	1.021			
	Total	285.508	198				
H5: Emission à Purchase Decision	Between Groups	98.365	8	12.296	12.483	0.00	
	Within Groups	187.143	190	0.985			
	Total	285.508	198				
H6: Battery Life time à Purchase Decision	Between Groups	487	8	16.951	21.487	0.00	
	Within Groups	149.896	190	0.789			
	Total	636.896	198				
H7: Charging Point Network à Purchase Decision	Between Groups	114.107	8	14.263	15.811	0.00	
	Within Groups	171.400	190	0.902			
	Total	285.507	198				

The ANOVA table shows the results of a one-way analysis of variance (ANOVA) for the Hypothesis -1 the effect of different price levels on Purchase Decision. The F-value of 9.654 is calculated by dividing the between-groups mean square (10.314) by the within-groups mean square (1.068). This F-value indicates that the variability in Purchase Decision due to Relative Purchase Price is larger than the variability due to chance. The significance level (Sig.) of .000 indicates that the probability of obtaining such a large F-value by chance is very small (less than 0.05), which suggests that the effect of Relative Purchase Price on Purchase Decision is statistically significant.

The results of a one-way analysis of variance (ANOVA) for the Hypothesis-2 effect of Fuel Price on the Purchase Decision of a product. The F-value of 17.491 is calculated by dividing the between-groups mean square (15.136) by the within-groups mean square (0.865). This F-value indicates that the variability in Purchase Decision due to Fuel Price is larger than the variability due to chance. The significance level (Sig.) of .000 indicates that the probability of obtaining such a large F-value by chance is very small (less than 0.05), which suggests that the effect of Fuel Price on Purchase Decision is statistically significant.

The results of a one-way analysis of variance (ANOVA) for the Hypothesis-3 effect of charging time on the Purchase Decision of a product. The F-statistic is 17.754, which is the ratio of the between-groups mean square (15.266) to the within-groups mean square (0.86). This F-statistic indicates that there is a statistically significant difference in purchase decision based on charging time. The p-value (or "Sig.") is reported as .000, which means that the result is statistically significant at the .005 level. Therefore, we can conclude that there is strong evidence to suggest that charging time has a significant effect on purchase decision.

The results of a one-way ANOVA test conducted for the hypothesis-4 to assess whether there are any significant differences in the mean Purchase Decision scores across longer ranges. The mean square is 7.969, which is the sum of squares between groups divided by the degrees of freedom for between groups. The F-value associated with this mean square is 7.807. This F-value indicates that the observed differences between the means of the groups are statistically significant. The significance level (i.e., the p-value) associated with this F-value is .000, which is less than the conventional threshold of .05. Therefore, the differences in mean Purchase Decision scores across different Longer Ranges are statistically significant.

The results of a One-Way Analysis of Variance (ANOVA) for the hypothesis-5 that aims to examine whether there is a statistically significant difference in the average purchase decision of a product based on different levels of emission. The "Mean Square" is 12.296, which is the sum of squares divided by the degrees of freedom. The "F" value is 12.483, which is the ratio of the between-groups mean square to the within-groups mean square. The "Sig." (significance) value is .000, which indicates that there is a significant difference in Purchase Decision based on the differences in Emission between the groups.

The ANOVA table summarizes the results of hypothesis-6 represents the results of a relationship between Purchase Decision and Battery Life. The Mean Square (MS) is 16.951, which is the Sum of Squares divided by the degrees of freedom. The F-statistic is 21.487 and the significance level (p-value) is .000, which indicates that the differences in Purchase Decision between the groups are statistically significant.

The results of a One-Way Analysis of Variance (ANOVA) for the hypothesis -7 conducted to determine if there is a significant difference in the mean purchase decision of a product based on different levels of charging points network. The F-value (15.811) and significance value (.000) in the table indicate that the observed difference in the means of purchase decision across different levels of charging points network is statistically significant.

DISCUSSION

The above interpretations describe the results of several one-way ANOVA tests conducted to investigate the effect of different variables on Purchase Decision. The ANOVA tables show the between-groups and within-groups sum of squares, degrees of freedom, mean squares, F-values, and significance levels (p-values) for each hypothesis.

For Hypothesis-1, the results suggest that the effect of Relative Purchase Price on Purchase Decision is statistically significant. Similarly, for Hypothesis-2, the effect of Fuel Price on Purchase Decision is also statistically significant. For Hypothesis-3, the results indicate that charging time has a significant effect on Purchase Decision. The findings for Hypothesis-4 suggest that differences in mean Purchase Decision scores across different Longer Ranges are statistically significant. For Hypothesis-5, the results indicate a significant difference in Purchase Decision based on differences in Emission between the groups. For Hypothesis-6, the results suggest that Battery Life has a statistically significant effect on Purchase Decision. Finally, the results of Hypothesis-7 indicate a statistically significant difference in mean Purchase Decision scores across different levels of charging points network.

Overall, the findings suggest that various factors, such as relative purchase price, fuel price, charging time, range, emission, battery life, and charging points network, significantly influence Purchase Decision. These results can be useful for marketers and product developers to understand the factors that affect consumer decision-making and make informed decisions about pricing, marketing, and product features. However, it is essential to note that these results are based on a specific sample and context and may not be generalizable to other populations or contexts. Therefore, further research is necessary to confirm the findings and generalize them to other settings.

CONCLUSION:

In conclusion, the findings from the ANOVA tables suggest that various factors significantly influence Purchase Decision. These factors include relative purchase price, fuel price, charging time, range, emission, battery life, and charging points network. The results can be beneficial for marketers and product developers to understand consumer behavior and make informed decisions regarding pricing, marketing, and product features.

LIMITATION OF THE STUDY

One limitation of this study is that the data were collected using a web-based survey, which may introduce response bias and limit the representativeness of the sample. The sample was also limited to adults over the age of 18 living in Hyderabad city, which may not be representative of other populations or contexts. Additionally, the study relied on self-reported data, which may be subject to response bias and social desirability bias. Another limitation is that the study did not consider other factors that may influence purchase decisions, such as brand reputation, safety features, and aesthetics. Moreover, the study did not examine the interaction effects between the variables, which may provide a more comprehensive understanding of the factors that influence purchase decisions.

Finally, the study focused only on electric vehicles and did not consider other types of vehicles, such as hybrid or gasoline-powered cars, which may influence consumer preferences and decision-making differently. Overall, these limitations suggest that caution should be exercised when generalizing the results of this study to other populations or contexts.

SCOPE OF FUTURE RESEARCH

However, further research is necessary to confirm these findings and generalize them to other settings. Future studies can replicate the current research in different contexts and with different samples to examine whether similar results are obtained. Additionally, future studies can investigate other factors that may influence Purchase Decision, such as brand image, quality, and product design. Furthermore, studies can examine the interplay between different factors and their combined effect on Purchase Decision. Overall, this research can contribute to a more comprehensive understanding of consumer behavior and aid businesses in making more informed decisions regarding their products and marketing strategies.

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