

Two-Wheeler Purchase Decision: An AHP Approach

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Abstract

The study aims to examine the features which belongs to the main criteria such as financials, features of vehicle, promotion and maintenance. Also, the sub criteria are examined for the Two-Wheeler with each of them having three sub criteria and promotion having four sub criteria. During the study five companies Honda, Suzuki, Hero, Yamaha and TVS Motors were selected based on the price range and engine in cubic centimetres (CC). This depends upon the psychology of the individual for making a purchase decision

The analysis was carried by Analytical Hierarchical Process (AHP). The AHP model revealed the most important choice criteria used by customers for selecting the two-wheeler post pandemic. It was found that Hero Honda receives the better ranking followed by Yamaha in two-wheeler market. This study will help the two-wheeler marketer in planning their promotion appropriately to target the buyers and also design their virtual marketing plan for customers.

The study is conducted only for customers from some regions Delhi and Haryana, India. Besides this, the study does not examine the long run implications of the change in the customer behaviour and how it may change if things go back to normalcy again. The future scope of research is the study may be conducted on customers from other regions of the country.

Keywords: AHP Methodology, Decision techniques, Two-wheeler purchase.

1. INTRODUCTION

COVID 19 pandemic has impacted every industry across the globe. The automobile industry in India which was anyway showing a downward trend before COVID was no different. However, choosing personal mobility over public transport because of the pandemic was ray of hope for the automobile sector. The psychology of purchasing the two wheelers is based on many factors. There are four factors that influences consumer behaviour. These factors are cultural, social, personal and psychological. The popularity of the product and its sales value depicts the cultural and social. Aging reflects the personal factor. Also, personality, lifestyle, and class (economic)

influence behaviour. The Class depicts background, education level, health and occupation etc. As per experts, two wheelers would remain a preferred choice over car for people migrating from public transport as they would find it more financially viable as they may also be experiencing wage cut at workplace. The personal mobility decision will also lead to growth in sale of pre-owned or second hand two wheelers. Therefore, the important question that arises is what would be the choice criteria adopted by the buyers while selecting a two-wheeler and is that different than the pre COVID times (Yuvaraju and Rao, 2014). Through this paper researchers are trying to address these two questions.

Another important change seen during pandemic was the pre-purchase behaviour of the customer from visiting the dealer to online research on the vehicle to be purchased. This change in behaviour gave an opportunity to the companies to showcase their product and its features optimally in the virtual manner. Thus, making it even more critical to understand what does the customer looks for while making the selection of a two-wheeler.

The paper begins with in-depth literature review on the two-wheeler market in India pre and post pandemic. This is followed by discussion on impact of COVID on purchase behaviour of Indian Customers. Further paper focuses on the choice criteria adopted for purchase of two-wheeler. This study uses Analytical hierarchical Process (AHP) to find out consumers preferences towards two-wheeler selection using the following criteria: Features, Financials, Promotion and Maintenance. The key objective of the paper is to find the best alternative for the customers during COVID-19 pandemic using the given criteria (iAdvize, 2020). The paper will offer an understanding to the two-wheeler company on promotion offers to run, vehicle features to be highlighted in the campaigns and post purchase services that can attract the customers.

2. Literature review

2.1. Impact of COVID on two wheeler market in India

According to data given by Society of Indian Automobile Manufacturers (SIAM) month of October 2020 was a slightly recovering month for the Indian two-wheeler segment. October 2020 saw a increase in two-wheelers sale up to 16.88% where 20, 53,814 units were sold as against 17, 57,180 units in the Oct, 2019. Also, the two wheeler production increased to 40.14% to 24, 18,028 units in October 2020 from 17, 25,462 units in same moth as last year, reflecting in an increased demand due to personal mobility forced by the pandemic. This demand was expected to grow further due to the festive season extending to mid-November. The urban markets were struggling with an

increased number of COVID-19 cases, but the less impacted rural and semi-urban markets have comparatively enabled a stable growth in sales. In months before the festive season (august-September2020), the industry noted 22% and 19% sequential growth and a Year-on-Year 3% and 12% increase in wholesale volumes, respectively.

Major Players such as Royal Enfield, Bajaj Auto, Yamaha TVS, and Suzuki saw a borderline difference in their market share as compared to last year. The leader of the segment Hero MotoCorp-the world's major two-wheeler manufacturer reinforced its position and increased its market share to 40.4% in FY20-21 in comparison with 36.6% a year ago. Whereas, the Japanese auto manufacturer Honda Motorcycle and Scooter India (HMSI) saw a dip in its India share by 3% to 25.9% so far in this period (Jani and Pandya, 2012).

In general the share of the home-grown two-wheeler manufacturers has risen to 67.4% in this financial year so far against 64% last year.

2.2. Purchase criteria adopted for two-wheeler selection pre COVID

The most important criteria while selecting any consumer durable is financial aspect. Due to the pandemic many companies have lay off or reduced the salary of their employees. Keeping this in view customers have become even more value conscious than before. During the pandemic times the companies and dealers have given many attractive offers to encourage the purchase of vehicles. Also many banks have reduced interest rates on vehicle loan to help boost sales of two wheelers. Therefore it is also important to understand what promotion offer does a customer looks while making a purchase.

The features of the vehicle are an inevitable part of choice criteria. The customer compares the features of the vehicle to assess the value of his/her purchase decision. Upkeep of the vehicle post purchase is also considered as an important criterion while making purchase decision therefore maintenance is also used as an important choice factor. Further to the

primary choice criteria-Financials, Features, Promotion and Maintenance secondary literature was used to identify the secondary criteria for selection of vehicle. The AHP Model was developed using the criteria's identified in primary as well as secondary data analysis. Since the study focuses on 125 cc automatic two-wheeler segment in the price

range of 70K to 80K five brands offering this choice were Honda, Suzuki, Hero, Yamaha and TVS.

The various researchers discussed the use of various the research papers use the various features in two-wheeler and four wheelers' vehicles. The details of the factors are discussed in the Table-1

Table-1 *Four Factors for Vehicle purchase*

Description	Features discussed	References
Laid down the criteria to select the best vehicle	cost, fuel economy, the exterior and interior were discussed	(Byun, 2001).
Examined different criteria used while purchasing a two wheeler	Operational, economic, performance, and maintenance aspects	(Yogi, 2018).
Emphasized on the most important criteria for students	The pricing and after-sales-service	(Valamarthi and Kadhar,2015)
Exploratory research discussed the features for the purchase of car	social parameters, price, style, fuel economy, safety, space, performance and brand are the most critical predictors of purchase intention of luxury cars	(Gokhale et al, 2021)
Evaluated the customer to select and buy the car	Shape, looks, safety, features & interior image and presales and post sales policies have been discussed	(Kumar, 2014)

3. Methodology:

The Multi-criteria decision making (MCDM) refers to the multi-dimensional decision making

based on the factors and sub factors determined in the analysis. The following table refers to the various researches used the AHP tool as a methodology in their analysis. The details are discussed in Table-2

Table-2: *Methodology Used*

Description	Tools used	References
Consumers are faced with several sets of criteria to select the right 4 Wheelers during Covid	Analytical Hierarchy Process (AHP) approach	(Raza and Masmoudi, 2020)
Proposed a model to evaluate the set of criteria in a purchase of a sedan in India	fuzzy AHP model	(Chand, et al ,2017)
Shopping Goods and Consumer Buying Behavior: An AHP. Oxford, United Kingdom.	AHP Model	(Swain and Dhurkari, 2018, May; Dhurkari, and Swain 2019).
Decision making for leaders for analysis	AHP Model	(Saaty, 2012)
Impact on the Automotive Industry: Navigating the Human and Business Impact of COVID-19.	Relation to the emergency management models for evaluation	(Schmidt et al, 2020)

An AHP questionnaire was administered to the potential buyers of two-wheeler to study the purchase decision criteria adopted by them during the pandemic. The following AHP

model was developed based on the results of the questionnaire and literature review as shown in Figure-1.

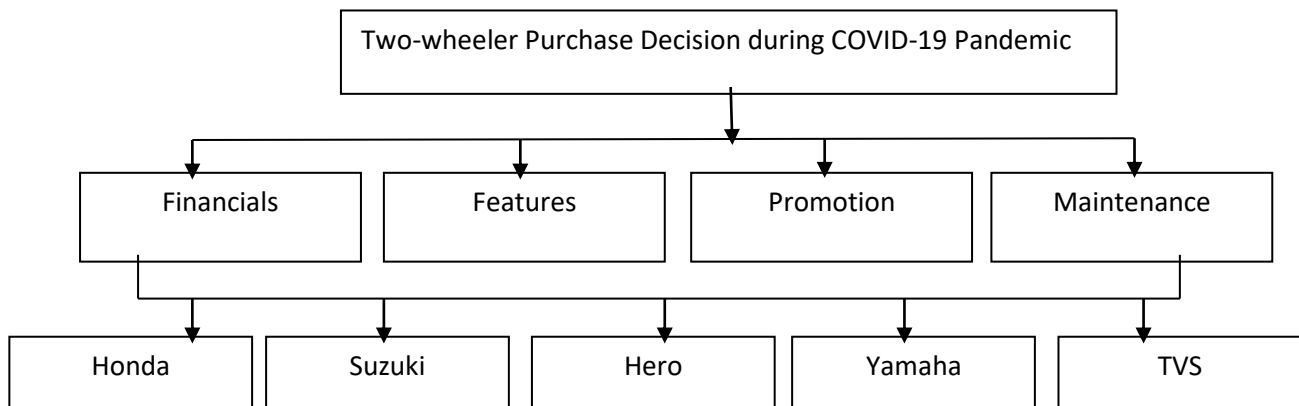


Figure-1- AHP Model

The following parameters are identified for the two-wheeler purchase during the covid was studied the various. All the parameter finalised

and then categorised into Financials, Features, Promotions and maintenance in table 3

Table 3: Category details.

Main Criteria	Description	Reference
Financials (Fi)	The financials is one of the most important criteria for the purchase of two wheelers. It describes the financial commitment a person is ready for purchase of two wheeler.	(Yallagandala, 2020).
Features (Fe)	The features of the vehicle are used to purchase the two wheelers	(Lee et al, 2014; Hadjidimitriou et al, 2019)
Promotions (P)	The promotions is important for the brands to put forth the features of their vehicles in front of consumers	(Anami and Pagi, 2009)
Maintenance (M)	The maintenance for the two wheelers involves cost and hence is an important factor for selection of vehicle	(Bella et al, 2011)

Financials includes Interest Rate (Fi1), Job Security (Fi2) and Sending Power (Fi3). Feature covers the Technology (Fe1), Design (Fe2) and Safety/Braking system (Fe3). Promotions (P) comprises of Warranty Offer (P1), Insurance Offer(P2), Price Discount (P3)

and After Sales Service offer (P4). Maintenance (M) includes Mileage (M1), Cost of Spare Parts (M2) and Cost of Servicing (M3). The details of all the parameters are given below in Table 4:

Table 4: *Sub Category details.*

Main Criteria	Sub Criteria	Description	Reference
Financials (Fi)	Interest Rate (Fi1)	Banks offer best deals and attractive interest rates to customers who are planning to purchase two-wheelers	(Ntziachristos et al, 2006)
	Job Security (Fi2)	Stability in jobs has an important implication on vehicle purchase decision	(Shailesh, 2014)
	Spending Power (Fi3)	The degree to which people have money to buy Two wheeler	(Monga and Chaudhary, 2011)
Features (Fe)	Technology (Fe1)	individuals' attitudes and intentions towards purchase of two-wheelers is also affected by a new technology adopted by vehicle	(Jayasingh et al, 2021) (Eccarius and Lu, 2020)
	Design (Fe2)	design varies greatly to suit a range of different purposes and therefore affects the choice	(Cervero and Kockelman, 1997)
	Safety/Braking system (Fe3)	effective braking system has a significant effect on the evaluation of two wheeler reliability while purchasing	(Yogi, 2015)
Promotions (P)	Warranty Offer (P1)	Extended warranty offers helps consumers choose one version or brand over the other	(Bian et al, 2019)
	Insurance Offer(P2)	Two wheeler insurance plans offer various add on covers such as emergency assistance programme for delivering that extra protection making consumer choice easier	(Hjelm, 2005)
	Price Discount (P3)	Offering cost discount significantly influence the intention to purchase	(Alford and Biswas, 2002).
	After Sales Service offer (P4)	level of purchase decision significantly improves due to after sales service offer	(Liang and Lai ,2002)
Maintenance (M)	Mileage (M1)	Mileage while purchasing a two-wheeler is crucial to evaluate futuristic operating cost of two wheeler	(Bansal et al,2021)
	Cost of Spare Parts (M2)	Availability & cost of spare parts greatly impacts the purchase decision of two wheeler	(Shende,2014).

	Cost of Servicing (M3)	Cost of servicing is a critical component in the two wheeler purchase decision	(Lane and Potter, 2007).
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4. Methodology Adopted

AHP Methodology defines the various steps for the implementation of AHP with the following steps.

1. Definition statement of problem.
2. Broaden categories are decided and also consider all actors for that category's objectives.
3. List the criteria and also define the broad categories.
4. Create the hierarchy of levels constituting criteria and alternatives focusing on goal.
5. Comparing element at each level to its corresponding level, standardize them at

numerical scale. This requires n multiply $(n - 1)/2$ comparisons, where n - number of elements, diagonals are 1 and with the considerations that diagonal elements are equal or '1' and all the other elements are reciprocals.

6. calculate the maximum Eigen value. identify consistency index (CI) and consistency ratio (CR), and normalized values for each criteria/alternative.

7. $(\lambda_{\max} - n) / (n - 1)$, Where λ_{\max} is the maximum eigenvalue of the judgement matrix. This CI can be compared with that of a random matrix, RI. The ratio derived, CI/RI, is termed the consistency ratio, CR. Saaty suggests the value of CR should be less than 0.10 refer to table below.

RI values	N	2	3	4	5	6	7	8	9	10
	RI	0.00	0.58	0.90	1.12	0.12	1.32	1.41	1.45	1.51

8. If the maximum Eigenvalue, CI, and CR are satisfactory then decision is taken based on the normalized values; else the procedure is repeated till these values lie in a desired range.

categories are shown with their weights are shown in Table 5. In this analysis, the identified parameter under Financials, features, promotions and maintenance category are evaluated by using multicriteria methodology called AHP methodology (Arora and Gupta, 2017) as discussed. Based upon the literature review are discussion with experts, the weights for the following companies are examined. The AHP weights with the company expert weight age are defined in Table: 5. The categories wise parameters details are evaluated as follows:

5. Analysis and Findings

In this analysis, the AHP (Arora et al., 2011) has been implemented and the main parameters are examined and applied. The, the local and global weights of all parameters under different

Table – 5 Evaluation of weights for main parameters

	Financials (Fi)	Features (Fe)	Promotion (P)	Maintenance (M)	Average	Sum	Weighted Sum
Financials (Fi)	0.69	0.75	0.69	0.43	0.64	2.9	4.48
Features (Fe)	0.14	0.15	0.2	0.29	0.19	0.8	4.27

Promotion (P)	0.1	0.07	0.1	0.24	0.13	0.5	4.09
Maintenance (M)	0.08	0.03	0.02	0.05	0.04	0.2	4.01

The computed CR implies a reasonable level of consistency i.e 0.07 i.e. (<0.1), which is enough to recognize the factors. The weight ratings of factors for two-wheeler purchase as financial, feature, promotion and maintenance are 4.48, 4.25, 4.09 and 4.01 respectively, and they were found to be important factors. The results are in

lined with past studies. It can be easily validated from past studies and also looking at vehicle purchase trends, users give first preference to ease of financials then to features, and then performance and give last preference to maintenance for two-wheeler purchases as shown in table 5.

Table 6 : Evaluation of weights for parameters under Financial Factor

	Interest Rate (Fi-1)	Job Security (Fi-2)	Spending Power (Fi-3)	average	Sum	Weighted Sum
Interest Rate (Fi-1)	0.143	0.077	0.172	0.131	0.396	3.030
Job Security (Fi-2)	0.286	0.154	0.138	0.192	0.589	3.061
Spending Power (Fi-3)	0.571	0.769	0.690	0.677	2.162	3.195

The computed CR implies a reasonable level of consistency i.e 0.082 i.e. (<0.1), which is enough to recognize the important factors for evaluation. The weight ratings of factors for two-wheeler purchase as financial is determined as Spending Power, Job Security and Interest Rate are 3.195, 3.06 and 3.030 respectively, and they were found to be

important as financial factors. The results are in lined with past studies. It can be easily validated from past studies and also looking at vehicle purchase trends based on financial, users give first preference is spending power then job security and then interest rates as shown in table 6.

Table 7 : Evaluation of weights for parameters under Feature Factor

	Technology (Fe-1)	Design (Fe-2)	Safety/Braking system (Fe-3)	Average	Sum	Weighted Sum
Technology (Fe-1)	0.076	0.047	0.095	0.073	0.219	3.012
Design (Fe-2)	0.380	0.236	0.224	0.280	0.858	3.060
Safety/Braking system (Fe-3)	0.543	0.716	0.680	0.647	2.017	3.119

The computed CR 0.055 i.e. (<0.1), that means there is level of consistency which is enough to recognize the important factors for evaluation. The weight ratings of factors for two-wheeler purchase as features is determined as Safety/Braking system, Design and Technology are 3.119, 3.06 and 3.012 respectively, and are

important as features factors. The results are in lined with past studies. This means that there is a validation from past studies and also looking at vehicle purchase trends based on features, users give first preference is Safety/Braking system then Design and then technology as shown in table 7.

Table 8 : *Evaluation of weights for parameters under promotion Factor*

	Warranty Offer(P-1)	Insurance Offer(P-2)	Price Discount(P-3)	After Sales Service offer(P-4)	Average	Sum	Weighted Sum
Warranty Offer(P-1)	0.044	0.068	0.030	0.018	0.040	0.162	4.050
Insurance Offer(P-2)	0.399	0.621	0.685	0.536	0.560	2.475	4.418
Price Discount(P-3)	0.338	0.207	0.228	0.357	0.283	1.246	4.410
After Sales Service offer(P-4)	0.219	0.104	0.057	0.089	0.117	0.481	4.100

The computed CR i.e 0.09 (<0.1), that means there is level of consistency which is enough to recognize the important factors for evaluation. The weight ratings of factors for two-wheeler purchase as Promotion is determined as Insurance Offer, Price Discount, After Sales Service offer and Warranty Offer are 4.418, 4.410, 4.100 and 4.050 respectively, and they were found to be important as promotion

factors. The results are in lined with past studies. It can be easily validated from past studies and also looking at vehicle purchase trends based on promotion, users give first preference is Insurance Offer, then Price Discount, then After Sales Service offer and finally Warranty Offer for two-wheeler purchase as shown in table 8.

Table 9 : *Evaluation of weights for parameters under Maintenance Factor*

	Mileage (M-1)	Cost of Spare Parts (M-2)	Cost of Servicing (M-3)	Average	Sum	Weighted Sum
Mileage(M-1)	0.732	0.789	0.600	0.707	2.263	3.201
Cost of Spare Parts (M-2)	0.146	0.158	0.300	0.201	0.617	3.065
Cost of Servicing (M-3)	0.122	0.053	0.100	0.092	0.277	3.021

The computed CR 0.083 i.e. (<0.1), that means there is level of consistency which is enough to recognize the important factors for evaluation. The weight ratings of factors for two-wheeler purchase as maintenance is determined Mileage , Cost of Spare Parts and Cost of Servicing are 3.201, 3.065 and 3.021 respectively, and they were found to be important as maintenance

factors. The results are in lined with past studies. It can be easily validated from past studies and also looking at vehicle purchase trends based on promotion, users give first preference is Mileage, then Cost of Spare Parts and then Cost of Servicing, for two-wheeler purchase as shown in table 9.

Table -10- *Final Ranking*

	Fi-1	Fi-2	Fi-3	Fe-1	Fe-2	Fe-3	P-1	P-2	P-3	P-4	M-1	M-2	M-3	Overall	Rank
Honda	0.5	0.3	0.3	0.6	0.7	0.6	0.2	0.4	0.2	0.6	0.6	0.5	0.6	0.5	1

Suzuki	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	4
Hero	0.1	0.2	0.3	0.1	0.2	0.1	0.2	0.2	0.4	0.2	0.2	0.1	0.1	0.2	3
Yamaha	0.4	0.4	0.3	0.3	0.1	0.2	0.6	0.3	0.4	0.2	0.2	0.3	0.2	0.3	2

In table-10, based on the weights calculated it has been found the Honda is at Rank-1, Yamaha is at Rank-2, Hero at Rank -3 and Suzuki at Rank-4. For Honda the sub parameters prioritise by the user for the purchase are in the order from high to low (5 imp factors) are Design (0.687), After Sales

Service offer (0.631), Safety/Braking system (0.617), Warranty Offer and Insurance Offer (0.614). The other sub-factors are also important with slightly less weightage but are also important. All other brands also have to work upon the sub parameters to work upon the customer inclination for the purchase of two wheelers.

Table 11- Sub feature ranking.

Main Features	Sub Features	Local Weights	Weights	Global Weights	Rank
Financials (Fi)	Interest Rate	0.367	0.639	0.234	2
Financials (Fi)	Job Security	0.418	0.639	0.267	1
Financials (Fi)	Spending Power	0.349	0.639	0.223	3
Features (Fe)	Technology	0.073	0.193	0.014	9
Features (Fe)	Design	0.280	0.193	0.054	6
Features (Fe)	Safety/Braking system	0.647	0.193	0.125	4
Maintenance (M)	Mileage	0.707	0.127	0.090	5
Maintenance (M)	Cost of Spare Parts	0.201	0.127	0.026	7
Maintenance (M)	Cost of Servicing	0.092	0.127	0.012	11
Promotion (P)	Warranty Offer	0.040	0.041	0.002	13
Promotion (P)	Insurance Offer	0.560	0.041	0.023	8
Promotion (P)	Price Discount	0.283	0.041	0.012	10
Promotion (P)	After Sales Service offer	0.117	0.041	0.005	12

In table 11, defines the overall rank of all the thirteen parameters. The ranks and weights of first 5 important parameters and sub parameters as financials- Job Security (0.267), financials- Interest Rate (0.267), financials- Spending Power (0.223), Feature- Safety/Braking system (0.125) and Maintenance- Mileage (0.090).

The final local and global averages are mentioned in Table-11.

6. Conclusion and Future Aspects

The priority of main features is prioritize as Financials, Features, Promotion and maintenance respectively. In Financials , Spending having high preference than Job Security, Interest Rate. Considering the Features, Safety/Braking system having high preference than Technology and Design. In Promotion- Insurance Offer having high preference than Price Discount, After Sales Service offer and Warranty Offer and finally in Maintenance-Mileage having high preference than Cost of Spare Parts and Cost of Servicing

Further Analysis, considering Honda at rank 1, Yamaha at rank 2, Hero at rank 3 and Suzuki at rank 4.

The application of the study can help customers during COVID-19 to purchase a vehicle within their budget concerning financial aspects, job security, and so on. To study the impact of COVID-19 on consumer behavior, can be used by marketers to create digital touch points as consumers prefer dealing virtually and contactless during COVID-19. This study can help company officials to use the features for two wheelers purchases.

Future Aspects of the study may be conducted on customers from other regions of the country. Also, other techniques of multicriteria Decision techniques such as Topsis and Fuzzy AHP may be used to examine the customer choice criteria for selecting two wheelers. Few more sub criteria may also be included in the study to analyze the decision making in more depth.

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