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## Research Article

## Impact of Safety and Comfort Features on Women's Perception and Loyalty Towards Car Brands with Special Reference to Indore City

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### Abstract

India's automotive industry is the cornerstone of the country's manufacturing and economic development, contributing 7.1% to India's gross domestic product (GDP) and 49% to manufacturing GDP. As the fourth largest automobile producer globally, India has the scale and strategic depth to emerge as a global leader in the automotive value chain. The sector spans a vast ecosystem ranging from vehicle assembly and auto component manufacturing to deep inter-linkages with critical industries such as steel, electronics, rubber, IT and logistics. In recent years, India has seen exponential growth in vehicle production, with more than 28 million units to be manufactured in 2023-24 alone. The industry's contribution goes beyond industrial production, and it supports millions of direct and indirect jobs, fostering innovation of safety and comfort features in especially in car segment which shows wide scope for expansion, but since the last decades car users and government are focusing safety and comfort features because of rate of growth of road accidents in India, as per official statistics was published by the Ministry of Road Transport and Highways (MoRTH), 153,972 persons were death in road accidents in the year 2024. Which is 11.3 per cent deaths per 100,000 of the population, which is a horrible figure. Of those who died, only 14% had females, and the rest were males. Internationally, females always have a low share of road deaths compared to males. The car manufacturers have been focusing more on government guidelines towards car build quality and safety rating by using the latest technology and AI, by which road accidents may be reduced. They have been using advanced safety features like ADAS 2-star, five-star, airbags, seat belts, and ABS. The presented research study has been conducted using primary and secondary data.

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**KEYWORDS:** Safety, ABS, ADAS, rating, technology, AI, Automation.

## 1. INTRODUCTION

The proliferation of new technologies alongside a rising number of vehicles has rendered traffic accidents increasingly unavoidable, with incident rates escalating daily. Such accidents are causing losses in human life and property comparable to, or in some cases exceeding, those caused by natural disasters. The growing prevalence of accidents represents a critical issue that demands urgent attention. Addressing this challenge necessitates the development of a comprehensive action plan encompassing multiple dimensions, including traffic engineering interventions, enforcement strategies, and educational initiatives, all of which must operate in a coordinated manner.

### Vehicle Design as a Pillar of Traffic Safety

Vehicle design plays a central role in establishing a safe and efficient traffic system. Ensuring road safety requires seamless interaction among drivers, passengers, vehicles, and the surrounding infrastructure. Consequently, vehicle design must account for both human behavioural tendencies and the physical limitations imposed by roadways, thereby creating a system that supports safe vehicle operation.

### Engineering Approaches to Risk Reduction

Road users can address various risk factors to lower both the likelihood of accidents and their potential severity. Traditionally, vehicle safety engineering has focused on modifying vehicles to aid drivers in avoiding collisions or to protect occupants in the event of a crash. Advanced technological solutions have increasingly been recognised as effective tools for reducing both the frequency and severity of traffic accidents. For example, radar-assisted automatic braking systems can prevent or significantly mitigate rear-end collisions, which are among the most common and hazardous types of crashes. Recent years have witnessed renewed interest in high-tech crash countermeasures, likely driven by advances in miniaturised electronics and the integration of micro-electronic systems into vehicle ignition, braking, and performance monitoring functions.

### Advanced Technologies for Safety and Comfort

Society often regards road accidents as primarily behavioural in origin, rather than as complex problems requiring coordinated interventions in both human behaviour and technology. However, the application of modern technologies has the potential to prevent a substantial number of fatalities and severe injuries. This does not imply that drivers should operate vehicles recklessly; rather, it underscores the role of technology in mitigating unintentional human errors. Road transport technologies have advanced significantly in recent years. At one extreme, autonomous driving technologies now allow vehicles to navigate traffic safely without human input, although widespread implementation remains limited. Conversely, simple measures such as enforcing seatbelt use for all occupants can dramatically reduce traffic-related deaths. Even in regions with high compliance rates (over 95%) due to awareness and enforcement campaigns, unbelted drivers still

account for a disproportionately high number of fatalities. In this context, technology-driven interventions may represent the most efficient means of targeting non-compliant drivers and saving lives.

### Some popular safety and comfort features are given below

- Electronic Stability Control (ESC)
- Lane Departure Warning (LDW)
- Collision warning with automatic braking:
- Blind-zone warning:
- Emergency brake assist:
- Airbags
- Seat belts
- Adaptive high beam
- Reverse backup sensors
- Back-up camera
- Tire pressure monitoring systems
- Traction Control Systems
- Automated parking system
- Climate Control
- Adjustable Steering
- Clean window
- Entertainment system
- Power steering
- Comfortable Seat
- GPRS Tracking

## 2. REVIEW OF LITERATURE

**Dipan Basu (2024):** The title of the research study was “Vulnerability of Female Drivers Involved in Motor Vehicle Crashes” Motor vehicle accidents have been effectively reduced over the past decades; however, it is not clear whether the benefits are equally realised by the vehicle users of either sex or car manufacturers. The number of female drivers is increasing, but the rate of females involved in fatal crashes is remarkable, and the simplicity of driving patterns and risk behavior are reason behind that. We evaluate whether advances in occupant safety and comfort technology give equal injury protection for drivers of either sex involved in a serious or fatal crash.

**Prishita Borkar (2023):** The title of the research study was “A Step Towards Safer Journeys: Developing a Women-Only Cab Service with Comprehensive Tracking for Parent Notifications” The advanced and innovative steps not only enhance the safety and comfort of female passengers but also motivate empowerment and independence, helping women navigate their daily lives with more confidence. Additionally, it gives new opportunities for female drivers, contributing to gender equality in the workforce. The future scope of a women drivers service with comprehensive tracking is vast, need to improvement in technological advancements, safety, personalisation, strong government regulation and sustainable operations by continuously development.

### 3. OBJECTIVE OF STUDY

The objectives of the research study are given below

- To analyse the awareness of safety and comfort features towards car brands
- To study women's perception towards safety and comfort features of cars

#### Research Hypothesis:

The research hypothesis has been designed for the presented research study.

- Null Hypothesis  $H_{01}$ : There is no significant awareness level found among the women for safety and comfort features towards car brands.
- Alternative Hypothesis  $H_{11}$ : There is a significant awareness level found among the women for safety and comfort features towards car brands.
- Null Hypothesis  $H_{02}$ : There is no significant positive perception found in women towards safety and comfort features in cars.

- Alternative Hypothesis  $H_{12}$ : There is a significant positive perception found in women towards safety and comfort features in cars.

### 4. RESEARCH METHODOLOGY

The collected data are "primary and secondary" data, which are qualitative, and were further analysed so that conclusions can be drawn for the research study. "Primary data" has been collected through a survey in Indore City on car safety and comfort features from female car users of Maruti, Hyundai and Tata. A questionnaire was prepared for the survey and random sampling. The "secondary data" collection was done through the Internet, including web, e-magazines, "research papers, e-books, newspapers", etc. The research hypothesis has been tested by chi square test at a 5 per cent level of significance. The analysed data have been presented in tables.

### 5. Data Interpretation and Hypothesis Testing:

The Questions have been asked by female car users of different car brands.

Which Brands of cars do you have?

**Table 1:** Analysis of Car Brand

Brand, do you have a car				
Options		Frequency	Percent	Cumulative Percent
Valid	Maruti	50	50.0	50.0
	Hyundai	25	25.0	75.0
	Tata	25	25.0	100.0
	Total	100	100.0	

Table 1 shows the car brands owned by female respondents, and the question has been asked of female respondents to know their car brands. The options had been given (Maruti,Hyundai, Tata); the frequency and percentage found for

These options respectively (50,50.0), (25,25.0), (25,25.0) from the study "it is clear that" Maruti users' frequency and percentage found higher than other brands' users in Indore City, as presented in this research work. Are you aware of the safety and comfort Features in a car?

**Table 2:** Analysis of Awareness of Safety Features

Analysis of Awareness of Safety and Comfort Features in a car				
Options		Frequency	Percent	Cumulative Percent
Valid	Yes	100	100.0	100.0
	No	000	000	

Table 2 shows the analysis of awareness of safety and comfort features in Car, the "question was asked" of female respondents about for knowing about awareness of safety and comfort features. The options had been given (Yes, No); the frequency and percentage found for these options, respectively.

(1000,100.0), (00,00.0), from the study, "it is clear that option " yes' has a higher frequency and percentage as compared to other options in Indore City, as presented in this research work. Did you buy your car with advanced safety and comfort features?

**Table 3:** Analysis of buy your car as per advanced safety features

You buy your car as per advance safety features.				
Options		Frequency	Percent	Cumulative Percent
Valid	No	8	8.0	8.0
	Yes	92	92.0	100.0
	Total	100	100.0	

Table 3 shows the analysis of buying your car as per the advanced safety features in the car, the question was asked. from female Respondents about knowing about the analysis of

Buying your car as per the advanced safety features. The options had been given (Yes, No); the frequency and percentage found for these options, respectively, (1000,100.0),

(00,00.0), from the Study: “It is clear that option’ yes’has a higher frequency and percentage as compared to other options in Indore City. This means that most of the respondents

purchased their car for advanced safety and comfort features in this research work.  
What do you think that advanced safety and comfort features can prevent accidents?

**Table 4: Analysis of advanced safety and comfort features can prevent accidents**

Advanced safety and comfort features can prevent accidents.				
Options		Frequency	Percent	Cumulative Percent
Valid	No	10	10.0	10.0
	Yes	90	90.0	100.0
	Total	100	100.0	

Table 4 shows the analysis of advanced safety and comfort features that can prevent accidents. The question was asked” from female respondents about knowing about the analysis of advanced safety and comfort features that can prevent accidents. The options had been given (Yes, No); the frequency and percentage found for these options, respectively, (90,90.0), (10,10.0), from the study. It is clear that the option” yes’has a higher frequency and percentage as compared to other options in Indore City, which means that most of the respondents have

Positive perception towards advanced safety and comfort features in car they think that advanced safety and comfort features may reduce the rate of accidents, and they can feel safer on the road while driving.

**HYPOTHESIS TESTING:**

**H1 has been tested by Chi Square test**

Null Hypothesis H<sub>01</sub>: There is no significant awareness level found among the women for safety and comfort features towards car brands.

**Table 5: Descriptive Statistics**

Descriptive Statistics			
	N	Mean	Std. Deviation
You buy your car as per advance safety features	100	.9200	.27266

From the study of table 5, “it is clear that” (N, Mean, Std. Deviation) values are found respectively (100,.9200,.27266).

**Table 6: Frequency calculation for H1**

You buy your car as per advance safety features.			
Options	Observed N	Expected N	Residual
No	8	50.0	-42.0
Yes	92	50.0	42.0
Total	100		

From the study of table 6, “it is clear that” Observed N, Expected N, Residual for option no and yes are respectively (8,50, -42.0) and (92,50.0,42.0).

**Table 7: Test statistics for H1**

Test Statistics	
You buy your car as per advance safety features.	
Chi-Square	70.56
df	1
Asymp. Sig.	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 50.0.	

From the study of table 7, “it is clear that” Chi-Square value is 70.560 at degree of freedom 1 and Asymp. Sig. value is .000.

**Decision:** from the above study, “it is clear that” significant value is less than p value .050, hence null hypothesis rejected and “alternative hypothesis” has been accepted. This means that; There is a significant awareness level found in women.

Regarding safety and comfort features towards car brands. The Users have bought their car based on advanced safety and comfort features.

**H2 has been tested by Chi Square test.**

Null Hypothesis H<sub>02</sub>: There is no significant Positive perception found in women towards safety and comfort features in cars.

Table 8: frequency calculation for H2

Advanced safety and comfort features can prevent accidents.			
Options	Observed N	Expected N	Residual
No	10	50.0	-40.0
Yes	90	50.0	40.0
Total	100		

From the study of table 8, “it is clear that” Observed N, Expected N, Residual for option no and yes are respectively (10,50, -40.0) and (90,50.0,40.0).

Table 9: Test statistics for H1

Test Statistics	
	Advanced safety and comfort features can prevent accidents.
Chi-Square	70.56
df	1
Asymp. Sig.	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 50.0.	

From the study of table 9, “it is clear that” Chi-Square value is 70.560 at degree of freedom 1 and Asymp. Sig. value is .000.

**Decision:** from the above study, “it is clear that” significant value is less than p value .050, hence null hypothesis rejected and “alternative hypothesis” has been accepted. It means that: There is a significant positive perception found in women towards safety and comfort features in cars. They have a positive perception towards safety and comfort features in a car.

## 6. CONCLUSION

Car design is fundamental to a safe and comfortable system, which is very important to safe interaction between users, vehicles and the road environment. It is most remarkable because now in India, female car users have increased in the last few decades, and it is estimated to increase further in future; hence, car manufacturers have been designing vehicles as per women's perceptions. They study women's perceptions of car comfort and safety, they give more weightage to women and behavioural and physical limitations of road users, how they address a range of risk factors and help to reduce exposure to risk, crash involvement and crash injury severity.

The need for some designed guidelines by the government and insurance companies to provide considerable advantage as discounts rate in premium for the safety vehicles fixed with advance safety features to car users, though advanced car technologies may reduce and guide for remove driver errors, which is significant that drivers be aware of the capabilities and limitations of advanced safety and comfort features must learn them.

To fully realise the benefits of advanced technologies, it should be promoted to gain good experience because it is changing perceptions of buying a car. The users are focusing more on safety and comfort features in car but the need for proper design is significant to ensure that drivers are not overwhelmed due to technology.

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