

MRC RESEARCH BROADCAST

Effect of ADAS Technology in Claim Frequency Reduction

EFFECT ON CLAIM
FREQUENCY

FINDINGS ON
CLAIM COST

DIRECTION OF
COLLISION

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INTRODUCTION



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Chief Executive Officer,
MRC Malaysia

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We are pleased to present another edition of our MRC Research Broadcast, designed to keep you informed and engaged with our latest specific research, technical guidelines and latest technological developments from MRC's own research team, MRC global research partners and counterparts, as well as other relevant stakeholders.

Malaysia's automotive industry is undergoing a significant transformation, driven by the rapid adoption of Advanced Driver Assistance Systems (ADAS). Technologies such as Autonomous Emergency Braking (AEB), Lane Keep Assist (LKA), Adaptive Cruise Control (ACC), Blind Spot Detection (BSD), Front Collision Warning (FCW), and Lane Departure Warning (LDW) are redefining how vehicles operate, shifting the industry towards safer and more intelligent mobility.

Therefore, in this edition, we present a data-driven analysis comparing vehicles equipped with ADAS against those without, focusing on vehicle of the same make and model in the Malaysian market. The findings provide insights into how ADAS influences claim frequency and repair costs.

Through this study, we aim to support industry stakeholders with relevant and practical insights, while contributing to ongoing efforts to enhance service quality, improve decision-making, and strengthen the automotive ecosystem in Malaysia. Thank you for taking the time to read through the contents, and we hope you find it informative and enriching.

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Executive Summary



Introduction

Malaysia's automotive industry is undergoing rapid technological change, driven by the growing adoption of Advanced Driver Assistance Systems (ADAS). These systems use sensors, cameras, radars, and advanced software to monitor the vehicle's surroundings and assist drivers in avoiding potential collisions.

Key features such as Autonomous Emergency Braking (AEB), Lane Keeping Assist (LKA), Adaptive Cruise Control (ACC), Blind Spot Detection (BSD), and Traffic Sign Recognition are designed to reduce human error and improve overall road safety. They also support the gradual shift towards semi-autonomous driving.

Despite these advancements, the real-world impact of ADAS remains an important area to evaluate. While these technologies aim to reduce accident frequency, their increasing complexity may lead to higher repair cost after a collision due to specialised parts and calibration requirements.

In Malaysia, this is especially relevant as accident rates

and claim cost continue to rise alongside increasing vehicle ownership. Therefore, it is important to understand whether ADAS can effectively reduce accidents while keeping overall claim cost manageable.

To provide data-driven insights, MRC Research Team conducted a comparative analysis between vehicles equipped with ADAS and those without. The study focuses on vehicles of the same make and model, registered in the same year, ensuring a consistent and reliable framework for assessing the real-world effectiveness of ADAS in the Malaysian market.

Hypothesis

As the number of vehicles equipped with ADAS increases, accident claim frequency is expected to decrease. However, the average claim cost per vehicle may increase due to the higher complexity and repair cost associated with ADAS components.

Objective

- To identify and classify vehicle models equipped with ADAS technology in Malaysia, and to quantify their representation in accident claims.
- To compare accident frequency trends between identical vehicle models equipped with ADAS and those without ADAS in the Malaysian market.
- To analyse and compare claim cost between vehicles with ADAS and those without ADAS.
- To assess the impact of ADAS on collision directionality by comparing vehicles equipped with ADAS against those without.

Methodology

This study adopts a comparative approach to evaluate the effectiveness of ADAS in reducing accident claim frequency and overall claim cost in Malaysia. The analysis is based on two primary datasets.

The first dataset consists of accident claim records extracted by MRC Malaysia from the Integrated Claims and Automotive Portal (iCAP) using Business Intelligence (BI) reporting tools. It includes all claims recorded between January and December 2024 for all new vehicle models registered in 2023. This ensures full-year exposure and allows for meaningful comparisons between vehicles equipped with ADAS and those without.

The second dataset comprises car parc information in Malaysia, focusing on the distribution of vehicles with and without ADAS features. It includes all vehicle models sold and registered between January and December 2023. This dataset is sourced from the Malaysian Automotive Association (MAA) Total Industry Volume (TIV) report and supplemented with sales data provided by vehicle manufacturers directly. Together, these datasets provide both claim outcomes and market representation, enabling a more comprehensive evaluation of ADAS effectiveness.

The study compares accident trends and claim cost between identical vehicle models with and without ADAS. By selecting the same make, model, variant and registration year, the analysis minimises

variability and ensures that any observed differences can be attributed to the presence of ADAS. Key variables include claim frequency, accident severity, and repair cost. Statistical analysis is used to identify significant differences in both accident outcomes and financial impact.

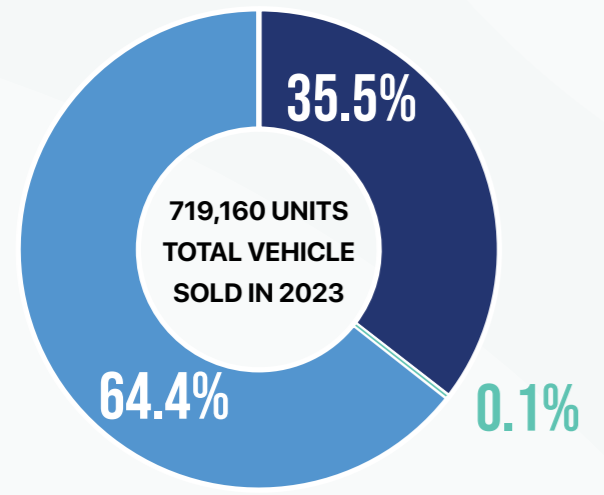
In addition, collision directionality is analysed to identify high-risk impact zones. This helps assess how effectively ADAS features reduce the likelihood of different types of collisions. For example, front collisions may be mitigated by functions such as Autonomous Emergency Braking (AEB) and Forward Collision Warning (FCW), while side collisions may be reduced through radar-based features such as Blind Spot Detection (BSD), Lane Keep Assist (LKA), and Lane Departure Warning (LDW). This analysis provides insights into the distribution of collision types and the role of ADAS in reducing associated risks.

Overall, this approach enables the study to address key industry concerns regarding the impacts of ADAS and its potential to reduce accident frequency while also contributing to higher repair cost due to increased system complexity. The findings are expected to provide evidence-based insights into accident trends, insurance claim patterns, and cost implications within the Malaysian automotive industry.



Model Selection

In Malaysia, the total passenger cars sold in 2023 were 719,160 units. Out of these vehicles, we need to select makes and models that have both variants with ADAS and without. We can divide them into three main groups.



255,269 UNITS (12 MODELS)
Selected vehicle models that have both variants with ADAS and without

634 UNITS (6 MODELS)
Vehicle models not selected although have both variants with ADAS and without

463,257 UNITS
Vehicle models not selected, consists of vehicles where either:

- All variants not equipped with ADAS
- All variants equipped with ADAS
- Undefined/Customisation

The largest group, which is about 463,257 units or 64.4%, consists of vehicles where either all variants are without ADAS, or all variants are with ADAS, or the ADAS specification is undefined or customised. These vehicles are not suitable for comparison, so they are excluded from the study.

The second group, which is the most important for this analysis, includes 255,269 units or 35.5%, covering 12 vehicle models. These are vehicles that have both variants available with ADAS and without ADAS. This allows us to make a fair, direct comparison, so these models are selected for the study. These 12 vehicle models and their associated ADAS system are illustrated on the next page.

Finally, there is a very small group, about 634 units or 0.1%, across 6 models. Although these vehicles technically have both variants, the volume is too small to produce meaningful analysis, so they are also excluded.

Model Selection Exclusions

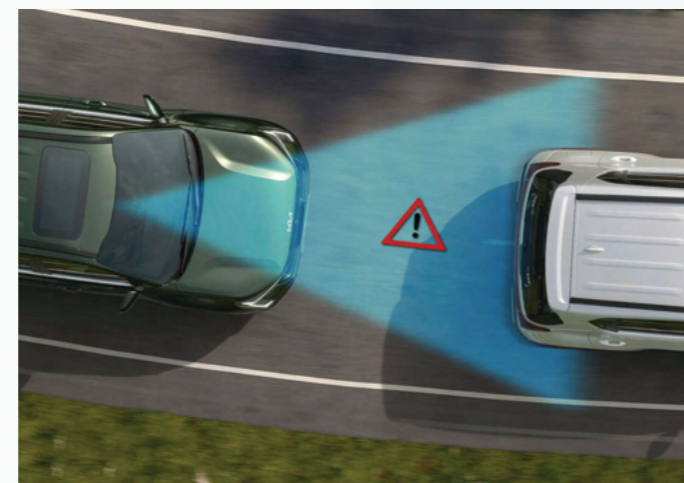
There are a few key scenarios to highlight for vehicles sold in Malaysia. Although the analysis focuses on selected models registered in 2023, differences in ADAS adoption across brands present challenges in achieving balanced representation.

For example, some manufacturers offer ADAS as optional features depending on customer preference. So, even within the same model and variant, it is difficult to consistently identify and classify vehicles as either ADAS-equipped or non-ADAS, which may affect the accuracy of comparisons.

Next, certain continental brands such as Mercedes-Benz and Volvo, they have standardised ADAS features across all of their models sold in Malaysia. As non-ADAS variants are not available, these brands are excluded from the study.

Also, Chinese EVs sales are growing rapidly and ADAS is usually offered as standard features. These vehicles are not yet fully represented in 2024 accident claim data due to their recent entry into the market. As a result, more time and data are needed to properly assess their impact on accident trends and insurance costs.

Overall, these scenarios highlight the challenges in conducting direct comparisons between ADAS and non-ADAS vehicles in Malaysia. The findings should therefore be interpreted with caution. At the same time, they point to opportunities for future research as ADAS adoption continues to grow and more comprehensive data becomes available.



MODEL	ADAS	AEB AUTONOMOUS EMERGENCY BRAKING	ACC ADAPTIVE CRUISE CONTROL	BSD BLIND SPOT DETECTION	FCW FORWARD COLLISION WARNING	LKA LANE-KEEPING ASSIST	OTHERS
Perodua Bezza 2023	✓	✓			✓		FDA FRONT DEPARTURE ALERT
Perodua Axia 2023	✓			✓	✓	✓	FDA FRONT DEPARTURE ALERT
Perodua Aruz 2023	✓				✓		
Proton X50 2023	✓	✓	✓	✓	✓	✓	LDW LANE DEPARTURE WARNING
Proton X70 2023	✓	✓	✓	✓	✓	✓	LDW LANE DEPARTURE WARNING
Proton X90 2023	✓	✓	✓	✓	✓	✓	LDW LANE DEPARTURE WARNING
Honda Accord 2023	✓	✓	✓	✓	✓	✓	
Honda CR-V 2023	✓	✓	✓	✓	✓	✓	LDW LANE DEPARTURE WARNING
Toyota Corolla Cross 2023	✓	✓	✓	✓	✓	✓	
Mazda 3 Sedan 2023	✓	✓	✓	✓	✓	✓	
Mazda CX-3 2023	✓			✓	✓		LDW LANE DEPARTURE WARNING
Mazda CX-5 2023	✓			✓	✓	✓	R-AEB REAR AUTONOMOUS EMERGENCY BRAKING

Research Findings on Claim Frequency

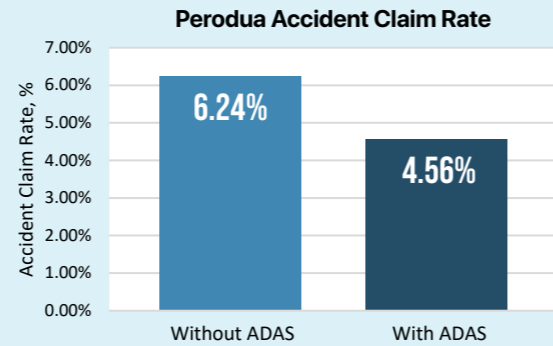
Claim Frequency by Vehicle Manufacturer

Claim rate is a common measure used in the insurance industry to show how often accident claims occur within a group of vehicles. It represents the proportion of vehicles involved in an accident that resulted in a claim during a specific period.

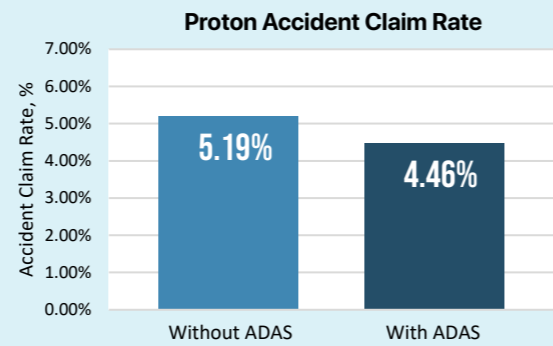
In simple terms:

$$\text{Claim Rate} = \frac{\text{Number of Accident Claims}}{\text{Total Number of Vehicles Insured}}$$

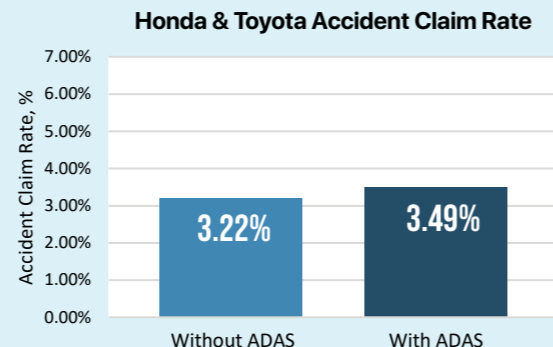
Vehicle Model	Car Parc		Claims Frequency	
	Vehicle without ADAS	Vehicle with ADAS	Vehicle without ADAS	Vehicle with ADAS
Perodua Bezza	63,935	25,332	3,641	1,207
Perodua Axia	54,384	11,156	3,839	639
Perodua Aruz	3,286	18,040	105	642
Total	121,605	54,528	7,585	2,488



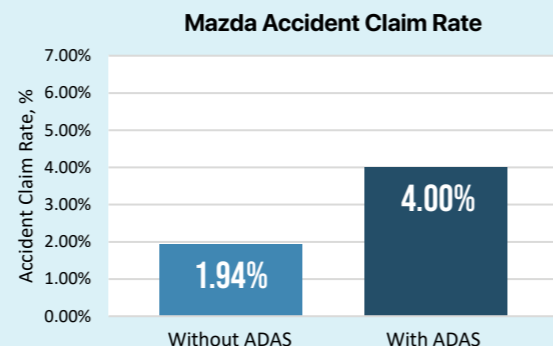
Vehicle Model	Car Parc		Claims Frequency	
	Vehicle without ADAS	Vehicle with ADAS	Vehicle without ADAS	Vehicle with ADAS
Proton X50	18,675	9,249	1,054	473
Proton X70	3,897	6,713	129	258
Proton X90	914	3,510	36	138
Total	23,486	19,472	1,219	869



Vehicle Model	Car Parc		Claims Frequency	
	Vehicle without ADAS	Vehicle with ADAS	Vehicle without ADAS	Vehicle with ADAS
Honda Accord	214	735	11	39
Honda CR-V	1,708	6,072	52	188
Toyota Corolla Cross	1,126	16,968	35	603
Total	3,048	23,775	98	830



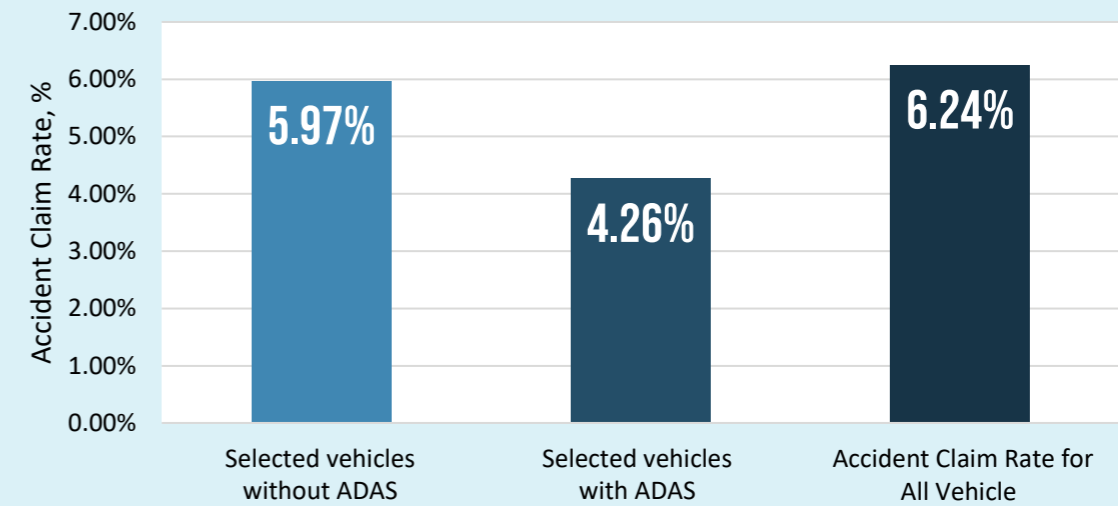
Vehicle Model	Car Parc		Claims Frequency	
	Vehicle without ADAS	Vehicle with ADAS	Vehicle without ADAS	Vehicle with ADAS
Mazda 3 Sedan 2.0	390	216	2	18
Mazda CX-3	712	1,288	10	58
Mazda CX-5	500	6,249	19	234
Total	1,602	7,753	31	310



Total Claim Frequency

Vehicle Manufacturer	Car Parc		Claims Frequency	
	Vehicle without ADAS	Vehicle with ADAS	Vehicle without ADAS	Vehicle with ADAS
Total Perodua	121,605	54,528	7,585	2,488
Total Proton	23,486	19,472	1,219	869
Total Honda & Toyota	3,048	23,775	98	830
Total Mazda	1,602	7,753	31	310
Total	149,741	105,528	8,933	4,497

National Accident Claim Rate



This indicates how many out of every 100 vehicles are involved in an accident claim.

The analysis compares accident claim frequency and claim rates between vehicles with and without ADAS across three selected manufacturer groups which are Perodua, Proton and Japanese vehicle manufacturers. The dataset includes 149,741 vehicles without ADAS and 105,528 vehicles with ADAS, with a total of 8,933 claims for non-ADAS vehicles and 4,497 claims for ADAS-equipped vehicles.

The findings show that vehicles without ADAS recorded a claim rate of 5.97%, while vehicles equipped with ADAS had a lower claim rate of 4.26%.

In conclusion, vehicles with ADAS experienced 28.6% fewer claims compared to similar vehicles without ADAS across the selected manufacturers. This suggests that ADAS features contribute to a reduction in accident frequency.

FORMULA	
THE RELATIVE REDUCTION COMPARES THE ADAS CLAIM RATE TO THE NON-ADAS BASELINE :	$\frac{\text{RATE (NO ADAS)} - \text{RATE (ADAS)}}{\text{RATE (NO ADAS)}} \times 100\%$
PLUGGING IN THE NATIONAL RATES FROM THE FIGURE :	$\frac{5.97\% - 4.26\%}{5.97\%} \times 100\% = 28.6\%$

The vehicle that fitted with ADAS will reduce the number of accident claim

28.6%

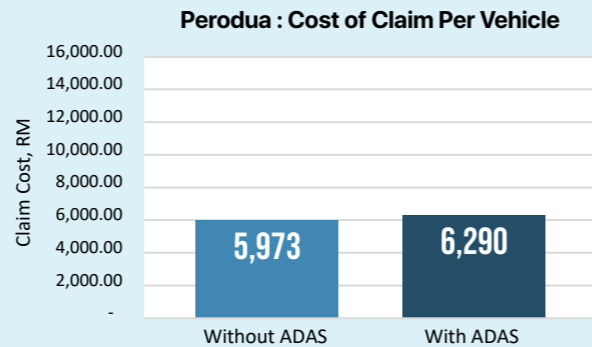


Research Findings on Claim Cost

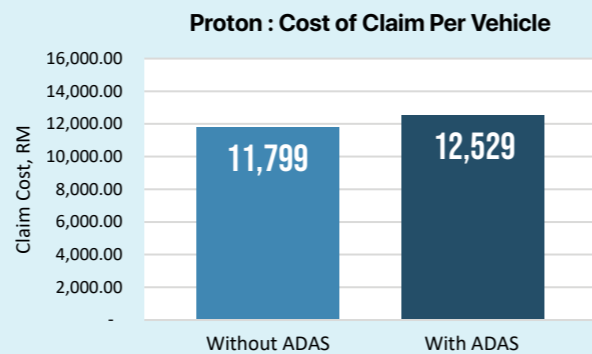
Cost of Claim Per Vehicle by Vehicle Manufacturer

Building on the findings from claim frequency, the analysis is extended to examine the repair costs associated with selected vehicle models. By comparing identical models equipped with ADAS and those without, the study highlights the differences in repair expenses and overall claim costs per vehicle.

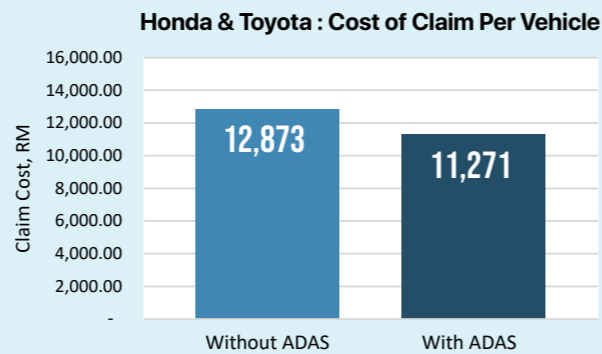
Vehicle Model	Claims Cost (RM)	
	Vehicle without ADAS	Vehicle with ADAS
Perodua Bezza	22,477,100.35	7,333,087.38
Perodua Axia	21,788,414.49	3,592,899.72
Perodua Aruz	1,039,868.11	4,723,782.10
Total	45,305,382.95	15,649,769.20
No. of Claims	7,585	2,488
Cost of Claim per Vehicle	5,973.02	6,290.10



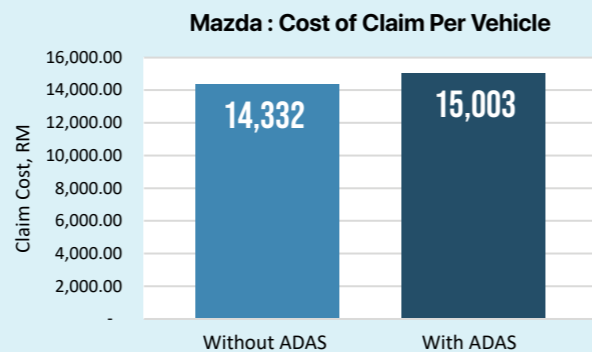
Vehicle Model	Claims Cost (RM)	
	Vehicle without ADAS	Vehicle with ADAS
Proton X50	12,296,974.84	5,866,049.81
Proton X70	1,649,131.46	3,064,161.73
Proton X90	436,284.63	1,957,229.19
Total	14,382,390.93	10,887,440.73
No. of Claims	1,219	869
Cost of Claim per Vehicle	11,798.52	12,528.70



Vehicle Model	Claims Cost (RM)	
	Vehicle without ADAS	Vehicle with ADAS
Honda Accord	92,580.28	448,465.44
Honda CR-V	738,387.00	2,512,530.36
Toyota Corolla Cross	430,602.01	6,394,177.68
Total	1,261,569.29	9,355,173.48
No. of Claims	98	830
Cost of Claim per Vehicle	12,873.16	11,271.29



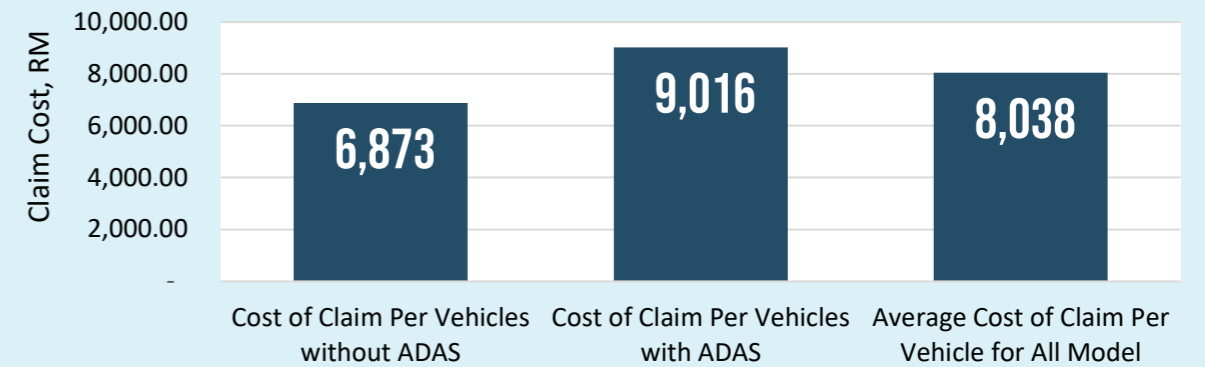
Vehicle Model	Claims Cost (RM)	
	Vehicle without ADAS	Vehicle with ADAS
Mazda 3 Sedan 2.0	25,569.38	250,611.67
Mazda CX-3	114,048.12	804,874.16
Mazda CX-5	304,667.75	3,595,532.30
Total	444,285.25	4,651,018.13
No. of Claims	31	310
Cost of Claim per Vehicle	14,331.78	15,003.28



Cost of Claim Per Vehicle by Selected Vehicle Manufacturer

Vehicle Manufacturer	Cost of Claim Per Vehicle Manufacturer (RM)	
	Vehicle without ADAS	Vehicle with ADAS
Total Perodua	45,305,382.95	15,649,769.20
Total Proton	14,382,390.93	10,887,440.73
Total Honda & Toyota	1,261,569.29	9,355,173.48
Total Mazda	444,285.25	4,651,018.13
Grand Total	61,393,628.42	40,543,401.54
No. of Claims	8,933	4,497
Cost of Claim Per Vehicle	6,872.68	9,015.66

Cost of Claim Per Vehicle, RM



Claim cost refers to the amount paid for each accident claim to repair or compensate for damage. It reflects the severity of the accident where higher costs indicate more expensive repairs. In actuarial analysis, this is commonly measured as cost per claim (average severity) and is used together with claim rate (frequency) to estimate the expected loss per vehicle.

The findings show that the total claim cost is lower for ADAS-equipped vehicles overall, but the average cost per claim is higher. Vehicles without ADAS recorded a total claim cost of RM 61.39 million from 8,933 claims, while vehicles with ADAS recorded RM 40.54 million from 4,497 claims.

On a per-claim basis, the average cost for non-ADAS vehicles is RM 6,873, compared to RM 9,016 for

ADAS-equipped vehicles. This represents an increase of approximately 31.2%.

This indicates that while ADAS helps reduce the number of accidents, each individual claim tends to be more expensive. The higher repair costs are mainly due to the presence of advanced components such as sensors, cameras, and the need for calibration when these systems are damaged. As a result, although ADAS improves safety by lowering accident frequency, it also contributes to higher repair costs when accidents occur.

FORMULA

$$\text{COST INCREASE} = \frac{9,016 - 6,873}{6,873} \times 100\% = 31.2\%$$

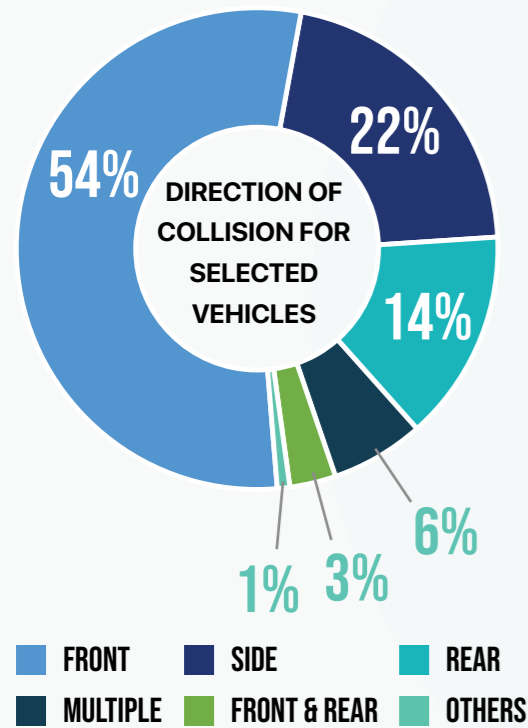
The cost of claims per vehicle that is fitted with ADAS is higher than the vehicles without ADAS.

31.2%



Research Findings on Direction of Collision

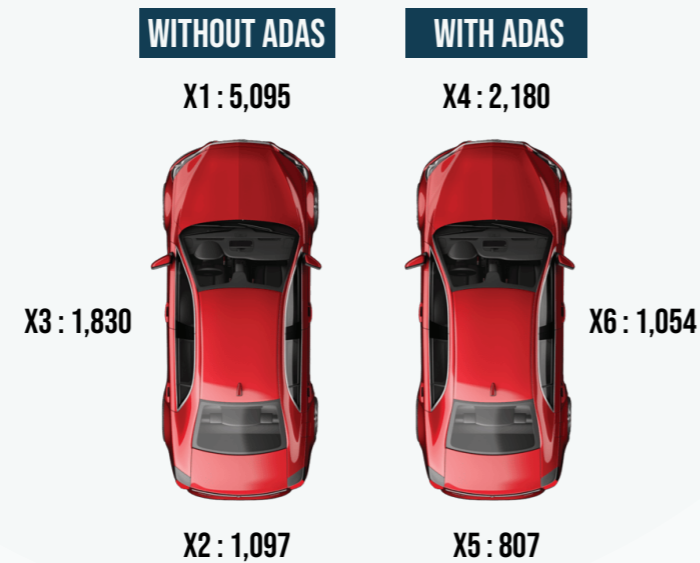
The chart summarises 13,430 recorded collision cases by impact location for the selected vehicles. The data shows that front impacts are the most common, followed by side and rear impacts. A smaller proportion involves multiple or other impact points. Overall, the distribution provides a clear view of typical crash patterns and highlights the areas most exposed to collision risk.



Side impacts total 2,884 cases, or 22% of all incidents. This is the second most common category and is typically linked to side-swipe movements, sudden lane changes, blind spots, intersections, or road junctions.

Rear impacts account for 1,904 cases, representing 14% of the total. These are often associated with sudden braking, misjudged stopping distances, or vehicles being struck from behind.

Together, these three categories make up around 90% of all incidents, indicating that most collisions occur in standard directional movements—front, side, or rear. The remaining 10% consists of less common and more complex impact scenarios.



Front impacts account for 7,275 cases, representing 54% of all incidents, makes it the most frequent impact type. These occurrences are commonly associated with lack of driver's attention, tailgating issues, braking problem, or limited forward visibility.

Direction of Collision	Without ADAS		With ADAS		Claim Rate Reduction	
	No. of Claims	Claim Rate (%)	No. of Claims	Claim Rate (%)	%	Result
Front	5,095	3.40	2,180	2.07	39.29	Reduced
Rear	1,097	0.73	807	0.76	-4.39	Increased
Side	1,830	1.22	1,054	0.998	18.36	Reduced
Car Parc	149,741		105,528			

Impact of ADAS on Collision Direction

The analysis also shows how ADAS features influence different types of collisions:

Front Impact

With ADAS system especially the AEB, FCW and ACC, front impact claim rates decreased significantly from 3.40% to 2.07%, representing a 39.3% reduction. This highlights the strong effectiveness of ADAS system in preventing forward collisions.

39.3%



Rear Impact

Rear impact claim rates increased slightly from 0.73% to 0.76%, a 4.4% rise. This may be due to efficient braking by ADAS-equipped vehicles, increasing the likelihood of being hit from behind by vehicles without similar systems.

4.4%



Side Impact

Side impact claim rates decreased from 1.22% to 0.998%, an 18.4% reduction. This suggests that ADAS features such as LKA, LDW and BSD may help reduce certain side collisions, possibly through early warning and mitigation before impact.

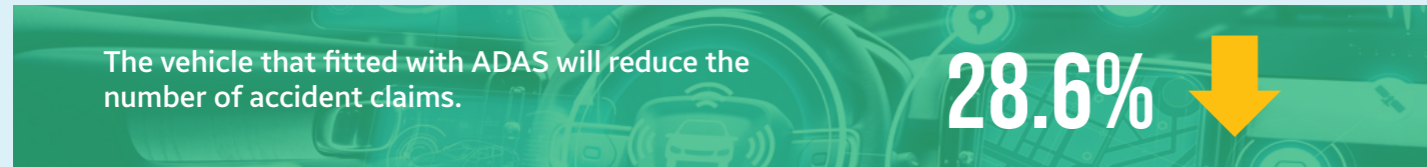
18.4%



Conclusion

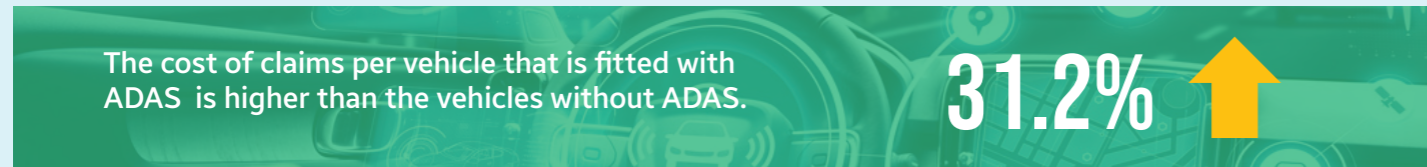
Research Finding #1 - Total Claim Frequency

The analysis shows that as the number of vehicles equipped with ADAS increases, accident claim frequency decreases. ADAS-equipped vehicles recorded a 28.6% reduction in claim frequency compared to vehicles without ADAS, indicating a clear improvement in road safety.



Research Finding #2 - Cost of Claim Per Vehicle

While ADAS helps reduce the number of accidents, the average cost per claim is higher. The findings show that claim costs for ADAS-equipped vehicles are approximately 31.2% higher than those without ADAS. This is mainly due to the presence of advanced components such as sensors, cameras, and the need for calibration during repairs.



Research Finding #3 - Direction of Collision

ADAS demonstrates a strong safety benefit, particularly in reducing front and side collisions, which are the most common types of accidents. Although rear collisions show a slight increase, the overall impact remains positive, with ADAS significantly improving collision avoidance and reducing overall risk.

The data shows the impact of ADAS on vehicle accident claims across different collision types. Vehicles equipped with ADAS experience a significant 39.3% reduction in frontal accident claims and an 18.4% reduction in side impact accident claims. However, there is a slight increase of 4.4% in rear accident claims for ADAS-equipped vehicles.

Parts Basket with and without ADAS

A parts basket refers to a consolidated list of components used to estimate vehicle repair costs after an accident. It helps insurers, workshops, and manufacturers understand the total financial impact of a claim. In this study, the comparison highlights the differences in repair costs between ADAS-equipped and non-ADAS vehicles.

The analysis sampling focuses on selected models, namely the Proton X50 (2023) and Mazda CX-3 (2023), which include both ADAS and non-ADAS variants. This allows for a consistent comparison within the same model range.

The findings show that body repair costs are generally similar between both variants. However, when ADAS components are damaged, repair costs increase significantly due to the need for specialised parts and calibration.

	Proton X50 Flagship 2023	Proton X50 Standard 2023	Mazda CX-3 2.0 High 2023	Mazda CX-3 1.5 Plus 2023
ADAS The parts basket consists of replacement ADAS components such as ECU, Radar, Camera, Sensors, etc.	TOTAL RM 10,113	TOTAL -	TOTAL RM 17,783	TOTAL -
BODY REPAIR The parts basket consists of replacement body repair components such as Bumper, Headlamp, Bonnet, Fender, Radiator, etc.	TOTAL RM 14,394	TOTAL RM 14,048	TOTAL RM 16,508	TOTAL RM 15,451
	RM 24,507	RM 14,048	RM 34,291	RM 15,451

In summary, ADAS provides clear safety benefits by reducing accident frequency and improving collision outcomes. However, these benefits come with higher repair costs when accidents occur. This highlights the dual impact of ADAS, enhancing road safety while increasing the complexity and cost of vehicle repairs.

Moving Forward

ADAS market penetration in Malaysia remains relatively low compared to non-ADAS vehicles. However, the increasing share of new vehicles equipped with ADAS is expected to contribute to a continued reduction in accident frequency.

As adoption grows, the cost of replacement parts may gradually decrease due to higher production volumes and improved availability. For rear-end collision, although the current data shows a slight increase, with the growing trend, we may see the inverse effect.

With more vehicles equip with ADAS, these patterns are expected to change. Ongoing monitoring and future analysis will be important to better understand how ADAS influences accident trends and collision outcomes over time.

