

## MyMAP: World's First Holistic Rating System for Motorcycles

Z. H. Zulkipli\*, N. K. Alias, A. Omar, D-W. Kak, M. S. Abdul Khalid, A. S. Amir, M. N. Mahmud, Z. M. Jawi and K. A. Abu Kassim

Malaysian Institute of Road Safety Research, 43000 Kajang, Selangor, Malaysia

\*Corresponding author: [zarirhafiz@miros.gov.my](mailto:zarirhafiz@miros.gov.my)

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MyMAP is the first of its kind and aims to stimulate healthy competition among motorcycle manufacturers towards safer designs, as well as to give the public more information when considering purchasing a motorcycle. MyMAP is additionally unique to other initiatives in the field as it introduces assessment criteria for the manufacturer's effort towards educating and supporting the buyer on safe riding practices. This paper will discuss the vision, strategies, and challenges faced in establishing the program.

Graphic: Assoc. Prof. Ahamad Tarmizi Azizan (Atan Af) is a senior lecturer in Arts at Universiti Malaysia Kelantan (UMK), and the founding President of the ASEAN Digital Art Society (ASEDAS).

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## *Background*

The New Car Assessment Program has been the gold standard for evaluating vehicles' safety aspects. First created in 1979 by the United States National Highway Traffic Safety Administration, its success at reducing crash fatality and injuries by encouraging better safety design and customer awareness (Kahane, 2015) led to its widespread adoption to other countries, like the European Union Countries (Euro NCAP), Australia and New Zealand Australasian ANCAP, and Japan with JNCAP. Malaysian Institute of Road Safety (MIROS) pushed for a similar program catering for the South-East Asian market, first with the locally focused Malaysian Vehicle Assessment Program (MyVAP), culminating in the formation of ASEAN NCAP in 2011.

Nowadays, thanks to the program's attentive focus on the performance of vehicular safety technologies as well as improved consumer information schemes, most vehicles that enter the ASEAN market have achieved at least four stars rating out of five (Abu Kassim et al., 2019). However, the majority of NCAP around the world so far only focusing on improving the safety of passenger cars, while most road fatalities and injuries actually occur among motorcyclists, especially in South-East Asian countries. Worldwide, powered two-wheeler (PTW) deaths account for 23% to 28% of all road fatalities between 2013 and 2016 (WHO, 2015). Southeast Asian countries contributed the most to PTW fatalities compared to other countries with 43% death – whereas, in Malaysia, 62.7% of road deaths were among motorcycle users (PDRM, 2017).

There are many reasons why there is yet specific vehicle assessment program such as NCAP for motorcycles, chief among them being that it is primarily a crash test-driven program. This destructive method of testing is suitable for larger vehicles that protect passengers within their cabin structure, allowing features of the structure itself to play a part in mitigating crash injuries alongside other passive and active systems. Whereas a motorcycle rider is not secured to the bike and is likely thrown from the vehicle in a crash, thus the structural integrity of a motorcycle will not benefit the rider. Instead, a safety rating for motorcycles should emphasize more on other crash prevention features. Nevertheless, it is undeniable that most NCAPs have already introduced motorcycle safety technology as part of their assessment point for ratings which could help reducing passenger cars against motorcycle-related crashes. Though, the technology introduced such as blind spot sensors, it is still from the perspective of a passenger car. Thus, NCAP metrics are not simply transferable towards motorcycle assessment without some considerable paradigm shifts.

There is currently no systematic rating system for motorcycle safety in the world that assesses using scientifically rigorous methodologies. At most, there is only consumer reporting on user satisfaction (Charles, 2016), which is understandably subjective and may not accurately reflect its actual safety aspects. There are however scientific tests for motorcycle safety equipment, such as helmets (Department of Transport, n.d.; Transport for NSW, n.d.) and riding jackets (MotoCAP, n.d.; Transport Accident Commission, 2018). Thus, equipped with the experience of establishing MyVAP and subsequently ASEAN NCAP, MIROS together with the Malaysia Automotive, Robotics and IoT Institute (MARii) set forth to formulate a suitable rating system for motorcycles, resulting in the launch of the Malaysia Motorcycle Assessment Program (MyMAP).

### *Vision & Mission*

MyMAP's vision is to achieve safer mobility for all motorcycle users in Malaysia - and for its success be an exemplar for other countries to follow and improve upon, especially throughout the region with its heavy proportion of motorcycle users and beyond.

Its mission, on the other hand, is to spearhead the utilization of safety technology on motorcycles and enhance consumer awareness regarding riding safety (MIROS, 2021; Abu Kassim et al., 2021). Such goals are in line with the National Automotive Policy (NAP) to promote the adoption of the latest technologies, R&D activity, and emphasis on consumerism as the means to enhance road user safety and reduce road traffic deaths (MIROS, 2021). To obtain a good rating for their products, manufacturers shall offer the best possible technology as standard in all segments, stimulating the entry of safer motorcycles into the market. MyMAP also aims to empower consumers to make informed purchasing decisions about safer motorcycles with comprehensive and objective but easy-to-understand rating information.

Key among the objectives of MyMAP is the design of safer motorcycle chassis and critical components such as brakes, tires, and speed control devices (MIROS, 2021). Additionally, increased rider visibility would also be part of the agenda for design improvements, concordant with NAP as prescribed by the Ministry of International Trade and Industry (MITI) and MARii.

Through this program, MIROS aspires to achieve the same level of success that had been made through ASEAN NCAP in improving vehicle safety in ASEAN. This program is expected to build upon the work of ASEAN NCAP to push the safety aspects further for motorcycles in terms of:

1. Enhancing motorcycle safety in Malaysia;
2. Showing that an integrated approach is vital for improving motorcycle safety;
3. Promoting key technologies which will elevate motorcycle safety level;
4. Encouraging healthy competition across the motorcycle industry to adopt the latest safety technologies; and
5. Supporting and contributing to the UN's Global Sustainable Development Goals.

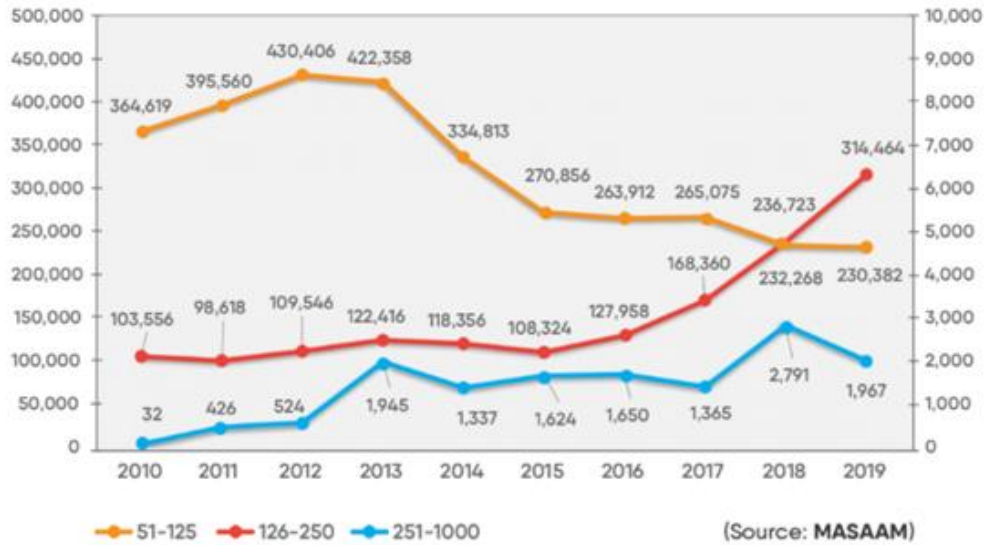
It is hoped that MyMAP could set an example to other parts of the world as one of the effective initiatives in solving motorcycle safety issues.

### *MyMAP Strategy*

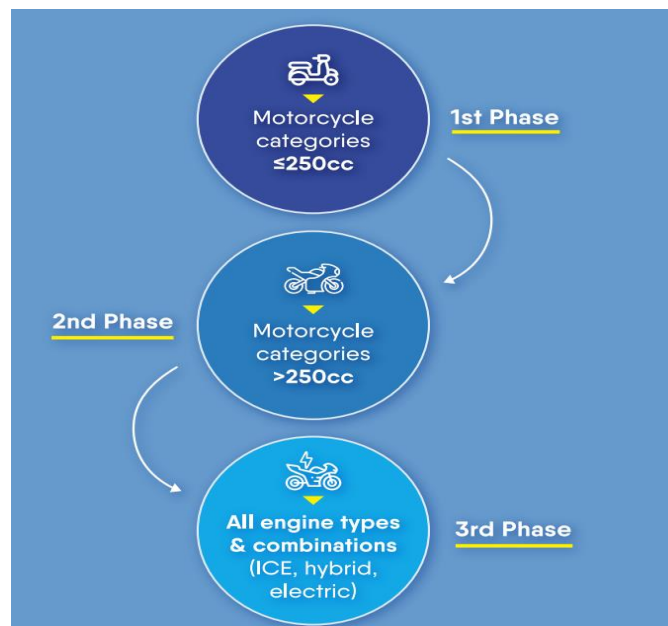
Based on the Total Industrial Volume (TIV) data on motorcycles in Malaysia, it is reported that low engine capacity motorcycles (250cc and lower) are the most popular type of motorcycle, dominating more than 99% of the market share compared to those with higher engine capacity for 2010 – 2019 as shown in Figure 1.

The price tag of low cc motorcycles (< 250cc) is usually low, making them more appealing to budget-conscious consumers. To keep a more competitive price, manufacturers tend to compromise on advanced safety features to drive costs down to compete against cheaper alternatives. This marketing strategy exposes the low cc motorcycle with greater crash and injury risk without the protection of more advanced safety features. Thus, we proposed to implement MyMAP to promote safety elements as a new dimension of market strategy,

focusing on low cc motorcycles in the first phase of the program. We will expand the evaluation scope to more categories of motorcycles by phase as shown in Figure 2.



**Figure 1:** Total Industry Volume (TIV) in Malaysia by engine capacity



**Figure 2:** Scope of the assessment based on phase

Unlike passenger cars, manufacturers have fewer options to incorporate passive safety elements into motorcycles. MyMAP cannot directly adopt the NCAP approach in evaluating vehicle performance, using the crash test. Therefore, MyMAP put more focus on active safety features and safe riding behavior for crash prevention. Taking this into consideration, we have developed four foundational pillars of MyMAP, which are compliance with UN Regulations, conformity of production, safety features, and support program. The details for each pillar are shown in Table 1. MyMAP uses the same 5-star grading system as NCAP and each pillar carries a certain weightage to the total points as illustrated in Table 2.

**Table 1:** The four pillars of MyMAP in brief

<p><b>1. Compliance to UN Regulations</b> refers specifically to United Nations Economic Commission for Europe (UNECE) under the 1958 Agreement, which provides specific requirements that need to be met — either fully against the latest version of the regulation, or partially using an earlier version — which is assessed and certified by an Approval Authority or using relevant test reports issued by Listed Technical Service. The specific UNECE clauses for this purpose that has been mandated in Malaysia fell under the category of Active Safety, General Safety, and Environmental Effects.</p> <p><b>2. Conformity of Production</b> is a continuation of the First Pillar, assessing the conformance of safety products in line with their technical specifications, as well as observance of Standard Operating Procedures in the assembly line. System test verifications are also performed, to ensure the assembled products do functionally fit together well. Traceability is also audited, to prove that the product level of change is trackable.</p> <p><b>3. The Safety Features</b> pillar focuses mainly on three aspects: the braking system, lighting system, and additional safety features. A good braking system ensures shorter stopping distance and better stability in avoiding hazards. A good lighting system not only improves the rider’s sight distance and also ensures better conspicuity, especially in mixed traffic and nighttime. Additional safety features are a catchall category for any other systems that assists the rider’s safety. MyMAP awards bonus points to the motorcycle with additional safety features, which are subjected to proper justifications and prior information to the auditors.</p> <p><b>4.</b> Lastly, the <b>Support Programme</b> can be broken down into three sections, which are motorcycle riding training, safe riding information, and riding personal protective equipment (PPE). Training refers to either physical lessons or video that educates the motorcycle user towards safer riding practices. Safety Information on the other hand is any other medium used to share information to the user, such as riding booklet or motorcycle riding tips. Finally, points will be awarded if there is complimentary PPE (such as helmet, glove, safety vest) given upon purchase of the motorcycle.</p>
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**Table 2:** Point distribution for the four pillars

PILLARS	POINTS
Compliance to UNECE Regulations	0.50
Conformity of Production	1.50
Safety Features	2.50
Support Programme	0.50
<b>TOTAL</b>	<b>5.00</b>

Anti-lock Braking System (ABS) is a safety system that prevents the wheels from locking up (stops spinning) while the car is still moving. The system ensures the driver has control of the car. As the wheels continue to rotate, the car can move in whatever direction the driver is facing. ABS was initially introduced on high-end vehicles in 1978 and has been required on all new passenger cars sold in the European Union (EU) since 2007.

MyMAP emphasized the inclusion of ABS in a motorcycle, as the technology has sufficiently matured, and the cost has been reduced tremendously since its first introduction for motorcycles in the early 1990s. Many countries around the world had made the ABS mandatory due to its effectiveness in reducing crashes and fatalities. Previous studies in Germany, India, and Indonesia show that ABS helps reducing motorcycle crashes by 26, 33, and 26 percent respectively (Kumaresh et al., 2017). Thailand also projected that within just three years of implementation, mandatory motorcycle ABS would save between 1,200 and 1,800 lives as well as provide an economic return of 31-46 billion THB (Seetamanoch et al., 2019).

Besides ABS, MyMAP also pays special attention to implementations of other safety technologies such as:

1. **Other Braking solutions** such as Combined Braking System and Advanced Emergency Braking System;
2. **Support Programs** which include training and education, as well as Personal Protective Equipment (PPE);
3. **Rider Assistance Technology**, such as Telematics, Advanced Driver-Assistance Systems (ADAS), and battery safety, as well as
4. **Vehicle Sensing and Cognition Technology**, which includes Light Detection and Ranging (LiDAR), Radar, Adaptive Cruise Control (ACC0, and Inertial Measurement Unit (IMU).

Motorcycle visibility is also a pressing concern, as the majority of motorcycle crashes involve drivers not seeing the motorcycle until too late. Thus, it is crucial to emphasize the motorcyclist's capabilities to see and be seen (Och & Buche, 2010). The regulatory enforcement for Daytime Running Light (DRL) is meant to increase rider conspicuity, with continuous development to improve rider vision, visibility, and the lighting signature of motorcycles (IMMA, 2019). Other related technologies for this purpose include retro-reflective material (e.g. tires), hazard light, adaptive headlight, and blind-spot technology.

The inclusion of Support and Educational Programs as one of the MyMAP Pillars is especially noteworthy, as this has never been done before in other rating systems. The rationale behind it is the realization that the human factor plays a bigger role for motorcyclists relative to the motorcycle's other safety systems, compared to the driver of a larger vehicle that can fit more safety technologies within the vehicle's design. Although motorcyclists have received competency training as part of the process of getting a riding license, MyMAP's Support Program encourages motorcycle manufacturers to provide supplemental safety knowledge, which includes proper braking techniques and some defensive riding skills.

The Support Program pillar further awards bonus points to any manufacture that is willing to provide Personal Protective Equipment (PPE). Despite its proven effectiveness at saving motorcyclist life and reducing injury severity (de Rome et al., 2011), PPE (other than the regulatory safety helmet) is rarely worn by low cc motorcyclists, likely due to cost or inconvenience. Therefore, this pillar aims to promote more usage of PPE among motorcyclists

by giving it to the buyer upon purchase. At the end of each motorcycle model’s assessment process, MyMAP star rating shall be awarded according to a scale of 1 to 5, as illustrated in Table 3.

**Table 3:** MyMAP star rating point demarcation

POINTS	STARS
4.50 - 5.00	★ ★ ★ ★ ★
3.75 - 4.49	★ ★ ★ ★
3.00 - 3.74	★ ★ ★
2.00 - 2.99	★ ★
1.25 - 1.99	★

### *MyMAP’s Inaugural Rating*

For the first iteration of the program, MForce Bike Holdings Sdn. Bhd. had volunteered for their SYM VF3i LE 185 model to be assessed. This model is especially noteworthy for being the first of its class (sub 250cc) to incorporate an Anti-Lock Braking (ABS) system, a feature that is normally present only on more premium higher cc models.

The assessment process was carried out by audit teams from MIROS’ Vulnerable Road User Safety and Mobility Unit (VRUM), which consisted of six auditors and was supervised by an Audit Advisor and Lead Auditor. Guided by the four Pillars, documentations and certifications were assessed for compliance with UNECE regulations, the production line was inspected for conformity to standard operating procedures, as well as for parts comparison against technical drawings. This being our first foray, there were no systematic performance tests done on the parts nor the whole finished product itself, although such tests are indeed in the pipeline for the future. The pilot program was concluded with the SYM VF3i LE 185 model achieving 4.62 points total out of 5, garnering it a 5-star MyMAP rating.

### *MyMAP Challenges*

**Consumer Perception** – Due to NCAP’s worldwide fame, the public might misconstrue MyMAP’s star rating to mean the same thing, i.e. as primarily a measure of the motorcycle’s crashworthiness. Although for NCAP, higher star ratings do correlate to better crash survivability (Kullgren et al., 2010) the same might not necessarily be true for MyMAP, due to its different emphasis. MyMAP’s rating system also does not cover reliability aspects of the vehicle, nor does it take into account customer satisfaction, which is usually handled by long-term aftermarket surveys. This confusion of purpose can be minimized by increasing public awareness of MyMAP’s scope.

**Industry Participation** – As a voluntary program, participation from the industry is key to make MyMAP work. Incentives offered by joining the program are pivotal to attract manufacturers. Fortunately, MARii has come on board to support the program. MARii, under the purview of the Ministry of International Trade and Industry (MITI), had promised to offer tax incentives to manufacturers that had achieved a star rating.

**Aftermarket Issues** – The biggest problem foreseen with MyMAP is the aftermarket scenario. As motorcycles are relatively cheap compared to passenger cars, motorcycles are often easily modified by the user after being bought, potentially compromising - or worse, circumventing, as is often the case with speed limiters – the performance of any factory-installed security features. Thus, had the motorcycle safety performance failed, the rating could come under attack although the reason could stem from the unsafe modification. Moreover, whereas passenger car safety performance benefits would show in the event of a crash (such as airbags, crumple zones, and passenger cabin reinforcements), motorcycle safety performance would not have the same pronounced effects. Compared to passenger cars, motorcycles are usually operated beyond their capability, thus reducing their safety performance and reliability.

**Budgetary Constraints** – MyMAP is currently wholly funded by MIROS alone. Should more elaborate testing mechanisms be introduced (such as destructive tests), this requires an increase in budget, to afford suitable testing facilities. Currently, there is no monetary support from other agencies yet. To sustain and expand this program, more partners need to be engaged, up to and including Global NCAP to leverage upon their experience and expertise. Non-monetary support is also needed from various agencies, technical partners, and road safety initiatives from around the world, as evidenced by the ASEAN NCAP endeavor (Jawi et al., 2013).

**Test Facilities** – In this preliminary phase of MyMAP, there is no performance test being included partly due to the fact there are no suitable test facilities to perform the test. The oncoming test facilities planned by MIROS will enable various motorcycles to undergo a more comprehensive test. Among the test that can be done are braking performance tests, handling, and some other safety technologies that are available on motorcycles.

### *Conclusion*

The launch of MyMAP marks another effort from the government to tackle motorcycle safety issues in the country. This program hopes to build upon the success of ASEAN NCAP to further push the safety improvement on motorcycles via technology advancement and breaking the mould on new approaches, such as more elaborate support programs. By being a voluntary program, MyMAP fills in the middle niche between government regulations and market demands, being informed by both ends while still providing an objective set of measurements and targets that manufacturers can aim for and customers can evaluate against.

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