

The Reality of Traffic Safety Management and Implementation Procedures in Algerian Cities : The Case of the City of M'sila

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Abstract : Traffic safety and its management methods are considered one of the most important elements that must be taken into account in cities, and are also considered an important prerequisite for their efficiency, as their importance increases through global and local trends calling for improving traffic safety management for them, as they are among the social, economic and health problems associated with cities, as this translates To pay attention to procedures that work to enhance its concept in city planning, and give it additional characteristics that will improve the quality of life in cities. This study aims to identify the reality of traffic safety management in the city of M'sila, through a set of its own procedures, relying on the methodology of Gap Analysis Checklist, through it, the percentage of implementation of its procedures is known and the size of the resulting gap is determined, as the overall average compliance rate reached 51.43%, which led to a gap of 48.57%. Therefore, it is necessary to implement some measures to improve traffic safety in the city of M'sila, based on realistic, reliable, updated and analysable data regarding the reality of traffic safety management in the city of M'sila.

Keywords: Traffic safety; Traffic safety management; Necessary procedures; M'sila city

1. Introduction

Traffic accidents in the world are considered one of the most prominent and dangerous contemporary problems that hinder the development of societies, due to the resulting social and human losses and great economic costs [1], Which is reflected in the high rates of injuries, deaths, vehicle damage, and mental and health diseases [2], The World Health Organization and the World Bank also confirm that traffic accidents are the second leading cause of death among the world's population, with the cost of injuries resulting from traffic accidents in developing countries estimated at \$65 billion annually, Therefore, attention must be paid to traffic safety and giving it the necessary priority is indispensable, because of its great importance in saving lives, reducing injuries, avoiding car repair costs in the event of accidents, etc [3], This is what the United Nations system and its member states recognized the need to improve traffic safety nearly 60 years ago, during which global and regional organizations implemented a wide range of traffic safety measures in cities, including the United Nations regional committees and the World Health Organization and the World Bank [4], The heads of state in the United Nations General Assembly for the 2030 Sustainable Development Plan also adopted a set of goals for traffic

safety due to its importance to human health, safety and life [5].

Element 6 of Goal 3 of the 2030 Sustainable Development Goals related to the right to health, which aims to halve the number of deaths and injuries resulting from traffic accidents, and Element 2 of Sustainable Development Goal 11 related to making cities and human settlements inclusive, safe and attainable by the year 2030 [5].

The World Health Organization also considered, in its global report on the status of traffic safety issued in 2015, that including such an ambitious target for traffic accident deaths (reducing traffic accident deaths to less than half) within the sustainable development goals is considered a major progress in terms of traffic safety, Rather, it reflects a growing recognition of the significant toll caused by road traffic injuries, Traffic collisions constitute the main cause of death for those between the ages of 15-29 years, and in recognition of the heavy burden they place on national economies and families, as well as recognition of the strong scientific database and its impact in reducing the number of injuries resulting from traffic accidents [5]. Accordingly, most international countries, in the field of improving the application of traffic safety, have established procedures, plans, and goals that they work to achieve and follow up in order to reduce traffic

accidents, and thus reduce the number of injured and killed, An example of this is Britain, which worked to set a national goal for the year 2010 in 2000 to reduce by 40% all fatal traffic accidents and injuries, and by 50% for children based on the average achieved during the period 1994/1998, where the goal was based on an experimental basis using the method Bottom-up analysis examined trends in traffic accidents and the rates of those accidents per kilometer by road users [6], The impact of potential measures was assessed taking into account different traffic growth and policy implementation scenarios, and one of the sub-objectives of Unique Great Britain was to significantly reduce human casualties in areas lacking social concern [6], Therefore, traffic safety measures were integrated with the government's priorities in the field of social policy to improve social welfare services in these areas [5], The number of deaths and serious injuries decreased by 40% by 2008 and the goal of 2010 was achieved, The goal of reaching the death rate to 50% among children was also achieved, and the rate of deaths and serious injuries decreased to 59%, However, the decrease in deaths to 29% indicates Failure to achieve the required percentage for serious injuries, as consultations were held regarding setting new goals for the year 2020, specifically for deaths and serious injuries separately [5].

With the rapid urbanization of cities through the increase in their population numbers, these challenges have become more difficult, and Algeria, as part of this world, suffers from the problem of traffic accidents and the accompanying number of injuries and deaths every year at an increasing rate, despite its awareness of the importance of traffic safety and its role in confronting, The scourge of traffic accidents, It ranks third, after Egypt and the Kingdom of Saudi Arabia, with regard to the number of deaths caused by traffic accidents in Arab countries [7], Statistics indicate that the number of traffic accidents amounted to 4,699 accidents, which led to the death of more than 3,600 people and the injury of about 9,000 people in 2013, Road users bear responsibility for not respecting the traffic law, especially excessive speed, dangerous overtaking, and traffic violations, as well as loss of control by a percentage of no less than 90 %. Of the total traffic accidents [8], Accordingly, a set of steps and procedures were taken, the latter of which resulted in the establishment of the National Commission for Road Security and defining its nature and tasks in accordance with Executive Decree No. 303/19 issued on November

17, 2019, as an authority responsible for traffic safety [8].

According to the latest statistics of the National Delegation for Road Security in Algeria, the state of M'sila occupies first place in terms of traffic accidents and deaths during the year 2020, as it witnesses high risk rates compared to global and national rates, with a count of 798 traffic accidents, in which many citizens, estimated at 125, were killed dead (National Delegation for Road Security, 2023), Its danger is reflected in all segments of society, so it must be confronted by putting in place the necessary measures to reduce it, and reduce its social, health and economic impacts, through traffic safety management operations and the application of its procedures, The latter is considered:

- A specialized process carried out by engineers specialized in traffic safety, which includes continuous evaluation of traffic safety on existing roads, during design and implementation or afterward [9], In order to identify the various traffic safety risks that may affect road users and thus determine the necessary traffic safety improvement measures [10].

- An organized commitment process to achieve a project plan, carried out by a team of auditors in the risk conditions for the possibility of traffic accidents for all road users [11], It is also considered an effective tool for identifying defects related to the reality of traffic safety on the roads, and therefore it is a preventive tool that gives an official report on the existing deficiencies and works to raise and improve the level of traffic safety [12].

The importance of traffic safety management and the extent of its application in the city of M'sila stems from the necessity of diagnosing its current reality, given the continuous increase in traffic accidents and the large number of their victims in the city, along with identifying their causes (Identifying the application gap), in order to facilitate the process of improving its management and improvement procedures [13], As well as helping decision makers in how to implement it according to a set of procedures [14], In this context, there are a set of measures to improve traffic safety and implement them in cities, through a system that is compatible with work to prevent traffic accidents and reduce deaths [15], To achieve the strategic goal of 1.5 deaths per 100,000 population in 2030 [16], This program consists of a set of axes and indicators that make up the specification model, See (Figure 1).

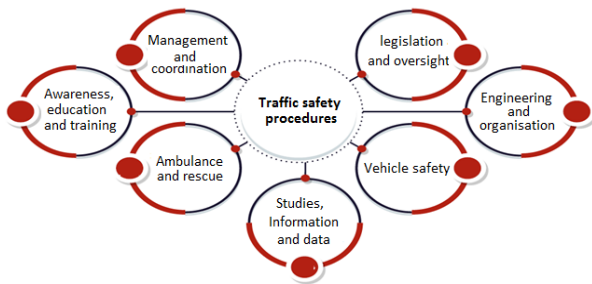


Figure 1 : Traffic safety procedures
Source : Authors, 2023

2. Materials and methods

2.1. Presentation of the study area

The city of M'Sila, which is the case study, is located in the central part of Algerian territory, within the Hodna Basin, it is also located within the following geographical coordinates between two circles of vision '35.48', '35.67' north of the equator. Between linear longitude '4.57', '4.48' east of Greenwich meridian [17], 100 km away from the Mediterranean Sea, and about 460 m above its surface, Two important and main national roads pass through it : National Road No. 40, which connects the state of Bordj Bou Arreridj and the state of Djelfa, and National Road No. 45, which connects the state of Batna and Algiers, Which are characterized by large traffic, The state of M'sila also has borders with 7 states, which gives the city of M'sila special mobility and a significant strategic position, as it is considered a link between the Algerian east and west, as well as its north and south, which inevitably negatively affects the traffic aspect of the city and thus exacerbates the traffic problems on top of which Traffic insecurity (Figure 2).

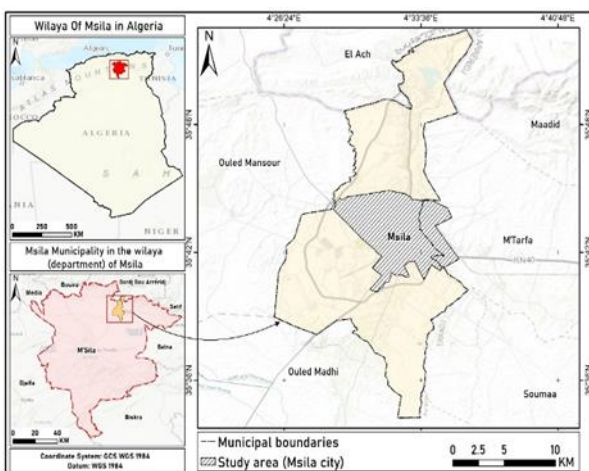


Figure 2 : Location of the field of study City of Msila
Source : Treatment of the researchers by Arc Map
10.2.2, 2023

2.2. Methodology

The research relied on the case study approach, as it is the approach characterized by accurate detailed description of relevant information [18], In addition to its many features, in terms of its ability to combine more than one research method at the same time [19], Which is represented by observations, personal interviews, using checklists, and directly asking observations and inquiries for the purpose of obtaining the required data and information that the research requires in order to reach the desired goals [20].

Due to the nature of this forward-looking and future research, which aims to study the reality of traffic safety management in the city of M'sila, and analyze the necessary measures that the city must take to implement it correctly, through an interrogation and analysis tool, which the user uses to interpret and explain the criteria and weight them [21], In order to clearly justify all traffic safety measures and the extent of their application, it was necessary to use a method suitable for this type of research, which is the method of collecting data and information in order to improve the procedures necessary to improve traffic safety based on the analysis of so-called traffic safety indicators, Through a set of mathematical methods, represented by the arithmetic mean, ratios, weights, and frequencies, in order to translate them into a quantitative expression to obtain greater accuracy in describing and analyzing a variable or group of variables from data and information, and thus making the appropriate decision sizes [22].

2.3. Materials

Given the nature of the research, the approach followed, and the time and resources available, the researcher found that the most appropriate tool is the gap analysis checklist, It is considered the most appropriate tool for studying the reality of traffic safety management and the extent of its application in cities to achieve the objectives of this research, as through this tool the data and information collected are summarized, diagnosed and analyzed for the purpose of describing the research variables because it depends on the field experience of the research site [23], Then, the actual reality of the Traffic Safety Department in the city of M'sila and the extent of its procedures are evaluated based on experts' answers, field observations, interviews, and official documents, and based on that, conclusions can be determined, Through which recommendations and proposed solutions can be developed in a more realistic way.

The checklist for traffic safety programs applied in a group of countries is also used to analyze the necessary measures that the city must take in properly managing traffic safety, as it is considered an interrogation and analysis tool that the user uses to interpret and explain the standards and weight to them [24], It is an Excel spreadsheet that forms an analysis network using weighted criteria, in a clear and educational manner, that constitute traffic safety procedures, as it aims to:

- Evaluate the level of effort you provide to officials regarding traffic safety procedures, as this evaluation is considered an assessment of the city in question whether it fulfils traffic safety procedures and cares about them.
- Educating various users about the systematic and multi-sectoral approach that the concerned administration must adopt in evaluating traffic safety procedures.
- The tool allows the city to identify the strengths and weaknesses of its traffic safety management and implementation procedures, thus allowing it to determine the required routes.

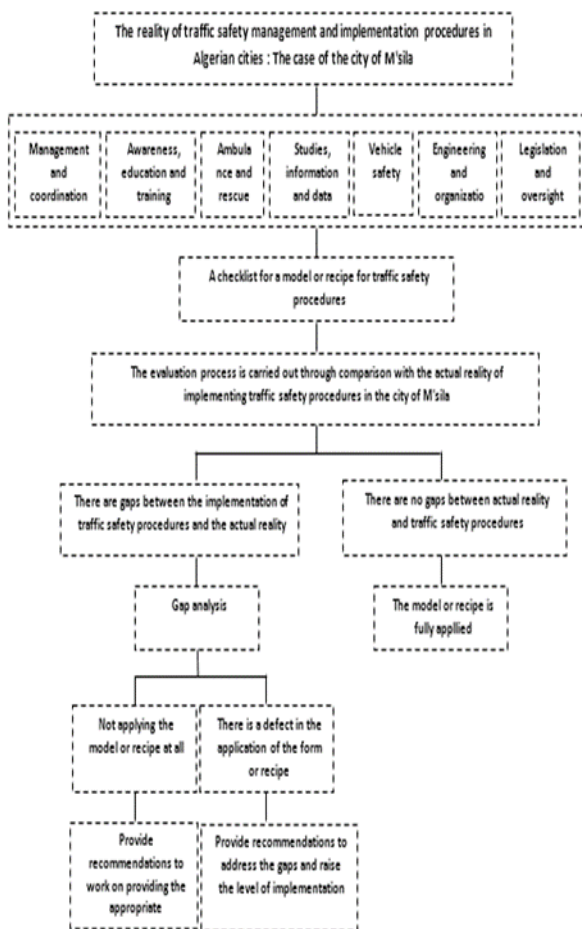


Figure 3. Study scheme
Source : Authors, 2023

3. Results and discussion

In order to reach the size of the gap at the level of all seven traffic safety procedures first and at the general level of the city of M'sila in the field of evaluating and analysing the necessary procedures that the city must take to properly manage traffic, A checklist was used, The percentage of conformity, which depends on the amount of the weighted arithmetic mean that we obtain (represented by the numerator), since (the denominator) is the highest degree on the scale is a fixed amount, is acceptable (partially applied, fully documented) Which is at a weighted arithmetic mean (3) and at its lowest level when its amount is (50%), where the size of the gap is at (50%), which is the degree of distance from the ideal state, which is represented by the percentage of matching range (100%), which corresponds to an arithmetic mean weighted by (6), The more the gap decreases due to improvement processes, the better it is and the closer it is to the situation (Completely applied and fully documented) In the same way we conduct calculations for the other variables, The results are shown in the following table:

Table 1. Five-point scale weights for the specification paragraphs

Sequence	Scope of application and documentation	Weight (grade)
1	Fully implemented and fully documented	4
2	Fully implemented and partially approved	3
3	Partial applicator, partial authenticator	2
4	Partially implemented, not documented	1
5	Not implemented Not documented	0

Source : Authors, 2023

The main and sub-items were adopted in constructing the checklist for the objectives of the Traffic Safety Department and the procedures for implementing them. The gaps in the city (M'sila City) will also be found according to the following equations:

- Equation (1) Arithmetic mean = sum (weights * frequencies) /sum of frequencies.

- Equation (2) Percentage of conformity = (weighted arithmetic mean) /value of the highest weight in the scale.

- Equation (3) Gap size for each checklist = 1 – percentage of conformity.

Table 2. A general summary of the extent of application of traffic safety management procedures

N	Programs	Weighted rate	Percentage of application	Gap percentage
1	Legislation and oversight	2.6	65	35
2	Engineering and organization	1.32	33	67
3	Vehicle safety	2.75	69	31
4	Studies, information and data	0.78	19	81
5	Ambulance and rescue	1.55	39	61
6	Awareness, education and training	3.25	81	19
7	Management and coordination	2.14	54	46
General Average		2.06	51.43	48.57

in the city of M'sila

Source : Traffic Safety Programs + Authors Processing, 2023

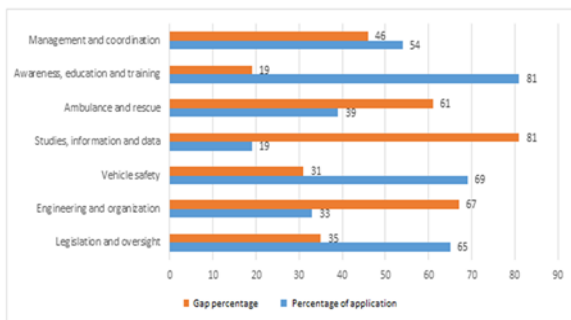


Figure 4. A general summary of the extent of application of traffic safety procedures

Source : Traffic Safety Programs + Authors Processing, 2023

Through the previous table and figure, we found that the results of the actual evaluation of traffic safety management and its procedures in the city of M'sila and the extent of their application, the overall average was 51.43%, which resulted in a gap of 48.57% due to the lack of application of some procedures related to traffic safety management in the city, and therefore the degree of their application is Half applied as shown in (Figure. 03), which is represented by the linear scale of the degree of application.

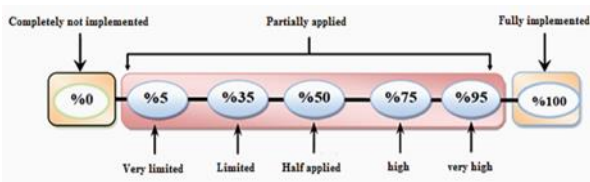


Figure 5. A linear measure of the degree of implementation of traffic safety prcedures in the city of M'sila

Source : Authors, 2023

Accordingly, the following points were recorded:

3.1. Legislation and oversight

It is clear to us from the previous table, which refers to legislation and oversight, and through the interviews we conducted with various stakeholders in traffic safety management, and regarding the extent of conformity with the objectives and procedures shown in (Table. 2), that it becomes clear to us that the element of legislation and oversight is relatively high through the degree of their application, the weighted average is 2.6, with an application rate of (65%), as almost all of the program's procedures indicate that they are fully implemented and fully or partially documented, However, there is still weakness in the application of traffic safety procedures, which formed a gap of (35%), Therefore, we concluded that:

❖ **Strengths:** There are strong points that enable the city of M'sila to manage traffic safety efficiently and effectively, and they are fully implemented and fully documented as follows:

- increasing penalties for those who commit serious violations that cause accidents.
- Amending the regulating legislation, so that the pedestrian road user bears responsibility for his mistakes.
- Focus on controlling dangerous moving violations that contribute to accidents.
- Good deployment of oversight devices and the use of mobile monitoring methods to control violations.
- Tightening control over vehicles transporting hazardous materials, public transportation, and student buses.

❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, which are as follows:

- Implementing the traffic points system.
- Amending and reconsidering the joint responsibility between the driver and the vehicle owner.
- Expanding the use of automated monitoring.

3.2. Engineering and Organization

The Engineering and Regulation Program indicates good management of traffic safety and the extent of application of its procedures, which was very low. The evidence for this is that the weighted rate is 1.32 (33%) and that almost all of the procedures related to the objectives indicate that they are not applied and not documented, which indicates the presence of A gap of (67%), as shown in (Table. 2), Therefore, we concluded from the previous table:

❖ **Strengths:** There are strong points that enable the city of M'sila to manage and improve traffic safety, and they are fully implemented and fully documented as follows:

- Classifying roads and linking them to road safety requirements.
 - Using traffic calming methods in residential areas.
 - Promoting the concept of shared transportation by requiring public schools and universities to provide transportation for students and directing government and private institutions to provide public transportation services to their employees.
 - Developing public transportation and encouraging citizens to use public transportation.
- ❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, which are as follows:
- Conducting an engineering assessment of existing roads and intersections and managing them.
 - Applying criteria for classifying dangerous sites according to their frequency and degree of danger.
 - Identify locations of recurring incidents and address them according to priorities.
 - Subjecting new road construction projects to international specifications and conducting traffic audits.
 - Study and improve the level of traffic safety in the vicinity of schools.
 - Implementing technical specifications for the design, operation, maintenance and management of the road network.
 - Preparing a comprehensive urban plan for cities and villages for urban expansion areas.
 - Linking the issuance of construction permits to government institutions and major commercial complexes with traffic impact studies.
 - Reducing the percentage of individual ownership of various modes of transport by merging individual operators in the land transport sector with qualified companies and creating a comprehensive plan.

3.3. Vehicle Safety

From the table above, which shows the vehicle safety program, the degree of implementation of its objectives and procedures, raising their technical level, and encouraging the availability of public safety means for imported vehicles has been achieved greatly, as the weighted average is 2.75 with an application rate of (69%), as most of the procedures related to the objectives almost indicate It is fully implemented and

fully documented, as a gap of (31%) was recorded, Therefore, we concluded from the previous table:

❖ **Strengths:** There are strengths that enable the city of M'sila to improve traffic safety management efficiently and effectively, and they are fully implemented and fully documented as follows:

- Developing periodic technical inspection of vehicles.
- Conduct regular inspections of vehicles on the roads.
- Updating the specifications of vehicles transporting hazardous materials.
- Reconsidering the operational lives of all modes of public transport and trucks, expanding their replacement modernization, and reconsidering the import of used vehicles and spare parts.
- Developing training programs to qualify workers in the field of vehicle maintenance.

❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, as follows:

- Providing customs and tax exemptions for safety devices in vehicles, such as multiple airbags, brake systems, and tires.
- Establishing controls for licensing car maintenance workshops and their workers.

3.4. Studies, information and data

Through the previous table, which indicates the element of studies, information and data related to traffic safety management and its procedures, and in view of the interviews that we conducted with the frameworks of the Directorate of Civil Protection for the state of M'sila and the extent of conformity with the goals and procedures in the city of M'sila, we found that the weighted rate is (0.78) with an application rate (19%) , as almost all of the procedures related to the objectives for this element indicate that they are not implemented and not documented, or are partially implemented and not documented, which resulted in a very large gap of (81%), Therefore, we concluded from the previous table:

❖ **Strengths:** There are strengths that enable the city of M'sila to improve traffic safety management, and they are partially implemented and partially documented as follows:

- Establishing a central traffic database that collects transportation, road, traffic, and accident information.

- Cooperation in universities and research and consulting centers in the field of studies and research on road safety.
- ❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, as follows:
- Activate the location service (GPS) when preparing the accident plan.
- Developing a system to collect and analyse accident information.
- Developing an accident plan to include all the elements causing the accident.
- Expansion of electronic services and government services.

3.5. Ambulance and Rescue

It is clear to us from (Table 02) that the application of the goals and procedures for first aid and rescue for traffic safety is significantly low because most of the procedures indicate that they are not applied and not documented, and that the weighted average is (1.55) with an application rate of (39%), and a gap of (61%), Therefore, we concluded from the previous table:

- ❖ **Strengths:** There are strengths that enable the city of M'sila to improve traffic safety management, and they are fully implemented and fully documented as follows:
- Developing health care services for those injured at the accident site and during transportation.
- Adopting the global training plans ATLS for doctors and ATCN for nurses.
- ❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, as follows:
- Developing emergency center services to include the service of receiving the GPS location of the person reporting the accident by creating a smart application for reporting accidents.
- Adopting global training plans for service providers such as PHTLS.
- Creating a team specialized in emergency hospitals and centers around the clock.
- Finding CHICK LISTS protocols for dealing with infected people.
- Classification of the level of hospitals and trauma centers according to international standards.

3.6. Awareness, education and training

From (Table 2), which shows the awareness, education and training program and the extent of compliance with traffic safety objectives and procedures, and

through the personal interview that we conducted with the managers of the Directorate of Transport for the state of M'sila, it became clear to us that the weighted average is (3.25) with an application rate of (81%), which is a high percentage. There is still a gap of (19%), Therefore, we concluded:

- ❖ **Strengths:** There are strengths that enable the city of M'sila to improve traffic safety management, and they are fully implemented and fully documented as follows:
- Introducing traffic safety concepts into school curricula.
- Organizing awareness programs and holding training courses for school and university students to introduce road safety rules.
- Developing awareness-raising media campaigns that highlight the importance of adhering to road safety rules, And the danger of wrong behaviour.
- Review, evaluate and develop the training and examination methodology used for those seeking a driver's license.
- Reconsidering the conditions for licensing training centers and qualifying driving instructors.
- Developing driver training curricula.
- Qualifying drivers of public transport buses and school buses, and reviewing and amending the conditions for obtaining this type of license.
- Review and amend the conditions for obtaining a driving permit related to the type of transportation and the mode of transportation on which he will work, by adding the requirement to obtain courses specialized in the type of transportation on which he will work, before granting him a driving permit.
- ❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, as follows:
- Implementing the gradual system for obtaining driving licenses for novice and young drivers.

3.7. Management and coordination

From (Table 2) related to the management and coordination program, the degree of application of its procedures is applied in a relatively acceptable manner, as the weighted average is 2.14 with an application rate of (54%), as most of the procedures indicate that they are fully applied and fully documented, and partially applied and not documented, as was done, recording a gap of (46%), Therefore, we concluded from the previous table:

- ❖ **Strengths:** There are strengths that enable the city of M'sila to improve traffic safety management, and

they are fully implemented and fully documented as follows:

- Establishing a special directorate for road safety in each concerned authority to implement and implement what is stated in these programs.
 - Allocating part of the budget of the concerned authorities to implement their procedures.
 - Identifying a leadership body concerned with road safety and granting it the necessary powers to follow up on the implementation of the objectives of these programs, An example of this is the Supreme Council for Road Safety.
- ❖ **Weak points:** The city of M'sila has areas through which traffic safety management can be improved, as follows:
- Launching outstanding performance awards for entities participating in implementing road safety programs to create incentives and achieve positive competition.

4. Conclusion

Traffic safety, in its broad sense, aims to adopt all programs, plans, regulations, and preventive procedures to reduce or prevent traffic accidents, injuries, and deaths [25], This is due to the human, economic, social and psychological losses, which are reflected in the high rates of injuries, deaths, vehicle damage, and psychological and social diseases, which have become clear that they can be reduced through effective procedures that ensure better achievement of traffic safety and its management, as countries, represented by their cities, have adopted programmes, plans and procedures, It works towards reducing traffic accidents and achieving traffic safety.

This is something we did not notice in the city of M'sila, where the lack and limitations of traffic safety management appear through some of its procedures, which resulted in a continuous increase in traffic accidents and losses over the years and their varying degrees, that is, it was not applied in an integrated manner, as it includes different sectors and is part of the governance of its procedures, Which requires modifying and improving it through coordination and legislation, as well as financing and allocating resources, as well as promotion and monitoring with evaluation, research and development, and also the transfer of knowledge between various governmental and independent agencies and bodies while ensuring that responsibility is shared between them, according to an integrated approach aimed at improving traffic

safety management and implementing its procedures in the city of M'sila.

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