

**Failure To Advance and Implement Road Safety Initiatives Due to an Overbearing Institutional Actor: The Case of Red Light Cameras, the New Jersey Government, and the New Jersey Department of Transportation**

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **Introduction**

Despite significant advancements in traffic and transportation safety initiatives and technologies, United States traffic deaths are increasing (Leonhardt, 2023). These safety technologies' effectiveness depends on local institutions. The effectiveness of these technologies and initiatives is not always assessed. The amount of property damage, lives saved, and crashes reduced do not become apparent unless the safety initiatives that local institutions, such as local governments, are implemented and sustained. A particular case demonstrating the power and influence of local government upon transportation and road safety is that of the New Jersey Senate which elected to eliminate red light camera safety initiatives. A report from the New Jersey Department of Transportation revealed that the use of red light cameras would have resulted in a reduction in traffic deaths (Cichowski, 2018). The influence of the local government prevented information supporting the effectiveness of red light cameras from being disseminated as well. New Jersey is known for having three of the most dangerous traffic hotspots in the United States (Doyle, 2022). The state is also known for its abundance of road safety violations. Research regarding the consideration behind safety initiatives for adoption by local governments is not considered (Albalate & Yarygina, 2017). However, research regarding the general innovative effectiveness of safety policies and engineering is abundant and is unlikely to yield policy changes in comparison to traffic-specific policies.

Current research is focused on proving that road safety technologies such as artificial intelligence and image processing, are effective in ensuring road safety (Eskandari Torbaghan et al., 2022). While understanding the benefits of technology on road safety is informative, this research fails to take into account the power that institutions have in the implementation of road safety technology and initiatives. Understanding the power that institutions have in the adoption

of technology and safety initiatives provides an illuminating view of the increasing epidemic of traffic-related deaths and safety violations. Disregarding the power that institutions, such as the New Jersey Senate, possess ultimately leads to an incomplete understanding of the factors influencing road safety and may lead to a continued ineffective approach to implementing safety initiatives. Additionally, engineers, motorists, pedestrians, and the Department of Transportation (DOT) will remain insufficiently informed regarding the forces that prevent the ratification of traffic safety initiatives. This results in the improper allocation of time, resources, and funding by these consequential groups in the development of road safety initiatives and technologies. Furthermore, this hinders road safety and prevents the potential for safer roads to become a reality. Through the case of the consequential decisions made by the New Jersey government on road safety initiatives, I will use actor-network theory (ANT), a conceptual framework that quantifies social, technical, and natural factors through networks of interconnected relationships, to argue that government institution, rather than engineers, motorists, pedestrians, and the DOT, is a powerful actor that determines the adoption of road safety initiatives and technologies that could lead to a decreased number of traffic-related fatalities.

I will begin by defining the structure of ANT and use it to identify the important human and non-human actors within the New Jersey road safety network. I will use sociologist Michel Callon's definition of ANT, a method of relating heterogeneous associations among both human and non-human actors, to frame my analysis (Callon, 1987). Within the context of this case, I will provide evidence as to why government institutions fail to advance safety initiatives and why they dictate which initiatives are implemented. I will also show that the New Jersey government is the dominating actor that determines road safety by regulating the New Jersey DOT and by failing to enact potentially effective legislation. Due to the rejections of effective

policies and legislation, as well as the polarizing rhetoric among New Jersey lawmakers, the intended role of the government within the network becomes ineffectual and prevents the network from achieving its goal of ensuring the most effective approach to traffic safety.

### **Literature Review**

While the majority of scholarship regarding road safety is focused on technological developments and the efficacy of various safety initiatives and legislation, there is scholarly work that does analyze critical socio-technical factors and the relationships between them. This work does highlight the impact that a governing institution has on road safety. Gamero et al.'s paper provides an analysis of organizational factors that contribute to real transport safety (Gamero et al., 2018). They acknowledge that sociotechnical systems theory requires the acknowledgment of organizational factors, such as learning and training programs. They argue that transport organizations, unlike regulatory measures, are neglected in prior analyses of traffic safety. Through their analysis of logistic and road transport organizations in Spain, they found that in organizations where organization learning was encouraged, the likelihood of traffic accidents was reduced. While this does hint at the power that organizations have in promoting traffic safety, it fails to account for government institutions. Given that government institutions can regulate transportation organizations, this research fails to account for transport organizations influenced by the government and ignores the power government entities have in establishing initiatives among transport organizations.

Alternatively, Tavakkoli et al. performed an analysis of evidence regarding safety interventions and concluded that legislation and enforcement interventions are the most impactful in low and middle-income countries (Tavakkoli et al., 2022). They establish that the road transport system is flawed due to poor collaboration between stakeholders. While they do

demonstrate that funding, effective legislation, and government-backed initiatives do result in effective safety outcomes, they do not differentiate the government from other stakeholders within the transport system. However, unlike Gamero et. al, they indicate that more research is needed to understand the relationships between transportation system stakeholders.

In this paper, I will utilize the sociotechnical ideas of influence that are evident across these scholarly works to develop the assertion that the government, not transportation organizations, is responsible for effective changes in road safety through the context of the New Jersey government and by using actor-network theory (ANT) to provide a comprehensive and systematic analysis of the New Jersey Senate's decision not to adopt road safety initiatives.

### **Actor-Network Theory**

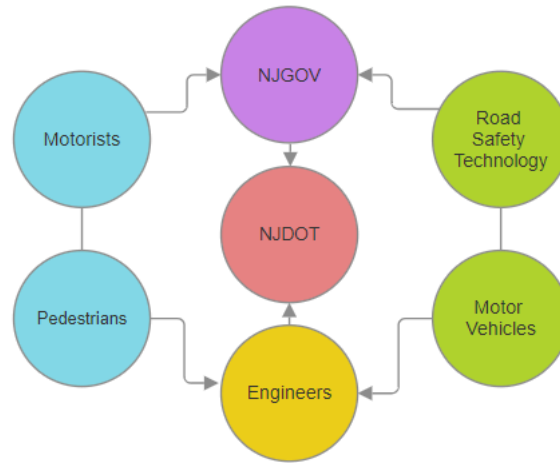
Actor-network theory (ANT) is a science, technology, and society (STS) concept that establishes an effective framework for evaluating the New Jersey transportation network as it allows for the assessment of the individual constituents and the relationships between them that comprise the network. I will utilize the form of ANT that was established by sociologist Michel Callon. Foundationally, ANT is a method of critically analyzing the formations and motivations of complex sociotechnical systems. ANT provides a method of describing heterogeneous associations between an interconnected network of human and non-human actors as well as their mechanisms of transformation or consolidation (Callon 1987). Each actor within a network can be defined as a network in itself, however, the relationships between these actors determine the extent to which the actors themselves can act upon the network and therefore promote compartmentalization ensuring organization within the network. The power that each actor possesses is defined by the relationships that each of the actors have with each other. The strength of these relationships creates overall power in an actor network (Latour, 1986). The

construction and perfusion of a network can be identified through the concept of translation defined by Callon (Callon, 1986).

Translation describes the method by which actor networks are created. The development of an actor network revolves around a primary actor as this actor contributes to the construction of the network and the continuation of the network through time. The continuation of the network and technological development through time can also be considered as translation (Cressman, 2009). Callon defines translation through four stages: problematization, interessement, enrolment, and mobilization (Callon, 1986). Within problematization, the primary actor is discovered and reveals the problem that needs to be solved by the network. This primary actor also identifies the necessary additional actors that need to be recruited to the network. In the next stage, interessement, the primary actor starts to recruit the additional actors into the network and attempts to orient their interests with the problem that the network must solve. In the enrolment stage, the additional actors have established their interests and objectives with the problem definition and are now given roles, responsibilities, and positions within the network as determined by the primary network. The additional actors must follow the responsibilities assigned to them and carry them out in an honest, effective manner. Finally, in the final stage known as mobilization, the primary actor establishes its position as the commander and disseminates information for the actor-network, which at this point, functions as a united entity.

For the purposes of this paper, it is important to recognize that Callon demonstrates the methods by which an actor network can fail if a particular actor negligently or intentionally fails to perform the objectives designated to it by the primary actor (Callon, 1986). Likewise, I intend to use ANT, and Callon's definition of translation, to locate and identify failures within the New Jersey transportation network. I will also identify the actors, relationships, and any additional

information that has led to the network’s failure to achieve its objective of maintaining road safety. I will utilize the concept of power, as it is defined in ANT, to demonstrate how the New Jersey government has failed to uphold its responsibility within the actor-network and how it has an unbalanced amount of influential power in comparison to other actors within the network.



**Figure 1 - The general New Jersey transportation actor-network.** NJGOV is the New Jersey government and NJDOT is the New Jersey Department of Transportation.

## **Analysis of the New Jersey Transportation Network**

### ***New Jersey Transportation Network Formation***

Establishing an actor-network will assist in demonstrating the suboptimal scenario that is currently implemented and influenced by the NJ government, and the optimal scenario that should be implemented in which the NJ government and NJDOT can best ensure road safety. Demonstrating the construction of the New Jersey Transportation actor network will provide the context required for the analysis of the framework to be completed. The initial step in determining an actor-network is to define the heterogeneous actors that are within the network. I have identified the key human and organized human actors that are within the network by identifying collective groups that are considered across multiple relevant studies that relate to

transport safety and transportation networks (Albalate & Yarygina, 2017, Gamero et al., 2018, Jing et al., 2020). These actors and their relationships are denoted in Figure 1. These actors are defined as (i) Motorists (e.g. car drivers, motorcycle drivers, etc.) who use the roads and are responsible for personal road safety and transportation; (ii) pedestrians who use the sidewalks near and around roads; (iii) engineers who develop road safety technology as well as passenger safety technology for vehicles; (iv) the NJ Department of Transportation (NJDOT) that governs road safety and oversees the implementation of road safety initiatives and technologies; (v) the NJ Government that funds the DOT and implements regulations and legislation to protect drivers and pedestrians. Adjacently, I have also identified the key non-human and technological actors by analyzing the same studies as well as additional relevant studies that observe the impact of road safety technologies (Garber, 2007). These actors are (vi) motor vehicles that are used to traverse roads and highways and (vii) road safety technologies that are designed to protect motorists and pedestrians.

To understand the power dynamics between the actors of the New Jersey transportation network, the associations between the actors must be understood. I will demonstrate these associations by establishing the formation of the network through the four stages of translation. Multiple local news articles will provide a foundation for how the network is developed and operated. Additionally, I will demonstrate the relationships between the actors through the connections denoted in Figure 1. NJDOT is the main actor within the network. This is shown in Figure 1 as the actor is central to the network and all tasks from other actors eventually feed into the NJDOT actor, as depicted by the arrows. As described by the Bergen Record, the New Jersey Department of Transportation performs research, develops safety initiatives, and implements safety technology (Cichowski, 2018). Throughout the many reports published by the Bergen



Record in regards to the handling of transportation decisions, it is evident that NJDOT makes consequential decisions that leave an impact on road safety in the state of New Jersey. The policies, programs, and initiatives defined by NJDOT directly affect New Jersey motorists and pedestrians. Additionally, NJDOT enlists resources from other entities such as the New Jersey government and research organizations to maintain their safety objectives. Based on these reasons, I will establish NJDOT as the primary actor around whom the New Jersey transportation actor-network is formed through translation.

During the first phase of translation, known as problematization, NJDOT determines that motorists and pedestrians require safe roads and highways for transportation. Additionally, NJDOT establishes that the risk of damage to life and property must be minimized for their objective to come to fruition. This is represented by the arrows and matching colors between the motorist and pedestrian actors in Figure 1. Based on this problem definition, NJDOT identifies that engineers are required to develop safety technologies that will minimize human error and maximize road safety. NJDOT also establishes that funds and legislative power will be required from the New Jersey government to enact safety guidelines and legislation. Within Figure 1, this is represented by the arrows of the engineer and NJGOV actors directly relating to the centralized NJDOT actor. In the second phase, known as interessement, the NJDOT actor can recruit other human actors whose interests align with the problem statement. NJDOT recruits pedestrians and motorists as they are the actors that require safe roads for transportation and therefore automatically align with the problem definition. The NJDOT also recruits engineers to perform safety research, design safety technology, and advance road safety solutions. Lastly, NJDOT recruits the New Jersey government to assist pedestrians and motorists in maintaining safe transport and advance the safety objectives set out by NJDOT. NJDOT joins the network as

it works to prevent motor vehicle-related crashes and the resulting property damage, injuries, and fatalities on New Jersey's roadways (Division of Highway Traffic Safety, n.d.).

In the most theoretically beneficial scenario, the pedestrians, motorists, and NJ government will all be comfortable with their roles and maintain the mutual associations between them as described above and as shown in Figure 1. Having defined this scenario, engineers would research various safety technologies and find the optimal technologies that ensure safety. In doing so, they would recruit non-human actors and technological actors into the network. These actors would comprise the road safety technology and non-human technical actors. Now having added the road safety technology actor into the network, the NJ government would allocate funding for the engineers and NJDOT to implement the road safety technologies and accompanying initiatives. This is denoted by the arrow indicating the relationship between the road safety technology actor and the NJGOV actor in Figure 1. The NJ government would also be informed by the pedestrians, motorists, engineers, and NJDOT on what policies should be legislated to minimize the risk of fatalities, injuries, and property damage. With these conditions in place, the pedestrians and motorists who utilize NJ roadways would have the safest environment for transportation. This will allow them to live without travel safety concerns and to live productive lives. NJDOT will ensure the proper transmission of responsibilities between motorists, pedestrians, engineers, and the NJ government. This promotes a minimized risk to public safety and a maximized quality of life for all who use the NJ roadways.

### ***New Jersey Government's Failure to Advance Initiatives***

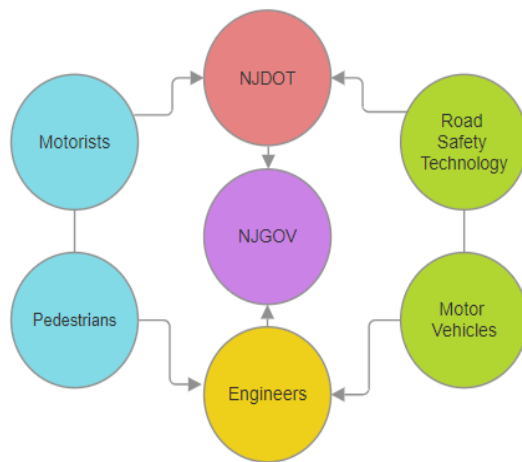
The NJ government failed to advance safety initiatives developed by safety engineers which greatly contributed to the failure of the NJ transportation network's ability to provide safe roads. New Jersey is known to have two of the most dangerous intersections in the country

(Doyle, 2022). It is also known as one of the most dangerous states to drive on due to the large number of pedestrian fatalities.

A news report written by the Bergen Record details the NJ senate's decision to retract funding for the implementation of life-saving red light cameras that were proven to have increased safety outcomes for motorists (Cichowski, 2018). NJDOT engineer David Martin had performed extensive research regarding the effectiveness of redlight cameras. Martin published a report, which was hidden from the public by NJDOT, and determined that red light cameras reduced crashes and pedestrian accidents substantially while also saving \$8.2 million in healthcare and property damage costs (Martin, 2013). It was shown in the report that certain intersections reduced red light crashes by 100% and that although there were smaller reductions in right-turn crashes in other areas, the outcome still resulted in safer roads. However, throughout the duration of the red light camera program, NJDOT faced fierce opposition from NJ lawmakers who claimed that the cameras were a money grab. Eventually, lawmakers coerced NJDOT to abandon the program. It is important to note that lawmakers could force NJDOT to shut down their camera program and influence them in a way that prevented NJDOT from carrying out its objective within the actor-network. These factors illustrate the failure of the NJ government to uphold its role of supporting engineers and NJDOT's safety objectives as well as its contributory objective of reducing crashes, property damage, and fatalities.

Thus far in my analysis, I have shown that the power of the NJ government has violated its intended purpose and destabilized the NJ transportation actor-network ultimately preventing the achievement of the main objective of the network. However, an alternative view might suggest that NJDOT, as the primary actor of the network, should have enacted other policies that they knew would be approved by the NJ government. This would theoretically circumvent the

problem of having their red light camera program shut down. However, this view fails to consider the power that the NJ government has in relation to NJDOT. This view also fails to acknowledge that as the network builder, NJDOT should be able to enlist the help of the NJ government actor without being overridden. In a paper by Jing et. al, researchers compared the factors responsible for road traffic accidents (Jing et al., 2020). The researchers found that of the contributing factors to road traffic accidents, the frequency of inadequate regulation was the highest indicating that inadequate regulation was one of the most common reasons for road traffic accidents. Additionally, the study concluded that “government regulation exhibits significant effects on organizational influences, unsafe supervision, and unsafe behaviors” (Jing et al., 2020, p. 2). This indicates that the government has the most influence regarding road safety initiatives and implementation. This is important to note as the NJ government is ultimately determining which safety initiatives to implement throughout the state, which exemplifies the findings in this study. I will now provide an in-depth analysis of how the imbalance of power between the NJ government and the other actors within the NJ transportation network has led to the failure of the network.



**Figure 2 - The modified New Jersey transportation actor-network where NJGOV is the central actor.**

### *New Jersey Government's Power Imbalance*

In addition to not advancing safety initiatives, the NJ government actor also failed to maintain its power agreement with the primary NJDOT actor, further hindering the New Jersey transportation network's objective of upholding road safety. As detailed above, the responsibility of the NJ government actor is to support any efforts for safety legislation that would benefit the public. However, in this case, the NJ government elected to advance its interests and override the authority of NJDOT to implement red light cameras that would have potentially saved lives and money (Cichowski, 2018). This is also demonstrated by the NJGOV actor becoming the central actor and switching places with the NJDOT actor as shown in Figure 2. The NJ government denied NJDOT's safety initiatives and prevented motorists and pedestrians from being protected, highlighting a crucial power imbalance.

It is important to understand that political institutions, such as the NJ government, have immense power. In the paper by Jing et. al, it was shown that government institutions can influence other organizations, such as NJDOT, as well as promote unsafe behaviors (Jing et al., 2020). In addition to this, a paper by Albalate & Yarygina examined the relationships of different types of government on road safety outcomes (Albalate & Yarygina, 2017). The researchers analyzed a large set of countries over a long period using empirical data methods to draw conclusions on the role of institutions in road safety determinants. It was found that democratic institutions are associated with higher safety outcomes. However, the paper also concluded that raising political awareness was insufficient to ensure road safety. It was determined that "if strong efficient institutions are not created, the general indifference to traffic laws and the authorities that enforce them can hamper effective outcomes" (Albalate & Yarygina, 2017, p. 23). This is akin to the actions of the NJ government which failed, as a democratic

institution, to respect the authority of NJDOT and its road safety initiatives. While the NJ government is a democratic institution, it does not maintain strength in ensuring its objective of ensuring road safety as it is easily persuaded by representatives who may have an indifference to traffic safety programs or who may be ill-informed regarding the effectiveness of such programs.

## **Conclusion**

In this paper, I have utilized the sociotechnical concept of ANT to characterize the New Jersey transportation actor-network to identify the key moments of failure that prevent the network from achieving its objective of maintaining the most effective approach to road safety. Through the analysis of the power dynamics and roles between key actors within the network, it is evident that the NJ government actor both failed to advance safety initiatives and failed to maintain the power dynamic that was assigned to it by the NJDOT actor. Instead, the NJ government advanced interests that were of misinformed representatives and not the interests of NJDOT, motorists, pedestrians, and engineers. With this information, the analysis of the network and the associations of power between actors reveals that the behaviors of the NJ government led to the inability of NJDOT to carry out its objective of implementing life-saving measures and subsequently prevented the actor-network from achieving its objective of establishing the most effective road safety approach. Taking this into account, the general reader will be informed regarding the power and influence that government institutions have in determining the effectiveness of road safety. The general reader will also be more aware of the importance of establishing strong efficient institutions that cooperate with transport organizations to ensure that pedestrians and motorists are given the safest means of transportation possible.

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