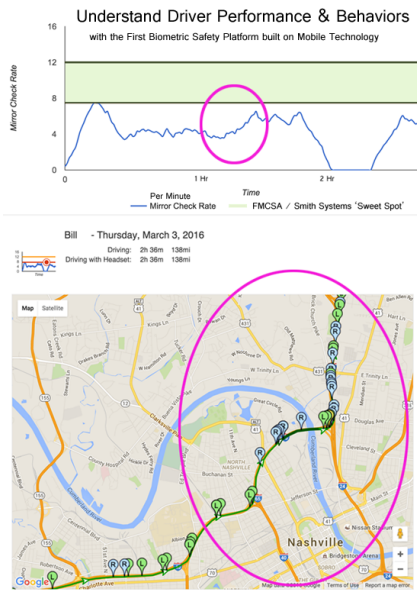




Figure 1. Maven Machines Co-Pilot Source Obtained from



NONMARKET ANALYSIS FOR MAVEN MACHINES

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19-686: New Technology Commercialization

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1. Executive Summary

1.1 Executive Summary

Maven Machines is a Pittsburgh-based startup company specializing in smart wearable technology, specifically Bluetooth headsets for truck drivers that monitor the driver's location with GPS tracking and his safety practices with accelerometers. Using the driver's phone, the headset stores and uploads data to the trucking company headquarters, where they are used to evaluate safety performance and monitor driver habits. Since their inception, Maven Machines has sought to improve their standing in the market by establishing strong relationships with trucking fleets and more recently through the implementation of a successful nonmarket strategy.

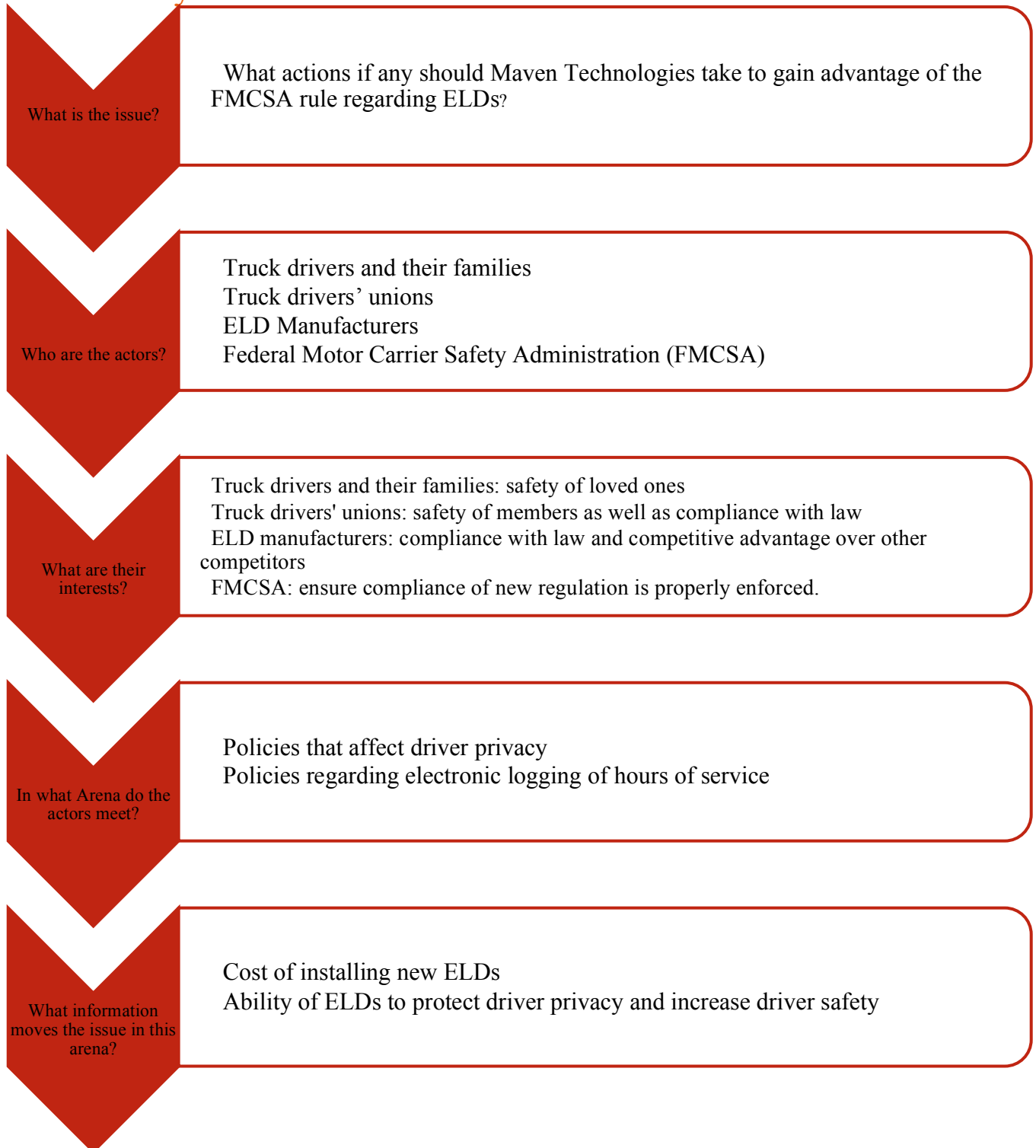
Of interest is a new regulation established by the Federal Motor Carrier Safety Administration (FMCSA), which will require that by December 18, 2017, all trucks contain an electronic logging device (ELD) that connects to the engine and collects data on the truck's operation and location. While it seems like this would be a boon to Maven Machines, the issue is complicated by the fact that their headset, the Maven Co-Pilot, does not satisfy the specifications set out by the FMCSA. Although some of the necessary changes, such as functionality for recording a driver's schedule, could be implemented with comparatively simple software changes, the requirement that the ELD connect directly to the engine poses a large obstacle. To address the issue, we analyzed three potential answers to the question: What actions, if any, should Maven Machines take to utilize the FMCSA's new regulation requiring ELDs in all trucks by the end of 2017?

Our first option was to maintain the status quo – continue to develop and market the Maven Co-Pilot as a standalone product for monitoring and improving safety without trying to take advantage of the ELD rule. The second was to redesign the Maven Co-Pilot to include a component connecting to the truck's engine. The third was for Maven Machines to partner with one or more ELD manufacturers to make the Maven Co-Pilot an add-on product that works in conjunction with the ELD. Our analysis indicates that this third option is the most likely to succeed in the long term.

The goal of Maven Machines' nonmarket strategy is to increase their customer base and establish themselves in the trucking marketplace, and assuming each option is equally successful, option 2 is the most effective because the new Co-Pilot would be one of the best, most fully-featured ELDs on the market at a time when ELDs will be in high demand due to the FMCSA rule. However, the drawback of this option is that redeveloping the Co-Pilot will be highly costly, requiring significant amounts of time and money. For a startup company with few employees and limited capital, this might be impossible, and if it doesn't have the intended outcome, it could put Maven Machines on shaky financial ground. Option 3 takes advantage of

the ELD regulation to increase their space in the market while reducing development costs and allowing the Co-Pilot to possibly be compatible with multiple types of ELDs.

1.2 4I Analysis of Nonmarket Environment



This project will cover the details of how we analyzed the current non-market environment for Maven Machines Co-Pilot as related to the new FMCSA regulation. It will view the technical aspects of their current technology and address its advantages and its shortcoming with regards to the new regulation. It will address how it can possibly adapt to the new regulation and then suggest alternatives to help it address this legislation in order to maintain and/or expand market share. It will analyze the options based on Prince Analysis which is a metric that considers the issue position, power and priority of the actors involved. Based on these characteristics, it evaluates the impact of the policy option on them and then decides on the value of the policy to the actors. From there, we make a recommendation that allows them to address their policy question of addressing the ELD regulation thus leading to market benefit.

2. Technology Overview

2.1 Maven Machines Co-Pilot

According to the company, “Maven Machines seeks to address the issue of truck driver fatigue and distraction which is a primary cause of injury and physical damage in the trucking industry” (Maven Machines, 2016). While competing products pay attention to monitoring the vehicle via GPS coordinates and mechanical systems, they take no measurements on the driver. Maven Machines thus has a competitive advantage relative to the other products, as the sensors collect information that can signal distraction or fatigue such as head bobs.

In addition, it utilizes the phones GPS to collect information related to geographical location, distance travelled as well as serve as an interface for driver to access driving performance. Most importantly, it deals with the issue of privacy which currently technology fails to properly address. The drivers utilize the trucks for multiple purposes one of which includes for residential purposes and thus they view some recordings as being an invasion of privacy. The headset can be turned on and off and as such the user can control the amount of information collected on the driver. Other features include the following:

- High quality mic with noise suppression
- Real time driver safety gauges
- Active safety system
- Incident Reports and analytics.
- 14 hours of talk time, etc.



Figure 3. Source: <http://mavenmachines.com/>

Overall, proper use of the product enhances driver safety as analyses of driving records shows driving habits plus it gives the added benefit of reducing distraction via Bluetooth features such as its lengthy talk time capability.

2.2 Potential Markets

The market for Maven Machine drivers are truck drivers, and as most truck drivers work with fleet companies, they market mostly to fleet carriers. Fleet carriers such as PGT Inc. Trucking and ARL Network are current clients who have benefitted from the multifunctional capabilities of Maven Machines' Co-Pilot. The desired clientele for Maven Machines remains as UPS, which is currently the largest unionized trucker fleet in the nation. The benefits to making headway with such a union would result in national usage of their product and lend increased credence to the company's claims of improved truck driver safety. While individual truckers could also form a part of the clientele base, it is expected to be a smaller number as the fleet carriers are usually sole proprietors of the trucks and hence are the ones investing in the in-cab cameras and other safety features required by the FMCSA.

Another identified client was safety driving companies for truck drivers. We proposed that the device could be used to help re-instruct drivers on how to drive safely performing checks such as mirror checks and learning when during route, they might experience fatigue. The analytics obtained from the driving records could be used to such aims as well as used to possibly shape opinion around driving habits. In discussions with the company, the company opposed the notion and preferred to market to fleet carriers instead. In addition, research facilities such as Virginia Tech Transportation Institute (VTTI) were suggested as a potential client to study impacts of safety technology on ensuring driver safety as well as possibly studying the issue between privacy and safety for drivers. However, it did not make it into the meat of our policy analysis, as it does not directly influence the electronic logging requirement.

In the short term the product gives added benefit to drivers many of whom already connect Bluetooth headsets to use their phones. The headset warns the operator in real time to the possibility that they are falling asleep through an audio warning when the headset detects a "head bob". The headset also includes all the basic features of current Bluetooth headsets meaning that drivers get all the features they already have with the added safety benefits. With a rechargeable battery that lasts more than 10 hours the headset is usable for the entire length of an average day driving.

The headset uses a wide array of sensors to gather data then the company's software can break that data down into different actions to determine if the driver is paying enough attention or starting to fall asleep. That data can then be aggregated to make larger observations on a huge population of operators as a whole. This means that future technologies could take advantage of this data to make further improvements to driver safety. The headset is always recording so in the event of an accident or a near-miss data can be analyzed to determine what lead to the incident. This function of the headset improves greatly the more operators agree to wear the headset. Maven Machines is starting to field test their product across four different fleets. Feedback from operators has been positive. The data they've gathered already is valuable. This technologies have the potential to make the highways safer not just for long-haul truckers, but for everyone.

2.3 Electronic Logging Devices

According to the new legislation passed by FMCSA under 49 CFR part 395.8, drivers required to use record of duty status are now mandated to use ELDs for all CMV operations with a few exceptions in addition to supporting documents, which they must also carry. The ELDs are to meet requirement underlined by the FMCSA and must collect trip information including location data, change of status, as well as other information most of which are to be obtained from the vehicle's engine. "It is a recording-only technology, used to track the CMV while it is operating" (Regulations.gov, 2016). In addition, the drivers as well their supervisors each have their own unique IDs to keep track of people especially when approved changes are to be made. The ELDs do not need to track the drivers in real time neither does it need the capability to communicate between driver and motor carrier. It is required to have "integral synchronization interfacing with the commercial vehicle engine (CMV) electronic control module (ECM) to automatically capture engine power status, miles driven and engine hours" (Regulations.gov, 2016).

3. Challenge and Opportunity Identification

3.1 Driver Safety

There exist three major issues that Maven Machines should be concerned with for their non-policy analysis of which they have either challenges/opportunities. With driver safety, we

believe they have quite an advantageous position. With the recording of the driver's movements they are able to collate information of the driver's hours of service. This information shows how well the truck driver performed the various checks while driving including mirror checks and other distractions. It displays safe driving practices such as mirror checks and head bobs which are features other safety equipment for truck drivers do not offer. In addition, it is not a requirement on ELDs and as such this is a competitive advantage for Maven Machines if they are capable of incorporating this feature into their response to the ELD requirement. It also provides real time tracking of the drivers, which they themselves can view, and is also available to their fleet carrier.

3.2 Privacy Concerns

In addition to the safety advantage that the Maven Co-Pilot provides, it also wins in the privacy department. As truck drivers use their trucks not only for transporting goods and services but as temporary domiciles while working, technology that collects information about them during off-hours are often viewed as intrusive. This becomes important when comparing the Co-Pilot to currently available alternatives, which primarily include in-cab surveillance cameras. Opposition to these cameras is easy to understand as most models include a lens that remains focused on the driver whenever they are driving. The Co-Pilot product has a significant advantage over these products, as there is not a camera constantly watching vehicle occupants. Although the product provides an advantage in privacy for drivers over competing products, privacy should still be a major concern for the product. The product still uses GPS technology to track the movement of drivers and can provide much of the same information as in-cab cameras just through different means. It's possible that drivers will still be uncomfortable with this level of data gathering on their behavior.

Another important opportunity in eliciting driver support for this product may come from the drivers' family members. The main goal of the Co-Pilot product is to improve driver safety so what action, if any, can be taken to enlist the help of driver's families in widespread adoption of the technology? The Co-Pilot doesn't provide any significant advantage over in-cab cameras, some of which do record constantly, in this regard. However, the Co-Pilot is the best option for improving driver safety while still respecting the privacy of drivers.

3.3 Compliance with ELD Regulation

There are numerous challenges that Maven Machines is going to face for which they mostly revolve around the wide adoption of the Bluetooth device among truck drivers, and one of the main ones is determining the best way to take advantage of the FMCSA's electronic logging device mandate for the end of 2017. The Co-Pilot device currently includes several features such as head bob detection, fatigue level monitoring and mirror check monitoring – features which increase the driver alertness and should dramatically reduce the amount of errors on the drivers' part. Incorporated with real time driver tracking, the data analytics is available on dashboard via

cellphone and support is provided via a safety partner they can reach easily. However, this does not by itself satisfy the FMCSA guidelines for what counts as an acceptable data logger.

Provided that Maven Machines decides to develop their own ELD compliant device or retrofit the Co-Pilot, they must provide the following information:

- Name of ELD product
- Model number of product
- Software version
- ELD identifier (This is a six-character alphanumeric identifier assigned by the provider to uniquely identify the certified model and version of the ELD; this must match the ELD identifier that is included in the data output from the ELD)
- Picture and/or screenshot of the product
- User's manual describing how to operate the ELD.
- Data transfer mechanism description and step-by-step instructions for a driver to transfer ELD records to an authorized safety official
- Summary description of ELD malfunctions
- ELD authentication value, an alphanumeric value that will be used to verify the authenticity of the ELD (per section 7.14 of the final rule)

Certification also requires authentication using the authentication value as well as a “certifying statement” describing how the product was tested to comply with FMCSA regulations.

4. Policy Context

4.1 Relationship with DOT and FMCSA

When it comes to the policy context for Maven Machines, much of it is defined by the company’s relationship with the Department of Transportation (DOT) and the Federal Motor Carrier Safety Administration (FMCSA). DOT regulations require that truck drivers use headsets when talking on the phone, and those headsets must only cover one ear. Otherwise, they could face fines. The Maven Machines headsets are designed to meet these safety regulations and expand on them, offering additional features like head-bob detection to prevent drivers from falling asleep. In addition, the FMCSA grants commercial drivers’ licenses (CDLs), which means that they get to set best safety practices and establish the necessary safety standards for truck drivers. Although these two agencies regulate commercial transportation (i.e. truck drivers), they don’t yet directly interact much with Maven Machines because the use of their headsets remains outside the domain of FMCSA or DOT regulation.

For the most part, Maven Machines currently operates by targeting large company truck fleets such as FedEx. The pitch to clients is that the Maven Machines headsets will help improve safety both in the short run – they will wake up drivers if they begin to fall asleep – and in the long run, since they provide valuable information about general safety practices like mirror checks that will help encourage better driver behavior. Right now, all of those benefits are levied

for within the company; as far as I know, the FMCSA and DOT neither condone nor warn against the use of Maven Machines headsets. This is part of why for this company, there seem to be more nonmarket opportunities than obstacles. No existing FMCSA or DOT policy stands directly in the way of their headsets becoming more popular, but at the same time, these two agencies could be doing more to help promote their product since it ostensibly lines up so well with their mission.

Following excerpt is from the ATA, a draft to be sent to legislators demanding some standardization across state borders:

“As a professional truck driver engaged in safely delivering goods in interstate commerce, I write you to help ensure that when I have to take a break or how I get paid does not change based on the state I happen to be driving through. Congress passed a provision to preempt state laws and regulations relating to prices, routes, and services of motor carriers as part of the Federal Aviation Administration Authorization Act of 1994 (F4A) in order to allow standard ways of operating nationwide - for the benefit of consumers and drivers like me.

I urge you to support a clarification of the F4A preemption provision to restore uniformity and promote the continued safe, efficient, and affordable transportation of goods by truck. My understanding is that states are trying to disrupt the rules we drivers are used to playing by. State laws aimed at providing factory and agricultural workers meal and rest breaks, when applied to me, completely disrupt the routes I can service under federal hours of service rules designed to enhance truck safety, the safety of the motoring public, and the health of drivers like me. State laws that change the way the vast majority of drivers are used to getting paid - whether by the mile, by the load, or by percentage of revenue - will require my employer to change nationwide payroll systems, adding significant compliance costs and resulting in less money available for driver pay. Like everyone else, I am interested in making more money but I am against laws that not only don't put more money in my pocket but could result in less.

The clarification of the F4A preemption provision is narrowly targeted and leaves these matters subject to uniform federal regulation. With your support, professional truck drivers like me can continue to deliver goods in a safe, efficient manner that benefits the consumer.”

Section 395.26 provides that the ELD automatically record the following data elements at certain intervals: date; time; location information; engine hours; vehicle miles; and identification information for the driver, the authenticated user, the vehicle, and the motor carrier. When a CMV is in motion and the driver has not caused some kind of recording in the previous hour, the ELD will automatically record the data elements. However, if a record is made during a period

when the driver has indicated authorized personal use, some elements will be left blank and location information will be logged with a resolution of only a single decimal point.

As per the federal regulations, Maven Machines stands to have a competitive advantage as the FMCSA is currently seeking technology that better assist truck drivers to reduce accidents. With features such as head bob monitoring, lane switching and mirror checks, the device alerts the driver thereby reducing the possibility or severity of accident when the driver's attention is impaired. As their technology is less intrusive relative to in-cab cameras, combined with the safety features their device provides, it would be the better product to go with.

4.2 Privacy Issues

Privacy has become an important topic surrounding most new technologies. From social networking services to infamous examples of flashlight phone applications that record a user's location and use it for targeted advertising. While most of the time privacy concerns are detrimental to companies, Maven Machines faces a unique opportunity to benefit from some of these concerns over privacy. As per the federal regulations, Maven Machines stands to have a competitive advantage as the FMCSA is currently seeking technology that better assist truck drivers to reduce accidents. With features such as head bob monitoring, lane switching and mirror checks, the device alerts the driver thereby reducing the possibility or severity of accident when the driver's attention is impaired. As their technology is less intrusive relative to in-cab cameras, combined with the safety features their device provides, it would be the better product to go with.

Maven Machines' Co-Pilot product is in a position where freight operators view comparable alternatives as a serious invasion of privacy. Compared to in-cab cameras, the Co-Pilot will be a welcomed safety improvement that still protects driver privacy. Since the introduction of in-cab cameras long-haul drivers have nearly unanimously taken a clear stance against them.

This fight against in-cab cameras in trucks can easily be compared to the fight against in-cab cameras in trains. After a few bad accidents involving trains there has been a push by the public and policy makers to require cameras in trains. Train operators have fought this new surveillance measure by comparing it to having a camera to watch anyone else perform their job. Train operators feel that most people would not be comfortable being videoed at their desk.

Maven Machines does not currently market their product to train operators. The in-cab camera debate is also slightly further along in its life cycle in the train industry than in trucking. By observing the policy actions in this field where in-cab cameras have become much more controversial Maven Machines could use it to guide how they approach these privacy concerns within trucking. While trucking accidents are far more common than train accidents, they are less publicized, and while policy makers may not yet be considering requiring in-cab cameras in trucks if it's being considered for trains trucks can't be far behind (the electronic logging device

rule may be a precursor). If Maven Machines can provide an alternative that drivers can get behind they may have a significant advantage over the camera companies.

After speaking with CEO and founder Avishai Geller, we decided to pursue the potential to utilize the FMCSA electronic logging device regulation to expand Maven Machines' client base. The rule provides a more structured policy forum and better defined policy options, and it drew the most interest from company management.

5. Policy Forum

5.1 FMCSA Rules and Forums

The main public forum for the issues surrounding Maven Machine's Co-Pilot product is the Federal Motor Carrier Safety Administration. The FMCSA is a branch of the United States Department of Transportation. It is responsible for all rules surrounding the safe operation of commercial vehicles. The FMCSA works similarly to other executive branch offices in that it accepts petitions from the public for new rulemaking. After FMCSA announces a proposed rule there is often time for comment. Such was the case when the agency recently released its aforementioned rule regarding electronic logging devices, which again will be used to keep track of driver hours to make sure they are not driving more than the strict rules on Hours of Service also laid out by the FMCSA. The current method for this record keeping involves hand written logbooks. Between January 11 and January 15, 2016, four separate groups filed petitions for reconsideration of this new rule regarding ELDs. These groups include the Motion Picture Association of America (MPAA), the Truck & Engine Manufacturers, Saucon Technologies, and Gerald Baugher. The deadline for public comment was January 15 2016. Here we will briefly look at the stances of two of these interest groups, MPAA and Saucon Technologies.

In a comment submitted on January 15, 2016, just before the comment deadline, the expressed concern that many of their drivers will operate a variety of trucks in a typical workweek. Since ELDs are tied into the vehicle's engine control unit, the MPAA is concerned that the logs will be tied to the truck and not the driver. This will make it difficult for these types of drivers to keep track and accurately report their hours.

Saucon Technologies, on the other hand, sells technology solutions to fleet operators including devices to meet the ELD rule laid out by the FMCSA. In a comment submitted on June 25 2014, Saucon Technologies stated that ELDs they had previously sold to customers would not meet the stricter rules enforced by the new rule mandating the use of an ELD in all trucks. Saucon has an interest on behalf of their customers of the rule allowing their previously purchased device to be used to meet this new rule.

The problem faced by Maven Machines is that the commenting period for this rule has passed, limiting their options for how to take advantage of the new regulation. Had the deadline not passed, it would be conceivable to encourage the FMCSA to drop the portions of the regulation that require ELDs to be connected directly to the engine, making it easier for the Co-Pilot to eventually be counted as such. But now that the regulation is finalized for all intents and

purposes, Maven Machines is limited to making their product conform to the regulation in-house, partnering with another company to meet the regulation cooperatively, or ignore the regulation and continue to sell the Co-Pilot as a standalone product.

5.2 Policy Question and Options

To begin our policy analysis, we defined our "what-if" policy question:

What actions, if any, should Maven Machines pursue to take advantage of the FMCSA electronic logging device rule to improve their standing in the trucking market?

Since this rule automatically goes into effect in 2017, we felt that this would yield the earliest return on investment if they could influence it to favor them. As there is no way of authenticating the current log books (as seen in Figure %2), so being able to re-design their technology to meet the standards while protecting the driver and having regulation require similar standards would be very advantageous for them.

To take advantage of the ELD regulation, we came up with three policy options that would seek to address Maven Machines' concerns, balancing feasibility and potential payoff. They are:

1. Maven Machines will present data to local teamster unions on truck driver safety concerns and the Maven Co-Pilot to gain their support in approaching the FMCSA to allow the Co-Pilot to be used as an ELD.
2. Maven Machines will apply for a grant from FMCSA to have Virginia Tech Transportation Institute study the benefits of the Co-Pilot device over alternatives.
3. Maven Machines will redesign the Co-Pilot's underlying technology to meet the current requirements for ELD.

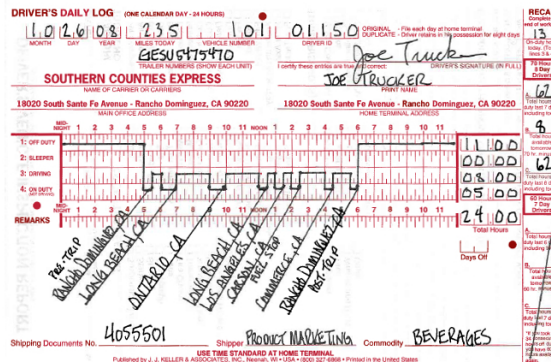


Figure 5.2 .Current log book. Source obtained from <http://www.scexpress.com/images/DriverLog.jpg>

6. Range of Outcomes

In order to address which policy option is the best for Maven Machines to pursue, we will use a 4E framework for policy analysis, examining each option's effectiveness, efficiency, equity, and ease of political acceptability. This section will look at the first two, effectiveness and efficiency. Effectiveness is defined as the likelihood that proposed policy will achieve the desired goal of meeting FMCSA regulation pertaining to ELDs. Efficiency is defined as the cost of proposed policy relative to its effectiveness (Open learning initiative, 2016). We will examine equity and ease of political acceptability in Section 7: Bargaining Context.

6.1 Status Quo: Effectiveness and Efficiency

Policy: Maven Machines will not market the Co-Pilot as an ELD and instead as a product that would be used in addition to a registered ELD.

Benefits: Maven Machines do not have to redevelop their technology, as the time frame to do so is relatively short considering all trucks need to adapt by December of 2017. This improves the company's short-term stability since they would not have to deviate from their standard course

Costs: Opportunity costs associated with failing to take advantage of the FMCSA ELD rule. When speaking to Maven Machines CEO and Founder Avishai Geller, he expressed great interest in utilizing the ELD regulation to improve Maven's standing in the market, so to simply abandon any plans on that front would be to forfeit those potential sales.

While the status quo is the least risky and easiest option to pursue, it also does nothing to expand Maven Machines' client base, meaning from the company's perspective, its effectiveness and efficiency are low.

6.2 Option 1: Effectiveness and Efficiency

Policy: Maven Machines will redesign the Co-Pilot's underlying technology to meet the requirements for ELD.

Benefits: If Maven Machines is able to do so, it would result in tremendous benefit for them as their product would not only meet FMSCA compliance but it would also have the added benefit of driver safety.

Costs: Potentially prohibitive because we do not believe that Maven Machines has the capability of fundamentally redesigning its core product. This is for a few reasons:

1. The FMCSA specifically requires that the ELD (electronic logging device) be able to read whether or not the engine is on or off of which their headset is currently unable to

do. It can however, measure the distance traveled and location via GPS on the phone however, the ruling wants it tied to engine.

2. Maven Machines has only a limited time in developing possibly a plug-in device that would be able to read the engine. There are also costs associated with developing the device which including developing prototype as well as time cost that needs be dedicated to this development which takes away from other activities the company is currently focused on.

Option 1 has the most potential to increase Maven Machines' profile out of any of the three because it would allow the company to take full advantage of the ELD regulation. Since all trucks will be required to purchase an ELD, being able to market an ELD that has additional safety benefits like the hypothetical redesigned Co-Pilot, would allow Maven Machines to access a large new customer base. However, the massive capital and labor requirements to redesign the Co-Pilot makes this a difficult, risky option to pursue, even if the potential payoff is high.

6.3 Option 2: Effectiveness and Efficiency

Policy: Maven Machines will work with an ELD Manufacturer to make Co-Pilot a complementary product for their ELD.

Benefits: This allows them to provide their device with a complimentary that meets FMCSA compliance for ELDs while being cheaper than status-quo as it is offered as a combined product and not two individual products which should bring product costs down. Also as truck companies have to acquire an ELD or similar device, it gives them a larger market to target since they then have access to customer base of the ELD manufacturers.

Costs: Building such connections, which might take a while, as they need to convince the ELD manufacturers as to why the collaboration is also beneficial to the ELD manufacturers. This may result in futile exercises if they do not work their pitch properly.

Overall, this option strikes a balance between Option 1 and the status quo. While it does not have quite the upside potential of Option 1, it requires far less commitment and investment, making it superior from an efficiency perspective. The risk to the health of the company is lower, so it is a safer bet given that Maven Machines is still relatively young and vulnerable.

Policy Option	Effectiveness	Efficiency
Status Quo: Maven Machines will not market the Co-Pilot as an ELD and instead as a product that would be used in addition to a registered ELD	--	--
Option 1: Maven Machines will redesign the Co-Pilot's underlying technology to meet the current requirements for ELD	++	+
Option 2: Maven Machines will work with an ELD Manufacturer to make the Co-Pilot an optional add-on	+	++

Figure 6.1: Summary of Policy Effectiveness and Efficiency

There is also the option of working with Teamsters union and other associated trucking unions through which they could get a push for fleet carriers to provide the Co-Pilot. This has the most tremendous benefit if it can be properly pursued, as then it becomes a requirement if pushed by the unions thus forcing the fleet carriers to have to acquire devise or face complaints from unions who could take action to halt business. The costs associated with this is that, they might need study reports including offering pilot testing to the unions to build adoption of idea.

7. Bargaining Context

This section covers the second half of our 4E analysis: equity and ease of political acceptability.

7.1 Equity and Ease of Political Acceptability

The status quo has a high level of political acceptability, as it does not require any changes in the regulation set forth by the FMCSA. It is rated lower in equity as it puts Maven Machines at a

disadvantage since there is some overlap between the features added by the Co-Pilot and the features required in ELD's. This will reduce the value of Maven Machines' product since ELD's are required.

Option 1 is rated slightly above neutral for both equity and ease of political acceptance. This option would require Maven Machines to work within the existing regulation, which would have high political acceptance. After changing their technology, Maven Machines would have to go through the FMCSA process to become an approved vendor of ELD devices. The option also performs well on equity, as Maven Machines would be playing by the same rules as their competitors in providing technology solutions to the trucking industry.

Option 2 has a high degree of equity, as it would provide both Maven Machines and their ELD partner the opportunity to increase sales as they provide powerful additional features to their customers. This option also has high political acceptability as it works within the current regulations set forth by the FMCSA and Maven Machines would be working with a ELD vendor who already has approval from the FMCSA.

Policy Option	Equity	Ease of Political Acceptability
Status Quo: Maven Machines will not market the Co-Pilot as an ELD and instead as a product that would be used in addition to a registered ELD	-	0
Option 1: Maven Machines will redesign the Co-Pilot's underlying technology to meet the current requirements for ELD	+	+
Option 2: Maven Machines will work with an ELD Manufacturer to make the Co-Pilot an optional add-on	++	+

Figure 7.1: Summary of Policy Equity and Ease of Political Acceptability

7.2 Prince Analysis

In order to validate our conclusions regarding the ease of political acceptability for each of our alternative policy options, we performed a Prince analysis on each option. A Prince analysis is a method of examining each stakeholder's position on an issue and, using their relative importance and influence, determining the likelihood for a policy option to be executed successfully. Our methodology and results are shown below. Details about prince analysis can be viewed in Appendix A and B.

The total score for the option 1 (Maven Machines develops their own ELD) is 74.3%, which we thought was reasonable for this policy, as it does not require consent from many outside entities. They will be required to meet the same technical specifications as all other ELD manufacturers and FMCSA will have no reason not to grant them registered vendor status if they meet those requirements.

For the second alternative the overall Prince Analysis probability is 60.8%. We think this a reasonable analysis as it suggests that this policy option would be harder to implement than Option 1. We think this represents our estimations about the policy option, as it will require buy-in from registered ELD manufacturers.

8. Strategy, Arguments, and Recommendations

In viewing the nonmarket scenario around Maven Machines, we analyzed two policy options in which Maven Machines could either retrofit their Co-Pilot to meet new legislation or partner with an ELD manufacturer to develop a product that incorporates their Co-Pilot as part of its features. We performed two analysis which were a cost-benefit analysis as well as a prince analysis. From the cost-benefit analysis performed, we realized that option 2 in which they work with an ELD manufacturer results in higher benefits. From the analysis, we have developed short term and long-term strategies.

Short-Term strategy based on cost-benefit analysis:

Based on the cost-benefit analysis conducted, Maven Machines will have to opt for Option 2 which is the option in which they partner with an ELD manufacturer. The main reason for this is the time constraint they face. The effectiveness of this option is lower as while they achieve the objective of developing a product that meets the legislation, they may be forced to forgo some functionality of their product. In addition, there is also the issue of the product merely being sold as an add-on which may or not increase customer base as they option is supposed to do. The efficiency however is high for this option as the development and costs as well as the time constraint makes Option 1 infeasible in the short-term. To enact option 1, they must find an ELD manufacturer to partner with of which some selected registered ELD manufacturers have been listed in Table 8:

Company	Website
Support Resources, Inc.	www.load-logistics.com
Gorilla Fleet Safety, LLC	www.gorillasafety.com
FleetUp	www.fleetuptrace.com

Table 8 . **Registered ELD Manufacturers as of 4/24/2016:**

<https://3pdp.fmcsa.dot.gov/ELD/ELDLList.aspx>

In addition, this is a time sensitive issue and a partner must be identified immediately to allow them time to work out details of the new device and run testing so it is available to be sold.

Long-term analysis based on cost-benefit analysis:

In the long run, given more time, Maven Machines has the option of developing their own ELD device. In the event that they go with the short term option, the long term option may be a bit challenging as proprietorship might become an issue if they develop a device short –term as well as the loss of clients that may ensue as well. In the event that they do not, they can apply for funding to develop their device which then increases its efficiency and effectiveness. As they do not have the time constraint, in the long term, the only cost is the cost not covered by external funding applied for. However, unless companies are seeking to replace their ELD devices, in the long-run, this is also not a viable option for the company.

Based on the prince analysis review, Option 1 is the favorable option to take. The reason is that the policy exists in both options as the comment period has closed and very little can be done to influence decision in current state. As such, the priority and issue position of the actors changed as we see with ELD manufacturers in both options. While the prince analysis does suggest option 1, based on the cost-benefit analysis, it stands to reason that option 2 despite having the lower prince analysis is the most viable option.

Based on our analysis, we recommend that Maven Machines go with option 2 which is to partner with an ELD manufacturer to develop a joint product that incorporates the safety features of the Co-Pilot while meeting FMCSA regulations. The main rationale for this is the associated costs which significantly lower the efficiency of the option 1. As there is a time constraint on when the ELDs must be implemented, Maven Machines simply does not have the time to retrofit their device unless it is an option, they have already started to work on. As they have to conduct proper testing as well as make sure it gets registered in a timely fashion as well as ensuring its marketed within the same time frame as other companies, their best bet is to go with option 1. Provided they can retrofit their device to easily work with future ELD devices, they can continue to market their product. Provided they are able to garner support for their product from local teamsters, they can potentially pursue option 2 as a long term goal in

which they then use pressure from unions to cause adoption among fleet carriers. Overall, the recommendation is time sensitive and must be taken into consideration as such.

APPENDIX

APPENDIX A

Table 7.1: Prince Analysis for Option 1 in which Maven Machine develops their own Federal Motor Carrier Association registered Electronic Logging Device

Player	Issue Position	Power	Priority	Score
Truck Drivers and Families	4	2	4	32
This group is most directly affected by the use of Maven Machines' product. It will have a personal impact on their life and livelihood	Support; they prefer Maven Machines approach to privacy over other ELD manufacturers and desire the other benefits the co-pilot provides	Drivers and their families are an unorganized group. While some of them own their own trucks many of them work for a fleet which further diminishes their power	This issue directly affects their well-being	
Drivers Union	3	3	3	27
Drivers unions are meant to represent the interests of drivers. They have taken strong stances on driver privacy in the past and is the most likely reason for them to be involved in these policies	Support as the device if redesigned not only meets compliance but also actively protects the drivers through the functionality of Maven Machines' co-pilot such as mirror checks, etc.	They can require fleet carriers to provide device for licensed drivers if there is adoption by union.	The issue affects well-being of constituents	
ELD Manufacturers	-3	3	1	-9
They are responsible for developing compliant device for electronic logging with regards to FMCSA regulation	Maven Machines would be viewed as strong competition since a successful device from them would have more functionality	They have power since they make the device however, they still have to conform to testing listed under regulation	The issue affects customer base and hence profitability of companies	
FMCSA	0.5	4	1	2
They are responsible for regulation surrounding compliance for new form of data logging for truck drivers	They are likely indifferent as the ruling has been passed and compliance is mandatory	As they make the regulation, they are the most powerful player	The only concern they have is that the device meet compliance requirements	

Calculation 1	52
Calculation 3	70
Final	74.3%

APPENDIX B

Table 7.2: Prince Analysis for Option 2 in which Maven Machines works with an ELD manufacturer to develop a combined product that incorporates their co-pilot as well as meet regulation.

Player	Issue Position	Power	Priority	Score
Truck Drivers and Families	4	2	4	32
This group is most directly affected by the use of Maven Machines' product. It will have a personal impact on their life and livelihood	Support; Maven Machines wins them over on privacy and safety and if done properly, the two devices will be properly integrated hence making learning curve relatively easier.	Drivers and their families are an unorganized group. While some of them own their own trucks many of them work for a fleet which further diminishes their power	This issue directly effects their well-being	
Drivers Union	3	3	3	27
Drivers unions are meant to represent the interests of drivers. They have taken strong stances on driver privacy in the past and is the most likely reason for them to be involved in these policies	Support as the two devices will pair up easily and be lower cost for fleets to acquire than in the status quo scenario hence making it easier to convince fleet s to acquire it.	They can require fleet carriers to provide device for licensed drivers if there is adoption by union.	The issue affects well being of constituents	
ELD Manufacturers	-2.5	3	2	-15
Responsible for developing compliant device for electronic logging with regards to FMCSA regulation	Support; Maven Machines could be viewed as providing comparative advantage over other ELD manufacturers given the additional benefits the co-pilot provides such as mirror checks and head bobs Against: however the ELD manufacturers not being collaborated with still view them as strong competitions.	They have power since they make the device; however, they still have to conform to testing listed under regulation	Issue affects customer base and hence profitability of companies	
FMCSA	0.5	5	1	2.5
Responsible for regulation	Indifferent, as the ruling has been	As they make the	The only concern	

surrounding compliance for new form of data logging for truck drivers	passed and compliance is mandatory.	regulation, they are the most powerful player	they have is that the device meet compliance requirements	
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Calculation 1	46.5
Calculation 3	76.5
Final	60.8%

References

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