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FINANCIAL AND ECONOMIC IMPACTS OF AUTONOMOUS VEHICLES IN AZERBAIJAN

Abstract

Implementation of autonomous vehicles could change the finance and economics of the companies. Autonomous vehicles can operate around the clock, without the need for breaks or rest periods, which can increase efficiency and productivity. There could be no fatigue or tiredness for autonomous vehicles. This can lead to cost savings and increased revenue for companies that use autonomous vehicles. Autonomous vehicles can also help reduce labour costs, as they do not require a human operator. Autonomous vehicles are one of the main players in the market. For this reason, they are significant in Azerbaijan too.

Autonomous vehicles could 92% safer in case of human error. If autonomous vehicles could be implemented in Azerbaijan by the year of 2030 number of accidents could be 87. Autonomous vehicles could save from 13.3% to 26.7% of fuel. If I compare 2021 fuel costs to 2021 AV fuel costs, it will give us a difference of 301283 USD. Autonomous vehicles could also save 80-90% labour costs. With the implementation of the autonomous vehicles the labour costs could decrease from 1038 AZN to 156 AZN in 2017. Those numbers could decrease from 1451 AZN to 218 AZN in 2021.

Overall, autonomous vehicles could increase safety and impact the economy positively in Azerbaijan and worldwide. Autonomous vehicles could have a positive effect on the economy of Azerbaijan.

Keywords: Autonomous vehicles, autonomous planes, unmanned aerial vehicle, UAV, fuel cost, fuel consumption, finance, economy.

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İntrduction

Implementation of autonomous vehicles could change the finance and economics of the companies. Autonomous vehicles can be designed to operate more efficiently than traditional vehicles, which can reduce fuel costs and other expenses.

I would try to find the impact of autonomous vehicles on fuel costs, labour costs, fuel consumption, etc. I would also try to make future predictions for Azerbaijan with the help of autonomous vehicles. I would not focus on the ecological problems in Azerbaijan.

Autonomous vehicles can operate around the clock, without the need for breaks or rest periods, which can increase efficiency and productivity [3, 4, 6]. There could be no fatigue or tiredness for autonomous vehicles. This can lead to cost savings and increased revenue for companies that use autonomous vehicles.

Autonomous vehicles can also help reduce labour costs, as they do not require a human operator.

Analiz

Fuel costs are one of the biggest expenses for airlines, and fluctuations in oil prices can have a significant impact on profitability. According to the International Air Transport Association (IATA) [9], fuel accounts for approximately 25% to 30% of the operating costs of airlines, making it a big expense for the industry.

Autonomous vehicles are one of the main players in the market. For this reason, they are significant in Azerbaijan too. Autonomous vehicles could be the future of technology. It could be implemented in subways and railways. As we know, it is already implemented in major cities such as Tokyo, London, etc. AV could also be used as an autonomous car to reduce traffic. With higher technology, they could find optimal

routes. That could again benefit Azerbaijan and specifically Baku city [10, 13].

The implementation of autonomous vehicles in any country like Azerbaijan involves numerous factors. Those could include technological readiness, regulatory frameworks, environmental, etc. Shatanawi M., Ghadi M., and Mészáros F. [14] write about most of those issues in Azerbaijan. According to them, it could

benefit the automotive market. In general, I could say road incidents and pollution could decrease after the implementation of AV.

In general, I could say the implementation of AV in Azerbaijan could benefit many things. One of the big issues in Baku is traffic. Autonomous vehicles could not only reduce traffic but also could reduce traffic accidents [2, 7, 12, 16].

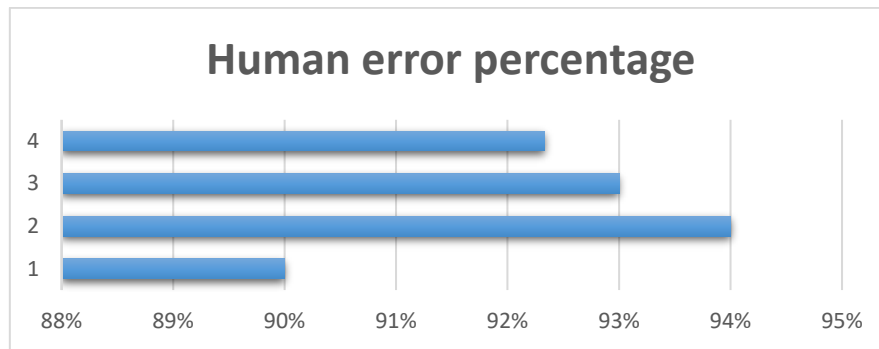


Figure 1 – Human error percentage, created by the researcher, 2023 [5, 7, 15]. Here 1 – represents data from 2023, 2 – data from 2020, 3 – data from 2017 and 4 – average human error percentage

In comparison I could find average percentage of human error in autonomous vehicles. On average 92% of accidents happen because of human error. According to that I did my calculations. Over the years the most

accidents for year happened in 2006 with 3197 accidents. The lowest point was 2020 with 1587 accidents. According to this data I could calculate the number of accidents that could be saved with autonomous vehicles [2].

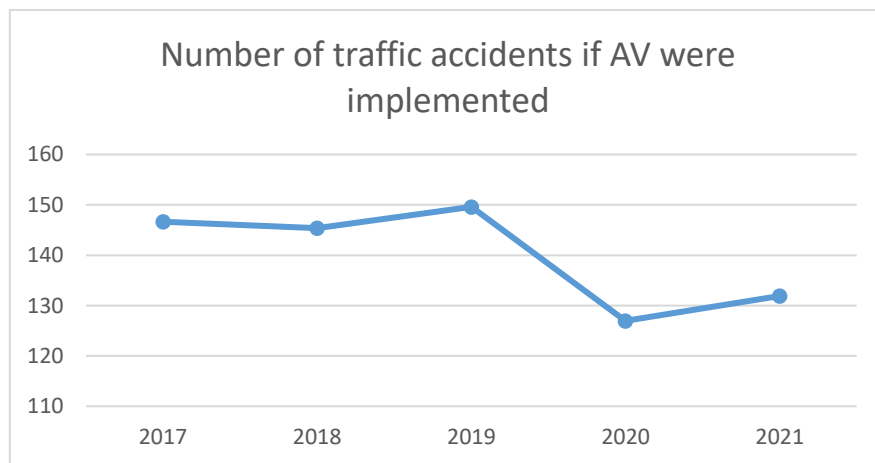


Figure 2 – Number of traffic accidents if AV were implemented, created by the researcher, 2023 [2, 7, 12, 15]

In the scenario where AV could be 100% implemented traffic accidents could decrease by 92% due no human error. In this case, the most accidents could happen in 2019 with 150

accidents and the least one could be in 2020 with 127 accidents. With this data I could also calculate future forecast for Azerbaijan.

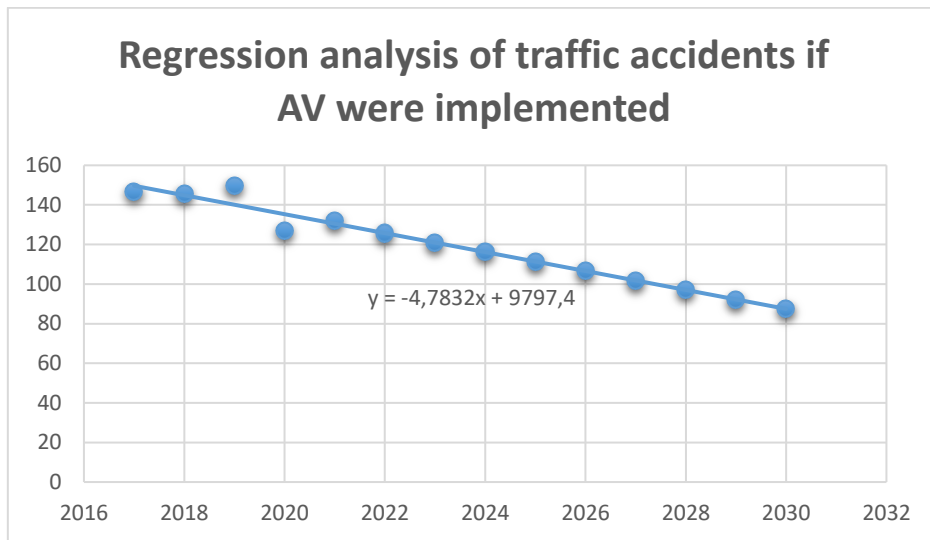


Figure 3 – Regression analysis of traffic accidents if AV were implemented, created by the researcher, 2023 [2, 7, 12, 15]

We can see the drop of the traffic accidents in Azerbaijan according to the analysis. According to the graph if autonomous vehicles could be implemented in Azerbaijan by the year of 2030 number of accidents could be 87 [2, 7, 12, 15]. I could also calculate the fuel savings in Azerbaijan. As I find out above that AV on average could save from 13.3% to 26.7% of fuel [5].

The record distance was in 2017 with 2374.3 km. In 2021 this number was 2060 km [1].

According to this data [1] and other data [6] I could calculate amount of fuel for 100 passenger flights over years. Most fuel consumption was in 2017 with 914110 L of fuel. In 2021 that number was 793100 L [1, 6]. As I find out the average fuel consumption saving percentage of autonomous vehicles, I could calculate the amount of fuel consumption if AV were 100% deployed.

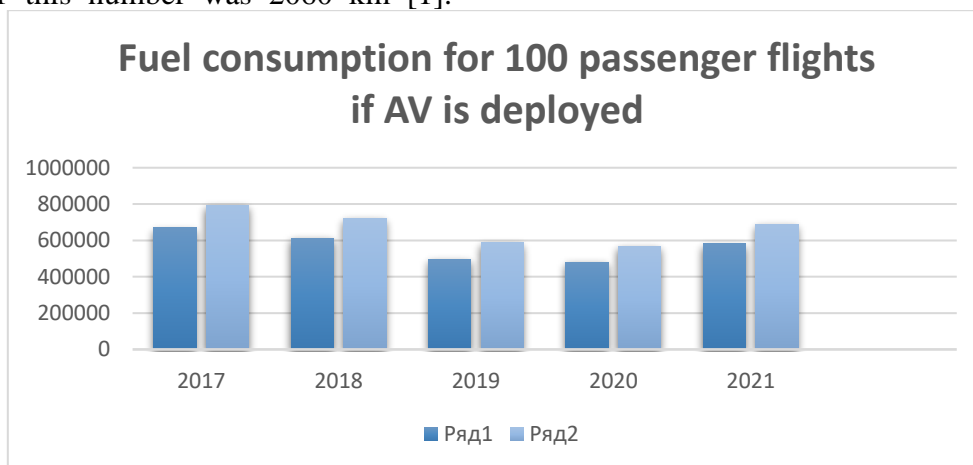


Figure 4 – Fuel consumption for 100 passenger flights if AV is deployed [1, 5, 6]. Here 1 – represents the worse scenario and 2 – the best scenario

According to my calculations in year 2017 fuel consumption for 100 passenger flight was around from 670042 L to 792533 L. In 2021 those numbers were 581342 L – 687618 L. With this data I could find average fuel consumption

for 100 passenger flight per year and make future forecast. Average fuel consumption for 100 passenger flights in 2017 was 731288 L, in 2018 667483 L, in 2019 541050 L, in 2020

524339 L and for 2021 the number was 634480 L [1, 5, 6].

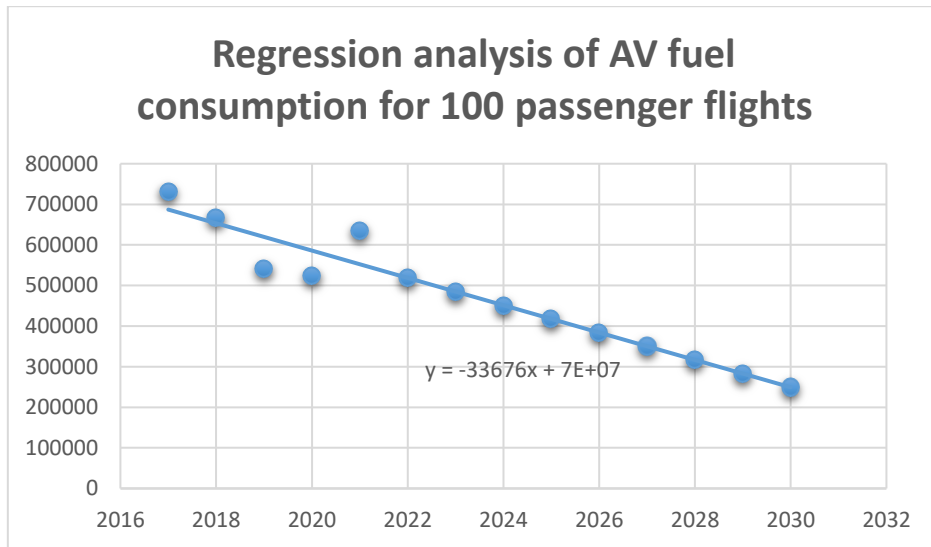


Figure 5 – Regression analysis of AV fuel consumption for 100 passenger flights, created by the researcher, 2023 [1, 5, 6]

According to my regression analysis by the year 2030 fuel consumption of AV on average for 100 passenger flights could be 249292 L [1,

5, 6]. With those numbers I could calculate fuel cost according to [16] (Prices according to 15.06.2023).

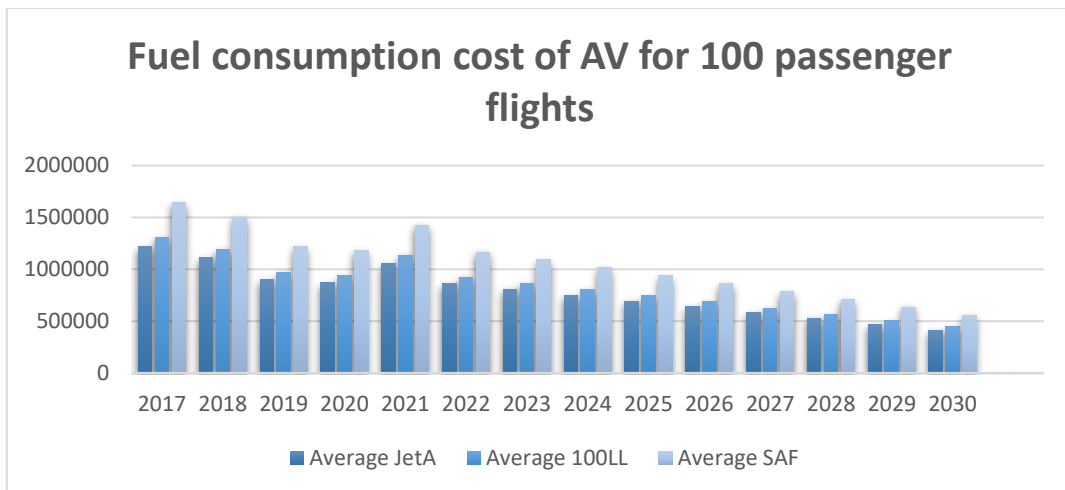


Figure 6 – Fuel consumption cost of AV for 100 passenger flights, created by the researcher, 2023 [1, 5, 6, 16]

Calculation suggests that average fuel cost for of AV 100 passenger flights could have been 1389006 USD. Moreover, the average fuel cost in 2030 could be 473504 USD. If we compare 2021 fuel costs to 2021 AV fuel cost, it will give us the difference of 301283 USD. Meaning in year 2021 that amount could have been saved with the deployment of autonomous planes [1, 5, 6, 16].

According to the data 80-90% of labour could be saved with AV [5]. With that data [5] and data of Azerbaijan Republic [1] I could calculate saved amount of labour costs. On the scenario where autonomous vehicles could be deployed at 100% on average the labour costs could decrease from 1038 AZN to 156 AZN in 2017. Those numbers could decrease from 1451 AZN to 218 AZN in 2021 [1, 5].

Different data talks about taxi prices could decrease with self-driving cars since driver labour could decrease [8]. According to the data taxi prices could be 0.29 USD – 0.63 USD per mile. That could be 0.18 USD – 0.39 USD per kilometre. For calculations in Azerbaijan that could be around from 0.31 AZN to 0.67 AZN per kilometre.

With that data I could calculate the average ticket price. Average ticket price could be 126 Euro, which could be 234 AZN [17]. From different data we can see that autonomous vehicles could decrease ticket prices by 11% [11]. With accordance to that I can calculate the average ticket price of autonomous planes in Azerbaijan and the ticket revenue for one person of the airlines flying over airspace of Azerbaijan. That makes average ticket price 208 AZN and the revenue for 2022 of airlines flying over Azerbaijan 24657221 AZN. That also means that AV saves 3047522 AZN.

Findings

Autonomous vehicles could 92% safer in case of human error. That could benefit Azerbaijan. In the scenario where AV could be 100% implemented traffic accidents could decrease. In this case, the most accidents could happen in 2019 with 150 accidents and the least one could be in 2020 with 127 accidents. If autonomous vehicles could be implemented in Azerbaijan by the year of 2030 number of accidents could be 87 [2, 7, 12, 15].

I also calculated fuel savings for Azerbaijan. As I have mentioned above autonomous vehicles could save from 13.3% to 26.7% of fuel [5].

Calculation suggests that the average fuel cost for AV 100-passenger flights could have been 1389006 USD. Moreover, the average fuel cost in 2030 could be 473504 USD. If I compare 2021 fuel costs to 2021 AV fuel costs, it will give us a difference of 301283 USD. Meaning in the year 2021 that amount could have been saved with the deployment of autonomous planes [1, 5, 6, 16].

Autonomous vehicles could save 80-90% labour costs [5]. According to that and labour cost statistics in Azerbaijan [1] I found a few findings. In the scenario where autonomous vehicles could be deployed at 100% on average, the labour costs could decrease from 1038 AZN

to 156 AZN in 2017. Those numbers could decrease from 1451 AZN to 218 AZN in 2021 [3, 8].

It was also said that autonomous planes could decrease airline ticket prices by 11% [11]. By that, I calculated the average ticket price of autonomous planes in Azerbaijan and the ticket revenue for one person from the airlines flying over the airspace of Azerbaijan. That makes the average ticket price 208 AZN and the revenue for 2022 of airlines flying over Azerbaijan 24657221 AZN. That also means that AV saves 3047522 AZN.

Overall, autonomous vehicles could increase safety and impact the economy positively in Azerbaijan and worldwide. Autonomous vehicles could have a positive effect on the economy of Azerbaijan.

I believe autonomous vehicles could be great for Azerbaijan for the benefits it could offer. With autonomous vehicles, I could decrease traffic and increase safety.

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A.И. РЗАГУЛИЕВ

ФИНАНСОВО-ЭКОНОМИЧЕСКОЕ ВЛИЯНИЕ АВТОНОМНЫХ ТРАНСПОРТНЫХ СРЕДСТВ В АЗЕРБАЙДЖАНЕ

Резюме

Аннотация: Внедрение автономных транспортных средств может изменить финансы и экономику компаний. Автономные транспортные средства могут работать круглосуточно, без перерывов или периодов отдыха, что может повысить эффективность и производительность. Для автономных транспортных средств не может быть усталости или утомления. Это может привести к экономии средств и увеличению доходов компаний, использующих автономные транспортные средства. Автономные транспортные средства также могут помочь снизить затраты на рабочую силу, поскольку они не требуют участия человека-оператора. Автономные транспортные средства являются одним из основных игроков на рынке. По этой причине они значительны и в Азербайджане.

Автономные транспортные средства могут быть на 92% безопаснее в случае человеческой ошибки. Если бы в Азербайджане были внедрены автономные транспортные средства, то к

2030 году количество аварий могло бы составить 87. Автономные транспортные средства могли бы сэкономить от 13,3% до 26,7% топлива. Если я сравню затраты на топливо в 2021 году с затратами на топливо автономных транспортных средств в 2021 году, мы получим разницу в 301 283 доллара США. Автономные транспортные средства также могут сэкономить 80-90% затрат на оплату труда. С внедрением автономных транспортных средств затраты на рабочую силу могут снизиться с 1,038 манатов до 156 манатов в 2017 году. Эти цифры могут уменьшиться с 1,451 манатов до 218 манатов в 2021 году.

В целом, автономные транспортные средства могут повысить безопасность и положительно повлиять на экономику в Азербайджане и во всем мире. Автономные транспортные средства могут оказать положительное влияние на экономику Азербайджана.

Ключевые слова: автономные транспортные средства, автономные самолеты, беспилотный летательный аппарат, БПЛА, стоимость топлива, расход топлива, финансы, экономика.

Ə.İ RZAQLIYEV

AZƏRBAYCANDA AVTONOM NƏQLİYYAT VASİTƏLƏRİNİN MALİYYƏ VƏ İQTİSADİ TƏSİRLƏRİ

Xülasə

Avtonom nəqliyyat vasitələrinin tətbiqi şirkətlərin maliyyə və iqtisadiyyatını dəyişə bilər. Avtonom avtonəqliyyat vasitələri fasilə və ya istirahətə ehtiyac olmadan gecə-gündüz işləyə bilər ki, bu da səmərəliliyi və məhsuldarlığı artırır. Avtonom nəqliyyat vasitələri üçün yorğunluq olmur. Bu, avtonom avtomobillərdən istifadə edən şirkətlər üçün xərclərə qənaət və gəlirlərin artmasına səbəb ola bilər. Avtonom nəqliyyat vasitələri həm də insan operatoru tələb olunmadığı üçün əmək xərclərini azaltmağa kömək edə bilər. Avtonom nəqliyyat vasitələri bazarın əsas oyunçularından biridir. Bu səbəbdən Azərbaycan da onlar əhəmiyyətlidir.

Avtonom avtomobillər insan səhvi 92% azalda bilər. Əgər 2030-cu ilə qədər Azərbaycanda avtonom avtomobillər tətbiq olunsa, qəzaların sayı 87-yə çata bilər. Avtonom avtomobillər yanacağa 13,3%-dən 26,7%-ə qənaət edə bilər. 2021-ci ilin yanacaq xərclərini 2021-ci ilin AV yanacaq xərcləri ilə müqayisə etsəm, bu, bizə 301,283 ABŞ dolları fərq verəcək. Avtonom avtomobillər həm də əmək xərclərinə 80-90% qənaət edə bilər. Avtonom avtomobillərin tətbiqi ilə əmək xərcləri 2017-ci ildə 1,038 manatdan 156 manata enə bilər. 2021-ci ildə bu rəqəmlər 1,451 manatdan 218 manata enə bilər.

Ümumiyyətlə, avtonom avtomobillər təhlükəsizliyi artırır və Azərbaycanda və dünyada iqtisadiyyata müsbət təsir göstərə bilər.

Açar sözlər: Avtonom nəqliyyat vasitələri, avtonom təyyarələr, pilotsuz uçuş aparatı, PUA, yanacaq dəyəri, yanacaq sərfiyyatı, maliyyə, iqtisadiyyat.

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