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Economic Features of the Use of Electric Vehicles in Delivery Services in Estonia[1]

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ABSTRACT

The article is devoted to substantiating the prospects and advantages of developing a small business specializing in the delivery of lightweight cargo in Tallinn during the COVID-19 pandemic. It was justified why such a business should not only be cost effective but also comply with the general principles of sustainable development and be socially responsible. Particular attention in the article is paid to identifying possible alternative strategies for forming the vehicle park of such a company. Analytically (based on the latest data from the auto producer; car, energy and fuel markets, as well as a company specializing in the construction of turnkey solar power plants), it has been proven that a mixed park, which is consists of gasoline cars and plug-in hybrids is the most a flexible solution requiring an investment exclusively in moving property. At the same time, it was shown that if a company has territorial capabilities to accommodate a sufficient number of solar panels and is ready to organize a business with a smaller park of cars, then the choice of electric ones becomes obvious.

Keywords: Delivery Business, Electric Cars, Energy Saving Cars, Fuel Consumption, Hybrid Cars, Small Business
JEL Classifications: L62, L87, O18, R49

1. INTRODUCTION

Humanity today has entered a new era of business – an era in which profit maximization cannot be achieved through unbalanced (unsustainable) management practices. This is not even a problem of the high cost of resources consumed by the company, but also a image question. A modern competitive company cannot be imagined without a strategy for introducing energy and resource-saving technologies, the use of which in production should bring economic and, as already indicated, reputational dividends.

The pandemic caused by the spread of COVID-19 has exacerbated issues related to the organization of a business, its specialization, tools and technologies, which introduction should help cope with

1. The research was performed within the framework of the international research project of the scientific and technical organization Teadmus OÜ (teadmus.org) «Economic Features of the Use of Electric Vehicles in Delivery Services in Estonia».

new problems. If for big business enterprises, the problems of the coronavirus spreading led to temporary stops, the organization of anti-epidemiological measures and, as a result, a drop in financial results for 2020 (significant, but not catastrophic), then for thousands of small businesses and private firms, the pandemic has had dire consequences (Fila et al., 2020). Part of the business was closed, part froze indefinitely, partly changed its activities, trying to adapt to new conditions.

The COVID-19 pandemic has led to business changes, even structural changes, as well as a reorientation of investment flows (Prokopenko et al., 2021a). At the same time, today, we see that despite any force majeure circumstances, there are types of businesses that continue to work normally, and in some situations even increase their economic efficiency (Shkola et al., 2021).

Such a business is, of course, associated with the provision of services for the sale of goods over the Internet. Participants in such trade are both legal entities and private entrepreneurs, both sellers of clothing, gadgets, accessories, and distributors of medicines, food, water, etc. At the same time, it is obvious that even such a business (infinite business) is impossible without an infrastructure providing delivery services (courier services).

Today, a private business realized that it is almost impossible to compete with large retailers amid a pandemic and multiple quarantine restrictions; accordingly, organizing a delivery service for small loads (up to 30–100 kilograms) from such retailers is a chance to stay afloat even in these conditions. For large retailers, in their turn, the introduction of multiple small delivery companies is also economically justified since they themselves do not need to invest significant resources in creating their courier services. In other words, informal outsourcing of delivery functions.

However, a small business for the delivery of light cargo existed even before the pandemic. Even then, it was a question of how to organize it more efficiently and in what technologies to invest. Some companies stubbornly continued to use classic gasoline cars, while others began to switch to electric traction.

Based on this, we set ourselves the task of determining how much and under what conditions modern electric vehicles can provide a positive economic result for a small business specializing in small cargo delivery services in order to help to maximize efficiency from their activities in a pandemic while not denying the importance of the Sustainable Development Goals (Strakova et al., 2021).

The problem of small business development in the context of a pandemic is also relevant for Estonia. Despite the fact that the number of detected infected people in April 2021 is approximately 300–400 people daily, for Germany, for example, this is 20 thousand people daily (JHU CSSE COVID-19, 2021). With a high degree of probability, this means that quarantine restrictions in Europe will continue and the delivery business will continue to be in demand as never before.

2. LITERATURE REVIEW

The task of improving the transport system has always been one of the priority tasks of the strategic development of urban areas (Karyy and Knjazevska, 2009). Researchers are exploring the possibilities that shared autonomous vehicles provide to improve urban populations' spatial equity of access (Eppenberger and Richter, 2021) and developing models for the economic and environmental assessment of supply chains (Hrechyn et al., 2021).

Prokopenko et al. (2021b) substantiated logistics concepts to optimize business processes. Hoffmann and Prause (2018) studied autonomous delivery robots and their corresponding regulatory framework focusing on urban areas, whereas Prause and Boevsky (2018) focused on using delivery robots in rural areas.

Some researchers are focusing on transport communications (Kandar et al., 2021), tariff policy (Bashynska, 2020) and innovative management concepts of common-pool resources for transportation (Prause and Hoffmann, 2020) to improve the efficiency of the transport system and even consider the health effects of transport (Kasdorf et al., 2021; Mura and Hajduova, 2021).

Recently, more and more attention of researchers has been focused on electric transport. The use of electric vehicles is assessed as part of pro-environmental behavior (Ionescu et al., 2020). Some studies are devoted to macroeconomic issues of the electric vehicle market development (Sotnyk et al., 2020).

Wu et al. (2022) studied the role of buildings and transactional interactive behaviour of cars in building a modern informational transactive society. The role in forming the physical energy space (Koraus et al., 2021), human social space and information cyberspace has also been proven.

Gautam and Rao (2022) substantiated the prospects for the beneficial use of hydrogen as a fuel for cars. A study has been conducted on how the H2 generated by running classic electric vehicles could be used as a fuel for hydrogen cars. The negative impact of classic (diesel and gasoline vehicles) on the environment has been shown. An investigation was carried out on the life cycle costs of various vehicles per 1 km of track.

Gururaj and Hegde (2022) show India's experience in tackling environmental emissions that result from increased vehicle numbers. Shown is the case of the government of India to encourage the development of electric cars. In addition, attention is paid to the prospects for developing alternative energy using vertical-axis wind turbines and solar photovoltaic panels.

Wang et al. (2022) substantiated the efficiency of using hybrid vehicles in terms of fluctuating speed regimes. The necessity was justified not only to obtain a useful effect in the form of recharging the battery while driving but also to protect the battery, which is the most important issue for the safety of the driver, passengers, as well as the environment.

Kumar et al. (2021) investigated the supply chain of electric vehicle batteries in India. Based on the example of BMW's activities, the following problems were identified in the supply of batteries: insufficient charging infrastructure, ineffective recycling and reuse of batteries, disposal of batteries.

Billhardt et al. (2022) studied the need to reduce the emission of harmful gases by enterprises on cities' territory. In the example of Madrid and London, the optimization of transport services (passenger and cargo) was shown, taking into account of harmful gases emissions control.

Lin et al. (2022) studied the problems of routing electric vehicles and improving the efficiency of the charging station infrastructure. A model was calculated, the results of which showed the need to direct the flows of electric cars in such a way that they could not only charge their batteries but also give it to the network.

Within alternative scientific work, the problem of routing of electric vehicles has also been investigated (Yang et al., 2021). This study looks at routing in terms of energy efficiency, delivery and recharging scheduling. Ways to improve the operational efficiency of electric transport logistics systems have been proven.

In the article (Aiello et al., 2021) the prospects for the construction of urban distribution systems through the use of electric freight bicycles in the delivery of goods were investigated. Electric bicycles are supposed not only to be used in their classic design but also to design them based on their needs.

Shvets et al. (2013) proposed a methodology for the economic and environmental examination of investment projects, which considers economic and ecological criteria for choosing alternatives in conditions of non-statistical uncertainty and can be adapted to manage delivery services.

Scenarios for replacing batteries in electric vehicles at Battery Swap Stations (BSS) were investigated in work (Yang et al., 2021). The article substantiated the principles of the placement of BSS stations and the strategy for their daily work. Were investigated and identified the factors affecting the efficiency of BSS stations.

In the scientific work (Yadav et al., 2021) the role of electrical networks in building an efficient system for the use of electric vehicles was investigated. It was shown that despite the fact that electric vehicles are a worthy replacement for classic cars, due to significant limitations (battery reserve, driving range on a single charge), for their effective use, it is necessary to optimize the routes for their movement.

However, the study of the economic features of the use of electric vehicles in delivery services remains outside the field of research.

2.1. The Purpose of the Article

The article is devoted to determining the economic effect of using electric cars in small courier delivery services in Estonia as well as finding out the conditions under which a full transition to electric traction is justified.

2.2. Presentation of the Primary Material

Before starting the presentation of our research, we must explain that no matter of obtained results, we realize and completely support the concept of sustainable development and sure that alternative vehicle traction (electric, hydrogenous etc.) is a future of business as well as of ordinary (private) life. At the same time, we must understand that the concept of sustainable development does not negate the economic efficiency of companies. It only refutes unbalanced economic growth.

Therefore, at this stage of technological development of vehicles in order to preserve the economic efficiency of companies (especially in the context of the crisis caused by the pandemic), we must seek an effective balance between the goals of companies and their impact on the environment. Also, in order to assess the efficiency of using electric (and hybrid) traction for a small delivery business, we will definitely take a vehicle with a gasoline engine for comparison.

The initial parameters of our research and an explanation to them:

1. The research object is a hypothetical newly formed company in Tallinn, which specializes in the provision of small cargo delivery services. By small, we mean loads weighing up to 100 kg.
2. The company's car park will consist exclusively of passenger cars - sedans, hatchbacks, crossovers. This choice is due to several reasons:
   - Price. Such cars are incomparably cheaper than commercial vehicles. In addition, it has a positive effect on the cost of a loan or leasing.
   - Carrying capacity. For the economic purposes of such a company, a car of this type will fully satisfy all the needs.
   - Specifications. We were not interested in data on top speed, acceleration dynamics, torque, etc. Only the possibility of delivering small loads with the greatest efficiency (based on the principles of sustainable development).
   - Loading and unloading. Such cars (as well as cargos), firstly, do not require special conditions and infrastructure for loading, and, secondly, they can be loaded and unloaded by the driver himself or with the involvement of 1 additional person - a loader at the delivery point (during loading) and of the cargo owner (upon delivery).
   - Parking. Such cars do not require special or especially large areas for parking. Therefore, this, in turn, does not require significant investments in the corresponding infrastructure.
   - Service. Since we will consider cars with the lowest price, this, as a rule, means the lowest costs for mandatory technician maintenance.
   - Fuel and energy consumption. The city-cycle consumption of fuel traditionally is maximal. It must be minimal as our goal is to decrease the negative influence of such business on the environment. Also, we are speaking primarily about delivery inside Tallin.
   - Insurance. Compulsory as well as voluntary insurance (CASCO) for such cars are also cheaper, although more expensive than for similar cars that are not used in business.
3. The delivery business will have clearly defined opening hours, unlike taxi services, in which the car (but not the driver) can work almost around the clock. The delivery service is tied to the opening hours of the pick-up points, shops, restaurants, etc.

Therefore, there is no need to ensure the constant operation of all vehicles and the dispatch service. It is possible to establish a watch for one or two cars, if necessary.

4. In this study, we will not take into account the possibility of a loan or leasing:
   - Our goal is to prove the net economic effect that cars with different types of engines can provide.
   - Depending on the bank, its specialization (as, indeed, a leasing company), the terms of lending (or leasing) may be different. Therefore, we see no reason to adjust the initial parameters for a specific bank.
5. We assume that the company is working 8 h every day. We also do not take into account the working hours of drivers on weekends - this does not affect the cost of operating a car with a particular type of engine.
6. We take into account an idealized situation: the car runs daily without any force majeure, but we deduct one day required for mandatory maintenance, insurance and public holidays. Thus, let us assume that the car works 360 days a year.
7. According to Google Maps, the average delivery from Tallinn city center to the outskirts takes about 20 min and corresponds to about 10 kilometers. We add the time required for loading and unloading to the drive time - 10 min. As a result, the entire road of the vehicle from the loading point (in the center) to unloading (in the outskirts) will take 30 min. It means that a car that runs 8 h a day will make 16 deliveries on average. However, we will deduct one trip since we need to provide the driver time for lunch and rest. Therefore, the daily quantity of deliveries will - 15 with an average mileage – 150 kilometers.
8. For the purposes of our analysis, we decided to investigate the car offers of only one company - Hyundai Motor Company due to the reasons that:
   - All types of modern engines are represented in the line of this manufacturer - gasoline (we did not take into account the cars with diesel engine since this is morally completely outdated technology); classic hybrids (the battery of which is recharged by the kinetic energy recovery system - KERS); plug-in hybrids (in which it is possible to recharge the battery using an external source); classic electric cars.
   - Car manufacturers of the Republic of Korea, trying to penetrate deeper into European markets, are usually very democratic in the pricing of cars and their maintenance.
   - We wanted to get away from potential advertising of individual car manufacturers - the competition in our study takes place between different models of the same manufacturer. We offer only analysis technology based on specific data from a real car manufacturer.
   - It is worth noting that the analysis can neglect the cost of annual vehicle maintenance as the manufacturer claims that regardless of the model and the term of use, the annual full maintenance cost is 312 euros (Hyundai, 2021). It is also important to point out that the cost of annual maintenance may vary and can be different by the manufacturer. It is not interesting for us to calculate the payback of cars of a particular brand, but to see the advantages of new technologies.

Based on official press releases of Hyundai Motor Baltic Oy, which is an official dealer of Hyundai Motor Company in Estonia, we`ve chosen four cars to be analyzed further. Our selection of cars and their technician characteristics (mandatory to be taken into account by us) is presented in Table 1.

It is important to note that we have chosen a car model with a classic gasoline engine as a control sample. This model is not the cheapest in the Hyundai line. However, it is more or less comparable in overall dimensions, carrying capacity and weight.

In addition, we did not consider the possibility of a "quick charge" for a plug-in hybrid and an electric car. Such charging is not necessary in this case as a dedicated fast charging facility will require additional investment. At the same time, the longest charging period (16 h for an electric vehicle from a standard household network) is quite consistent with the expected schedule of the car during the working day – 8 h.

The following scheme will work: there will be an activity during the working day, and in the evening and at night - charging.

At this stage, as a resultant indicator, we will calculate the cost of 1 km of the route made by cars with different types of engines. For this purpose, we need to take the information of the price on fuel and energy (for corporate users) in Estonia (Table 2).

Based on data presented in Tables 1 and 2, it is easy to calculate the price of the cost of 1 km of the route made by cars with different types of engines (Table 3).

Table 1: The vehicles that we analyzed during perfuming of our research

Characteristic	The model of the car			
	i30 Wagon (i30 MY21 Price Specs, 2021)	IONIQ (Hyundai, 2021)		
Power unit	Gasoline	Hybrid	Plug-in hybrid	Electric
Base price, € (Baltic Pricelist, 2021)	16 990	24 990	29 990	38 990
Engine	Single – gas engine	Double – gas + electric engine	Double – gas + electric engine	Single – electric engine
Fuel	Petrol	Petrol	Petrol	–
Average fuel consumption, L/100 km	6.0	4.5	1.1	–
Average energy consumption, kWh/100 km	–	–	–	13.8
On-board AC charger power, kW	–	–	3,3	7.2
Household charge (220V/12A/2.6 kW), hours	–	–	4	16
Charging from a dedicated household or industrial charger (3.6 kW–22kW), hours	–	–	3	11.5

Based on these calculations, we can make an unambiguous conclusion that the kilometer of the route made on an electric car is twice as chipper than on a plug-in hybrid (0,01 €/km and 0,02 €/km consequently). Moreover, the kilometer of the route made by using a plug-in hybrid is 3-times chipper than by classic hybrid (0,02 €/km and 0,06 €/km consequently), which, in its turn, is 25% chipper than by automobile with the most saving gasoline engine (0.06 €/km and 0.08 €/km consequently).

The figures for the cost of a kilometer between an electric car and a car with a gasoline engine cannot be compared at all. The difference in cost by 8 times (or 800%) speaks for itself.

In principle, based on these findings, it is theoretically possible to advise entrepreneurs who want to organize a small company to provide small delivery services in Tallinn to invest in an electric vehicle park (fleet).

However, not everything is so unambiguous and straightforward, and we decided to go further. In fact, the cost of a route kilometer can be considered as a serious resultant indicator in decision making. Nevertheless, these are only day-to-day indirect costs. In our opinion, it is more important to determine what is the interconnection between the benefits in such indirect costs and the payback of the car: from the moment of purchase (taking into account its original price) over a certain period of operation and also considered on definite intensity.

Table 2: The average price for fuel and energy

Energy source	Average price
Electricity on fixed average tariff (taxes incl.), €/kWh (Electricity Market Elektrihind, 2021)	0,0684
Price of gasoline - 95 (taxes incl.),/L (Fuel Prices in Estonia and Europe, 2021)	1,389

Source: Authors took data (Electricity Market Elektrihind, 2021; Fuel Prices in Estonia and Europe, 2021) at 20.04.2021.

For this purpose, we decided to calculate the costs of the operation of each car model (Table 1) for 8 years period (as supposed that this is the maximal possible period of credit and leasing providing in ordinary banking practice). The results of or calculation are presented in Table 4.

The following features may explain the logic of provided calculation based on data from previous tables:

- The initial (base) price of the car is the loss that we are taking at the moment of purchasing – before it`s directly used. We were adopting it like year 0;
- Each cell in a column "1st year" represents gross costs of energy sources (gasoline or electricity) per 1 car during the 1 year (and the first as well) with an estimated annual mileage of 54000 kilometers (we assumed that the duration of the working year is 360 days and calculated that daily milage for each car of such business in Tallin is approximately 150 kilometers);
- Each cell at columns "2nd year" – "8th year" we've got by adding of amount from the previous column and the data from column "1st year";
- Cell's colorization in the columns "Initial price" – "8th year" reflects the distribution of sums from highest (red color) to lowest (green color). Comparison of sums goes only inside the columns here, not rows.

Basically, we didn't expect such results of research. However, it gives us all possibilities to make such raw conclusions:

Table 3: The cost of 1 km of the route made by cars with different types of engines

Indicator (Calculation)	The model of the car			
	i30 Wagon	IONIQ		
Power unit	Gasoline	Hybrid	Plug-in hybrid	Electric
Daily mileage inside Tallin, km	150			
Daily working duration, hours	8			
Daily consumption of fuel, liters (Table 1 row 5 * Table 3 row 2/100)	9	6.15	1.65	-
Daily consumption of energy, kWh (Table 1 row 6 * Table 3 row 2/100)	-	-	-	20.7
Cost of a whole daily route, € (Table 3 row 4 * Table 2 row 2) (Table 3 row 4 * Table 2 row 1)*	12.5	8.54	2.29	1.41*
Cost of 1 km of route, €/km (Table 3 row 6 * Table 3 row 2)	0.08	0.06	0.02	0.01

Source: Calculated by authors based on data presented in Tables 1 and 2

Table 4: Gross costs of operation for each of selected cars at the 8 years period per 1 car

Car model	Power unit	Initial price, €	Consumption of fuel, € (colorization reflects the highest sum in each separate column)							
			1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year
i30 Wagon	gasoline	16990	4500	21490	25990	30490	34990	39490	43990	48490
IONIQ	hybrid	24990	3074,4	28064,4	31138,8	34213,2	37287,6	40362	43436,4	46510,8
	plug-in hybrid	29990	824,4	30814,4	31638,8	32463,2	33287,6	34112	34936,4	35760,8
	electric	38990	507,6	39497,6	40005,2	40512,8	41020,4	41528	42035,6	42543,2

Source: Calculated by authors based on data presented in Tables 1, 3

- The cars with gasoline engines obviously are the cheapest among others. It helps to maintain the profitability of such cars during four initial years of operation regardless even that such vehicles consume the highest quantity of more expensive gasoline (in comparison with the price of electricity), than other representatives of our sample.
- During the 5th year and further of operation in such business, the plug-in hybrid car becomes the cheapest if considering the initial price of cars in calculations.
- As we showed before, the cost of annual operation of the electric vehicle is the cheapest among others (but only at fuel price), however, remembering its initial (base) price, which is 2,2 times higher than of car with a gasoline engine and almost on 25% more expensive than of plug-in hybrid, all economic benefits are almost completely disappearing. Moreover, electric vehicles overcome the economic efficiency of a gasoline car and classic hybrid only by the 7th year of operation. At the same time, over such a period (8 years), it never approaches the efficiency of a plug-in hybrid.
- It is very difficult to give any explanation for the situation associated with classic hybrids. The data here speaks for themselves: it is possible that the use of such vehicles can be economically justified for solving some problems, but not in this case.

Next, it is necessary to determine the saving of financial resources for the whole car park (fleet) consisting of 20 units between the model with gasoline engines and alternative ones (Table 5).

From Table 5 we see that after the 8th year of operation (after a credit or leasing period), the park of electric vehicles saves almost €120 thousand compared to a fleet of cars with ordinary gasoline engines. However, obviously that electric traction, regardless of even its bottom expenditures for a kilometer of the route, still can't suggest such saving of finances like plug-in hybrids. The reason for this is very simple – the initial price for electric vehicles leaves the highest. Indeed, this is a temporary factor that will be changed in the future by the effect of mass production with refusing of automobile manufacturers to invest in the development of new gasoline engines.

Moreover, by the European Union's policy, the pace of electric vehicle production must grow significantly till 2030, which means that in 10 years, the situation may change dramatically (Reuters, 2021). Nevertheless, the initial unit price continues to be a decisive factor in decision-making while organizing new companies, which slows down the penetration of electric traction in a business.

Table 5: Saving of financial resources for the company specialized in delivering light cargos in Tallin in a case of choosing the cars with alternative engines instead of gasoline one. Calculated based on Table 4 for the park of 20 cars for 8 years of operation

Model	Model	i30 Wagon, €	IONIQ, €		
	Power unit	Gasoline	Hybrid	Plug-in hybrid	Electric
i30 Wagon	Gasoline	0	39584	254584	118936

Source: Calculated by authors based on data presented in Table 4

In this context, it should be noted that for our calculations, we have chosen the most objective parameters. That is, those that the car manufacturer itself declares. In practice, the efficiency of different types of cars depends on numerous subjective factors, which are often almost impossible adequately and sufficiently to take into account, among them:

- Driving style of all drivers working in the company. Some drivers have an intuitive sense of the vehicle's capabilities and can save fuel (or electricity). Others, trying to get to the place faster, spend more energy. The independent research (Tzirakis, 2017) proved that the aggressive of ineffective driving style might cause increase in gasoline consumption from 78.5% to 137.3%.
- Configuration of cars (vehicle equipment) – the list of all additional functions, features that are added on the plant. In order to make our analysis, we were taken the most cheapest configurations of cars. But for greater honest and taking into account of the official dealer`s offers it is necessary to say that hybrid cars, as well as electric cars, are incomparable better equipped by default.
- Cost and frequency of mandatory maintenance for vehicles of different manufacturers. Competition between auto manufacturers, as a rule, occurs not only in the functional aspect and prestige but also in matters of costs for mandatory maintenance. Moreover, there is competition in this aspect also between local dealers.
- Costs of insurance services. Insurance companies have developed internal standards for the insurance of cars in different price categories. That`s why depending on the scale of insurance corporations (is it local or international), their specialization (is it oriented on life and health or vehicle insurance), the cost of insurance will differ. Moreover, if we are talking about buying cars on credit, then it is worth noting that banks, as a rule, have contractual relationships with certain insurance companies. It means that the cost of insurance under loan agreements can also be completely different.

After all these conclusions, we decided to develop possible strategies to maximize the effect of our funds spending during the delivery business organization in Tallinn. If we determined that the park of plug-in hybrids is the most saving for the term of 8-years operation, we decided to take the gross costs as necessary, which is required to buy the 20 units of such vehicles – €599800. This amount is a multiplication of the initial plug-in hybrid`s price (which is €29990) at 20 units.

Strategy 1. Diversifying of the park: Firstly, we must generate our gross budget €599800 by investments, startup procedure or using of banking credit. Secondly, we are planning the park 20 gasoline cars with a total cost of €339800 (is the expenditures for 20 gasoline cars with an initial price of €16990). Thirdly, the difference between the gross budget and the budget for the purchase of a park of 20 gasoline vehicles (which is €260000), we use a total of 8 plug-in hybrids. Thus, planning a budget of almost 600 thousand euros, we get the opportunity to organize a business not from 20, but 28 cars. Fourthly, our park mustn't only be renewed from time to time, but we must take a strategy to replace our park of gasoline cars with hybrid ones. For this purpose, we suggest replacing used gasoline cars with new plug-in hybrids from the 3rd year of operation. We suppose it will be enough to start from 3 units during the 3rd year (after that four units during 4th year, five units during 5th year etc.). If to continue such practice and replace gasoline car each year, but on one unit more, at the 7th year, all our park will exclusively consist of plug-in hybrids. Moreover, if to continue such practice and replace old plug-in hybrids by new ones. The final structure of the park will have the next view (Table 6).

We'll provide some explanations to this table:

1. Colorization. Reflects the model of car. Yellow corresponds to gasoline cars, green reflects the plug-in hybrids. Blue shows what cars are replaced by new plug-in hybrids.
2. Amount in each cell. Shows the expenditures for the particular year of operation. Blue cell means that the car was bought and it replaces the old one (For it is the 1st year of operation).
3. Price. It is obviously that blue cells do not correspond with data from Table 4. It is so. However, if we decide to replace an old car with a new one, it simultaneously means that we sell an old car. We monitored the suggestions on similar cars at the secondary market (Longo, 2021) and subtracted them from the price for a new plug-in hybrid (Table 4, column 3, row 4). MPUGC and MPUHC are indexes that show the market price of a used gasoline car (MPUGC) as well as a plug-in hybrid car (MPUHC).
4. GB means gross budget – the total amount of money that accumulates for each next operational year for maintaining the whole park of cars.
5. PHB is a budget necessary to operate the park of plug-in hybrids, consisting of only such vehicles.

Data from Table 6 gives us all possibilities to consider that chosen strategy guarantees the company a replacement of all gasoline cars up to the 7th year of working on the market. Also, it is extremely important to add that during the 8th year, such a company will start partial replacement of even plug-in hybrids.

At the same time, we must underline that our suggestion makes the whole park more profitable by the same 8th year (colored by dark blue in Table 6). Even more important to pay attention that PHB was calculated for the park of 20 cars; however, the other data shows digits for the park of 28 cars. This is a big difference since such a business is in fact, almost 30% broader than if we take into account the purchasing of only plug-in hybrids.

In addition, specified situation has double social meaning:

- Such business gradually becomes more sustainable. It is important to perform of the principle of sustainable

Table 6: Annual costs for the operation of the car park owned by the delivery company in Tallin that includes 28 units and consists of gasoline and plug-in hybrid cars

Car number	Annual vehicle operating costs, €								
	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year
1	16990	21490	25990	30490	34990	39490	21990	26490	30990
2	16990	21490	25990	30490	34990	39490	21990	26490	30990
3	16990	21490	25990	30490	34990	20990	25490	29990	34490
4	16990	21490	25990	30490	34990	20990	25490	29990	34490
5	16990	21490	25990	30490	34990	20990	25490	29990	34490
6	16990	21490	25990	30490	34990	20990	25490	29990	34490
7	16990	21490	25990	30490	34990	20990	25490	29990	21990
8	16990	21490	25990	30490	34990	20990	25490	29990	21990
9	16990	21490	25990	30490	19990	24490	28990	33490	21990
10	16990	21490	25990	30490	19990	24490	28990	33490	21990
11	16990	21490	25990	30490	19990	24490	28990	33490	21990
12	16990	21490	25990	30490	19990	24490	28990	33490	21990
13	16990	21490	25990	30490	19990	24490	28990	33490	21990
14	16990	21490	25990	18990	23490	27990	32490	36990	21990
15	16990	21490	25990	18990	23490	27990	32490	36990	21990
16	16990	21490	25990	18990	23490	27990	32490	20990	21814
17	16990	21490	25990	18990	23490	27990	32490	20990	21814
18	16990	21490	17990	18814	19639	20463	21288	20990	21814
19	16990	21490	17990	18814	19639	20463	21288	20990	21814
20	16990	21490	17990	18814	19639	20463	21288	20990	21814
21	29990	30814	31639	32463	33288	34112	34936	20990	21814
22	29990	30814	31639	32463	33288	34112	34936	20990	21814
23	29990	30814	31639	32463	33288	34112	34936	20990	21814
24	29990	30814	31639	32463	33288	34112	19990	20814	21639
25	29990	30814	31639	32463	33288	34112	19990	20814	21639
26	29990	30814	31639	32463	33288	34112	19990	20814	21639
27	29990	30814	31639	32463	33288	34112	19990	20814	21639
28	29990	30814	31639	32463	33288	34112	19990	20814	21639
MPUGC	-	-	12000	11000	10000	9000	8000	-	-
MPUHC	-	-	-	-	-	-	10000	9000	8000
GB	579720	676315	748910	788479	799047	773616	740452	746342	680559
PHB	616288	632776	649264	665752	682240	698728	715216	731704	748192

Source: Calculated by authors based on data in Tables 1, 3

development proclaimed by the United Nations as well as the policy of the European Union in the question of alternative automobile traction.
- Such an activity totally corresponds to the norms of modern socially responsible business. The company is not only thinking about the environmental problems and decreasing of fuel consumption, but also about employees (they work in more healthy and comfortable conditions) and other stakeholders – citizens of Tallin, consumers, working staff engaged in an activity process etc.

Strategy 2. Operation of only plug-in hybrids. It is the absolutely normal alternative. However, it has some negative moments:
1. Less broad business in relation to Strategy 1. Still, an additional 8 cars are not only a source of additional costs but also an opportunity for additional profit.
2. Same budget – less possibilities. No matter of vehicles chosen for a business during of its foundation (gasoline + plug-in hybrids or plug-in hybrids only) the initial budget must be the same. Moreover, we see that such a strategy is less profitable in a longer prospective.
3. No possibilities to make renovation of the park available. By Strategy 1, the whole park of cars will be changed by the 8th year. Some cars (also plug-in hybrids) will be replaced even twice. Choosing Strategy 2, you need to understand that there are no similar opportunities for replacing the park in principle.

At the same time, such business will be more socially responsible, as gross gasoline consumption (from the first year of operation) will be lower since each plug-in hybrid consumes 72% less fuel per 100 kilometers than a gasoline car. That also is a significant benefit.

Strategy 3. Investing only in electric vehicles with the simultaneous building of own solar power station. That`s a possible strategy, at the same time, the price of only one solar power station that is consist of 40 panels with the power of 13 kW (which is enough to recharge only four cars at the same time – Table 1 row 7) will additionally cost €13500 (Eesti Energia, 2021). Which is more important, such panels require at least 85 m^2 of an available roof or free territory.

Suppose we`ll modulate the strategy, according to which the firm is invests in 15 electric vehicles and builds four solar power stations. In that case, it is possible not to spend money on electricity (or fuel compared to gasoline cars) at all, which is clean saving. Such budget will be approximate €600 thousand. However, we must realize that 160 solar panels and additional equipment will require almost 340 m^2 of free territory, at least in the suburbs of Tallinn. It is due to the fact that long journeys from the base to the city are not a very effective practice in the case of electric cars. That brings expenditures to purchase of territory or rent it. Also, the company must take all responsibilities to improve and service the territory.

At the same time, this is the most sustainable and socially responsible alternative. It is classical "green business," in fact.

Based on the data presented above, we can conclude that Strategy 1 is the most flexible. Indeed, it has a number of disadvantages, among which it is worth noting the need for a systematic and constant dependence on bank lending. In addition, the car park will constantly require monitoring of its condition in order to timely determination of those vehicles that require replacement in the first order. At the same time, we see that if the company does not have the opportunity to invest in the territory for the location of solar power plants, then Strategy 1 is a more effective solution.

3. CONCLUSIONS

Despite the deep concern of humankind about the state of the environment and the well-being of future generations, energy-efficient technologies and alternative energy sources continue to be quite expensive.

For this reason, not all enterprises want and are ready to make their business sufficiently socially responsible. Moreover, today not all entrepreneurs, in general, understand the importance of building a socially responsible business.

At the same time, it should be noted that the Covid-19 pandemic has exacerbated the issues of business founding and development, raised the problems of business optimization and specialization to a new level. Today, we can say with complete confidence that flexible, adaptive business is able to survive times of economic decline. A small, lightweight cargo delivery business definitely meets this criterion.

However, we see that the organization of even such a business is a serious matter. Competition among technologies (gasoline cars, hybrids and electric cars) remains rather a controversial task, since on the one hand we have the cheapness, and on the other: relatively higher initial budget; longer-term payback and social responsibility. It`s why the benefits of electric and hybrid vehicles are not always obvious factors in business decision-making.

From this point of view, entrepreneurs who want to develop their business in the field of lightweight deliveries should become familiar with the advantages of alternative and energy-saving technologies and should also be encouraged by state authorities and local governments.

In this article, we have proven that:
- Electric cars without investing in the construction of their own corporate solar stations are not the best alternative today due to the relatively high initial price for them;
- Classic hybrids, from the point of view of the economy, have no business advantages at all;
- The fleet of gasoline cars is initially the cheapest if we take into account only the initial cost of a unit. However, the increased fuel consumption for only 4-5 years negates this advantage;
- Plug-in hybrids by themselves do not guarantee absolute advantages; however, they are most profitable if the company forms a park exclusively f the same car model.
- The most versatile, according to this logic, there is a diversified park consisting of both: gasoline cars and plug-in hybrids. Such a fleet requires not only an adequate budget but also includes the possibility of a gradual renewal of it, which is also an extremely important advantage.

In the end, the considered alternatives are today very important for the development of the economy of Tallinn and Estonia as a whole, since our country also suffers from the continuation of the pandemic and massive quarantine restrictions. It means that today, more than ever, the introduction of new technologies should be aimed at both economic efficiency and resource conservation.

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