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Attitudes and Beliefs towards EVs in Denmark and The Netherlands

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Summary

This work researches the current opinion towards and knowledge about Electric Vehicles (EVs) among the Danish and Dutch population. Two nation-wide surveys were conducted to identify the misconceptions, concerns and benefits about EVs experienced by the target group. Results show that perceived knowledge levels on EVs in both countries are relatively high, although women seem to have a lower perceived knowledge level. Furthermore, there seems to be mostly still a neutral or negative attitude towards EVs and their capabilities. Danish respondents on average have more extreme opinions, both negative and positive while the Netherlands has the largest neutral group.

Keywords: electric vehicle (EV), consumers, user behaviour, survey, EV attitude

1 Introduction

Although the number of Electric Vehicles (EVs) on the European roads is increasing [1], there is still a long way to go to achieve ambitious climate goals such as a 30% market share [2] for EVs in the EU in 2030. The challenge of encouraging citizens of different European countries to adopt EVs requires an approach which fits the needs of these target groups. Thus, understanding current views towards EVs is crucial. Results of a survey among Danish and Dutch residents about the current attitude and beliefs about EVs will be used to understand EV-purchase decision making. This work is conducted within the scope of the proEME project [3], which aims at stimulating the uptake of electric vehicles by supporting stakeholders of the EV-market with tools and knowledge.

1.1 Goal and Research Questions

In order to be able to stimulate the uptake of EVs, it is crucial to understand which barriers and benefits citizens of different countries experience and to eventually correct false assumptions. This understanding helps to design effective, user-centred approaches to encourage the critical mass to adopt electric vehicles. The aim of this paper is to provide insight into the current opinion towards and knowledge about EVs among the Danish and Dutch population. The research questions that will be answered in this work are:

1. What is the current attitude towards electric vehicles among the Danish and Dutch population?
2. What is the knowledge level about electric vehicles among the Danish and Dutch population?

3. How can we understand consumer knowledge and attitude towards EVs by using decision-making models?
4. How can the obtained insights into knowledge of and opinions towards EVs be applied to design effective measures that increase EV-uptake?

1.2 Outline

This paper consists of the following sections. Section 2 discusses the relevance and background of understanding the EV-purchasing decision-making process. Section 3 covers the applied methodology for the survey as well as for the analysis of its results. Section 4 addresses the first two research questions by introducing the survey and presenting its results. Next, section 5 discusses how the survey results can be interpreted by using decision-making models. Implications of the results for user-centred strategies aimed at promoting EV-uptake are discussed in section 6. Finally, section 7 presents an outlook on expected future activities.

2 Background – Modelling Decision Making on EVs

To motivate individuals to change towards driving electric, it is crucial to understand the decision-making process underlying purchase decisions on EVs. Within the psychological domain, various theories are used to understand, predict and influence behaviour. Several of these theories have been applied to the adoption of EVs, such as Norm-Activation Model [4], Theory of Planned Behaviour (TPB) [5] and Technology-Acceptance Model [6]. However, according to Biresselioglu et al. [7, p. 5], "research has focused on specific markets and contexts, but provides no overall picture to show the links and relationships within the decision-making process [...] of electric mobility.". Similar views are expressed in [4]–[8]. This work aims at making a first step towards developing such a model, based on interpreting the results of surveys conducted in Denmark and The Netherlands using the TPB [9]. Increased understanding about the needs of consumers supports various stakeholders of the EV-market to better tailor their mobility strategies to the needs of the potential users of EVs. For electric vehicle adoption, several studies have demonstrated the relevance of single TPB predictors or the TPB as a whole [10]–[13].

According to the Theory of Planned Behaviour [14] (Fig. 1), human beings make their decisions based on rational evaluations of possible outcomes of actions. Intention is the most important predictor of behaviour, indicating the willingness of an individual to perform a particular behaviour. Having (1) a positive attitude towards the behaviour (attitude), (2) experiencing pressure from important others to perform the behaviour (subjective norms) and (3) having the feeling of being able to successfully perform the behaviour (perceived behavioural control) will lead to a strong intention to perform the particular behaviour [14].

An individual's attitude is formed by beliefs; ideas which the individual holds to be true [6]. Beliefs can be acquired by (1) direct observation, (2) acceptance of new information from a particular source, and (3) by inferring new beliefs based on information we already know. However, people can hold beliefs that are untrue, which might lead to potentially undesirable attitudes towards a desired behaviour. This problem can sometimes be solved by providing people with correct information [15]. Furthermore, if individuals have limited knowledge about a subject, they highly value the opinions of their peers. In that case, the subjective norm becomes more important than attitude in making a decision [15].

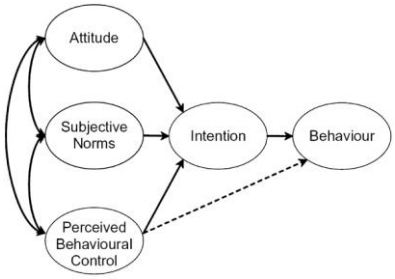


Figure 1 – Theory of Planned Behaviour [9]

Previous studies showed that all three TPB determinants of intention are relevant for BEV adoption [10], [16]–[18]. In [5], perceived behavioural control was measured trough functional barriers, such as vehicle characteristics, infrastructure and perceived mobility necessities: aspects of the personal living situation. In [16], Perceived Behavioural Control (PBC) was measured by whether consumers could use EVs in their daily life, based on e.g., range, and whether consumers could afford EVs. However, the literature disagrees on the role of TPB's subjective norm in the adoption of EVs. According to [19] a significant effect was found of subjective norm on BEV purchase intention, while [20] concluded that only for consumers with low or no interest BEV purchase intention was influenced by subjective norm. Moreover, literature about EV consumer adoption suggests that consumer experience, such as driving an EV, and knowledge, such as understanding the different total cost of ownership for EVs and ICEs, might be important factors influencing attitude and intention [16], [17].

3 Methodology

A questionnaire was conducted in 2018 among Danish residents (n=1500, 52% female). In December 2019, the questionnaire was replicated in The Netherlands (n=1553, 50% female). For both countries, the samples were representative to the composition of the population in terms of age, gender and region. The questionnaire consisted of 42 closed-questions covering topics including socio-demographics, the current and future mobility situation, and personal beliefs towards EVs. 23 questions were statements about electric vehicles, many of which can be considered as "myths". An example statement is "EVs are more expensive in daily operation that diesel or petrol cars". It is relevant to understand knowledge about operational costs, since in Norway the total costs of ownership (TCO) for EVs are already lower than for ICEs, while The Netherlands, France and UK have EV-TCOs close to ICE-TCOs [21]. All questions were answered based on a five-point Likert-scale (1 = Totally agree, 2 = Agree, 3 = Neutral, 4= Disagree, 5 = Totally disagree) to which a "Don't know"-answer option was added.

3.1 Data analysis

The score on Perceived Knowledge was determined by counting the number of "don't know" responses over the 23 EV-statements. Perceived Knowledge-scores were evenly categorised into "low" (16-23 don't know-responses), "medium" (8-15 don't know-responses) and "high" (0-7 don't know-responses). Internal reliability of the 23 statement-items was measured with Cronbach's Alpha for the Danish data, $\alpha = .97$, and Dutch data, $\alpha = .98$, both indicating an excellent correlation among the 23 items.

We determined Attitude by defining the median of all responses to the 23 EV-statements per individual. Any "don't know"-responses were treated as missing values. Participants were excluded from analysis if they answered more than 18 of the 23 EV-statements with "Don't know", however they were not excluded for Perceived Knowledge. Consequently, 1387 Dutch and 1417 Danish respondents were included in the analysis of attitude. The respondents' median on EV-myths were divided over three categories: 1) a median consisting of totally agree or agree was assigned to the Negative attitude-category, 2) neutral was assigned to the Neutral-category and 3) disagree or totally disagree was assigned to Positive attitude.

Based on comparing the survey-items to aspects of the TPB (Attitude, Social Norm, Perceived Behaviour Control, Intention and Behaviour) [9], the construct Perceived Behavioural Control was created. A principal component analysis (PCA) was conducted over the 23 EV-statements to identify the underlying factors in both Dutch and Danish data. Five factors were extracted. By interpreting these factors using the TPB, five subscales were identified: (1) Maintenance and Safety Concerns, (2) Range concerns, (3) Charging concerns, (4) Technology Development concerns and (5) Concerns about Ability to Buy. An exclusion of respondents, as discussed in 3.1.2, with over 25% of don't know responses was also applied in this case.

4 Results

This section will discuss the results of the Danish and Dutch surveys. First, the results of the Danish survey will be presented, after the Dutch results will be discussed. To answer the first research question, *"What is the current attitude towards electric vehicles among the Danish and Dutch population?"*, we investigated the attitude

towards EVs among both populations. Similarly, we determine the knowledge levels to answer the second research question. Finally, we present a comparative analysis on the Danish and Dutch results.

4.1 Results – Denmark

To place the results in context, during the last years, the number of registered BEVs in Denmark has been growing. In 2019, the market share of BEVs in Denmark was 2,2%, while in 2018 it was 0.7% [1]. However, EVs are not as popular in Denmark as in other Nordic countries. One of the reasons often cited is the high registration tax, which leads to high purchase costs for cars in general and even higher ones for EVs.

4.1.1 General overview of the data - Denmark

51% of the 1500 Danish respondents indicated their chance to purchase a car in the next 10 years as likely. Moreover, most households (66%) have one or more car (of any type). Regarding the number of EVs in Danish households, only 2.5% of the respondents have one or more EVs (includes PHEV and BEV) in the household. However, 27% of the respondents have tried driving an EV. To the question which criteria were important if one would buy a car tomorrow, the majority of the respondents answered (1) driving economy (65%) followed by (2) purchase price (61%) and (3) type and size of the car (55%). On the other hand, to the same question but then about electric vehicles, the most mentioned factor was (1) range (57%), follow by (2) purchase price (54%), and finally by (3) driving economy (44%).

4.1.2 Attitude towards EVs - Denmark

To explore the distribution of attitude towards EVs among the Danish sample, the respondents were divided over three categories: a negative attitude, a neutral attitude and a positive attitude towards EVs. As can be seen in Fig. 4a, the largest category consists of individuals with a negative attitude towards EVs.

Based on the 23 EV-statements, we explored the opinions about different EV-related topics among the Danish sample. Fig. 2 shows the five EV statements to which Danish respondents agreed the most. The highest agreement was on the statement that EVs are more expensive in purchasing price compared to ICEs (61%). This means that still 39% of the Danish respondents seems to be not well-informed, too optimistic or hold other beliefs about purchase prices since, in general, EV purchase prices are higher than their fossil fuel counterparts. The distribution of answers on this specific statement is visualized in Fig. 3b. Furthermore, the Danish respondents agreed the least with (1) EVs being boring (56%), (2) EVs being too slow on the highway (52%), (3) an EV being only suitable as second car (42%), (4) an EV being unsafe (39%) and (5) a higher risk of an EV to burst into flames (35%).

4.1.3 Denmark Perceived knowledge about EVs – Denmark

To explore the perceived level of knowledge about EVs among the Danish respondents, we divided the respondents over three categories based on their perceived knowledge. As can be seen in Fig. 4b, the majority (65.6%) has high perceived knowledge about EVs, whereas 23.8% and 10.6% have medium or low perceived knowledge about EVs, respectively.

Detailed analysis of the responses on the 23 statements on EVs, revealed that on several questions the percentage of “Don’t know”-responses was relatively high. The EV-statement with the highest percentage of “Don’t know”-responses among the Danish respondents was “EVs are more expensive in daily operation than conventional gasoline and diesel cars”. Fig. 3a shows that 57% of the respondents stated to not know whether BEVs are more expensive in daily operation than ICEs or not. Other topics with a high percentage of “don’t know”-responses were maintenance (53%, “Repairing an EV is difficult”) and battery-lifetime (52%, “The battery in an electric car has a short life and is expensive to replace”). In contrast, as can be seen in Fig. 3b, the percentage of people who did not know about the purchase price was less than for daily operational costs: the majority (61%) agreed with BEVs being more expensive in purchasing. Finally, respondents seem to be the least unsure about the range: only 11% does not know whether an EV can drive far enough to cover their daily driving.

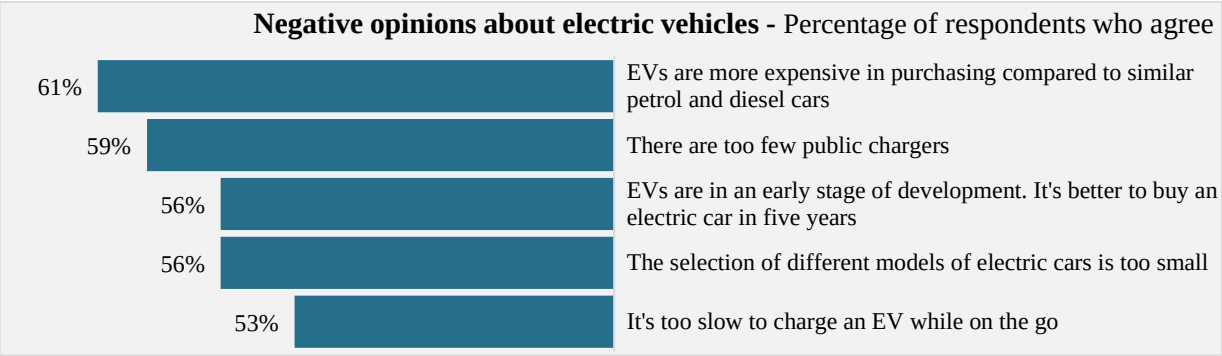


Figure 2 – Five EV-statements with highest agreement among Danish respondents (n=1500)

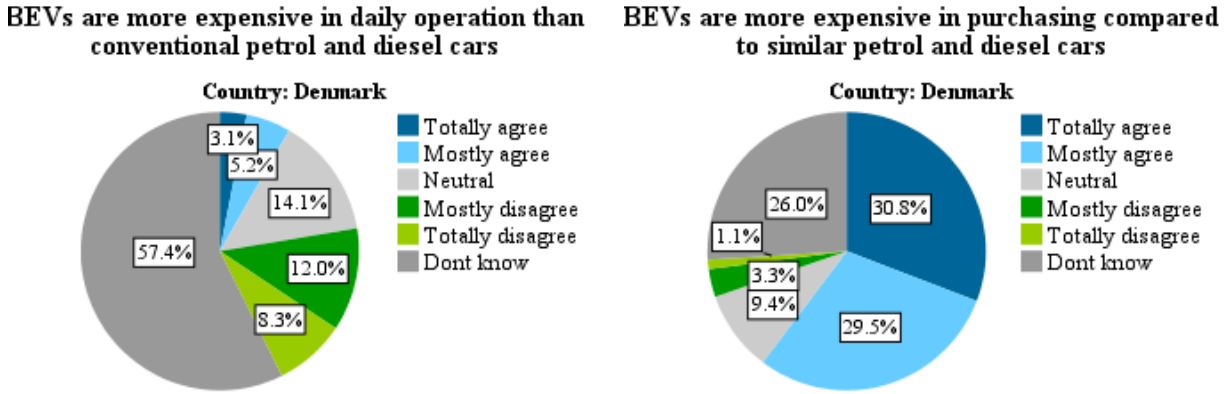


Figure 3 – Distribution of responses in Denmark to statements for operational costs (a) and purchase price (b)

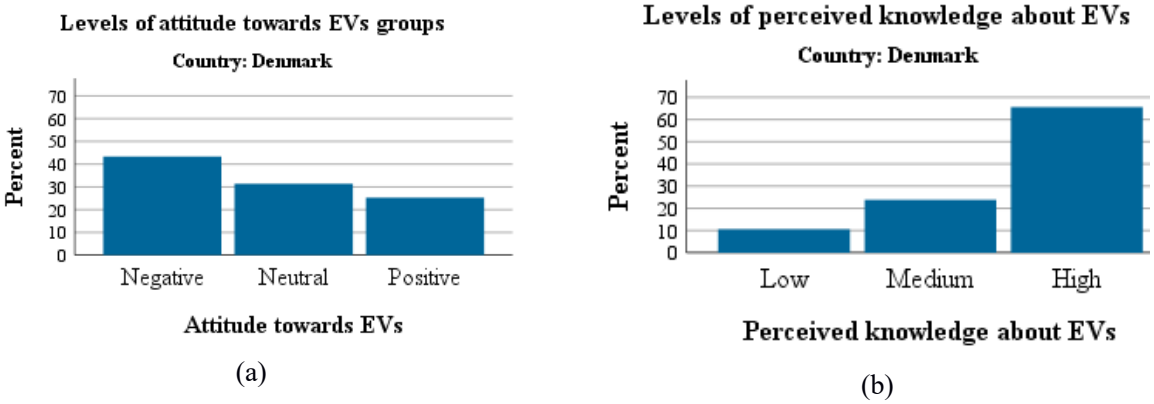


Figure 4 – Categorized overview for attitude level (a) and perceive knowledge level (b) in Denmark

4.1.4 Perceived behavioural control – Denmark

As described in section 3.1, the PCA revealed that Perceived Behavioural Control could be divided over five subcategories: (1) Maintenance and Safety (n=202, *M*=4.2, *SD*=.88), (2) Range (n=257, *M*=3.66, *SD*=1.12), (3) ability to buy (n=154, *M*=2.39, *SD*=.98), (4) Market readiness (n=352, *M*=2.12 *SD*=.88), and (5) Charge (n=307, *M*=1.87, *SD*=.81). Thus, Danish respondents were on average least negative about Maintenance and Safety

(measured by items such as *Safety is not good in an electric car*), but on average most negative about charging, measured by items such as *BEVs There are too few public charges*.

4.2 Results – The Netherlands

To place the results in context, in 2019, the market share of new registered EVs in the Netherlands was 9,6%, while it was 5,4% in 2018. Over 2019, The Netherlands has the third-highest market share in Europe after Norway (56%) and Iceland (24%) [1]. The Dutch government aims for a 10% market share for BEVs in 2020, while the goal for 2030 is that all new passenger cars are zero-emission [22].

4.2.1 General overview of the data – The Netherlands

65% of the 1553 Dutch respondents indicated their chance to purchase a car in the next 10 years as likely. 7% of the respondents have one or more EVs in the household (3% PHEV(s), 3% BEV(s) and 1% both). Moreover, 13% of the respondents have tried driving an EV. To the question which criteria were important if one would buy a car tomorrow, (1) the majority of the respondents (69%) answered the purchase price, followed by (2) driving economy (47%) and (3) type and size of the car (40%). On the other hand, to the same question but then about electric vehicles, the most mentioned factor was (1) purchase price (54%), followed by (2) range (32%), (3) operational costs (22%) and (4) type and size of the car (22%). Notably, driving economy was not present in the top three of mentioned EV-criteria, whereas for a conventional car it is second.

4.2.2 Attitude towards EVs - The Netherlands

In order to explore different levels of attitude towards EVs among the Dutch respondents, we categorised the median attitude into three categories. As can be seen in Fig. 7a, only 17.8% is positive towards EVs, while 40.8% is negative towards EVs and 41.4% is neutral towards EVs.

Similar to our analysis of the Danish results, Fig. 5 presents the five EV-statements, which had the highest level of agreement of the Dutch respondents. Notably, Netherlands and Denmark have the exact same outcome (61%) for purchase price. The statement to which the most of the Dutch respondents agreed was that EVs are more expensive in purchase price compared to ICEs. The distribution of the answers on this question is displayed in Fig. 6b. Moreover, respondents are negative about (1) EVs being too difficult to charge abroad, (2) a lack of public chargers and (3) EVs being in an early development stage and thus it is better to buy an EV in five years.

4.2.3 Perceived knowledge about EVs - The Netherlands

For several questions about EV-myths, the majority of the respondents answered “Don’t know”. The statement with the highest percentage of “Don’t know” responses was “EVs are more expensive in daily operation than conventional gasoline and diesel cars”, which is similar to the Danish results. To explore the perceived level of knowledge about EVs among the Dutch respondents, we divided the respondents over three categories based on their perceived knowledge. As can be seen in Fig. 7b, the majority (64.5%) has high perceived knowledge about EVs, whereas 20.4% and 15.1% have medium or low perceived knowledge about EVs, respectively.

As can be seen in Figure 6a, 43% of the respondents did not know whether EVs are more expensive in daily operation than conventional cars. Notably, although respondents were unsure about the daily operational costs of EVs, they were very sure about EVs being more expensive in purchase price compared to diesel or petrol cars: as shown in Fig. 6b, 61% agreed that EVs are more expensive in purchase costs compared to ICEs.

4.2.4 Perceived behavioural control – The Netherlands

As descibred in section 3.1, the PCA revealed that Perceived Behavioural Control could be divided over five subcategories: (1) Charge (n=384, *M*=3.51, *SD*=.91), (2) Range (n=276, *M*=3.5, *SD*=.95), (3) Maintenance and Safety (n=305, *M*=3.16, *SD*=1.28), (4) Market readiness (n=391, *M*=2.26, *SD*=.9), and (5) Ability to buy (n=354, *M*=2.06, *SD*=.93). Dutch respondents were on average least negative about charging (measured by items such as

"*There are too few public chargers"*), but on average most negative about being able to buy an EV (measured by items such as "*BEVs are more expensive in purchasing*").

4.3 Cross-Country Comparison

This section will compare the survey results for Denmark and The Netherlands by discussing differences and similarities between each country's consumers in terms of attitudes and beliefs towards EVs. Since both countries differ from each other in terms of car-policies, EV-uptake and charging infrastructure, comparing beliefs and attitudes might reveal new relations and behaviours towards EV uptake.

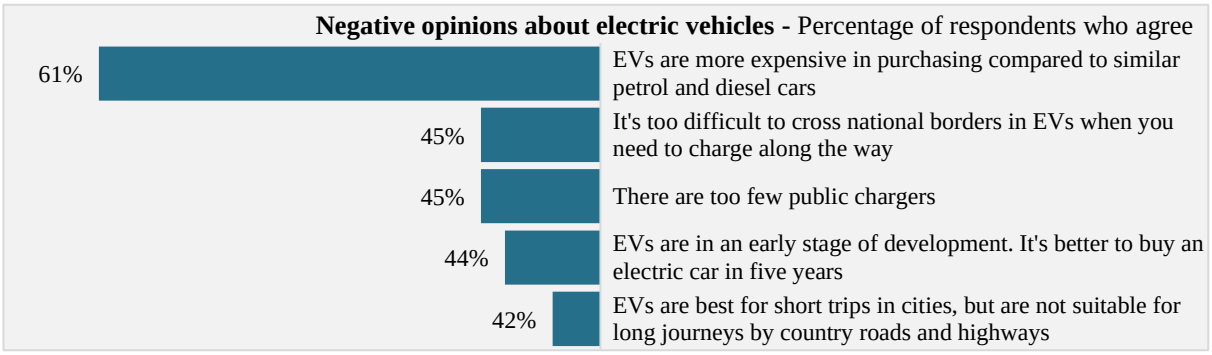


Figure 5 – Five EV-statements with highest agreement among Dutch respondents (n=1553)

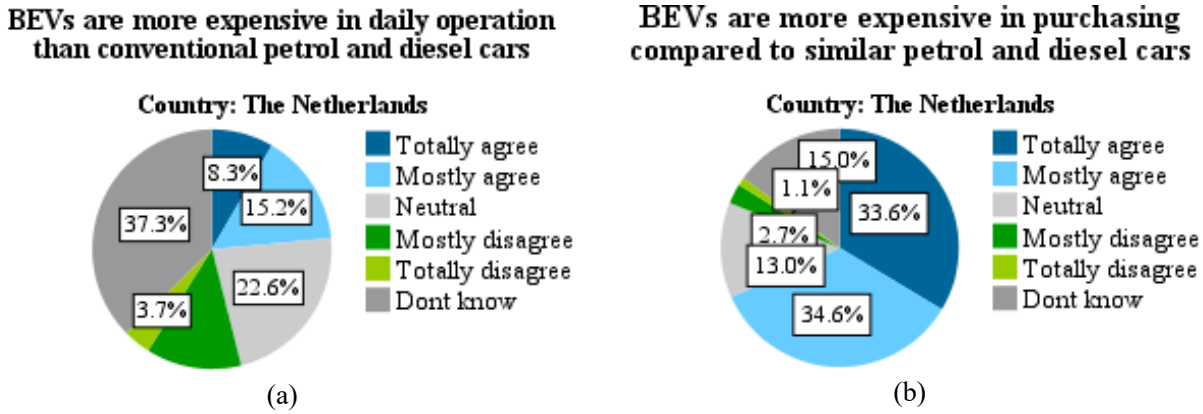


Figure 6 – Distribution of responses in The Netherlands to statements for operational costs (a) and purchase price (b)

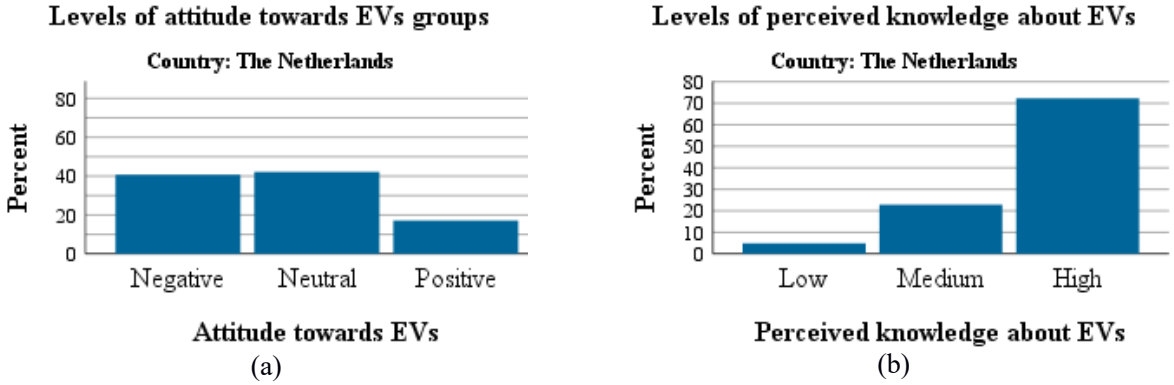
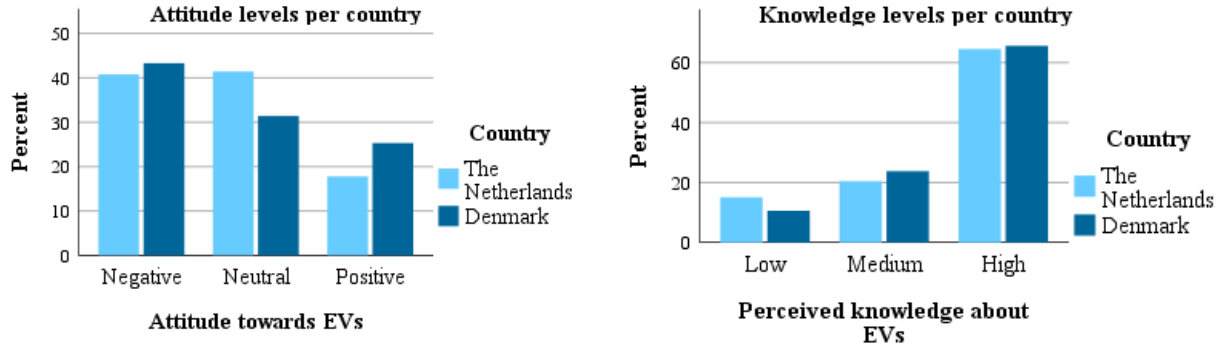


Figure 7 – Categorized overview for attitude level (a) and perceive knowledge level (b) in the Netherlands

Table 1: Overview of scores for Don't Know replies and Attitudes in both The Netherlands and Denmark

Variable	Country	N*	Mean	Standard Deviation
# Don't know-replies	The Netherlands	1553	6.41	7.34
	Denmark	1500	5.86	6.50
Attitude	The Netherlands	1387	2.73	0.91
	Denmark	1417	2.84	1.02
Attitude (neutral and don't know responses excluded)	The Netherlands	1387	2.66	1.17
	Denmark	1417	2.78	1.25
**For attitude, participants with more than 25% "don't know" answers are excluded from analysis.*				



(a) (b)

Figure 8 – Comparisons for attitude level (a) and perceive knowledge level (b) in the Netherlands & Denmark

4.3.1 Comparison of EV Attitude in The Netherlands and Denmark

A comparison of the attitude levels per country is shown in Fig. 9. As can be seen here, the Dutch respondents on average seem to be slightly more neutral towards EVs compared to their Danish counterparts, whereas the percentage of Danish respondents with both a negative and positive attitude is higher. For the positive attitude, this difference is largest. To determine whether the Danish and Dutch sample significantly differed in score on attitude, an independent samples T-test was performed. There was a significant difference in mean attitude score between Dutch and Danish respondents ($t_{2360.77}$= -2.99, p < .001). The mean attitude for Dutch respondents was 0.11 lower than for Danish respondents, as can be seen in Table 1.
Concerning transparency of data analysis, we also determined whether the Danish and Dutch sample significantly differed in score on attitude while excluding neutral- and don't know- responses. An independent samples T-test was performed. There was a significant difference in mean attitude score between Dutch and Danish respondents ($t_{23850.34}$= -2.56, p = .01). The average attitude score for Dutch respondents was 0.12 lower than for Danish respondents, as can be seen in Table 1.

4.3.2 Comparison of EV Knowledge Level in The Netherlands and Denmark

Fig. 8b shows the knowledge levels, measured by the number of don't know responses per individual, per country. Notably, for both countries more than 60% of the respondents score high on knowledge. At a first look, the percentage of medium- and high scoring respondents seems to be slightly higher for Denmark than for The Netherlands, while having fewer respondents in the low-knowledge category. To determine whether the Danish and Dutch sample significantly differed in the number of don't know-responses on the EV-statements, an independent samples T-test was performed. There was a significant difference in the mean number of don't know-responses between Danish and Dutch respondents ($t_{3026.61}$= 2.20, p < .001). As can be seen in Table 1, the average number of don't know-responses over all participants is slightly higher for the Dutch sample (M 6.53) than for the Danish sample (M = 5.86).

Table 2: Overview of scores for Levels of Knowledge in both The Netherlands and Denmark

			Level of knowledge		
Country	**Gender**	**Gender Distribution**	**Low** % within	**Medium** % within	**High** % within
The Netherlands	Male	49.3% (n=765)	27.4%	30.6%	60.3%
N = 1553	Female	50.7% (n=788)	72.6%	69.4%	39.7%
Denmark	Male	48.5% (n=728)	21.4%	30.5%	59.5%
N = 1500	Female	51.5%(n=772)	78.6%	69.5%	40.5%
Total	Male		24.9%	30.6%	59.9%
N = 3053	Female		75.1%	69.4%	40.1%

Next, a Pearson Chi-square test of independence was performed to examine the relation between gender and the perceived knowledge about EVs. Among the Dutch sample, a significant association between gender and Perceived knowledge was observed, $\chi2(2) = 137.78$, $p < 0.001$. Next, also among the Danish sample, an association between gender and Perceived knowledge was observed $\chi2(2) = 140.19$, $p = 0.000$. For all respondents in general, also an association between gender and Perceived knowledge was observed $\chi2(2) = 276.63$, $p < 0.001$.

To further explore the direction of the significant association between gender and Perceived knowledge, we analysed the distributions of the level of knowledge based on gender. As can be seen in Table 2, the majority of the Dutch and Danish individuals scoring low and medium on knowledge were female. The same results have been found for the Danish sample, except from the group scoring high on knowledge.

5 Theory of Planned Behaviour in the Context of Potential EV users

In this section, the results of the survey will be interpreted using the TPB [9] to answer the third research question: "*How can we understand consumer knowledge and attitude towards EVs by using decision-making models"*.

As discussed earlier, the more favourable an individual's attitude is towards the behaviour, the more it is perceived as the social norm, and the greater the perceived control over the behaviour, the more he or she is willing to perform this behaviour [9]. Only a minority of the respondents has a positive attitude towards EVs: most Danish and Dutch people were negative or neutral about EVs. Respondents were most negative about the higher purchase price for EVs compared to ICEs, while people were least negative about EVs being boring. Since a positive attitude towards the behaviour is one of the TPB's prerequisites, the negative EV-attitude might therefore explain the low EV-adoption rates among the sample. However, an additional question in the Dutch survey on how people perceived their opinion change in the last year revealed that 25% of the Dutch respondents became more positive about EVs, compared to 14% for ICEs, which seems to indicate a positive trend.

Next, our results showed that respondents are uninformed about several EV-related topics. For instance, Danish and Dutch people lack knowledge about topics including operational costs, weather influences on range, charging abroad, maintenance and battery-life. According to [6], an individual's attitude is related to beliefs hold to be true, based on previous experiences, acquired knowledge or logical reasoning. This might imply that in order for one to be positive towards EVs, one first has to be familiar with the topic. Besides, people value the opinions of their peers more if they lack knowledge themselves. In that case, the subjective norm becomes more important than attitude in making a decision [15]. Unfortunately, the current study did not measure perceived social norm.

Besides a lack of EV-related knowledge, we found that a group of respondents has a wait-and-see attitude towards EVs. They expect that better and cleaner alternatives might be developed in the future, and due to fast technology developments it might become hard to sell used-EVs. We found that for both countries the most important criterion for purchasing an EV is the purchase price. However, the higher purchase price of EVs compared to similar petrol and diesel cars is also the aspect which respondents were most negative about. This finding is in line with previous research [21]–[23]. Next, range is the second most-mentioned criterion by both samples. Although insufficient range is an often mentioned reason against EVs [8], [24], [25], among our respondents: 38% disagreed that an EV could not drive far enough to cover their daily needs.

When looking at the subscales, there was a notable difference: while Danish respondents were more negative about the charging infrastructure, Dutch respondents were less negative about the charging infrastructure. However, Dutch respondents were more negative about being able to buy an EV, such as higher purchase costs of EVs. However, according to TBP [9], to be willing to perform a behaviour, such as purchasing an EV, one must perceive it as feasible to take action. This might imply that the assumption of a lack of charging infrastructure or higher purchase prices than for ICE prevents people from buying EVs, which is in line with previous research on EV-adoption [8], [23], [24].

6 Discussion and conclusions

This worked aimed to provide insight into attitude and knowledge concerning EVs among the Danish and Dutch population. Firstly, we analysed data from a survey conducted in Denmark and The Netherlands to explore knowledge and attitude levels about electric vehicles. Secondly, we applied the results of the survey to the TPB to work towards understanding the process underlying the decision making process of buying an EV.

When interpreting the results in terms of the TPB, it is important to keep in mind that the current work used existing survey data. This means that the TPB was merely used to interpret the results. Further research aiming at developing a decision-making model of consumer EV-purchase processes from the TPB-perspective should therefore apply a bottom-up strategy. Furthermore, a different categorization of the number of don't know responses to determine the knowledge levels could have impact on the outcomes but has not been explored.

6.1 Implications for User-Centred Strategies Aiming at Uptake of EVs

Based on the results from the survey linked to the TPB, the current section will discuss first estimations on what the target group needs and suggestions for how this could be implemented in future strategies aimed at motivating people to change their behaviour and drive electric.

Surprisingly, although driving economy and operational costs were the third most-mentioned EV-criteria for Denmark and The Netherlands, respectively, respondents are actually least informed about an EV's daily operational costs compared to ICE's. This contradiction seems to support the phenomenon called "energy paradox" [25]. This paradox entails that most car buyers find fuel economy important but actually spend little time on comparing fuel economy of cars prior to purchasing [25]. This leads to consumers underestimating fuel savings and therefore lower adoption rates as theoretically predicted based on e.g., TCO-calculations [25]. In addition, a literature review by [18] stated that consumers lack the basic knowledge of calculating the real costs of driving ICEs and EVs, which leads to consumers not being aware of financial benefits of driving electric.

A way to operationalise these analyses towards EV uptake is to instigate a media campaign. Based on the Danish results showing a lack of knowledge among the Danish population, a Danish awareness campaign has been implemented to invalidate existing EV-myths [26]. Financial measures have impact, but could be maximised by understanding how people perceive it. For instance, as shown by the results, consumers are not aware of the driving costs of driving ICE vs. EV.

7 Outlook

This paper focused on addressing three research questions based on a questionnaire in Denmark and The Netherlands. In the future, the aim is to replicate this questionnaire in Norway, Germany and Hungary. Results will be used to further improve the understanding of consumer decision-making towards EVs which could be applied to strategies aiming at stimulating EV-uptake.

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