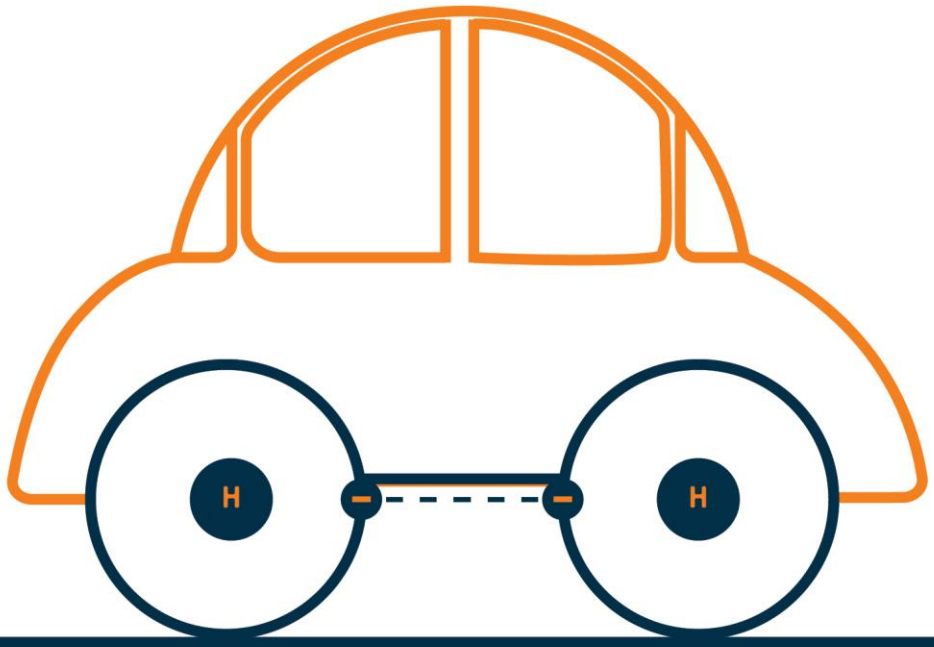
October, 2021

MOVING TOWARDS HYDROGEN BASED MOBILITY

Exploring the demand for hydrogen in the Foodvalley region



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Executive summary

This research aimed to find the expected demand for hydrogen in the Foodvalley region in the coming 5 years. More specifically, it aimed at identifying the most important motivations that companies and organizations have for using hydrogen vehicles, the most important obstructions that hinder the switch to hydrogen use, and an estimate of how the demand for hydrogen will develop in the coming 5 years.
Information was gathered via questionnaires and phone interviews among potential hydrogen consumers in the Foodvalley region. The qualitative data from the questionnaires and interviews was analyzed with thematic analysis and SPSS statistical software. A map was created to present the spread of hydrogen demand within the region.

A third of the contacted companies were interested in adopting hydrogen vehicles if sufficient filling points would be available. Their reasons for not switching yet were mostly related to high costs. Another third was not interested, again mostly due to costs. The last third was not sure about transitioning to hydrogen. Interest in hydrogen focused around Wageningen, Ede, and Veenendaal, which is therefore the most suitable location for a (pilot) hydrogen filling station. Additionally, some companies showed interest in producing hydrogen. Also, some were interested in their own filling station.

Within the results, environmental impact, costs and profits, practicalities, and policy were reoccurring themes. The biggest reason responding companies had for adopting hydrogen was to reduce their environmental impact. However, most available hydrogen vehicles are too expensive. Subsidies were found not adequate at making hydrogen affordable for small and mid-size companies. Hydrogen vehicles were often seen as less practical option than alternatives. Most of the reasons for this, such as the availability of vehicles and filling points, could be related to the novelty of the technology. Additionally, it was found that knowledge is missing, both on the availability and restriction of subsidies, as on the risks related to high pressure storage of hydrogen.

Retrieving information from a larger pool of companies will strengthen the understanding of obstructions and lock-ins preventing a hydrogen transition. Also, a reliable estimate of hydrogen demand among early adapters is still lacking. Therefore, it is recommended to continue data collection among potential hydrogen consumers. This can be done via an intensified version of this research, or by exploiting digital platforms to increase the visibility of the Workplace Hydrogen. This allows for data collection from a large pool of companies and organizations. Additionally, some policy measures are recommended that improve the affordability of hydrogen vehicles and that increase the availability of information.

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Glossary

Green energy – energy that is produced from renewable energy sources, in this report mostly from solar panels.

The companies – the companies that were contacted in this research.

Sustainable – The usage of energy at the present without compromising the needs of future generations. More specifically, energy that is produced without the reliance on fossil fuels and has minimal greenhouse gas emissions. Our definition is derived from the Brundtland Commission's definition for sustainability.

Obstruction – A reason for a company not to choose hydrogen as a fuel for mobility.

Motivation – A reason for a company to choose hydrogen as a fuel for mobility.

Deductive theme – A theme that was used to structure the data before analysis.

Theme – the result of the thematic analysis, to bundle main concerns and motivations that followed from data gathering.

Deductive code – A code that was gathered from literature to later structure the data

Code – Words that followed from the dataset, used to structure the answers given in the interviews and/or questionnaires.

1 Background

Hydrogen might play a big role in the energy transition. Here, the current developments and relevance to the project are described.

1.1 The energy transition

The Dutch government has set the goal of reducing GHG (greenhouse gas emissions) with 49% by 2040 and with 95% by 2050, compared to 1990 (Article 2- Klimaatwet, 2020). Consequently, the Ministry of Economic Affairs and Climate Policy has proposed an energy agenda which plans to produce almost 100% sustainable energy by 2050. This leaves the task to replace fossil fuels with sustainable alternatives.
Renewable forms of electricity, such as wind and solar, are presumed to meet our energy demand as we move away from fossil fuels. However, these types of renewable energy are subject to natural conditions that vary throughout the day. In order to solve the resulting mismatch between both demand and supply, and fluctuations of production during the day, energy storage solutions are much needed. Hydrogen can be such a solution if excess renewable electricity is used to produce hydrogen from water by electrolysis. Consequently, the Dutch government is planning to invest heavily in hydrogen production (Nationaal Waterstof Programma, 2021). Grey hydrogen, produced from natural gas, is already being used as a fuel in the Netherlands. However, the production of grey hydrogen contributes to 8% of our national carbon emissions (Rijksoverheid, 2021a). The Dutch government wants grey hydrogen to be replaced by blue hydrogen, where carbon is captured, and green hydrogen, produced by electrolysis of water with green electricity (Rijksoverheid, 2021a). In the financial plans for 2022, the Dutch government reserved €6.8 billion for climate goals (Rijksoverheid, 2021b). Part of this was €750 million to transform parts of the gas grid to a hydrogen grid. Also, €3 billion was added to the SDE++ subsidies (subsidies stimulating sustainable energy production and energy transition), which is available for blue and green hydrogen initiatives (Rijksoverheid, 2021c).

1.2 Current state of hydrogen as energy carrier in the Netherlands

Currently, the use of hydrogen as energy carrier is only starting to emerge in The Netherlands. The government is initiating the implementation of hydrogen in the transport sector, the business community, and knowledge institutions, for example via the 'Covenant hydrogen in mobility province Utrecht' (Provincie Utrecht, 2021). In the Regional Energy Strategy (RES) of the Foodvalley (Figure 1-1) it is stated they want to be energy neutral by 2050 (RES Regio Foodvalley, 2020). Part of this plan is usage of hydrogen as energy carrier, which they expect to be limited until 2030 (RES Regio Foodvalley, 2020).

Figure 1-1: The Foodvalley region (NAGF, 2021)

Some policies have been put into place by the Dutch government to encourage transition to hydrogen vehicles. Firstly, hydrogen vehicles are exempt from paying road taxes, including private and business owners (Belastingsdienst, N.D.). Secondly, if a company buys a new hydrogen vehicle, the investment costs may partly be deducted from the yearly profit, this is done via the MIA\Vamil regulation (RVO, 2021a). Different amounts of deduction are used for different vehicles and some accessories (making roadworthy or vehicle upgrades), can be considered. Additionally, there are subsidies for new zero-emission company cars via the SEBA regulation, here 10% of the price (including extras) can be subsidized with a max of € 5000 (RVO, 2021b). These two can be used together, but the subsidy is subtracted from the price that is used for MIA\Vamil. Additionally, negative reinforcement measurements have been put into place to encourage this transition, for example low-emission zones in many Dutch cities (Milieuzone, N.D.). In 2025 many cities will even put emission-free zones into place (RVO, 2021c).
The infrastructure required to realize the Dutch hydrogen ambitions is still lacking. Hydrogen filling stations are not yet widely available. Filling stations such as the station from Shell in Hoofddorp (Shell, 2020) or PitPoint in Arnhem (PitPoint, 2019) are created based on small initiatives and projects. Figure 1-2 shows locations for existing and planned public hydrogen filling stations in the Netherlands. Next to public stations, private stations like Twinning Energy in Maarn (Ekinetix, N.D.) also exist.

Figure 1-2: Locations of hydrogen filling stations, green is existing, and blue is in progress (H2Platform, 2021).

While hydrogen still has a futuristic image, it is already being tested or even used in a large array of vehicles (Waterstofnet, N.D.). In heavy machinery, the availability of new machines that are fueled by hydrogen is improving and include among others: cars, trucks, drones, airplanes, excavators, tractors, busses, and ships (Appendix 10.2). Many of these vehicles are already being produced on a small scale and sold. Some others are investigated as working prototype. Some companies already have a concept and the intention to start using hydrogen. However, there are car manufacturers that have explicitly said that hydrogen is not suitable for cars and therefore they won't research it (AD, 2021).

1.3 Workplace Hydrogen

In order to accelerate the development of hydrogen initiatives and boost innovation within the Foodvalley region, the Workplace Hydrogen was initiated in 2020 by the Living Lab Regio Foodvalley Circular (Workplace Hydrogen, 2021). The Dutch Boosting Group (DBG) was requested to act as a facilitator for Workplace Hydrogen. The goal of the Workplace Hydrogen is (1) to inform and inspire people, (2) to connect parties on a regional scale and (3) to collect the needs to arrange the Workplace Hydrogen in a suitable way (Workplace Hydrogen, 2021).

The Workplace Hydrogen has formulated the following vision for 2022 and 2025: 'by 2022 the application of hydrogen within the region will be made possible for at least one category of users; In 2025, this will meet the initial needs for hydrogen in the region and can be scaled up further; in the long term, the deployment of hydrogen for mobility within the Foodvalley region is realized' (Workplace Hydrogen, 2021).

1.4 Bottlenecks

There has already been a meeting between several interested stakeholders facilitated by the Workplace Hydrogen, where stakeholders could indicate what kind of knowledge is lacking for good decision-making. There, 45% stated they want to know more about supply, and 28% of participants wants to learn more about hydrogen vehicles (Hydrogen, 2021). There is interest in hydrogen transportation, but neither information nor infrastructure is readily available, and planned developments are unclear. The other way around, there are parties that are interested in supplying hydrogen, however, as the supply and demand being are insecure this puts the market in an ambiguous state.

The Workplace Hydrogen has requested advice on the requirements for successful adoption of (green) hydrogen for mobility within the Foodvalley region. More specifically, they want an overview in the form of a map that depicts the demand of hydrogen for the mobility sector until 2025.

2 Problem definition

Workplace Hydrogen, as the commissioner, aims to facilitate collaborations between demand and supply of hydrogen fuel in the Foodvalley region. According to the commissioner, a transition towards hydrogen should be demand driven but requires investments from all stakeholders involved. The problem is that in the current situation it is often uncertain if companies are willing to transition to hydrogen. If they are willing it is difficult to pinpoint how much their energy demand is, when and where.

The knowledge gaps of the commissioner are the location, quantity, and timing of the hydrogen demand in the Foodvalley region. Hand in hand with this goes the knowledge gap about the reasons for companies to consider or omit investing in hydrogen. Thoroughly collected data from (potential) consumers and suppliers within the Foodvalley region can provide an insight in the above-mentioned knowledge gaps concerning the demand and the obstructions for investment. In addition, an analysis of this data will give the Workplace Hydrogen a clearer picture of the main points of attention to result in smooth collaborations in the transition towards hydrogen mobility in the region.

Filling in the above-mentioned knowledge gaps will allow the commissioner to support collaborations in the energy transition. It will allow Workplace Hydrogen to offer tailored help to all stakeholders and/or specific areas of the Foodvalley region. Using the motives found in this project may take away uncertainty of stakeholders and increase their willingness to invest in green hydrogen. In addition, the results of this project in the Foodvalley region can be applied to other regions of the country as well.

3 Project purpose & Research questions

To fill part of the knowledge gap described in chapter 2, this research aims at finding the expected demand for hydrogen in the Foodvalley region in the coming 5 years. More specifically, it aims at identifying the most important motivations that companies and organizations have for using hydrogen vehicles, the most important obstructions that hinder the switch to hydrogen use, and an estimate of how the demand for hydrogen will develop in the coming 5 years.

Insight in obstructions, motivations, and interdependencies between stakeholders requires qualitative data, for which the following research question is defined:

1. *What are obstructions and motivations for the mobility sector in the Foodvalley to transition to the use of hydrogen fuel?*

Secondly, quantitative data on the hydrogen demand in the region will show where supply points are needed and when developments in the demand are expected. Therefore, the second research question is formulated:

2. *How is the demand for hydrogen expected to evolve in the mobility sector in the Foodvalley region in the coming 5 years?*

To further define the scope of this research question, four specific sub-questions are formulated:

- *How is the hydrogen demand geographically spread in the Foodvalley region?*
- *What is the difference in hydrogen demand between different mobility sectors?*
- *How will the hydrogen demand evolve in time; can specific moments of growth in demand be expected and identified?*
- *What is the interest and expected output of potential small-scale hydrogen suppliers?*

4 Methodology

The commissioner has asked us to gather quantitative and qualitative information from potential hydrogen consumers, to give an impression of what motivates them, what holds them back, and how they envision the future of hydrogen. To gather this data, we had to contact them. The data gathering and analysis is described in the following chapter. Out of ethical and privacy considerations we do not share the answers per company.

4.1 Data gathering

Data was gathered via questionnaires and phone interviews. We first identified the sectors that could be interested in hydrogen, then developed a questionnaire and an interview. The qualitative data was analyzed using thematic analysis and converted to binary codes to be able to statistically analyze all the data.

4.1.1 Identifying relevant potential hydrogen consumers

Answering the research questions required information directly from potential hydrogen consumers. To better define the target group of our research, a profile was formulated: a company with more than one vehicle and employee, in the Foodvalley, that have a website and are mobile in some way.
The following methods were used to find companies that fit the profile: (1) searching on google maps with combinations of sector and municipality name as search-term (appendix 10.1), since it provides an overview of companies within a certain municipality in the Foodvalley. (2) Searching on dedicated website for hiring company in a specific sector. In this research that was only used for contracting companies on the website Loonbedrijven-landentuinbouw.nl (N.D.). (3) Lastly by searching directly for websites. This was possible for large companies of which only a few exist in their sector, which were often already known (public transport, universities, and waterboards). If companies were not found by any of these three methods, they were not taken up in the list. When a company was found, their website was used to gain an idea about the size of their fleet. Companies with only one employee were discarded, because they were unlikely to own more than one vehicle. In case of multiple employees, it was estimated if the number of vehicles the company owned was more than 1. If this was the case, the company was added to the list. If no website could be found, the company was discarded in most sectors, with an exception to contracting companies, as these often appeared to have no website. In total we gather the information of 304 companies. Some of these companies appeared to have no email address; these were left out, with exception of a few that were contacted by phone. This procedure resulted in a list of 237 companies and organizations to whom we reached out to; we hereafter refer to them as: the companies. For privacy reasons this list was not added to the report. The total amount of companies in the Foodvalley region is 36355 (Allecijfers, 2021). This number is of all the companies including sectors out of our interest or without vehicles.

4.1.2 Data collection strategy

The companies were contacted by email, which included a link to a short questionnaire, which can be found in appendix 10.3. Email was chosen since calling over 200 companies was not deemed feasible within the time available for this project. To answer our research questions, a close interaction with the target group was considered fundamental, since the answer to these questions is highly subjective and vary through time under external influences (technology developments, government support, spread of information et cetera). A simpler questionnaire, based on close ended questions, could have been chosen to reduce the amount of effort on the behalf of the participant and increase the number of responses. However, with such method, it would not have been possible to collect the high-quality information needed for our research questions.

The questionnaire was easily answerable (information that respondents would not know by heart was not asked) to improve the response rate (Dillman, 2014). Additional measures to increase the response

rate were describing the reason of our research at the start of the questionnaire to motivate respondents, and using a specially made email address (consultancy.hydrogen@wur.nl), instead of a personal email address (Dillman, 2014). At the end of the questionnaire the respondents were asked if they could be contacted by phone or by email for follow-up questions (also these can be found in appendix 10.3).

To increase the response rate of the questionnaire, a reminder email was sent out twice to all companies that had not responded yet. For the second reminder email, a different questionnaire was used. This questionnaire contained the questions of both the first questionnaire and the interview. This was done to increase the amount of data we get from companies that do not want to be called or emailed, or that wanted to, but could not be reached.

The last stage of the data collection was holding phone interviews. First, companies that indicated in the questionnaire that they could be contacted by phone were called. In addition, some companies on our list that did not have an email address available on their website were called. Interview questions followed on the questions in the questionnaire but went more in depth. Follow-up questions depended on prior answers. The interview questions were turned into a questionnaire for the companies that wanted to be contacted by email and not by phone. This follow-up questionnaire was again sent via email. For the phone interviews, the questions were put in a rubric file that was used for the collection of answers. The option of recording and transcribing the phone interviews was omitted due to time constraints.

4.1.3 Composing questionnaire & interview questions

The research questions (chapter 3) formed the basis for the questions in the questionnaire and interview. The formulation and occurrence of questions were customized depending on previous answers. This assured the relevance and accuracy of the questions, which is important for preventing biases and increasing the response rate (Dillman, 2014). The formulation and use of open and closed questions followed guidelines from Dillman (2014). An overview of all questions can be found in appendix 10.3.

At the start of the questionnaire, it was asked if the respondent was familiar with hydrogen fuel. If respondents were not familiar, they were provided with background information prior to the following questions. This made the questions answerable to all.

Companies were asked how likely they are to change to hydrogen in case hydrogen is available at every filling station. Likeliness to change in the current situation was not asked because this does not create an incentive to supply hydrogen in the region; the question built upon the assumption that demand-focused research can breach the obstruction of demand waiting for supply and supply waiting for demand. Additionally, the answers to this question can indicate which obstructions and motivations are decisive, or have a bigger impact, on whether to adopt hydrogen vehicles or not.
Motivations for and against hydrogen were asked using open ended questions, to allow the respondents to freely associate their thoughts with the question (Clarke, 2002).
Companies that indicated an interest in hydrogen were asked how far they are willing to travel to fill up their vehicles, or if they were interested in a filling point on their own property. Combined with their addresses that were collected in the previous stage (section 4.1.1), areas in the Foodvalley region that are suitable for building a hydrogen filling station can be identified.

Estimating the scale of hydrogen demand, as well as moments in time when this demand is expected to grow, is a complex task. This depends on the type of vehicle, the moment of purchase, and the number of vehicles. Companies that answered that they were at least ‘perhaps’ switching to hydrogen in the coming five years were considered relevant for this assessment. Therefore, they were asked their fleet size, type of vehicles, and in how many years they need to replace one or more of their vehicles. Fleet

information from uninterested companies was deemed not relevant, and therefore not asked. We were selective in the amount and relevance of questions in the questionaries, as is also suggested by Dillman (2014). This should avoid the scenario where respondents start but not finish the questionnaire; a higher number of responses means that better (statistical) conclusions can be drawn. In addition, fleet size as indicator for company size can be useful when analyzing motivations and obstructions. Types of vehicles that relate to high or low interest in hydrogen can give information on which technology is lacking and more developments needed.

When estimating the need for hydrogen suppliers, it is useful to assess the interest for small-scale hydrogen production and supply. It was assumed that small scale suppliers and producers would mostly consist of hydrogen consumers, predominantly for private use. Therefore, we asked if companies were interested in the production of hydrogen, or in a filling station on their own property.

4.2 Thematic analysis

The qualitative data from the questionnaires and interviews was analyzed with thematic analysis. Thematic analysis is a common and useful tool for the analysis of qualitative data (Braun & Clarke, 2006). It is especially suitable for this project since it helps identifying common themes and patterns in questionnaire and interview data (Braun & Clarke, 2006). This is important for understanding the most important motivations and obstructions for the transition to hydrogen. Thematic Analysis consists of 6 steps (Maguire & Delahunt, 2017):

1. Getting familiar with the data.
2. Generating initial codes to organize the data systematically.
3. Search for and identify themes in the data.
4. Review themes.
5. Define themes and identify essence of theme.
6. Writing-up.

A combination of deductive and inductive coding was used. Deductive coding allowed us to specifically search for themes related to our research questions. Inductive coding allowed for including themes that were not expected in the answers. The combination of deductive and inductive coding was used to make the analysis as complete as possible without losing track of our research questions. The deductive codes that were developed prior to the analysis were structured in a framework of 5 deductive themes: Knowledge about hydrogen; Motivations; Obstructions; Current situation of companies; Willingness to change. For this framework, previous research about hydrogen perception in the Netherlands and Spain was consulted (Achterberg et al., 2010; Iribarren, 2016).

In step 2 of the thematic analysis, the interview and questionnaire answers were coded with the predetermined, deductive set of codes. Additionally, the inductive set of codes was determined based on the content of the answers. After the coding stage, unused deductive codes were discarded. The inductive and deductive codes were then combined to develop different themes that best represented the content of the data. Literature examples of thematic analysis (Gagnon & Roberge, 2012; Karlsen et al., 2017; Lehtomäki et al., 2016; Polous & Mahony, 2008) were used to get some clear examples of structuring the results within thematic analysis.

4.3 Data analysis SPSS

Variables needed to be correctly coded to be able to perform an SPSS analysis. Each motivation and obstruction that was defined in the thematic analysis was binarily coded using 1 for mentioned and 0 for not mentioned for each respondent. The other variables, such as sector or location of companies, were

coded on a numerical scale. An overview of the coded data can be found in appendix 10.6. (Field, 2018; Ott, 2015).

SPSS software was used to check the data for statistical correlations. Using the SPSS crosstabs option gave an insight into the distribution of one variable (for example municipality) within the categories of another (for example: “are you familiar hydrogen as an energy carrier?”). Crosstabs give the percentages of, for example, the companies that answered “yes” to the information question within each municipality. In addition, a chi-square test was performed on the categorial variables used in the crosstabs. A chi-square test enables exploration of a relationship between two categorical variables. It allowed determination if one categorical variable was significantly related to the other. This method was used to determine the distribution and relationship of the category “likeliness of companies to change to hydrogen” (“No answer”, “Not”, “Unlikely”, “Perhaps”, “Probably”, “There are already concrete plans”, and “We already use hydrogen vehicles”) and the motivations and obstructions per sector. (Field, 2018; Ott, 2015).

A second SPSS tool that was used was MANOVA (multivariate analysis of variance), which allowed determining correlations between variables. It was determined whether variables had a significant correlation to each other, if this effect was positive or negative, and the relative magnitude. The significance of a variable is determined by the p-value in relation to the error margin α. The p-value, or level of significance, is defined as “the probability of obtaining a value of the test statistic that is as likely or more likely to reject H_0 as the actual observed value of the test statistic, assuming that the null hypothesis is true’’ (Ott, 2015; p.257). If the p-value is larger than α, the null hypothesis (H_0) of a significant effect of the independent variable on the outcome of the dependent variable is rejected. For this research a commonly used α–value of 0.10 was used. This analysis enabled conclusions to be drawn about the likelihood of adopting hydrogen in combination with the thematically organized motivations and obstructions. This allowed us to identify the main obstructions and motivations. Bootstrapping was used to increase the robustness of the data, assuming that the data is a random sample from a large population. Bootstrapping allows for a 1000-time repetition of sampling from the data set. This creates a large data set thus inferring normality and allowing the use of MANOVA. (Field, 2018; Ott, 2015).

The benefit of the MANOVA method is that it will show if the effect of a motivation or obstruction has a significant effect on the likeliness of adopting hydrogen through multivariate test statistics. This is shown with a significant Pillai’s trace test (α<0.1). In addition, it also shows the univariate test-statistic on whether a particular motivation or obstruction has a significant effect on a particular category within the likeliness of companies to change to hydrogen through the significance of a F-test. A significant F-test indicates that variability in the independent variable can explain the variability in the dependent variable. (Field, 2018; Ott, 2015).

4.4 Visual representation

Maply (https://maply.com/) was used to show different answers given in the questionnaire on a geographical map. Maply is an online software, made to plot data on geographical maps. This gives the opportunity to show the location of the companies we reached out to and the companies that responded. Additionally, a map gives an immediate overview of the spread of (potential) hydrogen demand and thus suitable locations for hydrogen filling stations.

5 Results

Here, general data from the questionnaire and interview responses are presented first. Then, the thematic analysis is presented, followed by the results of the SPSS crosstabs and MONOVA analysis. Additionally, data is visually presented in three different maps.

5.1 Response rate and interest in hydrogen

In total, responses from 34 companies were obtained, either via the questionnaire, the interview or both. The distribution of companies that we reached out to and companies that replied is depicted in figure 5-1. Transport companies and construction companies were most abundant in the list of companies that we reached out to. Most responses were received from car rental services. Interesting to see is that the response rate is highest for the sectors agriculture and municipalities.

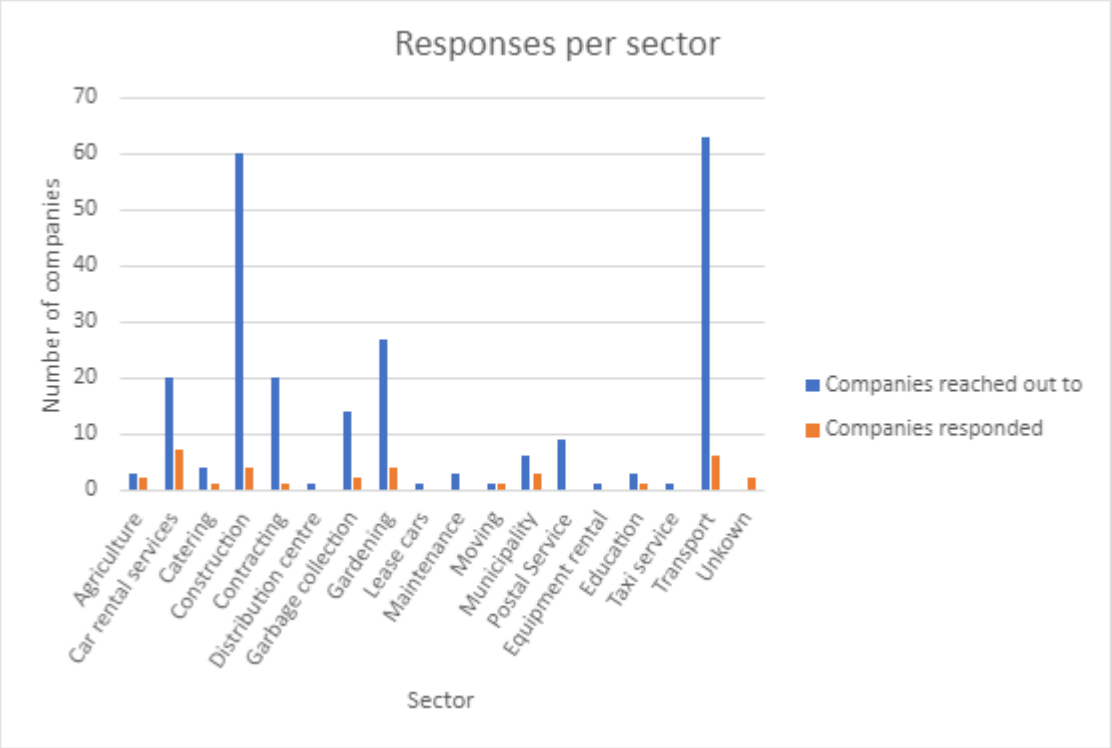

Figure 5-1: Overview per sector of companies we reached out to vs. who we received responses from

Interest in hydrogen was quite evenly spread, companies were slightly more interested than not. When asked how likely they were to (partly) switch to hydrogen if this was available at every filling station, 11 answered “not” or “unlikely”, 10 answered “perhaps” and 12 mentioned “probably” or "there are already concrete plans” (Figure 5-2).

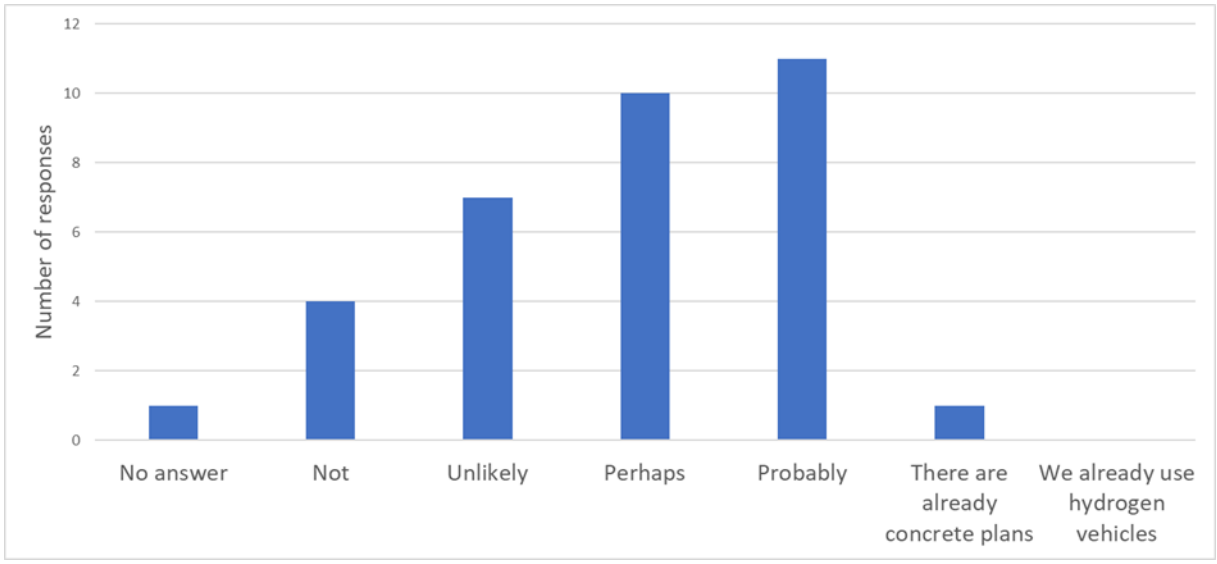

Figure 5-2: Likeliness to change

The companies that answered they would probably or perhaps transition, were asked which year the next moment for them would be to change (part of their) fleet. These answers varied from “this year”, to “13 years from now”, and did not show a clear peak moment.

5.1.1 Hydrogen production

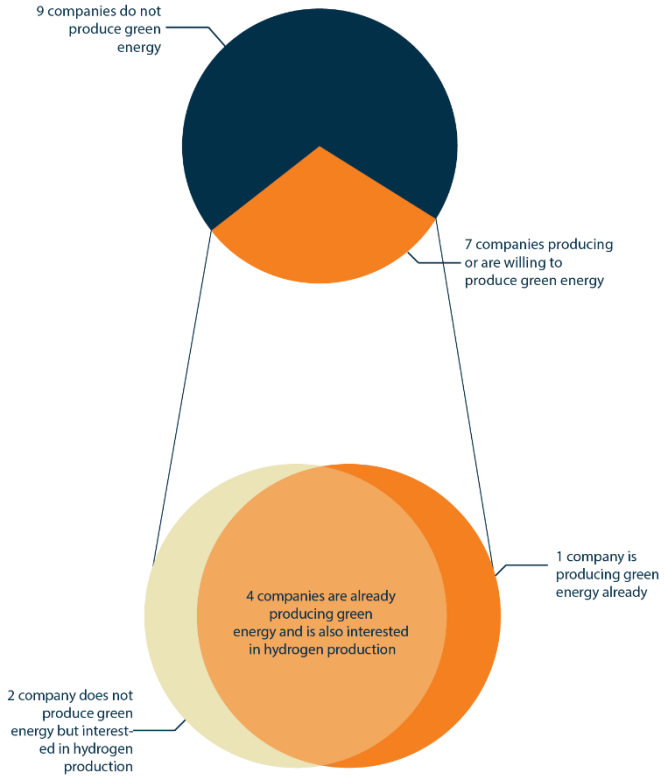

Figure 5-3: Overview of companies’ willingness to produce green energy and hydrogen energy

16 respondents were asked if they were interested in producing hydrogen, their responses are visualized in figure 5-3. Most of the companies who indicated they currently produce green energy on their premises indicated they are interested in using that to produce hydrogen (five out of six). One company that

produces green energy was not interested in producing hydrogen. Additionally, there were two companies out of 16 that are currently not producing green energy but would be interested in producing hydrogen on their premises.

5.1.2 Obstructions and motivations

The obstructions and motivations that were provided were categorized according to the codes of the thematic analysis (section 5.2). The most mentioned motivation was wanting to be more environmentally friendly (mentioned by 18 out of 29 respondents), followed by potential or expected increased profits (mentioned by 8 out of 29 respondents) (Figure 5-4).

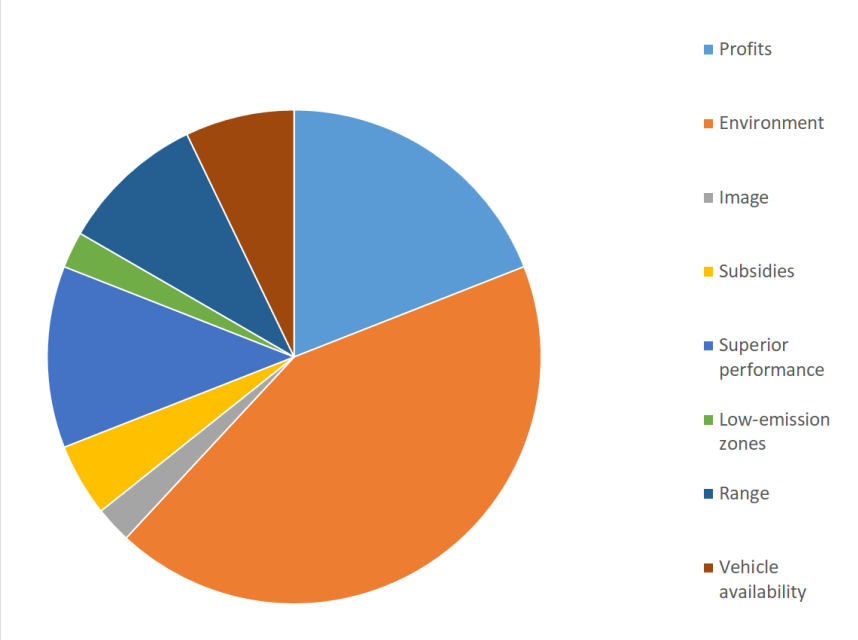

Figure 5-4: Motivations to choose for hydrogen as a fuel

The obstructions mentioned by respondents were more diverse, the most mentioned one was that hydrogen vehicles and/or fuel are too expensive (mentioned 17 out of 34 times). This was followed by the insufficient availability of hydrogen (7 out of 34) (Figure 5-5).

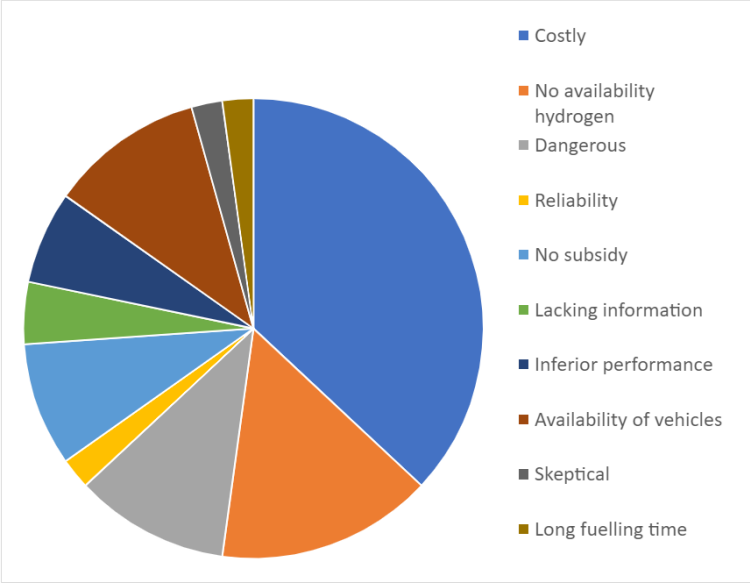

Figure 5-5: Obstructions not to choose for hydrogen as a fuel

5.2 Map

In figure 5-6 a map is shown with all the locations of companies that we reached out to. The companies are often concentrated around cities. This is because companies are often located in industrial areas in the city, or it is because our method of data gathering only found companies located in the city. Nevertheless, the map shows a distribution over the built-up area of the Foodvalley region. The companies marked with a green dot responded to our questionnaire. The companies marked with a red dot did not respond.

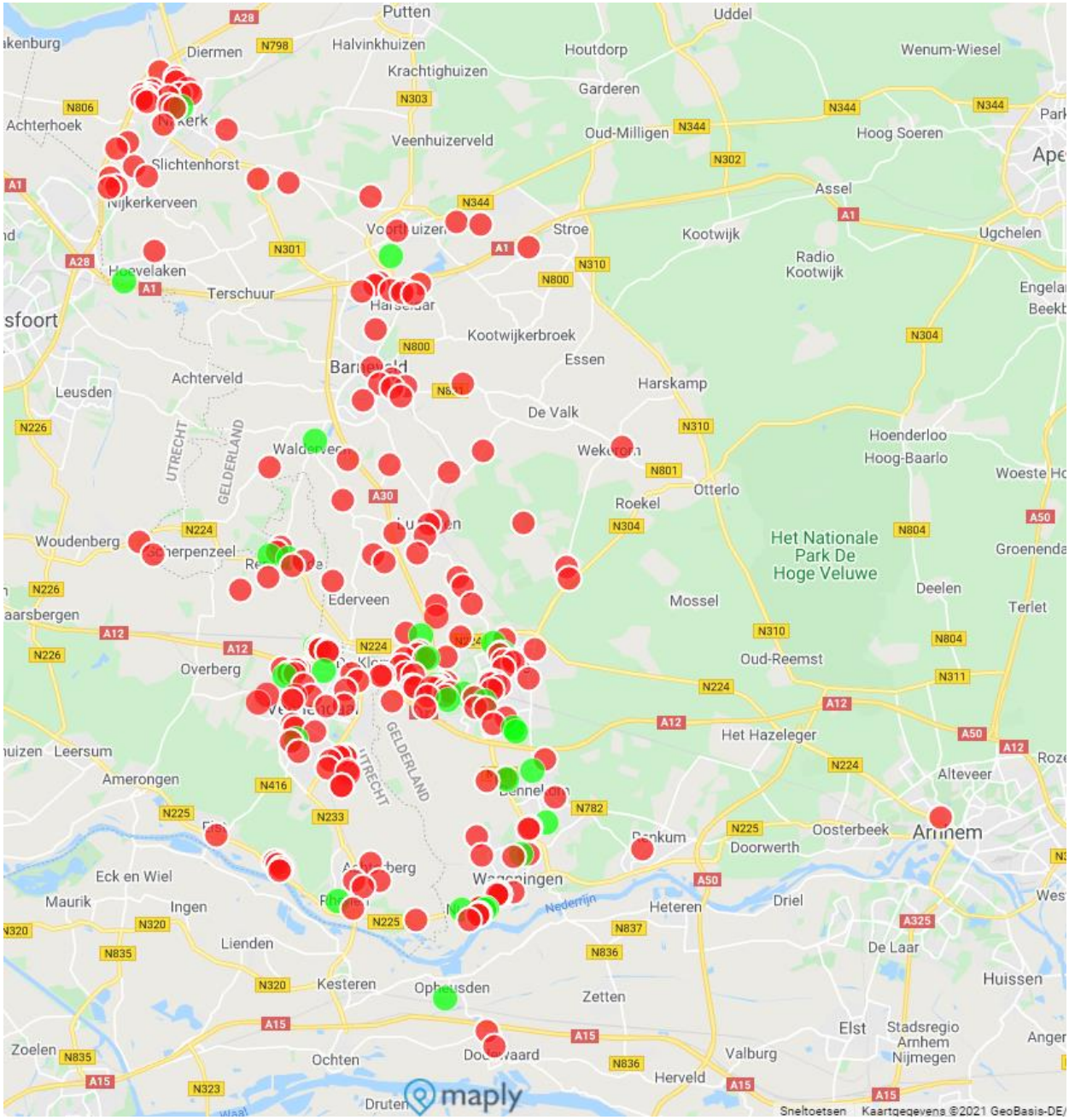

Figure 5-6: Locations of companies reached out to. Where green responded and red did not.

In figure 5-7 the map with companies that responded to the survey can be seen. The Foodvalley region is highlighted in blue, and the companies are represented by a marker. Each color represents the answer the companies gave to the question: “How likely are you to (partly) switch to hydrogen in the coming 5 years, assuming that every filling station has hydrogen available?”

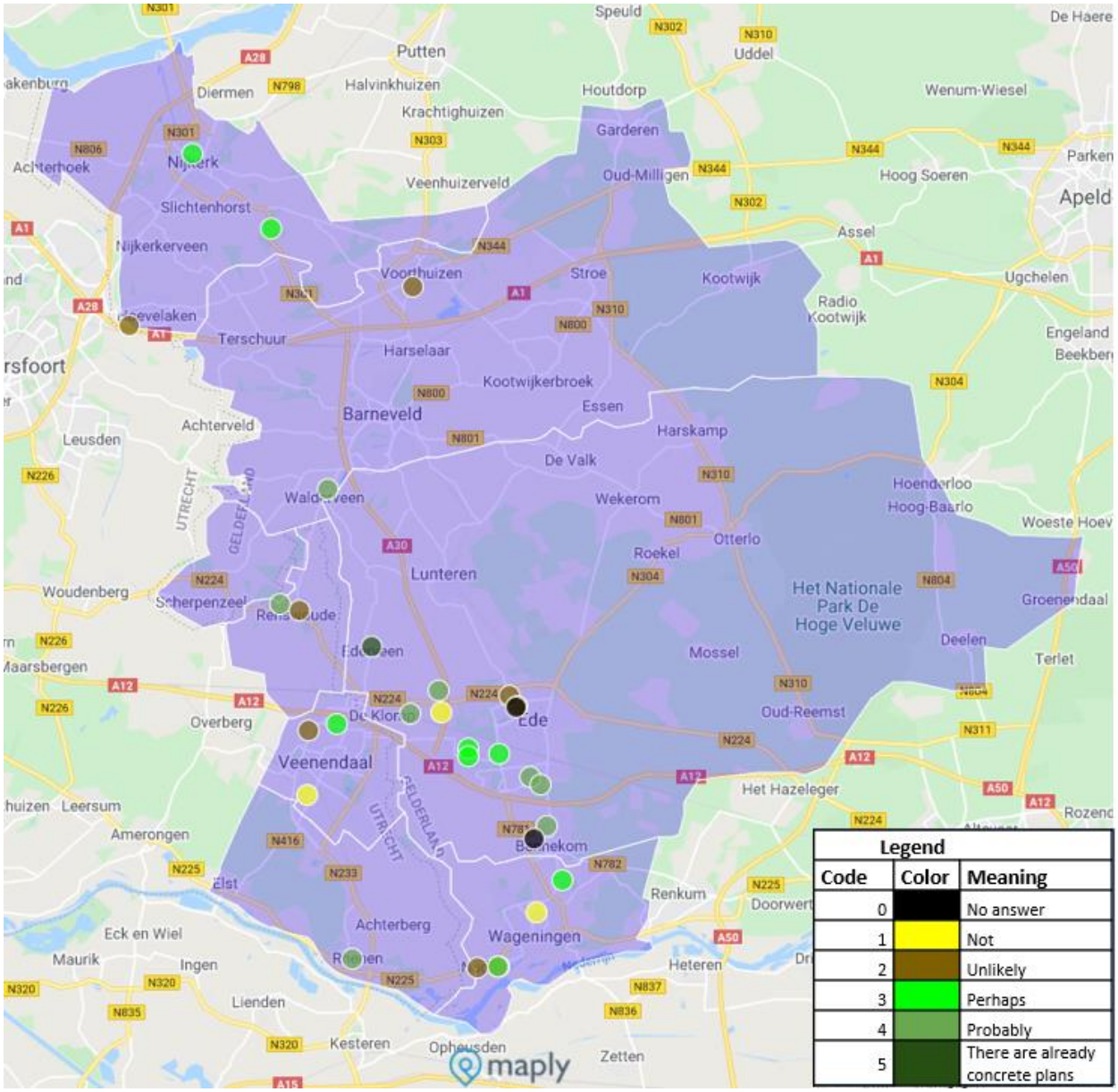

Figure 5-7: Location and how likely to change to hydrogen

In figure 5-8, it is shown how far companies are willing to travel to a hydrogen filling station. Not all the companies answered to the question: “What distance are you willing to travel to be able to fill up on hydrogen?”. The ones that did are depicted with a radius that resembles the acceptable driving distance for hydrogen fuel. Some companies want a hydrogen filling point on their terrain. These are resembled by a dot. There is a large spread in willingness to travel. This shows that a location for a filling point should be researched properly to increase the number of vehicles that can make use of it.

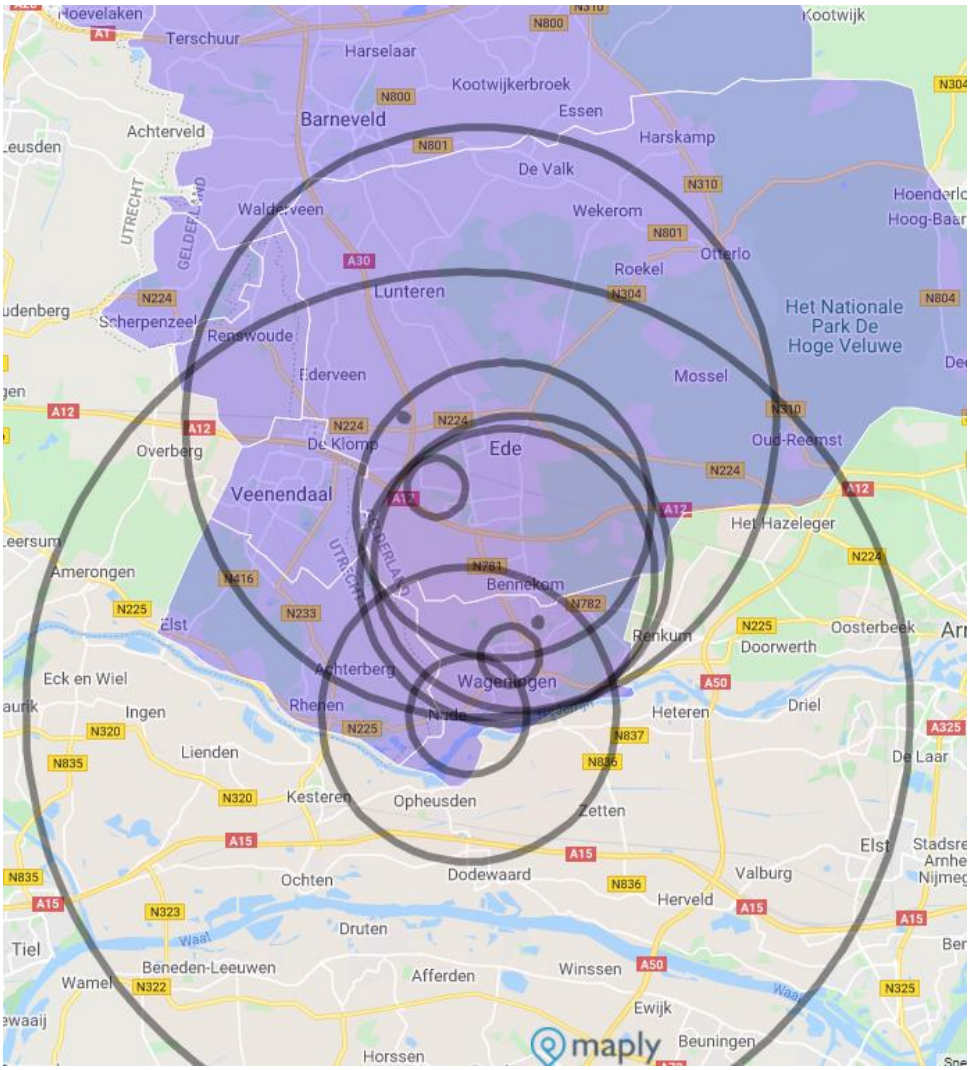

Figure 5-8: Willing driving distance for hydrogen.

5.3 Codes for thematic analysis

The answers gathered in the interviews and questionnaires were structured by creating a code per type of answer, which are represented in table 5-1. The codes were used to statistically analyze the answers and to create a clear overview before starting the thematic analysis. Further explanation on the codes is given in section 5.4.

Table 5-1: Overview of used codes with description

		Code description	**Code name**
Deductive	Motivation	Concerned about their environmental impact	Environment
		Looking for ways to improve credibility	Image
		Perceives economic advantages in this transition	Profits
		Interested in government subsidies	Subsidies
	Obstruction	Concerned about the number of available filling stations	No availability
		Concerned about the safety of the technology	Dangerous
		Perceives economic disadvantages in this transition	Costly
		Concerned about a to early adoption (inefficiency of the technology)	Not reliable
		Unsure about the environmental benefits, or does not think producing hydrogen is a smart idea	Skeptical
Inductive	Motivation	Sees the superior range compared to electric (battery) vehicles as an advantage.	Range
		Sees the advantage of being able to enter low-emission zones in city centers without a special permit.	Low-emission zones
		Perceives hydrogen vehicles as performing better than alternatives.	Superior performance
		The availability of the right hydrogen vehicle is seen as an advantage or motivation.	Vehicle availability
	Obstruction	The required type of vehicles is not available.	No vehicles
		Concerned with hydrogen vehicles performing worse than alternatives.	Inferior performance
		Lacks information to make an informed decision about adopting hydrogen vehicles or not.	No information
		Needs financial support in the form of subsidies, but cannot get them, or does not know how.	No subsidy

5.4 Thematic analysis results

The deductive themes *motivation* and *obstruction* were considered an important basis for the analysis as they form the answer to our first research question (*What are obstructions and motivations for the mobility sector in the Foodvalley to transition to the use of hydrogen fuel?*). To better understand these obstructions and motivations, additional codes were required to determine the themes.

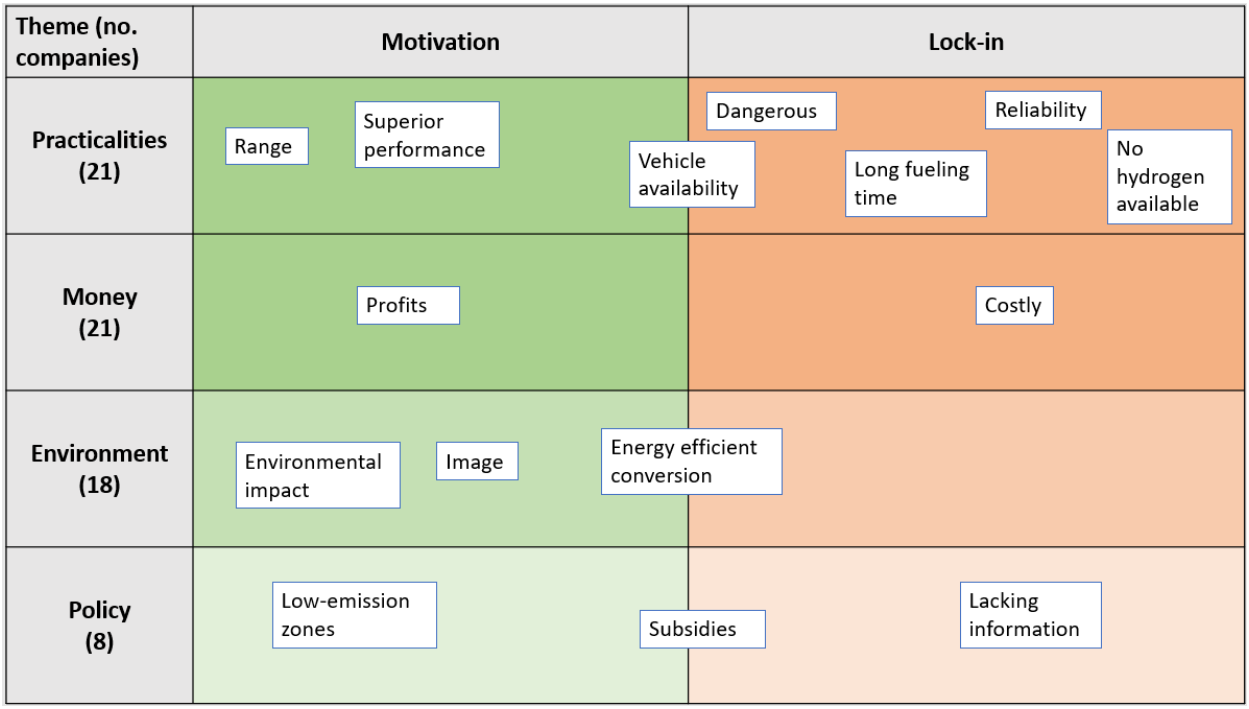

Figure 5-9: Overview of codes and themes resulting from interviews and questionnaire s

The resulting themes and codes that were used to structure the answers, and their occurrence, are displayed in figure 5-9 and table 5-2. Both themes *practicalities* and *money,* were mentioned by 21 companies. However, it is possible that a company mentioned 4 codes within one theme, and only one code for another theme. For example, more codes were determined within the theme *practicalities* than *money*, which is why this is higher in the figure.

Table 5-2: Occurrence of the codes used to analyze the questionnaire and interview answers. A description of the codes can be found in section 5.4

	Theme	Code	Occurrence
Motivation	**Money**	Profits	8
	Environment	Environment	18
		Image	1
	Policy	Subsidies	2
		Low-emission zones	1
	Practicalities	Superior performance	5
		Range	4
		Vehicle availability	3
Obstruction	**Money**	Costly	17
	Environment	Skeptical	1
	Policy	No subsidy	4
		Lacking information	2
	Practicalities	Dangerous	5
		Reliability	1
		Unpractical	3
		Inferior performance	3
		Availability of vehicles	5
		No availability hydrogen	7
		Long filling time	1

5.4.1 Performance and reliability of hydrogen as new technology

Many reasons, related to both motivations and obstructions, were related to *practicalities*. Practicalities are related to mostly ease of use and suitability of hydrogen vehicles. Many of the given motivations and obstructions were related to the novelty of hydrogen vehicles.

Related to *new technology*, *availability* of both the hydrogen itself and the right type of vehicle was an obstruction that occurred multiple times. Mostly construction companies felt that the right hydrogen vehicles were not (sufficiently) available. On the other hand, three companies pointed out that the availability of hydrogen vehicles was a motivation for them. These three companies were from different sectors, so this could not be related to a specific type of vehicle. Availability of hydrogen filling points seems currently the biggest downside to driving a hydrogen vehicle. This obstruction was mentioned by seven companies as being a reason to not switch to hydrogen. On the obstruction side, unreliability related to being a new technology was not seen as a big problem. Only one respondent mentioned this as an obstruction, in relation to experience he had with hydrogen cars in the past.
For some companies, performance of hydrogen vehicles was mentioned, but it differed whether they saw hydrogen vehicles as superior or as inferior to alternatives. The companies that were positive about the performance of hydrogen vehicles were solely making use of cars and vans. The companies that had a negative perception about performance included companies making use of wheel-loaders and excavators.
Related to performance, the higher *range* compared to electric vehicles is a clear advantage of hydrogen vehicles, but this was only a small theme within the results of this research. 4 out of 29 companies mentioned it as a motivation to switch to hydrogen. The target group of this research were mostly companies that operate locally within or around the Foodvalley region.

5.4.2 Influence of money on decision making

A common theme that emerged from the interview and questionnaire answers was *money*. Both the motivations and obstructions for adopting hydrogen vehicles were dominated by economically motivated answers.

It was seen that some respondents saw additional costs as a reason against switching to hydrogen, while others saw economics advantages in the transition. Some cases of the latter could also be interpreted as that it would be a motivation 'if' economic advantages occur; for example, some companies mentioned money to be both a motivation and an obstruction. Nonetheless, the prevalence of this theme in both obstructions and motivations could indicate some interesting points. For example, circumstances might be different between sectors. Although the number of responses was too low to prove a statistical correlation, it could be seen that mostly construction companies saw money as a motivation to change. Additionally, costs can be related to investments or to running costs, but this was rarely specified by respondents. Six companies mentioned (a lack of) subsidies, this relates to the *money* theme, but will be discussed together with other policy related themes in section 5.4.4

5.4.3 Willingness to reduce environmental impact

Environment is a theme that only occurred in motivations. Skepticism towards the sustainability of hydrogen vehicles was present for one company, who indicated they would not choose hydrogen if it was not produced in an efficient way. Reasons mentioned for wanting to be more sustainable were wanting to be more environmentally friendly themselves, but also having a greener image. One company mentioned that hydrogen vehicles would enable him to enter low-emission zones in cities without a special permit. This is more a practicality but is strongly related to the *environment* theme. Wanting to be more environmentally friendly was the most common motivation for companies to consider hydrogen, it was mentioned in 18 out of 29 responses

5.4.4 The influence of policy measures

9 out of 34 participants provided a motivation or obstruction related to *policy*, most often this was related to *subsidies*. Subsidies were mentioned both as motivation and as obstruction. In the case of obstructions, it was often mentioned that subsidies are hard to get or have complicated requirements. One interviewee, for example, mentioned that he had to pay back a subsidy he got for his electric vehicle because he was not aware of one of the requirements. Because of this he was hesitant to apply for subsidies again. Another interviewee mentioned that he would like to have support finding information about subsidies. One company had concrete plans to transition to hydrogen, but when he inquired about a possible subsidy, he discovered this is only available for research. Two companies mentioned that a subsidy would motivate them to adopt hydrogen vehicles. Interesting is that the companies that applied for, or investigated it, a subsidy mentioned *subsides* as an obstruction rather than a motivation. This could mean that companies assume that subsidies are available, while they are hard to get, or not available at all.

One company was motivated to transition due to easier access to low-emission zones in cities. Implementation of low-emission zones is a policy instrument to reduce green-house gas emissions. This company has three tow trucks, who require exemptions to reach customers in cities due to these low-emission zones. The lack of subsidies was the reason that this company did not use hydrogen trucks yet.

5.4.5 Why companies consider switching to hydrogen

10 companies answered that they were likely to switch to hydrogen vehicles if hydrogen was available at every filling station. One company already had concrete plans for switching to hydrogen. Out of these 11, 6 mentioned the environment as reason to switch. 3 of the 11 mentioned lower costs as reason.

5.4.6 Obstructions that prevent companies from switching to hydrogen

17 out of 34 respondents mentioned costs as reason not to switch to hydrogen, making it the most mentioned obstruction. However, more than half of these companies were still considering hydrogen if it was available at every filling station. From the 11 companies that mentioned that they were unlikely or not switching to hydrogen in the next five years, 6 mentioned costs as reason. Other reasons that were mentioned were dangers related to hydrogen, availability of filling points and of the right vehicle, and lacking information. However, these obstructions were all mentioned only once or twice. All 11 of these companies mentioned only the environment as reason in favor of switching to hydrogen.

5.5 Statistical analysis

After the gathered data was thematically analyzed, SPSS was used to analyze the data. The aim of this analysis was to find the answer to difference in likeliness to change by mobility sector through crosstabs. In addition, the MANOVA method was used to determine the obstructions and motivations that influence the demand for hydrogen.

5.5.1 Crosstab's analysis of sector and demand

A crosstab was made to analyze the percentage of companies in each sector per category of likeliness to transition to hydrogen. From the 34 companies several conclusions can be drawn. The table below shows the number of companies per sector, with 'Other' (within other are sectors like moving companies and deconstruction) and 'Car rental' being the largest representatives in our data set. (Field, 2018; Ott, 2015).

The results from the crosstabs and the chi-squared test can be found in appendix 10.5, in addition to a visual representation in figure 5-10 below. Figure 5-10 shows all respondents that answered 'not' changing, 75% or 3 of the 4 companies that answered are from the car rental sector. Within the car rental sector 50% of the respondents (3) filled in 'not changing'. The crosstabs shows that only one company in the sector 'other' has concrete plans to adopt hydrogen so far. Most companies, 11 in total, indicated that they will 'probably' change to hydrogen within the next five years as can be seen in the figure below. The most prominent sector with 40 percent of the total respondents indicating 'probably' is the sector 'other'. With 9 responses 'perhaps' is the second most answered response to the question if companies are likely to change to hydrogen fuel, with the car rental sector being the largest representative with 3 responses. (Field, 2018; Ott, 2015).

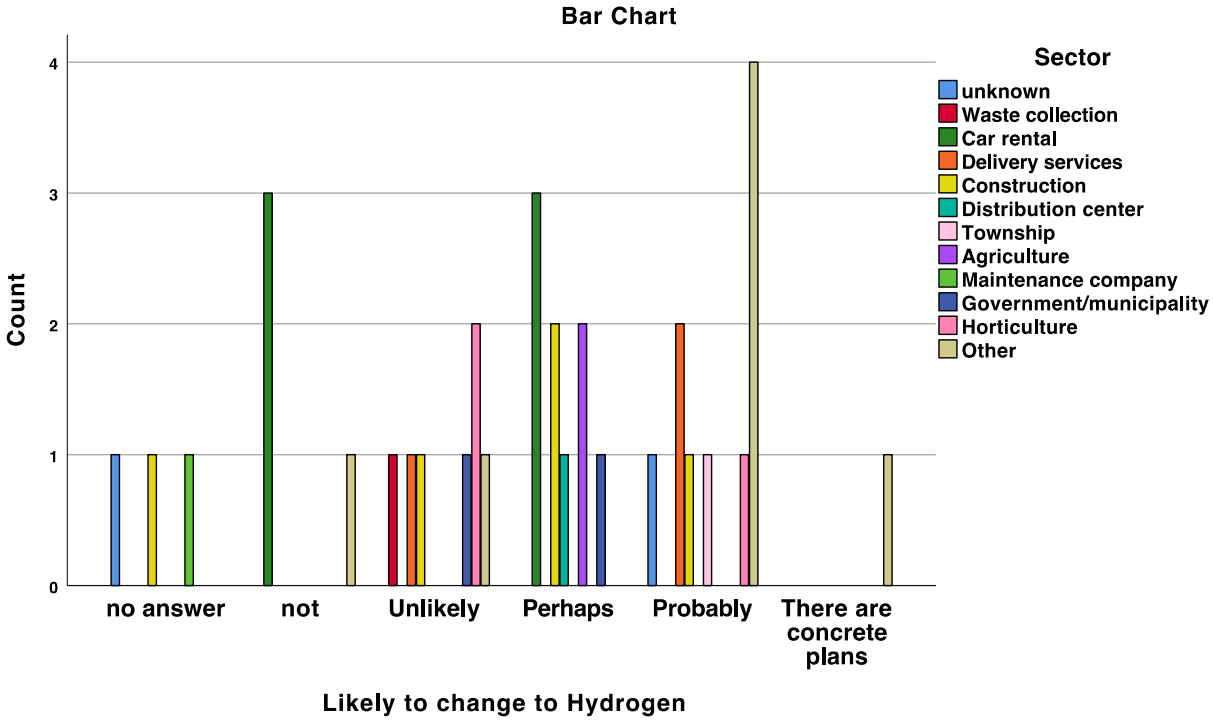

Figure 5-10: Likeliness of changing to Hydrogen per sector

The results from running a crosstab on sector, all 15 motivations, and obstruction variables, resulted in the graphs that can be found in appendix 10.5 The graphs show the distributions of sectors over their answer (yes or not relevant) per motivation and obstruction. On each combination of variables, a chi-square test was run to determine whether the variables are significantly related to each other, these results can also be found in the appendix 10.6. The combination of sectors and 'no subsidies' gave a significant result (0.094< 0.1) of the chi-squared test. This means there is a significant association between the type of sector and whether not having available subsidies is an obstruction for them. In figure 5-11 below it can be seen that 'no available subsidies' was indicated as an obstruction for Distribution centers and half of the 'other' sector. For all other combination the results of the chi-square test were insignificant. (Field, 2018; Ott, 2015).

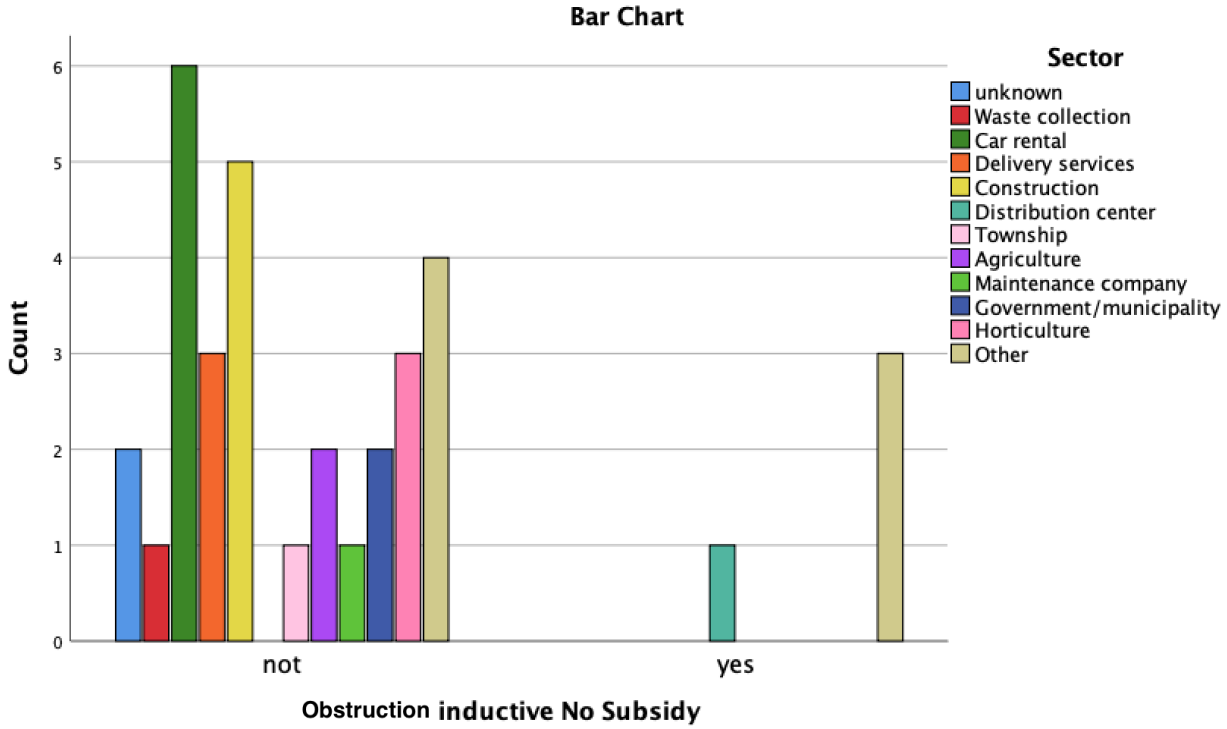

Figure 5-11: Obstruction of no available subsidies per sector

5.5.2 MANOVA method data analysis

The goal of the MANOVA method data analysis is to determine whether the various thematically derived motivations and obstructions (also referred to as obstructions) have a significant effect on the outcome. In this case, the outcomes are the categories of likeliness to change to hydrogen, using a rejection value of α= 0.1. As can be seen in appendix 10.6, many of the obstructions and motivations are not significant because they have a level of significance (or p-value) that is larger than 0.1. (Field, 2018; Ott, 2015).

The Multivariate tests show that with 0.084<0.1 there is a significant effect of the obstruction 'availability of subsidies' on the outcome of the likeliness for companies to change to hydrogen. Within the multivariate analysis this was the only significant relation found. The univariant F-test shows a significant effect of the obstructions costly (0.098<0.1) and inferior performance (0.089<0.1), and the motivation environment (0.04<0.1) on 'no answer' in the variable likeliness to change. For the companies who indicated they are 'not' likely to change, a significantly relevant motivation appears to be the environment (0.044<0.1). The significant motivation for companies who are 'unlikely' to change to hydrogen are the profits (0.032<0.1). (Field, 2018; Ott, 2015).

The companies that are open to changing to hydrogen (indicating 'perhaps') have one significant motivation and 3 significant obstructions. Both the motivation and obstruction that significantly affect the outcome of 'perhaps' changing to hydrogen, is the vehicle availability (0.069<0.1 and 0.097<0.1 respectively). The other obstructions affecting 'perhaps' changing to hydrogen mobility are conversion/grey hydrogen use (0.040<0.1) and long fueling times (0.099<0.1). For the company with concrete plans, the significant effect on the decision came from the obstruction of no available subsidies (0.004<0.1) and the inferior performance (0.099<0.1). (Field, 2018; Ott, 2015).

6 Discussion

Our work in the project yielded us results which can be backed strongly by the thematic analysis. When carrying out the data analysis we understood the biases that is present in our implemented methodology. The following section is a retrospection of our work in this project and identification of the flaws and strengths in our method of surveying, data collection and analysis.

6.1 Data collection: Biases - framing of questions & selection of sectors

The type of question, wording, and prior questions can all influence the answers given to questionnaire or interview questions (Dillman, 2014). The type of questions used in this research were mostly open questions, to avoid biases in the answers given. The order of questions in the survey, however, could have introduced some biases in the answers. In our questionnaire, the question concerning a possible timing for investment was: "if hydrogen was available at every filling station, how likely is it that you would (partly) transition to hydrogen vehicles in the next five years?" By framing the question with the assumption of sufficient hydrogen supply it is possible to perceive the position of the participant under the "ideal scenario", however, the assumption can influence the judgment of the participant to answer the next question in the questionnaire: "What is the main reason for you (not) to switch to the use of hydrogen vehicles?" and exclude the opportunity to retrieve answers from partakers who are willing to transition before hydrogen is readily available. Alternatively, with more time available, a trial period in the questioning process can mitigate biases in the answers to the questionnaire or interview questions. This intermediate step before the "real" questionnaire, with a small group of participants, can be useful to test where biases are found, by assessing the way questions were interpreted, or finding uncommon repetitions.

The choice of relevant industry sectors to include in the assessment, was based on the team's shared knowledge. This decision can justify some limitations found in the answers, including the high number of responses 'other' to the choice of industry sector in the questionnaire. Another limitation of the research and the company outreach happened when calling companies with a contact form. The car rental sector mostly uses these forms as contact option in their websites, which resulted in an excessively representation of the sector creating a bias in our dataset. A meeting with a focus group composed of relevant stakeholders (e.g., customers, policy makers, banks, investors, suppliers, municipality representatives) in the hydrogen industry could have assured all significant sectors were included. These could have contributed with additional input from where and whom to collect data from.

From literature its known that interviewees have the tendency to give answers that are socially desirable, or agree with the interviewer (Dillman et al., 2014; Hinz et al., 2007; Nederhof, 1985). To reduce this effect, the framing of questions was as neutral as possible. However, it can be stated that the energy transition, in which hydrogen is supposed to play a role, is socially desirable. Hence, respondents might have answered more in favor of hydrogen than their true opinion.

6.2 Data analysis: Interpretation of qualitative data

The collected data was largely qualitive. Interpreting the answers from the interviews and categorizing them posed challenges. The results show that money, environment, policy, and practicalities are the main themes related to a transition to hydrogen. On one side the costs of investment are still too high for some participants, on the other side the monetary opportunity of such risk is the most appealing factor for others. Inside this category, it was observed that fueling costs, and access/availability to subsidies were the key figures that stand out. The observed duality shows that there is still some uncertainty on the economic consequences, proving that more access/clarity over this type of information would be beneficial. Like most innovations, hydrogen as fuel is not a solution that fits everyone's needs. The frequent occurrence of environment as a motivation allows the inference that hydrogen as energy carrier is understood as a suitable solution for climate change among potential consumers. Therefore, the importance of providing green, as opposed to grey, hydrogen seems essential to fuel this motivation.

The results show likelihood to change in the coming 5 years. However, the study lacks detail into the specific industry sectors due to the limited number of responses under the time constraints of the project.

6.3 Data analysis: statistical analysis and working with limited sample size

Due to the small number of responses, the used data set might not have been an accurate representation of the Foodvalley region's population. The small number of data points also posed difficulty for statistical analysis of the data. Firstly, the data was not normally distributed, which might be due to the lack of random sampling methods applied or because of the low response rate. In order to obtain normally distributed data that is a random sample of the population whilst still representing all sectors, blocks could have been used. The gathered companies would have been assigned to blocks based on their sector. Within each block half of the companies would have been randomly assigned to be sent the questionnaire. Something else that could have been done ex ante to improve the statistical analysis is a power calculation to determine the necessary sample size. It needs to be taken into consideration that companies are still voluntarily answering the survey therefore this randomization method has to be corrected for the expected response rate that can be obtained from previous research in the region.

The statistical theories and models were appropriate for the data collected, although it needs to be taken into consideration that none of the team members is a statistician and there was only limited time to find, and learn about, the models. The significant results were different and fewer than we would expect in advance. Sometimes, significant results were obtained for categories where there was only one answer, like with the significance of convergence/green energy. The unexpected correlations could be attributed to the size of the data set or the unequal distribution between sectors. The time constraint of this project limited us in the amount of data we were able to collect and the amount of statistical knowledge we could research and apply both affecting the strength of the statistical data analysis.

7 Conclusion

Companies were found to have different views on the use of hydrogen vehicles. A third of the respondents were interested in adopting hydrogen vehicles if sufficient filling points would be available. Their reasons to transition were mostly related to environment. Another third was not interested, mostly due to costs. The remaining third was not sure about adopting hydrogen.

The thematic analysis has shown that motivations and obstructions were all related to the themes *practicalities*, *money*, *environment,* and *policy*. The most common motivation for companies to consider hydrogen within these themes, was wanting to be more environmentally friendly. Two other motivations that were often mentioned were increased profits, and the performance of the vehicles. Money was identified as the biggest obstruction preventing a transition towards hydrogen. Despite having a longer range than electric vehicles, hydrogen vehicles were mostly seen as a less practical option compared to alternatives. Related to practicalities was also the limited availability of hydrogen filling points. Additionally, it was found that improvements are needed in terms of policy. Both on the availability and restriction of subsidies, since 'push' measures alone do not suffice, as well as information availability.

The responding companies were mostly from southern more urban areas in the Foodvalley region; Ede, Veenendaal, or Wageningen. They were from varying sectors and had many different images of the future, varying from wanting to transition as soon as possible to thirteen years from now, or not at all. Generally, companies that currently produce green energy are also interested in using that electricity to produce hydrogen on their premises if the time comes to transition to hydrogen vehicles.

As for the demand in the following years, from the questionnaire we observe that around 60% of the companies are likely to change to hydrogen fuel in the coming years. Provided that a filling station is made available in the region.

The research indicates companies are interested in hydrogen. To create more clarity on this, we recommend further data collection among more companies. Lastly, it seems that the southern part of the Foodvalley is the most suitable location for a filling station to meet the initial needs for hydrogen. Finally, we recommend the Workplace Hydrogen to gather continue data gathering with fewer time constraints, which allows for a more intensive methodology.

8 Recommendations

This project revealed us the unanticipated bottlenecks. Since time was one of the biggest constraints on this project, we were only able to set the groundwork for assessing the demand of hydrogen within the Foodvalley region. However, continuing with a more intensive and systematic approach will help in assessing the demand of the region completely. We recommend that Workplace Hydrogen improves the survey methodology and continue with data gathering.

The chosen strategy to collect data on the demand for hydrogen in the Foodvalley region was focused on reaching out to different industries and finding the potential consumers one by one. This method allowed for a more selective process, which increased the quality of the information about demand but reduced quantity of participants. Alternatively, the project could rely more on digital platforms (email marketing, social media, website), which would increase the audience of the questionnaire and diversify the information. The following recommendations intend to briefly explain how to execute this alternative route for demand assessment and a marketing suggestion on how to apply the current and future demand information in different channels.

8.1 Website marketing tool – Long-term Demand Assessment

Currently, organizations rely on CRM (Customer Relationship Management) techniques to process customer data in "interaction spots". The first stage is to identify interaction points of the market and potential consumers. In addition, to strengthen customer relationships, CRM allows to better identify the target audience for a marketing and communication strategy. Workplace Hydrogen could introduce a system to collect data about the website visitors, and particularly those interested in hydrogen. Our suggestion is to invest in and develop a tool that will provide interested clients a quantitative visualization of a transition to hydrogen-based energy mobility. This tool requires the input of a few key numbers and provides then an estimation of CO_2 savings and change in costs (Appendix 10.4). With this visualization clients are aware of the economic and environmental impact of transitioning their current vehicles to the hydrogen equivalent. Additionally, a phased out personalized plan could be integrated to fit the investment power of the interested company. The estimations should be applicable to a range of vehicle models and corrected for the size of the fleet and average covered distance. The participants have the option to leave contact information, thereby a target audience for future surveys arises as the tool is being used. This tool has the function to collect contact details of potential customers, but most importantly is a marketing product to raise awareness for the Workplace Hydrogen and consequentially the current hydrogen transition.

8.1.1 Social media marketing

Workplace Hydrogen can optimize their presence on social media platforms to convey information about the innovations and advancement in the field of hydrogen. Climate change is one of the top 30 used hashtags in the social media (Pilař, 2019). If the social media posts share information about the influence of hydrogen energy on climate change; it increases their chances of reaching a larger and a diverse set of audience. Posting facts and analytical data on hydrogen technology could have a significant influence on interested companies as it increases the traffic for the profile.

8.1.2 Email marketing

Emailing the companies that are active in the energy sector to capture their interest is another way to gather data. This is also useful in lead nurturing, which is the process of developing and reinforcing relationships with prospects. Chances are that companies are not well informed about the advancement in hydrogen. With relevant and brief content in the body of the email the user can get informed about the advancements in the field. To develop the network of companies and organizations interested in hydrogen, Workplace Hydrogen could host a webinar and invite the prospects via email to attend the session.

8.1.3 Advertising in niche print media and local radio stations

Workplace Hydrogen can print informative columns and advertisements in specific subject focused magazines to capture the attention of potential clients. An alternative way to market and reach out to other companies is by partnering with the local radio station. An interview with an expert from the hydrogen field talking about the advancements in hydrogen or an informative clip will help in educating the interested companies and organizations.

8.1.4 Information points

From the thematic analysis it is observed that safety concerns are an obstruction for some companies. The information of safety tests can be made available at information points, which broadcast the results to companies. The points do not necessarily need a person behind the desk, it could be a banner with an interesting tag line having a QR code (linking to the Workplace Hydrogen website) printed on it. This could be a standalone initiative of the Workplace Hydrogen or can be achieved by collaborating with municipalities.

8.1.5 Government

A constraint of using hydrogen vehicles is the limited availability of filling points, this was also observed in the thematic analysis. The number of suppliers of hydrogen need to increase, which can be achieved by government backed initiatives, policies, and attractive subsidies; inclusive policies to involve the suppliers in the value chain of hydrogen economy and incentivizing their contribution will encourage interested suppliers to switch. Additionally, subsidies for purchasing a hydrogen vehicle can further encourage potential users to make the switch, since pull methods are currently not in place yet, whereas push methods, like the zero-emission zones, do not suffice. The ministry of economy and climate affairs have the goal of reducing the GHG emissions by 90% before 2050 – A hydrogen-based energy economy can help facilitate in achieving this goal.

8.1.6 Suggestions for future research

With the data collected by these additional strategies, Workplace Hydrogen can further forecast the demand for hydrogen in the following years. By investing in forecasting models and tools, a trend could be estimated for the customers who transition to a hydrogen vehicle by a certain year. This can go beyond the mobility sector and can be seen how it replaces fossil fuels.

The data can further be used to analyze the kind of impact the transition will have on climate change. The calculation could be spread out over a value chain in the energy economy and try to identify the regions where including the suppliers is possible. Additionally, the future research can gain insights in small-scale supplier's motivations and obstructions for making the switch to hydrogen energy. With significant information, the research should forecast the suppliers transitioning for the coming years. Future research should also focus on the correlation between the motivations/obstructions with the sector.

Another subject for future research, is the determination of the timeline of transitioning to hydrogen energy and identify the peak moments. It would be interesting if Workplace Hydrogen presented the forecasted trend in comparison with the actual trend. This would be useful in revising the anticipated demands periodically. In determining the timeline for transitioning, it would be interesting to gather insights on favorable locations for filling stations.

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10 Appendix

10.1 list of sectors that fit the mobility profile

Sector	Keyword
Garbage collection	"Waste management" + municipality
Car rental services	"Auto verhuur" + municipality
Delivery	"catering" + municipality; "delivery" + municipality
Construction	"Aannemer" + municipality
Distribution centers	"Distributie" + municipality
Municipalities	"Gemeente" + municipality
Agriculture	"Loonbedrijf" + municipality
Contracting companies	"Loonbedrijf" + municipality
Maintenance companies	"maintenance services" + municipality
Research institutes/universities	WUR or Hogeschool + municipality
Public transport	Direct access to website
Taxi-companies	"taxi services" + municipality
Gardening	"Hovenier" + municipality
Water Board (Waterschap)	"Vallei en Veluwe"

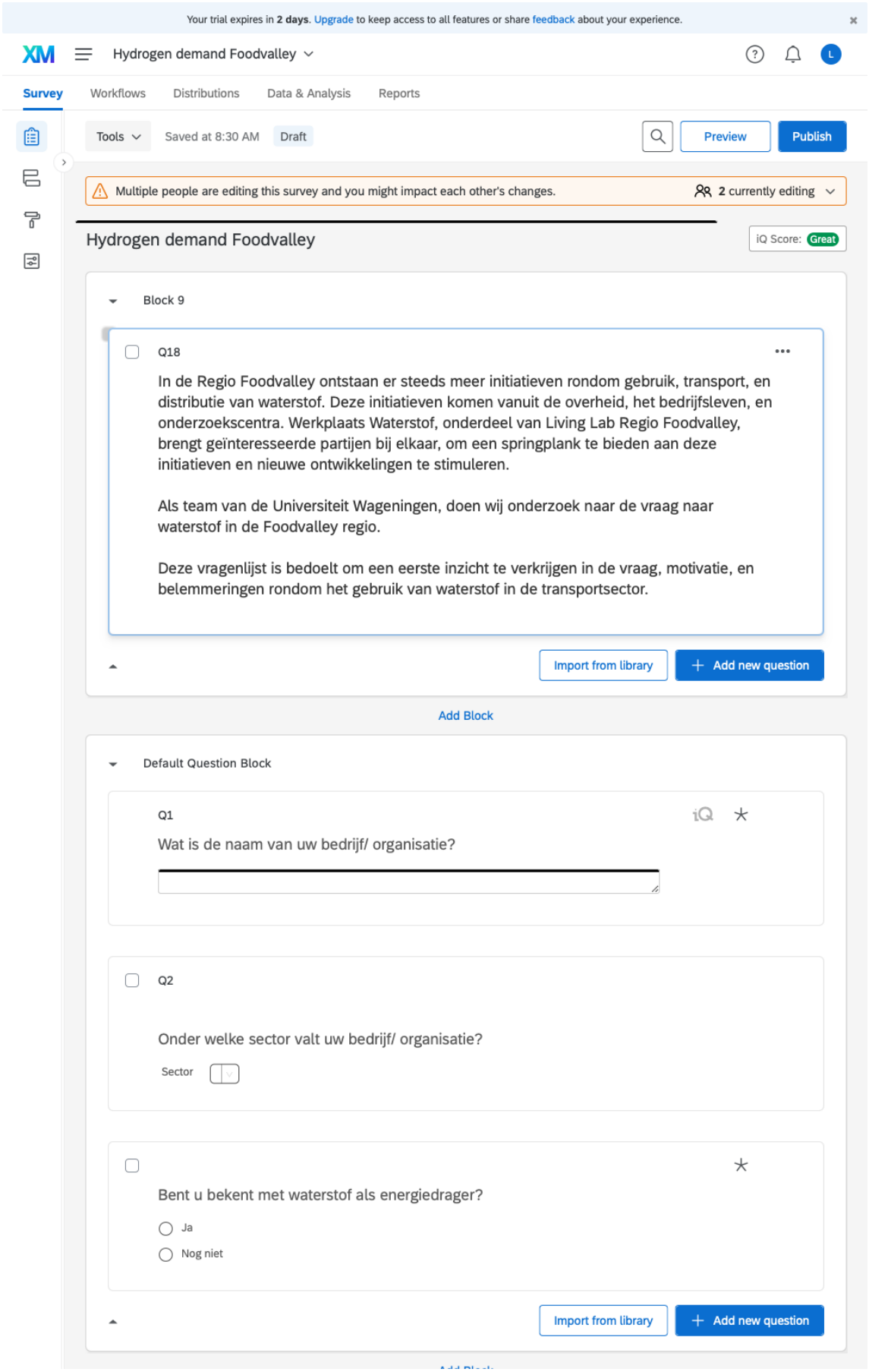
10.2 List of vehicles

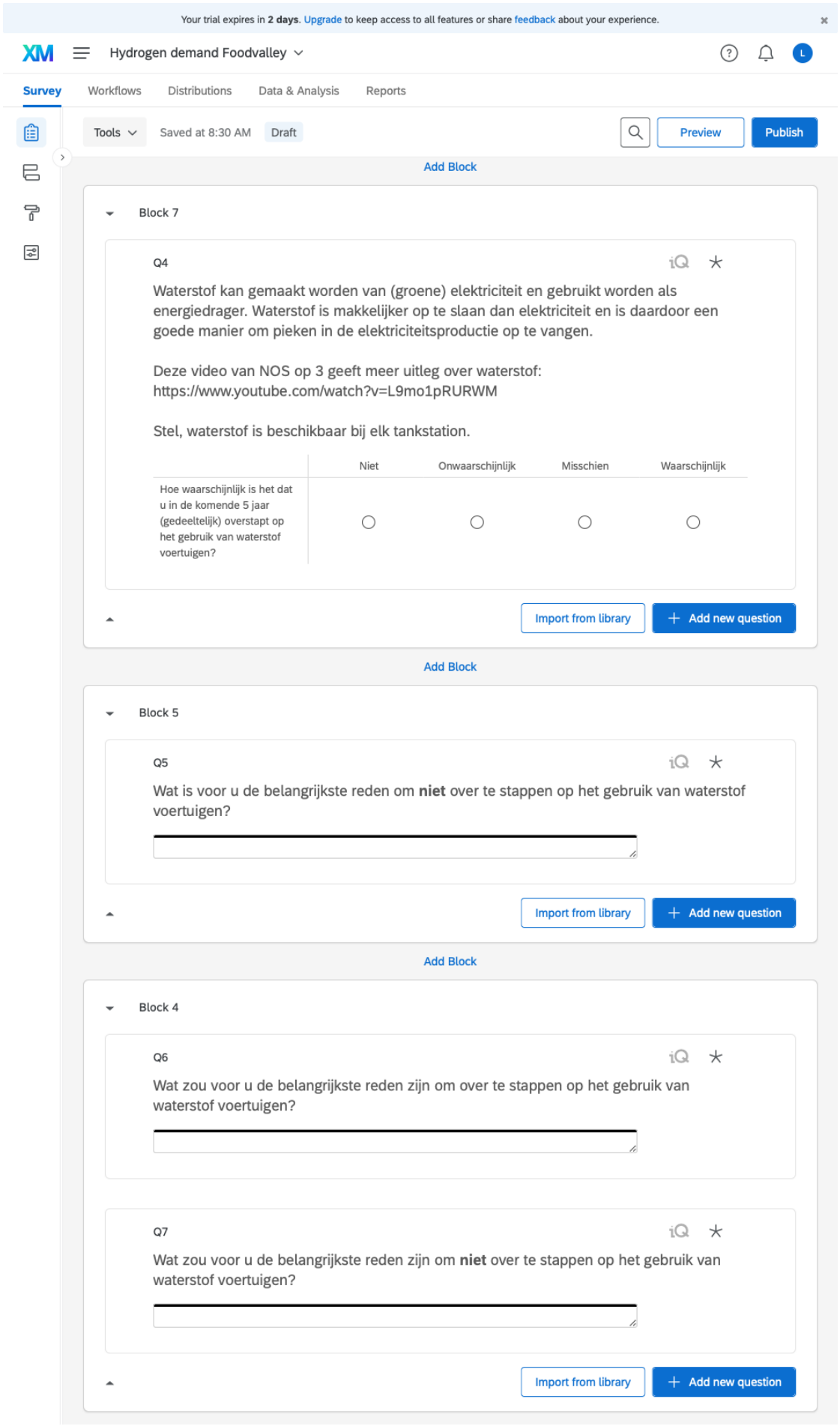
Product	Manufacturer	Website
Drones	Doosan Mobility innovation	https://www.doosanmobility.com/en/products/drone-dz15/
Helios unmanned aircraft	Helios/ Nasa	https://www.nasa.gov/centers/armstrong/news/FactSheets/FS-068-DFRC.html
Aircraft (concept)	Airbus	https://www.airbus.com/newsroom/press-releases/en/2020/09/airbus-reveals-new-zeroemission-concept-aircraft.html
Phantom eye unmanned aircraft	Boeing	https://www.boeing.com/defense/phantom-eye/
Cargo bike (prototype)	Urban arrow	https://blog3.han.nl/studeertechniek/hydrocargo-bakfiets-op-waterstof/
Burgman fuel cell scooter	Suzuki	https://fuelcellsworks.com/news/intelligent-energy-moves-closer-to-deployment-of-products-for-automotive-market-with-success-of-metropolitan-police-fuel-cell-scooter-trial/
Motorbike (patent)	Honda	https://motorbikewriter.com/honda-plans-hydrogen-motorcycle/
Car	BMW; Toyota; Mercedes; Hyundai	https://www.autoweek.nl/autonieuws/artikel/bmw-i-hydrogen-next-volgend-jaar-in-productie/ https://www.toyota.nl/modellen/mirai/index.json

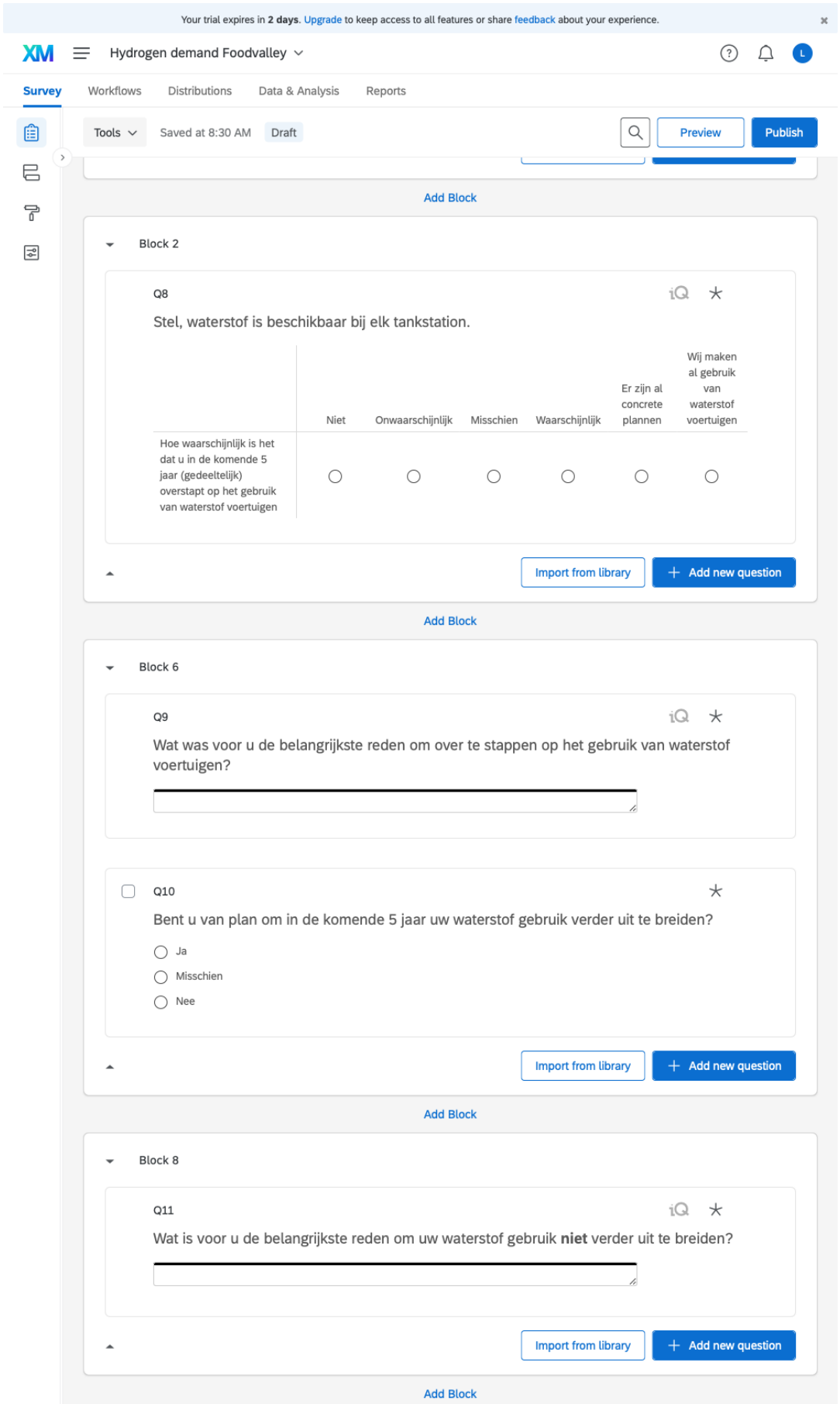
		https://www.daimler.com/products/passenger-cars/mercedes-benz/glc-f-cell.html https://www.hyundai.com/nl/modellen/nexo.html
Super car	Hyperion	https://edition.cnn.com/2020/08/12/success/hyperion-xp1-hydrogen-powered-supercar/index.html
Van	Renault Citroen Peugeot Volkswagen	https://www.renaultgroup.com/en/news-on-air/news/all-there-is-to-know-about-the-hydrogen-powered-car/ https://www.citroen.nl/over-citroen/nieuws/citroen-e-jumpy-hydrogen.html https://int-media.peugeot.com/en/node/90086522 https://www.bestelauto.nl/nieuws/eerste-h2-transporter-is-rdw-gekeurd-en-afgeleverd/15039/
Truck	VDL; Mercedes (prototype); MAN (prototype); Kenworth (prototype); Volvo/Daimler (concept); DAF (research); Hyundai	https://fuelcelltrucks.eu/project/vdl-27-ton-hydrogen-truck/ https://www.daimler.com/innovation/drive-systems/hydrogen/start-of-testing-genh2-truck-prototype.html https://www.mantruckandbus.com/en/innovation/hydrogen-meets-truck-man-is-building-initial-prototypes.html https://www.kenworth.com/about-us/news/pikes-peak-video/ https://www.volvogroup.com/en/news-and-media/news/2021/apr/news-3960135.html https://www.daf.com/nl-nl/over-daf/duurzaamheid/alternatieve-brandstoffen-en-aandrijflijnen/waterstof https://www.rtlnieuws.nl/tech/artikel/5232899/vrachtwagen-waterstof-hyundai-truck
Waste truck	E-Trucks Europe	https://fuelcelltrucks.eu/project/e-trucks-life/
Bus	Ursus/Solbus	https://fuelcellbuses.eu/public-transport-hydrogen/apeldoorn
Fire truck (Concept)	HySPERT	https://www.eurekamagazine.co.uk/design-engineering-news/hyspert-project-explores-hydrogen-fire-trucks/239583/
Excavator	JCB	https://www.jcb.com/en-gb/news/2020/07/jcb-leads-the-way-with-first-hydrogen-fuelled-excavator
Loader with piston engine	JCB	https://www.fwi.co.uk/machinery/technology/jcbs-hydrogen-fuelled-combustion-engine-examined
Tractor (mixed with diesel)	New Holland	https://fuelcellsworks.com/news/the-first-hydrogen-tractor-in-the-netherlands/
Terminal Lorry	Terberg Benschop	https://zepp.solutions/nl/first-hydrogen-powered-terminal-tractor-operational-in-port-of-rotterdam/
Street Sweeper	Green Machines	https://utrecht.nieuws.nl/stadsnieuws/77437/de-gemeente-utrecht-presenteert-veegmachine-op-groene-waterstof/
Forklift	Hyster; Linde; Toyota	https://www.hyster.com/en-us/north-america/industry-solutions/power-sources/hydrogen-fuel-cells/

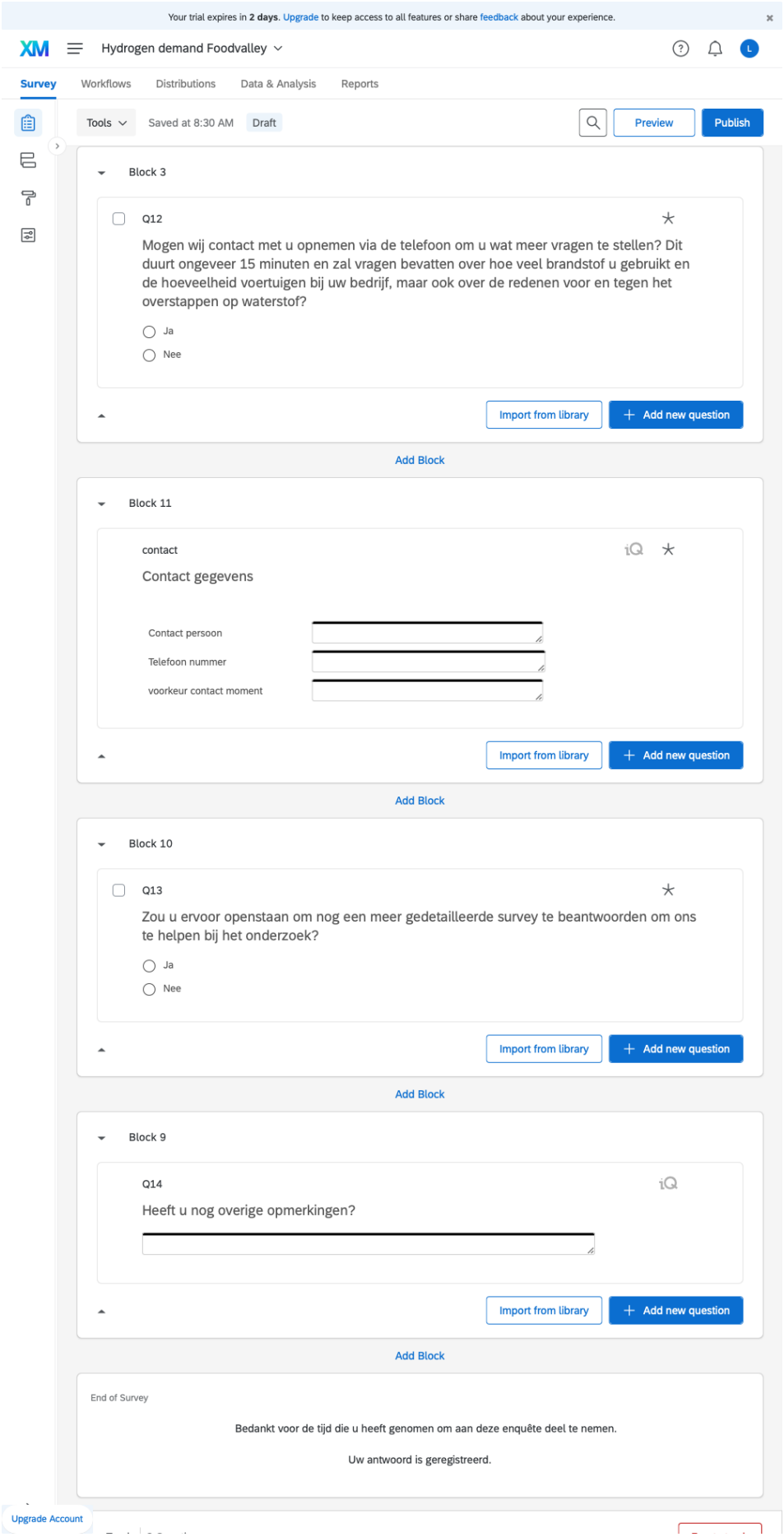
		https://www.linde-mh.com/en/About-us/Innovations-from-Linde/Fuel-Cells.html https://toyota-forklifts.eu/solutions/energy-solutions/what-fuel-cell-technology-means-for-your-forklift/
Riding lawn mower	MAHYTEC	https://www.mahytec.com/en/mahytec-creates-worlds-first-hydrogen-powered-riding-lawnmower/
Golf cart	-	https://www.researchgate.net/publication/253960078_Fuel_cell-battery_hybrid_powered_light_electric_vehicle_golf_cart_Influence_of_fuel_cell_on_the_driving_performance
Hydrogen Train	Coradia iLint	https://www.alstom.com/solutions/rolling-stock/coradia-ilinttm-worlds-1st-hydrogen-powered-train
Containership	Flagships	https://www.offshore-energy.biz/flagships-set-to-debut-worlds-1st-hydrogen-powered-commercial-cargo-ship/
Ferry	LMG Marin	https://www.offshore-energy.biz/worlds-1st-hydrogen-powered-ferry-delivered/
Generator (demo)	Bredenoord	https://www.bredenoord.com/nl/huren/specials/brandstofcelaggregaat-purity/

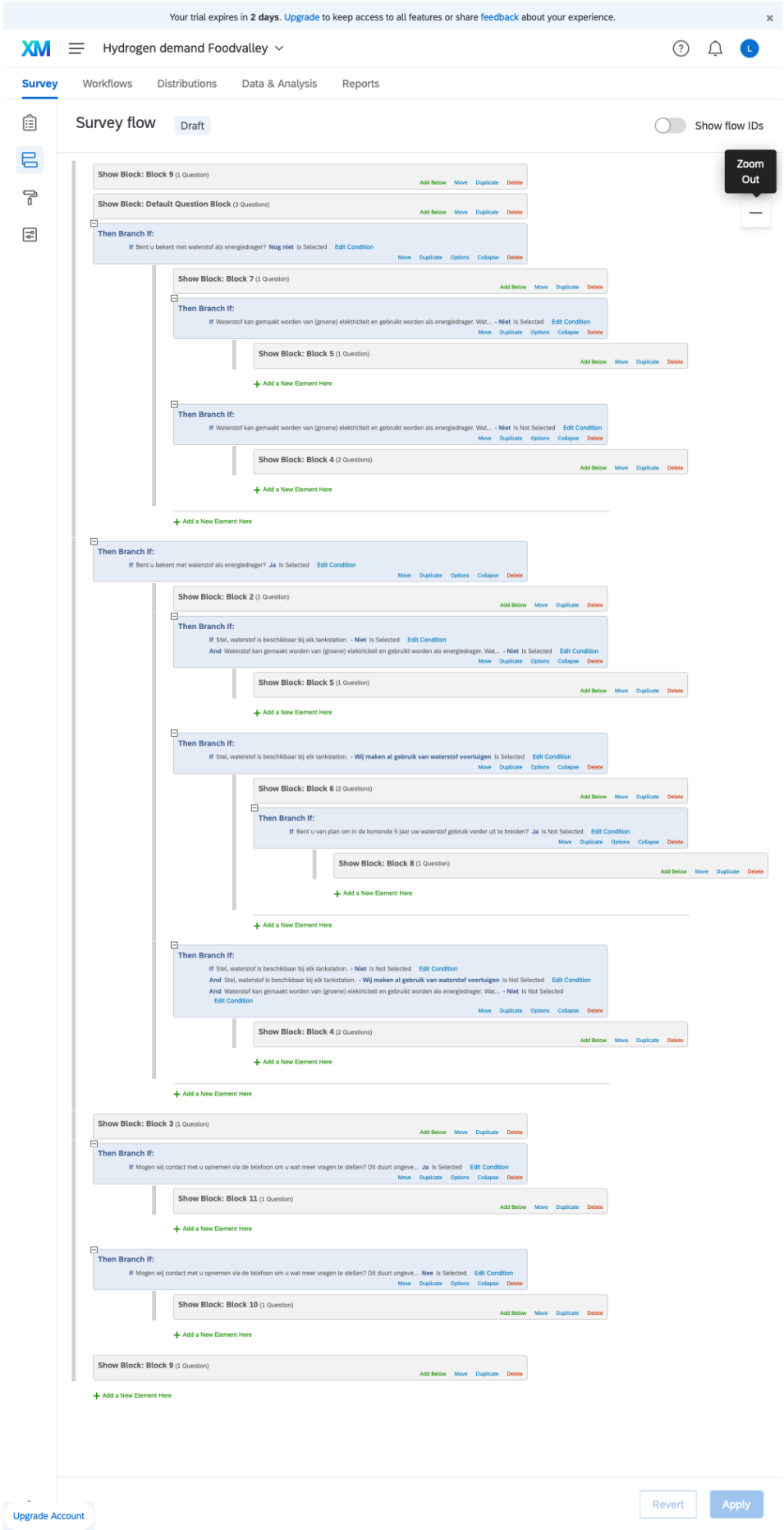
10.3 Questionnaire and Questionnaire flow



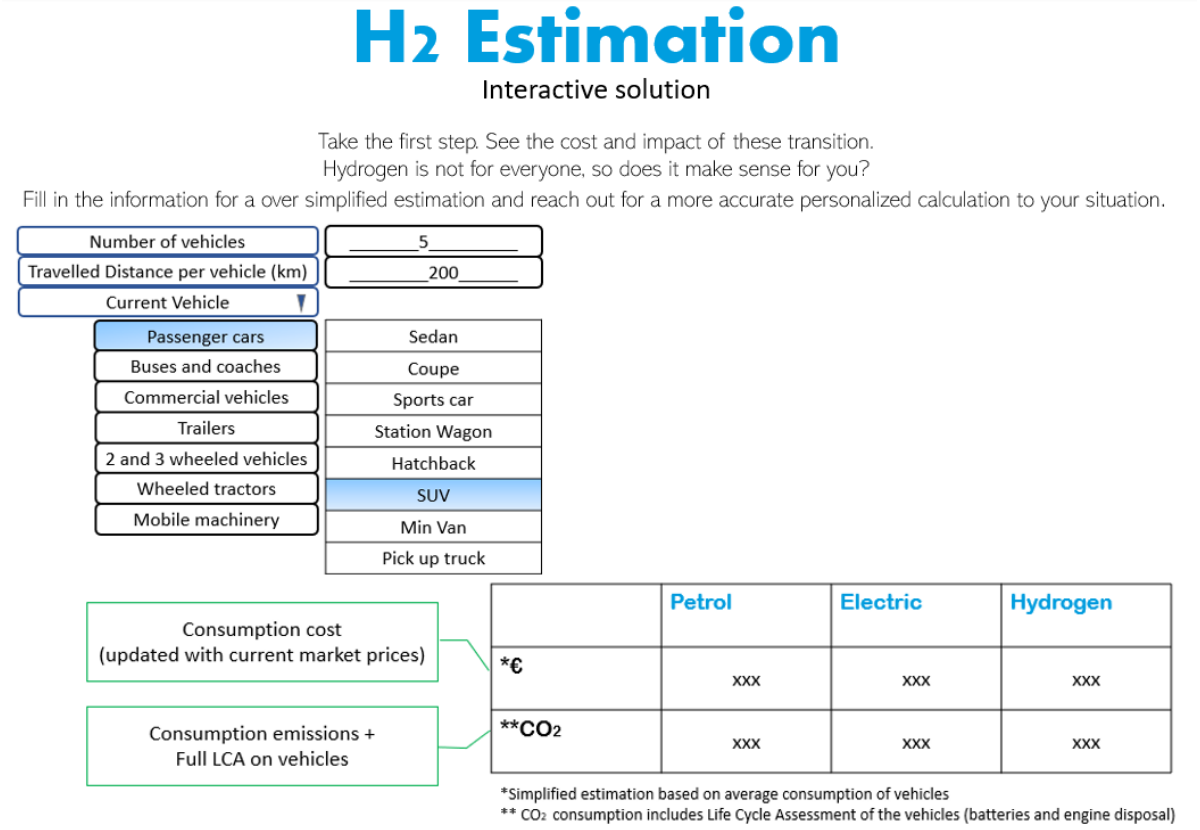

Your trial expires in 2 days. Upgrade to keep access to all features or share feedback about your experience.
Hydrogen demand Foodvalley
Survey
Workflows
Distributions
Data & Analysis
Reports
Tools
Saved at 8:30 AM
Draft
Preview
Publish
Add Block
Block 7
Q4
Waterstof kan gemaakt worden van (groene) elektriciteit en gebruikt worden als energiedrager. Waterstof is makkelijker op te slaan dan elektriciteit en is daardoor een goede manier om pieken in de elektriciteitsproductie op te vangen.
Deze video van NOS op 3 geeft meer uitleg over waterstof: https://www.youtube.com/watch?v=L9mo1pRURWM
Stel, waterstof is beschikbaar bij elk tankstation.
Niet
Onwaarschijnlijk
Misschien
Waarschijnlijk
Hoe waarschijnlijk is het dat u in de komende 5 jaar (gedeeltelijk) overstapt op het gebruik van waterstof voertuigen?
Import from library
Add new question
Add Block
Block 5
Q5
Wat is voor u de belangrijkste reden om niet over te stappen op het gebruik van waterstof voertuigen?
Import from library
Add new question
Add Block
Block 4
Q6
Wat zou voor u de belangrijkste reden zijn om over te stappen op het gebruik van waterstof voertuigen?
Q7
Wat zou voor u de belangrijkste reden zijn om niet over te stappen op het gebruik van waterstof voertuigen?
Import from library
Add new question


Your trial expires in 2 days. Upgrade to keep access to all features or share feedback about your experience.
Hydrogen demand Foodvalley
Survey
Workflows
Distributions
Data & Analysis
Reports
Tools
Saved at 8:30 AM
Draft
Preview
Publish
Add Block
Block 2
Q8
Stel, waterstof is beschikbaar bij elk tankstation.
Niet
Onwaarschijnlijk
Misschien
Waarschijnlijk
Er zijn al concrete plannen
Wij maken al gebruik van waterstof voertuigen
Hoe waarschijnlijk is het dat u in de komende 5 jaar (gedeeltelijk) overstapt op het gebruik van waterstof voertuigen
Import from library
Add new question
Add Block
Block 6
Q9
Wat was voor u de belangrijkste reden om over te stappen op het gebruik van waterstof voertuigen?
Q10
Bent u van plan om in de komende 5 jaar uw waterstof gebruik verder uit te breiden?
Ja
Misschien
Nee
Import from library
Add new question
Add Block
Block 8
Q11
Wat is voor u de belangrijkste reden om uw waterstof gebruik niet verder uit te breiden?
Import from library
Add new question
Add Block


Your trial expires in 2 days. Upgrade to keep access to all features or share feedback about your experience.
Hydrogen demand Foodvalley
Survey
Workflows
Distributions
Data & Analysis
Reports
Tools
Saved at 8:30 AM
Draft
Preview
Publish
Block 3
Q12
Mogen wij contact met u opnemen via de telefoon om u wat meer vragen te stellen? Dit duurt ongeveer 15 minuten en zal vragen bevatten over hoe veel brandstof u gebruikt en de hoeveelheid voertuigen bij uw bedrijf, maar ook over de redenen voor en tegen het overstappen op waterstof?
Ja
Nee
Import from library
Add new question
Add Block
Block 11
contact
Contact gegevens
Contact persoon
Telefoon nummer
voorkeur contact moment
Import from library
Add new question
Add Block
Block 10
Q13
Zou u ervoor openstaan om nog een meer gedetailleerde survey te beantwoorden om ons te helpen bij het onderzoek?
Ja
Nee
Import from library
Add new question
Add Block
Block 9
Q14
Heeft u nog overige opmerkingen?
Import from library
Add new question
Add Block
End of Survey
Bedankt voor de tijd die u heeft genomen om aan deze enquête deel te nemen.
Uw antwoord is geregistreerd.
Upgrade Account


Your trial expires in 2 days. Upgrade to keep access to all features or share feedback about your experience.
Hydrogen demand Foodvalley
Survey
Workflows
Distributions
Data & Analysis
Reports
Survey flow
Draft
Show flow IDs
Zoom Out
Show Block: Block 9 (1 Question)
Show Block: Default Question Block (3 Questions)
Then Branch If:
If Bent u bekent met waterstof als energiedrager? Nog niet Is Selected Edit Condition
Show Block: Block 7 (1 Question)
Then Branch If:
If Waterstof kan gemaakt worden van (groene) elektriciteit en gebruikt worden als energiedrager. Wat... - Niet Is Selected Edit Condition
Show Block: Block 5 (1 Question)
Add a New Element Here
Then Branch If:
If Waterstof kan gemaakt worden van (groene) elektriciteit en gebruikt worden als energiedrager. Wat... - Niet Is Not Selected Edit Condition
Show Block: Block 4 (2 Questions)
Add a New Element Here
Add a New Element Here
Then Branch If:
If Bent u bekent met waterstof als energiedrager? Ja Is Selected Edit Condition
Show Block: Block 2 (1 Question)
Then Branch If:
If Stel, waterstof is beschikbaar bij elk tankstation. - Niet Is Selected Edit Condition
And Waterstof kan gemaakt worden van (groene) elektriciteit en gebruikt worden als energiedrager. Wat... - Niet Is Selected Edit Condition
Show Block: Block 5 (1 Question)
Add a New Element Here
Then Branch If:
If Stel, waterstof is beschikbaar bij elk tankstation. - Wij maken al gebruik van waterstof voertuigen Is Selected Edit Condition
Show Block: Block 6 (2 Questions)
Then Branch If:
If Bent u van plan om in de komende 5 jaar uw waterstof gebruik verder uit te breiden? Ja Is Not Selected Edit Condition
Show Block: Block 8 (1 Question)
Add a New Element Here
Add a New Element Here
Then Branch If:
If Stel, waterstof is beschikbaar bij elk tankstation. - Niet Is Not Selected Edit Condition
And Stel, waterstof is beschikbaar bij elk tankstation. - Wij maken al gebruik van waterstof voertuigen Is Not Selected Edit Condition
And Waterstof kan gemaakt worden van (groene) elektriciteit en gebruikt worden als energiedrager. Wat... - Niet Is Not Selected
Edit Condition
Show Block: Block 4 (2 Questions)
Add a New Element Here
Add a New Element Here
Show Block: Block 3 (1 Question)
Then Branch If:
If Mogen wij contact met u opnemen via de telefoon om u wat meer vragen te stellen? Dit duurt ongeveer... Ja Is Selected Edit Condition
Show Block: Block 11 (1 Question)
Add a New Element Here
Then Branch If:
If Mogen wij contact met u opnemen via de telefoon om u wat meer vragen te stellen? Dit duurt ongeveer... Nee Is Selected Edit Condition
Show Block: Block 10 (1 Question)
Add a New Element Here
Show Block: Block 9 (1 Question)
Add a New Element Here
Upgrade Account
Revert
Apply

10.4 Information portal example



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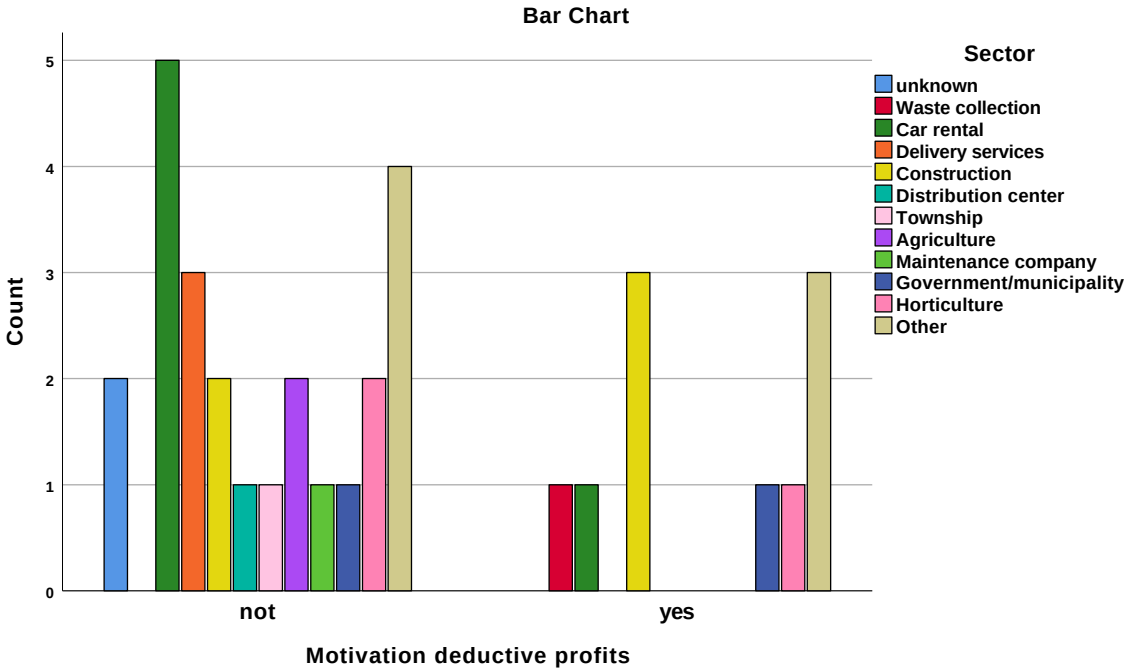
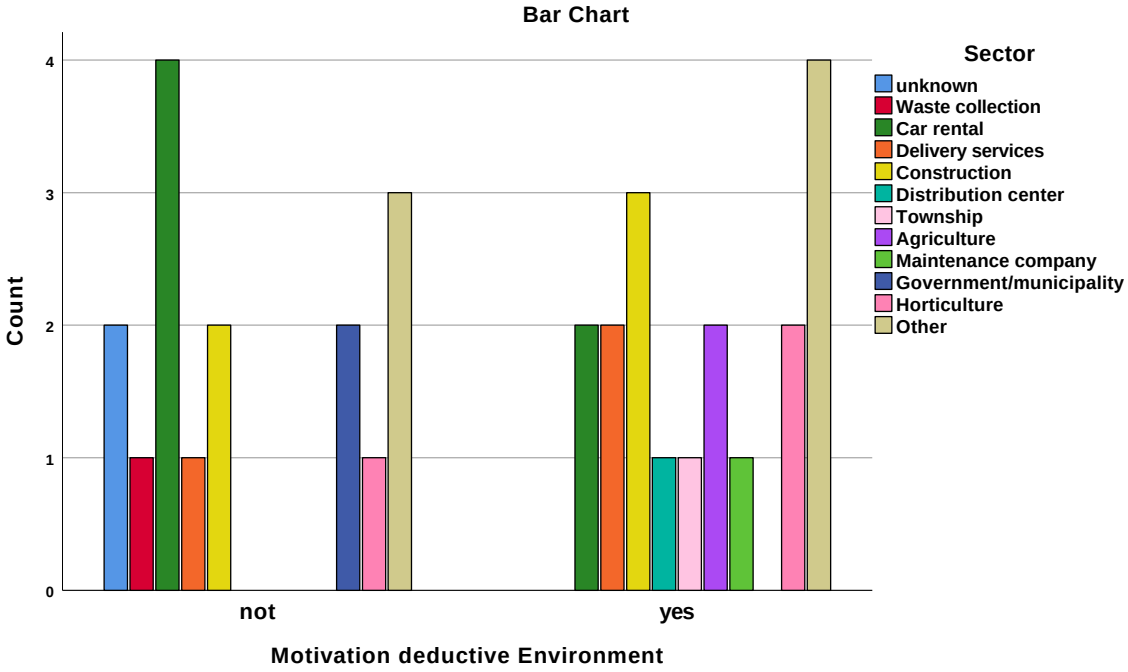
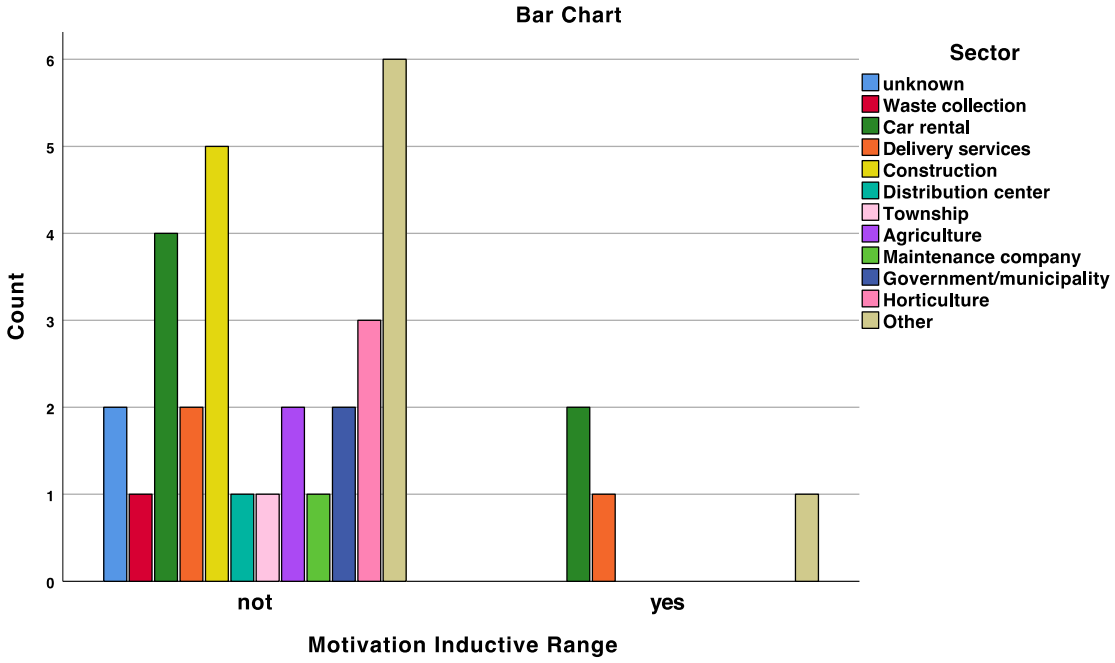
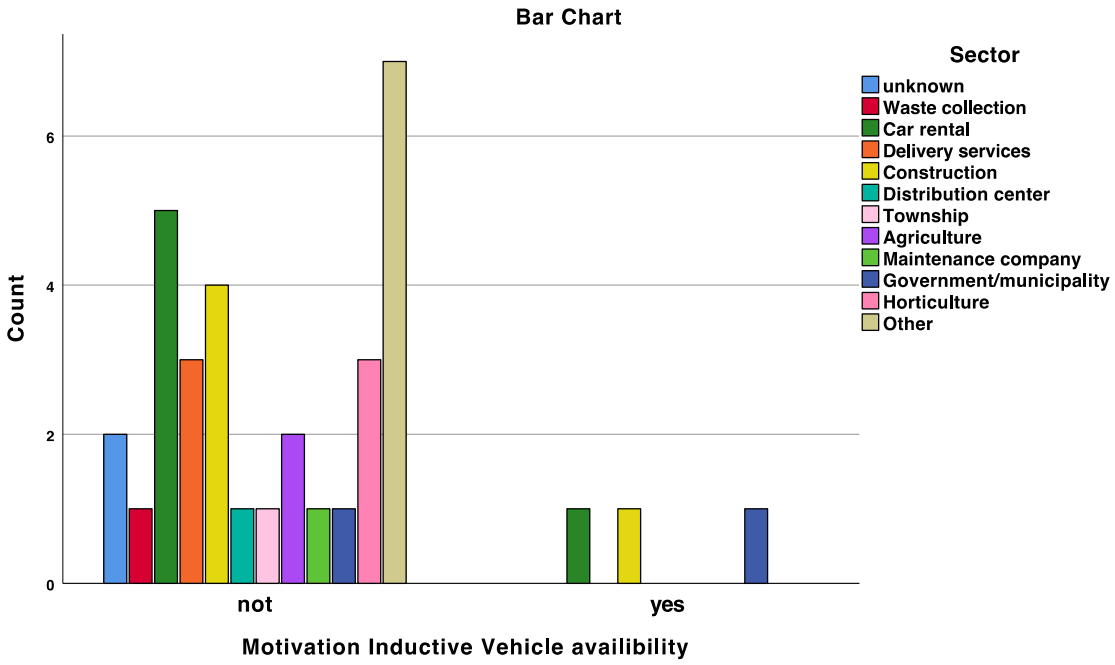
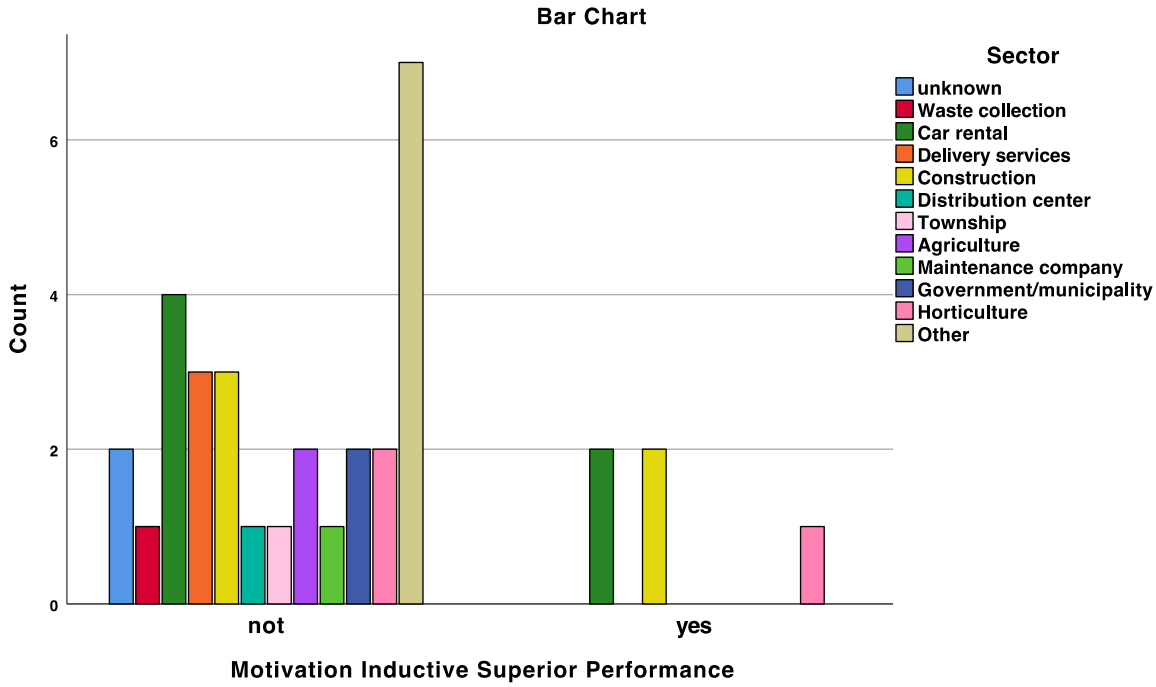
10.5 Data analysis

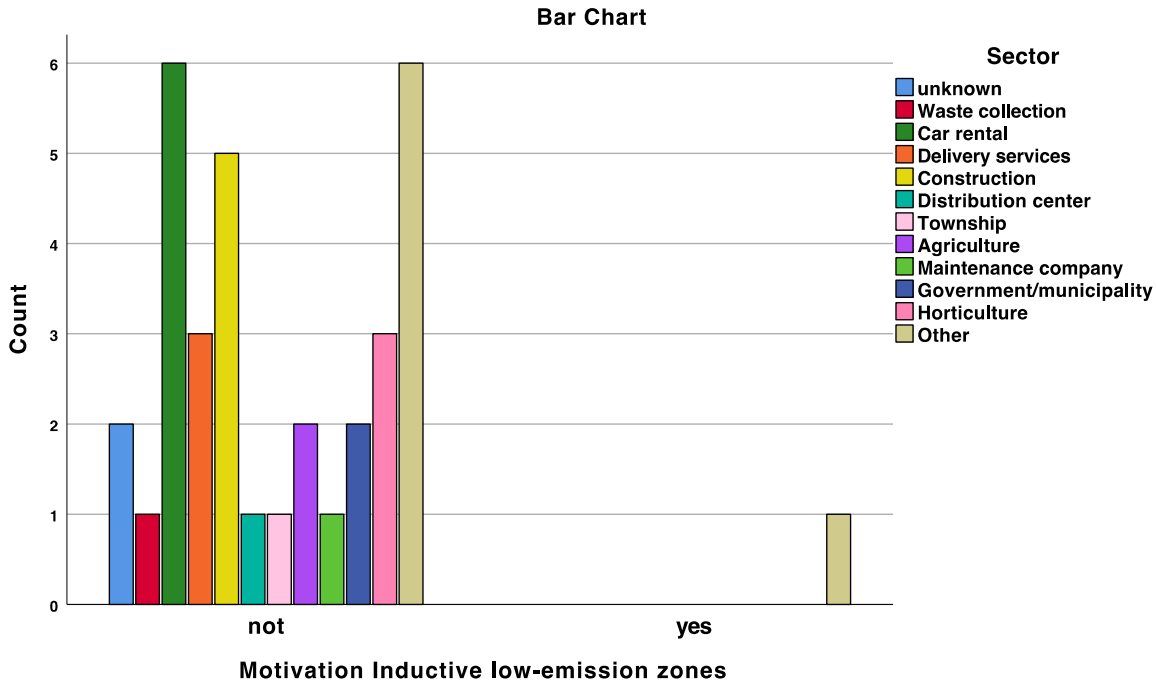


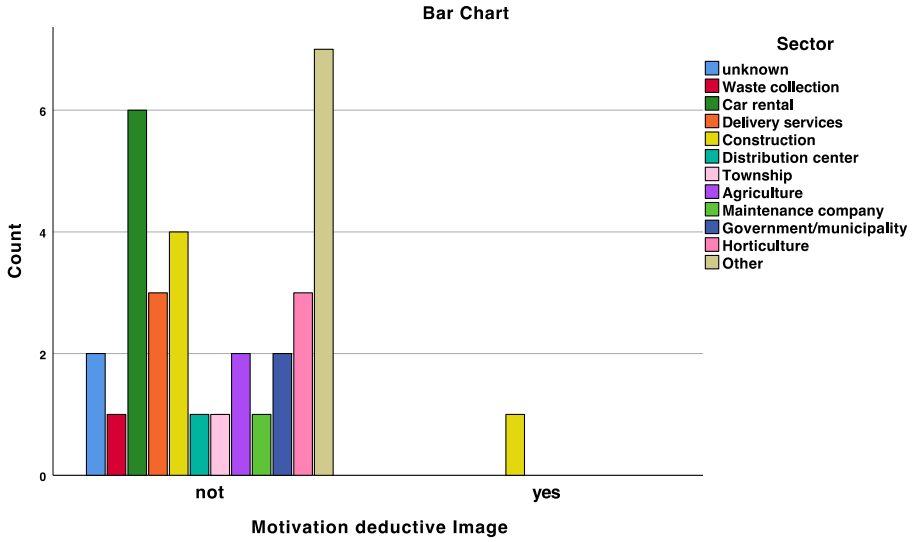


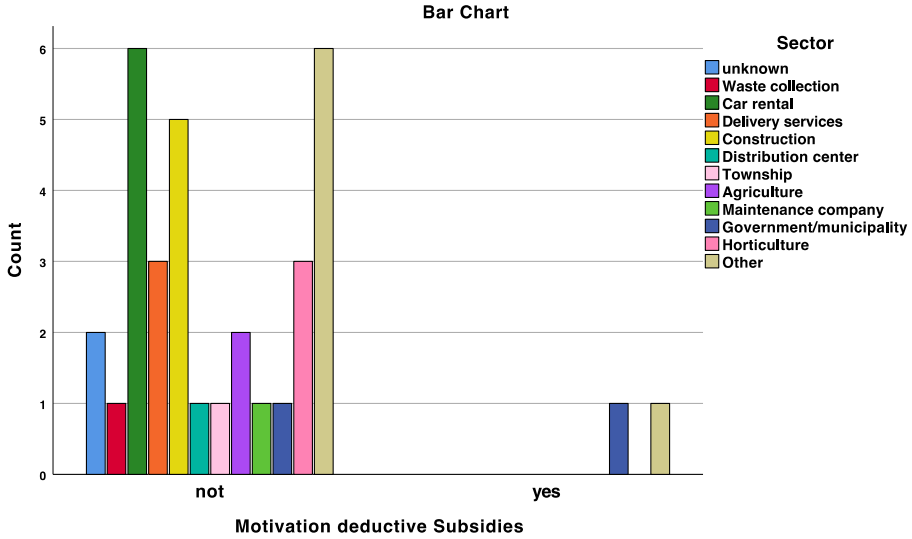

Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Motivation Inductive Range

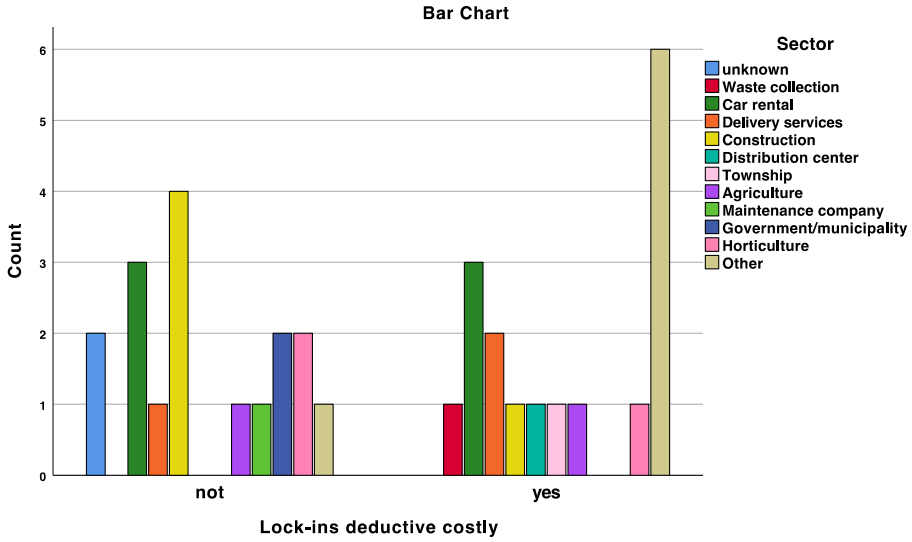

Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Motivation Inductive Vehicle availibility

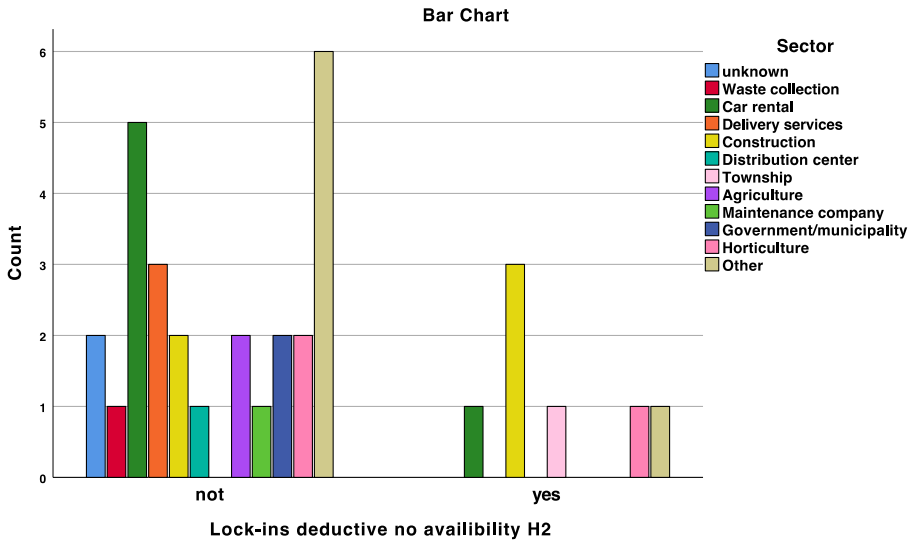

Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Motivation Inductive Superior Performance


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Motivation Inductive low-emission zones


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Motivation deductive Image


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Motivation deductive Subsidies


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Lock-ins deductive costly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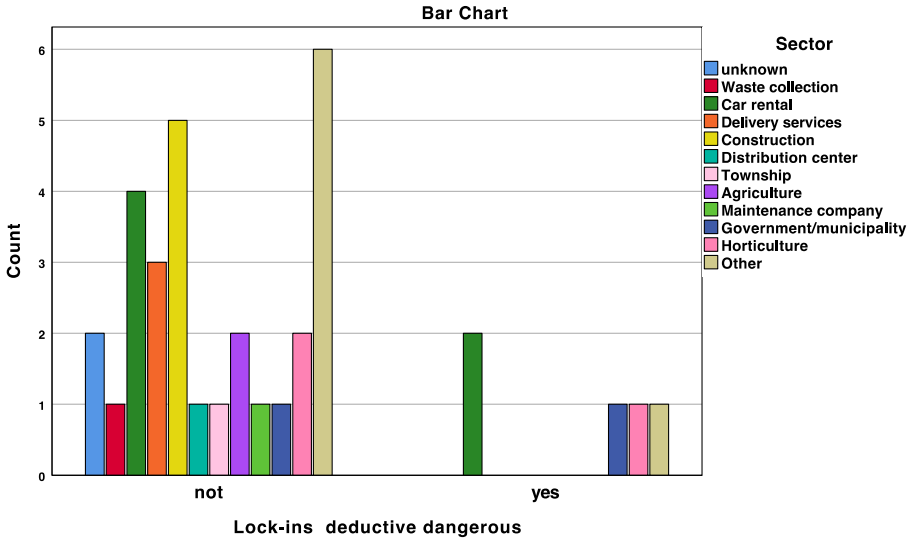
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Lock-ins deductive no availibility H2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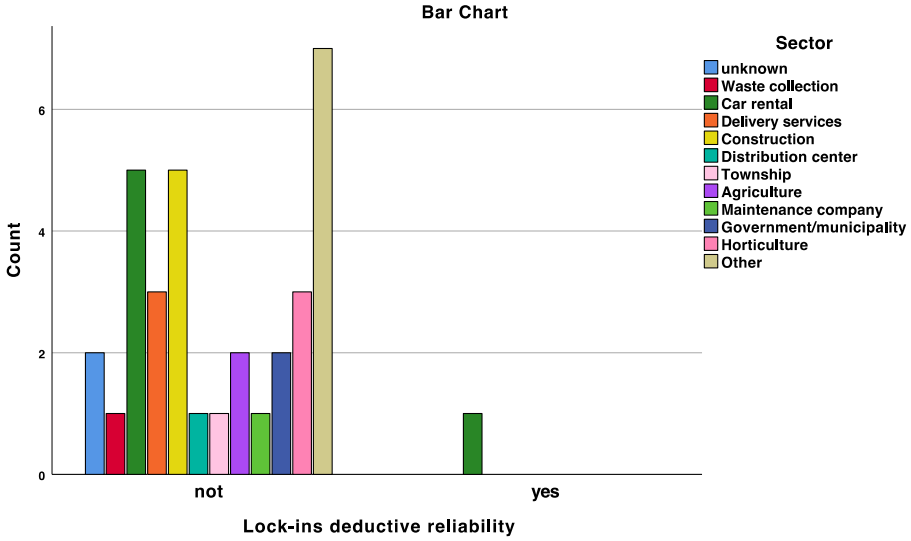
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Lock-ins deductive dangerous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Sector
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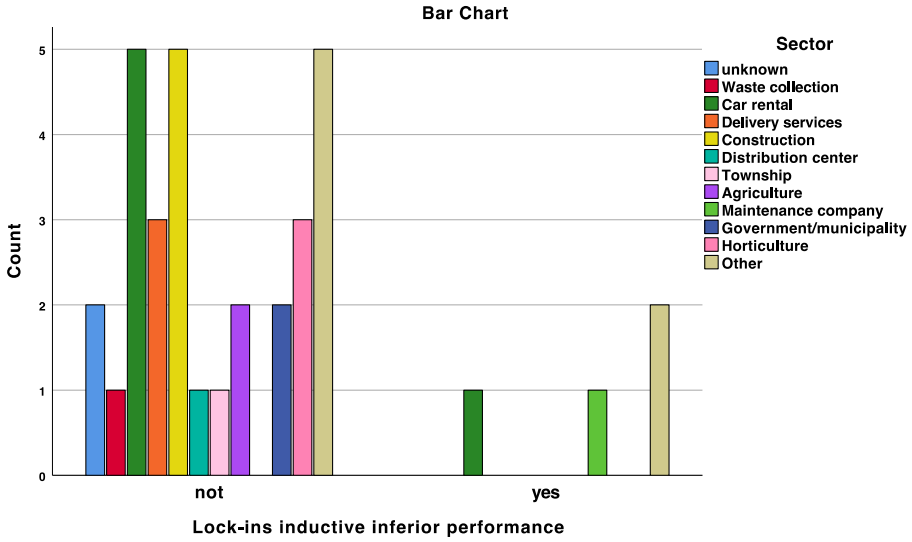
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Lock-ins deductive reliability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Sector
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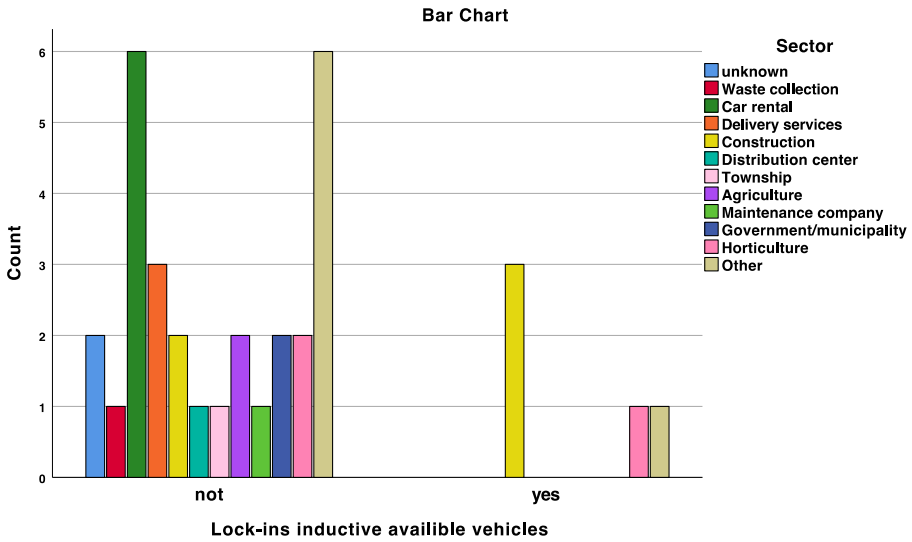
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
not
yes
Lock-ins inductive inferior performance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Car rental
Delivery services
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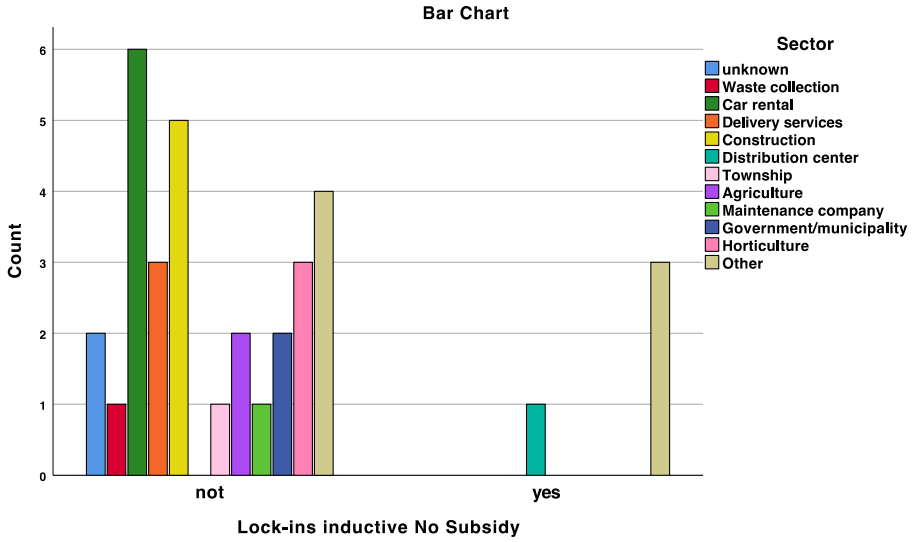
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Lock-ins inductive availible vehicles

Page 8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Sector
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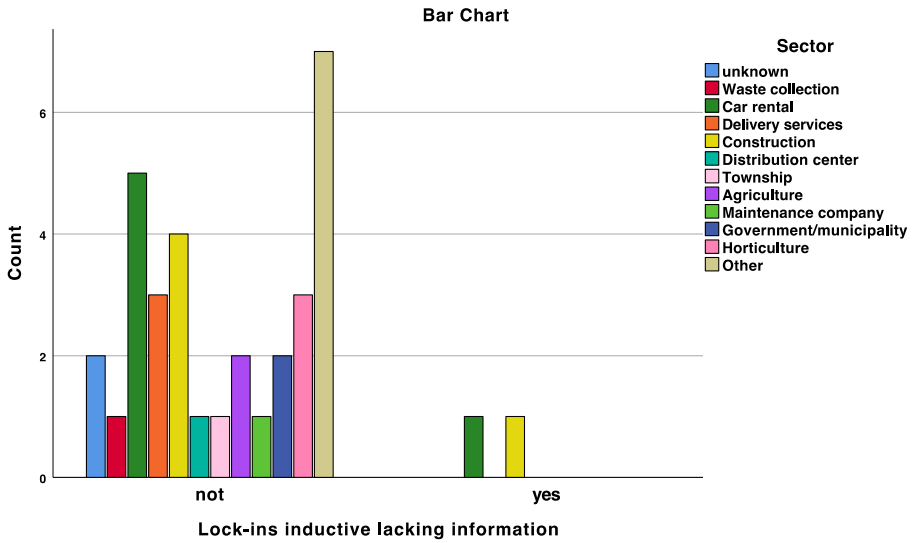
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
1
2
3
4
5
6
not
yes
Lock-ins inductive No Subsidy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Sector
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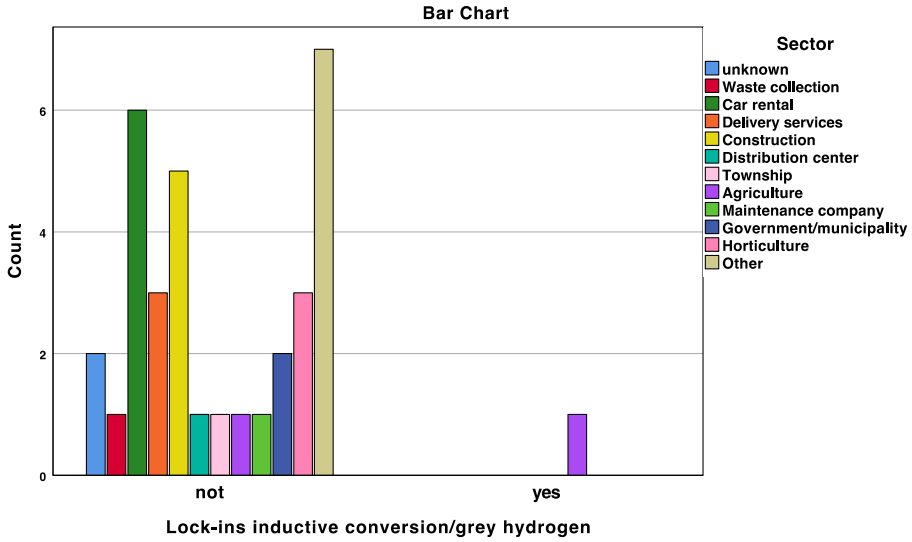
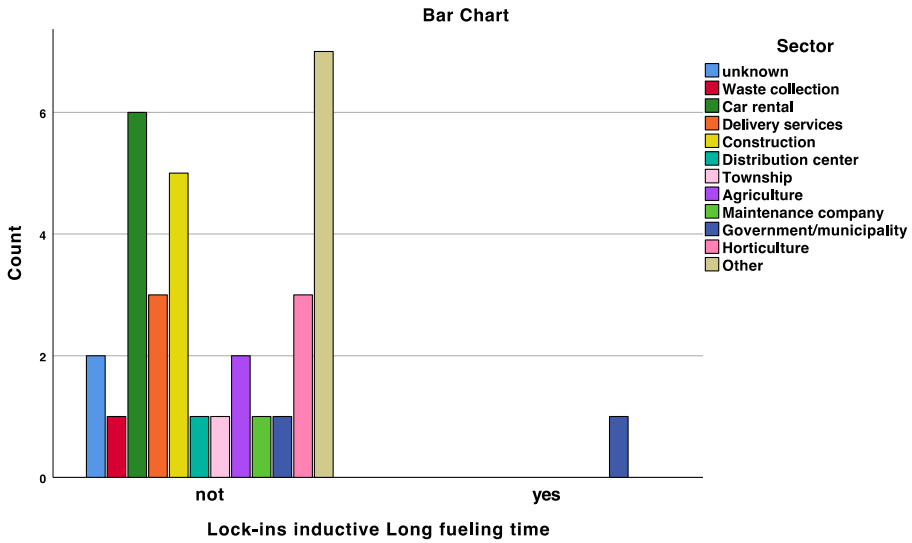
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Lock-ins inductive lacking information


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Lock-ins inductive conversion/grey hydrogen


Bar Chart
Sector
unknown
Waste collection
Car rental
Delivery services
Construction
Distribution center
Township
Agriculture
Maintenance company
Government/municipality
Horticulture
Other
Count
0
2
4
6
not
yes
Lock-ins inductive Long fueling time

10.6 SPSS output

Table 3 Multivariate MANOVA output for motivations and category likeliness to change

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	1,000	.[b]	5,000	16,000	
	Wilks' Lambda	0,000	000000000.000[b]	5,000	16,000	0,000
	Hotelling's Trace	###########	000000000.000[b]	5,000	16,000	0,000
	Roy's Largest Root	###########	000000000.000[b]	5,000	16,000	0,000
mdprofits	Pillai's Trace	0,301	1.380[b]	5,000	16,000	0,283
	Wilks' Lambda	0,699	1.380[b]	5,000	16,000	0,283
	Hotelling's Trace	0,431	1.380[b]	5,000	16,000	0,283
	Roy's Largest Root	0,431	1.380[b]	5,000	16,000	0,283
mdenvi	Pillai's Trace	0,244	1.033[b]	5,000	16,000	0,432
	Wilks' Lambda	0,756	1.033[b]	5,000	16,000	0,432
	Hotelling's Trace	0,323	1.033[b]	5,000	16,000	0,432
	Roy's Largest Root	0,323	1.033[b]	5,000	16,000	0,432
mdimage	Pillai's Trace	0,000	.[b]	0,000	0,000	
	Wilks' Lambda	1,000	.[b]	0,000	18,000	
	Hotelling's Trace	0,000	.[b]	0,000	2,000	
	Roy's Largest Root	0,000	.000[b]	5,000	15,000	1,000
mdsub	Pillai's Trace	0,097	.342[b]	5,000	16,000	0,880
	Wilks' Lambda	0,903	.342[b]	5,000	16,000	0,880
	Hotelling's Trace	0,107	.342[b]	5,000	16,000	0,880
	Roy's Largest Root	0,107	.342[b]	5,000	16,000	0,880
miperf	Pillai's Trace	0,315	1.471[b]	5,000	16,000	0,254
	Wilks' Lambda	0,685	1.471[b]	5,000	16,000	0,254
	Hotelling's Trace	0,460	1.471[b]	5,000	16,000	0,254
	Roy's Largest Root	0,460	1.471[b]	5,000	16,000	0,254
miLEzones	Pillai's Trace	1,000	.[b]	5,000	16,000	
	Wilks' Lambda	0,000	000000000.000[b]	5,000	16,000	0,000
	Hotelling's Trace	###########	000000000.000[b]	5,000	16,000	0,000
	Roy's Largest Root	###########	000000000.000[b]	5,000	16,000	0,000
miRange	Pillai's Trace	0,026	.085[b]	5,000	16,000	0,994
	Wilks' Lambda	0,974	.085[b]	5,000	16,000	0,994
	Hotelling's Trace	0,027	.085[b]	5,000	16,000	0,994
	Roy's Largest Root	0,027	.085[b]	5,000	16,000	0,994
miVehicleavail	Pillai's Trace	0,178	.692[b]	5,000	16,000	0,637
	Wilks' Lambda	0,822	.692[b]	5,000	16,000	0,637
	Hotelling's Trace	0,216	.692[b]	5,000	16,000	0,637
	Roy's Largest Root	0,216	.692[b]	5,000	16,000	0,637

Table 4 Univariate output MANOVA motivations and category likeliness to change to hydrogen

Tests of Between-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	likelychange=no answer	1.002[a]	13	0,077	0,889	0,576
	likelychange=not	1.696[b]	13	0,130	1,423	0,232
	likelychange=Unlikely	1.792[c]	13	0,138	0,732	0,714
	likelychange=Perhaps	3.384[d]	13	0,260	1,610	0,164
	likelychange=Probably	2.292[e]	13	0,176	0,740	0,707
	likelychange=There are concrete plans	.971[f]	13	0,075	###########	0,000
Intercept	likelychange=no answer	0,022	1	0,022	0,253	0,620
	likelychange=not	0,096	1	0,096	1,049	0,318
	likelychange=Unlikely	0,002	1	0,002	0,009	0,925
	likelychange=Perhaps	2,078	1	2,078	12,851	0,002
	likelychange=Probably	0,411	1	0,411	1,723	0,204
	likelychange=There are concrete plans	0,175	1	0,175	###########	0,000
mdprofits	likelychange=no answer	0,076	1	0,076	0,879	0,360
	likelychange=not	0,119	1	0,119	1,299	0,268
	likelychange=Unlikely	1,001	1	1,001	5,316	0,032
	likelychange=Perhaps	0,344	1	0,344	2,128	0,160
	likelychange=Probably	0,043	1	0,043	0,180	0,676
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
mdenvi	likelychange=no answer	0,418	1	0,418	4,828	0,040
	likelychange=not	0,199	1	0,199	2,171	0,156
	likelychange=Unlikely	0,000	1	0,000	0,001	0,980
	likelychange=Perhaps	0,006	1	0,006	0,038	0,848
	likelychange=Probably	0,084	1	0,084	0,353	0,559
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
mdimage	likelychange=no answer	0,000	0			
	likelychange=not	0,000	0			
	likelychange=Unlikely	0,000	0			
	likelychange=Perhaps	0,000	0			
	likelychange=Probably	0,000	0			
	likelychange=There are concrete plans	0,000	0			
mdsub	likelychange=no answer	0,000	1	0,000	0,000	1,000
	likelychange=not	0,000	1	0,000	0,000	1,000
	likelychange=Unlikely	0,333	1	0,333	1,770	0,198
	likelychange=Perhaps	0,000	1	0,000	0,000	1,000
	likelychange=Probably	0,333	1	0,333	1,399	0,251
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
miperf	likelychange=no answer	0,241	1	0,241	2,782	0,111
	likelychange=not	0,424	1	0,424	4,628	0,044
	likelychange=Unlikely	0,029	1	0,029	0,154	0,699
	likelychange=Perhaps	0,084	1	0,084	0,522	0,478
	likelychange=Probably	0,464	1	0,464	1,948	0,178
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
miLEzones	likelychange=no answer	0,009	1	0,009	0,105	0,749
	likelychange=not	0,000	1	0,000	0,000	1,000
	likelychange=Unlikely	0,036	1	0,036	0,193	0,665
	likelychange=Perhaps	0,145	1	0,145	0,900	0,354
	likelychange=Probably	0,082	1	0,082	0,343	0,564
	likelychange=There are concrete plans	0,909	1	0,909	###########	0,000
miRange	likelychange=no answer	0,013	1	0,013	0,148	0,705
	likelychange=not	0,013	1	0,013	0,140	0,712
	likelychange=Unlikely	0,013	1	0,013	0,068	0,797
	likelychange=Perhaps	0,013	1	0,013	0,079	0,781
	likelychange=Probably	0,051	1	0,051	0,215	0,648
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
miVehicleavail	likelychange=no answer	0,024	1	0,024	0,275	0,606
	likelychange=not	0,095	1	0,095	1,039	0,320
	likelychange=Unlikely	0,024	1	0,024	0,126	0,726
	likelychange=Perhaps	0,595	1	0,595	3,682	0,069
	likelychange=Probably	0,024	1	0,024	0,100	0,755
	likelychange=There are concrete plans	0,000	1	0,000	0,000	1,000
Error	likelychange=no answer	1,733	20	0,087		
	likelychange=not	1,833	20	0,092		
	likelychange=Unlikely	3,767	20	0,188		
	likelychange=Perhaps	3,233	20	0,162		
	likelychange=Probably	4,767	20	0,238		
	likelychange=There are concrete plans	5,303E-29	20	2,651E-30		
Total	likelychange=no answer	3,000	34			
	likelychange=not	4,000	34			
	likelychange=Unlikely	7,000	34			
	likelychange=Perhaps	9,000	34			
	likelychange=Probably	10,000	34			
	likelychange=There are concrete plans	1,000	34			
Corrected Total	likelychange=no answer	2,735	33			
	likelychange=not	3,529	33			
	likelychange=Unlikely	5,559	33			
	likelychange=Perhaps	6,618	33			
	likelychange=Probably	7,059	33			
	likelychange=There are concrete plans	0,971	33			

a. R Squared = .366 (Adjusted R Squared = -.046)
b. R Squared = .481 (Adjusted R Squared = .143)
c. R Squared = .322 (Adjusted R Squared = -.118)
d. R Squared = .511 (Adjusted R Squared = .194)
e. R Squared = .325 (Adjusted R Squared = -.114)
f. R Squared = 1.000 (Adjusted R Squared = 1.000)

Table 5: Multivariate output MANOVA obstructions and category of likeliness to change to hydrogen

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0,569	5.014[b]	5,000	19,000	0,004	0,569
	Wilks' Lambda	0,431	5.014[b]	5,000	19,000	0,004	0,569
	Hotelling's Trace	1,320	5.014[b]	5,000	19,000	0,004	0,569
	Roy's Largest Root	1,320	5.014[b]	5,000	19,000	0,004	0,569
Ldcostly	Pillai's Trace	0,172	.791[b]	5,000	19,000	0,569	0,172
	Wilks' Lambda	0,828	.791[b]	5,000	19,000	0,569	0,172
	Hotelling's Trace	0,208	.791[b]	5,000	19,000	0,569	0,172
	Roy's Largest Root	0,208	.791[b]	5,000	19,000	0,569	0,172
Ldnoavail	Pillai's Trace	0,148	.658[b]	5,000	19,000	0,659	0,148
	Wilks' Lambda	0,852	.658[b]	5,000	19,000	0,659	0,148
	Hotelling's Trace	0,173	.658[b]	5,000	19,000	0,659	0,148
	Roy's Largest Root	0,173	.658[b]	5,000	19,000	0,659	0,148
Lddanger	Pillai's Trace	0,187	.876[b]	5,000	19,000	0,516	0,187
	Wilks' Lambda	0,813	.876[b]	5,000	19,000	0,516	0,187
	Hotelling's Trace	0,231	.876[b]	5,000	19,000	0,516	0,187
	Roy's Largest Root	0,231	.876[b]	5,000	19,000	0,516	0,187
Ldreliab	Pillai's Trace	0,213	1.028[b]	5,000	19,000	0,430	0,213
	Wilks' Lambda	0,787	1.028[b]	5,000	19,000	0,430	0,213
	Hotelling's Trace	0,270	1.028[b]	5,000	19,000	0,430	0,213
	Roy's Largest Root	0,270	1.028[b]	5,000	19,000	0,430	0,213
Linsub	Pillai's Trace	0,379	2.319[b]	5,000	19,000	0,084	0,379
	Wilks' Lambda	0,621	2.319[b]	5,000	19,000	0,084	0,379
	Hotelling's Trace	0,610	2.319[b]	5,000	19,000	0,084	0,379
	Roy's Largest Root	0,610	2.319[b]	5,000	19,000	0,084	0,379
Lilack	Pillai's Trace	0,110	.467[b]	5,000	19,000	0,796	0,110
	Wilks' Lambda	0,890	.467[b]	5,000	19,000	0,796	0,110
	Hotelling's Trace	0,123	.467[b]	5,000	19,000	0,796	0,110
	Roy's Largest Root	0,123	.467[b]	5,000	19,000	0,796	0,110
Liperf	Pillai's Trace	0,258	1.318[b]	5,000	19,000	0,298	0,258
	Wilks' Lambda	0,742	1.318[b]	5,000	19,000	0,298	0,258
	Hotelling's Trace	0,347	1.318[b]	5,000	19,000	0,298	0,258
	Roy's Largest Root	0,347	1.318[b]	5,000	19,000	0,298	0,258
Liavaiveh	Pillai's Trace	0,147	.653[b]	5,000	19,000	0,663	0,147
	Wilks' Lambda	0,853	.653[b]	5,000	19,000	0,663	0,147
	Hotelling's Trace	0,172	.653[b]	5,000	19,000	0,663	0,147
	Roy's Largest Root	0,172	.653[b]	5,000	19,000	0,663	0,147
Licongh	Pillai's Trace	0,190	.890[b]	5,000	19,000	0,507	0,190
	Wilks' Lambda	0,810	.890[b]	5,000	19,000	0,507	0,190
	Hotelling's Trace	0,234	.890[b]	5,000	19,000	0,507	0,190
	Roy's Largest Root	0,234	.890[b]	5,000	19,000	0,507	0,190
Lilongfuel	Pillai's Trace	0,213	1.028[b]	5,000	19,000	0,430	0,213
	Wilks' Lambda	0,787	1.028[b]	5,000	19,000	0,430	0,213
	Hotelling's Trace	0,270	1.028[b]	5,000	19,000	0,430	0,213
	Roy's Largest Root	0,270	1.028[b]	5,000	19,000	0,430	0,213

a. Design: Intercept + Ldcostly + Ldnoavail + Lddanger + Ldreliab + Linsub + Lilack + Liperf + Liavaiveh + Licongh + Lilongfuel

b. Exact statistic

Table 6: Univariate output MANOVA obstructions and category likeliness to change to hydrogen

Tests of Between-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	likelychange=no answer	.756[a]	10	0,076	0,879	0,565
	likelychange=not	.682[b]	10	0,068	0,551	0,835
	likelychange=Unlikely	.966[c]	10	0,097	0,484	0,883
	likelychange=Perhaps	3.000[d]	10	0,300	1,907	0,097
	likelychange=Probably	.971[e]	10	0,097	0,367	0,949
	likelychange=There are concrete plans	.329[f]	10	0,033	1,180	0,353
Intercept	likelychange=no answer	0,001	1	0,001	0,012	0,915
	likelychange=not	0,292	1	0,292	2,357	0,138
	likelychange=Unlikely	0,009	1	0,009	0,044	0,836
	likelychange=Perhaps	2,191	1	2,191	13,932	0,001
	likelychange=Probably	0,003	1	0,003	0,012	0,913
	likelychange=There are concrete plans	0,007	1	0,007	0,240	0,629
Ldcostly	likelychange=no answer	0,256	1	0,256	2,974	0,098
	likelychange=not	0,003	1	0,003	0,027	0,871
	likelychange=Unlikely	0,217	1	0,217	1,086	0,308
	likelychange=Perhaps	0,094	1	0,094	0,598	0,447
	likelychange=Probably	0,031	1	0,031	0,116	0,737
	likelychange=There are concrete plans	0,001	1	0,001	0,041	0,841
Ldnoavail	likelychange=no answer	0,015	1	0,015	0,176	0,678
	likelychange=not	0,056	1	0,056	0,455	0,507
	likelychange=Unlikely	0,016	1	0,016	0,081	0,779
	likelychange=Perhaps	0,471	1	0,471	2,993	0,097
	likelychange=Probably	0,074	1	0,074	0,280	0,602
	likelychange=There are concrete plans	0,005	1	0,005	0,192	0,665
Lddanger	likelychange=no answer	0,128	1	0,128	1,486	0,235
	likelychange=not	0,278	1	0,278	2,247	0,147
	likelychange=Unlikely	0,141	1	0,141	0,706	0,409
	likelychange=Perhaps	0,037	1	0,037	0,232	0,634
	likelychange=Probably	0,056	1	0,056	0,210	0,651
	likelychange=There are concrete plans	0,014	1	0,014	0,503	0,485
Ldreliab	likelychange=no answer	0,000	1	0,000	0,001	0,972
	likelychange=not	0,213	1	0,213	1,721	0,202
	likelychange=Unlikely	0,086	1	0,086	0,428	0,519
	likelychange=Perhaps	0,735	1	0,735	4,674	0,041
	likelychange=Probably	0,025	1	0,025	0,094	0,762
	likelychange=There are concrete plans	0,002	1	0,002	0,069	0,795
Linsub	likelychange=no answer	0,023	1	0,023	0,266	0,611
	likelychange=not	0,095	1	0,095	0,765	0,391
	likelychange=Unlikely	0,207	1	0,207	1,034	0,320
	likelychange=Perhaps	0,015	1	0,015	0,095	0,761
	likelychange=Probably	0,066	1	0,066	0,250	0,622
	likelychange=There are concrete plans	0,285	1	0,285	10,220	0,004
Lilack	likelychange=no answer	0,027	1	0,027	0,318	0,578
	likelychange=not	0,005	1	0,005	0,038	0,847
	likelychange=Unlikely	0,063	1	0,063	0,317	0,579
	likelychange=Perhaps	0,240	1	0,240	1,525	0,229
	likelychange=Probably	0,234	1	0,234	0,884	0,357
	likelychange=There are concrete plans	0,001	1	0,001	0,020	0,889
Liperf	likelychange=no answer	0,271	1	0,271	3,152	0,089
	likelychange=not	0,057	1	0,057	0,458	0,505
	likelychange=Unlikely	0,065	1	0,065	0,328	0,572
	likelychange=Perhaps	0,005	1	0,005	0,032	0,859
	likelychange=Probably	0,110	1	0,110	0,416	0,525
	likelychange=There are concrete plans	0,083	1	0,083	2,959	0,099
Liavaiveh	likelychange=no answer	0,023	1	0,023	0,266	0,611
	likelychange=not	0,055	1	0,055	0,448	0,510
	likelychange=Unlikely	0,134	1	0,134	0,672	0,421
	likelychange=Perhaps	0,393	1	0,393	2,499	0,128
	likelychange=Probably	0,158	1	0,158	0,598	0,447
	likelychange=There are concrete plans	0,003	1	0,003	0,101	0,754
Licongh	likelychange=no answer	0,043	1	0,043	0,501	0,486
	likelychange=not	0,041	1	0,041	0,334	0,569
	likelychange=Unlikely	0,011	1	0,011	0,054	0,819
	likelychange=Perhaps	0,743	1	0,743	4,724	0,040
	likelychange=Probably	0,106	1	0,106	0,400	0,534
	likelychange=There are concrete plans	0,001	1	0,001	0,018	0,894
Lilongfuel	likelychange=no answer	0,000	1	0,000	0,001	0,972
	likelychange=not	0,213	1	0,213	1,721	0,202
	likelychange=Unlikely	0,086	1	0,086	0,428	0,519
	likelychange=Perhaps	0,735	1	0,735	4,674	0,041
	likelychange=Probably	0,025	1	0,025	0,094	0,762
	likelychange=There are concrete plans	0,002	1	0,002	0,069	0,795
Error	likelychange=no answer	1,979	23	0,086		
	likelychange=not	2,847	23	0,124		
	likelychange=Unlikely	4,593	23	0,200		
	likelychange=Perhaps	3,618	23	0,157		
	likelychange=Probably	6,088	23	0,265		
	likelychange=There are concrete plans	0,642	23	0,028		
Total	likelychange=no answer	3,000	34			
	likelychange=not	4,000	34			
	likelychange=Unlikely	7,000	34			
	likelychange=Perhaps	9,000	34			
	likelychange=Probably	10,000	34			
	likelychange=There are concrete plans	1,000	34			

Table 7:crosstabs likeliness to change category per sector

Likely to change to Hydrogen * Sector Crosstabulation

Column1	Column2	Column3	Sector unknown	Column4 Waste collection	Column5 Car rental	Column6 Delivery services	Column7 Construction	Column8 Distribution center	Column9 Township	Column10 Agriculture	Column11 Maintenance company	Column12 Government/municipality	Column13 Horticulture	Column14 Other	Total
Likely to change to	no answer	Count	1	0	0	0	1	0	0	0	1	0	0	0	3
		% within Likely to change to Hydrogen	33,3%	0,0%	0,0%	0,0%	33,3%	0,0%	0,0%	0,0%	33,3%	0,0%	0,0%	0,0%	100,0%
		% within Sector	50,0%	0,0%	0,0%	0,0%	20,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%	8,8%
		% of Total	2,9%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	8,8%
	not	Count	0	0	3	0	0	0	0	0	0	0	0	1	4
		% within Likely to change to Hydrogen	0,0%	0,0%	75,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	25,0%	100,0%
		% within Sector	0,0%	0,0%	50,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	14,3%	11,8%
		% of Total	0,0%	0,0%	8,8%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	11,8%
	Unlikely	Count	0	1	0	1	1	0	0	0	0	1	2	1	7
		% within Likely to change to Hydrogen	0,0%	14,3%	0,0%	14,3%	14,3%	0,0%	0,0%	0,0%	0,0%	14,3%	28,6%	14,3%	100,0%
		% within Sector	0,0%	100,0%	0,0%	33,3%	20,0%	0,0%	0,0%	0,0%	0,0%	50,0%	66,7%	14,3%	20,6%
		% of Total	0,0%	2,9%	0,0%	2,9%	2,9%	0,0%	0,0%	0,0%	0,0%	2,9%	5,9%	2,9%	20,6%
	Perhaps	Count	0	0	3	0	2	1	0	2	0	1	0	0	9
		% within Likely to change to Hydrogen	0,0%	0,0%	33,3%	0,0%	22,2%	11,1%	0,0%	22,2%	0,0%	11,1%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	50,0%	0,0%	40,0%	100,0%	0,0%	100,0%	0,0%	50,0%	0,0%	0,0%	26,5%
		% of Total	0,0%	0,0%	8,8%	0,0%	5,9%	2,9%	0,0%	5,9%	0,0%	2,9%	0,0%	0,0%	26,5%
	Probably	Count	1	0	0	2	1	0	1	0	0	0	1	4	10
		% within Likely to change to Hydrogen	10,0%	0,0%	0,0%	20,0%	10,0%	0,0%	10,0%	0,0%	0,0%	0,0%	10,0%	40,0%	100,0%
		% within Sector	50,0%	0,0%	0,0%	66,7%	20,0%	0,0%	100,0%	0,0%	0,0%	0,0%	33,3%	57,1%	29,4%
		% of Total	2,9%	0,0%	0,0%	5,9%	2,9%	0,0%	2,9%	0,0%	0,0%	0,0%	2,9%	11,8%	29,4%
	There are concrete plans	Count	0	0	0	0	0	0	0	0	0	0	0	1	1
		% within Likely to change to Hydrogen	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	14,3%	2,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	2,9%
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		% within Likely to change to Hydrogen	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Crosstabs and Chi-square test results for Sector and Profits as Motivation

Crosstab

		Sector												
		unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation deductive profits not	Count	2 a b	0 b	5 a b	3 a	2 a b	1 a b	1 a b	2 a b	1 a b	1 a b	2 a b	4 a b	24
	Expected Count	1,4	0,7	4,2	2,1	3,5	0,7	0,7	1,4	0,7	1,4	2,1	4,9	24,0
	% within Motivation deductive profits	8,3%	0,0%	20,8%	12,5%	8,3%	4,2%	4,2%	8,3%	4,2%	4,2%	8,3%	16,7%	100,0%
	% within Sector	100,0%	0,0%	83,3%	100,0%	40,0%	100,0%	100,0%	100,0%	100,0%	50,0%	66,7%	57,1%	70,6%
	% of Total	5,9%	0,0%	14,7%	8,8%	5,9%	2,9%	2,9%	5,9%	2,9%	2,9%	5,9%	11,8%	70,6%
	Standardized Residual	0,5	-0,8	0,4	0,6	-0,8	0,4	0,4	0,5	0,4	-0,3	-0,1	-0,4	
yes	Count	0 a b	1 b	1 a b	0 a	3 a b	0 a b	0 a b	0 a b	0 a b	1 a b	1 a b	3 a b	10
	Expected Count	0,6	0,3	1,8	0,9	1,5	0,3	0,3	0,6	0,3	0,6	0,9	2,1	10,0
	% within Motivation deductive profits	0,0%	10,0%	10,0%	0,0%	30,0%	0,0%	0,0%	0,0%	0,0%	10,0%	10,0%	30,0%	100,0%
	% within Sector	0,0%	100,0%	16,7%	0,0%	60,0%	0,0%	0,0%	0,0%	0,0%	50,0%	33,3%	42,9%	29,4%
	% of Total	0,0%	2,9%	2,9%	0,0%	8,8%	0,0%	0,0%	0,0%	0,0%	2,9%	2,9%	8,8%	29,4%
	Standardized Residual	-0,8	1,3	-0,6	-0,9	1,3	-0,5	-0,5	-0,8	-0,5	0,5	0,1	0,7	
Total	Count	2	1	6	3	5	1	1	2	1	2	3	7	34
	Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
	% within Motivation deductive profits	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
	% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
	% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	10.330[a]	11	0,501	0,604		
Likelihood Ratio	12,905	11	0,300	0,580		
Fisher's Exact Test	9,479			0,648		
Linear-by-Linear Association	.836[b]	1	0,361	0,376	0,192	0,017
N of Valid Cases	34					

a. 24 cells (100.0%) have expected count less than 5. The minimum expected count is .29.

b. The standardized statistic is .914.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,081	0,135	0,580	0,562	
		Motivation deductive profits Dependent	0,200	0,219	0,825	0,410	
		Sector Dependent	0,037	0,141	0,258	0,796	
	Goodman and Kruskal tau	Motivation deductive profits Dependent	0,304	0,098		.528[c]	0,604
		Sector Dependent	0,030	0,018		.465[c]	0,454
	Uncertainty Coefficient	Symmetric	0,133	0,043	2,845	.300[d]	0,580
		Motivation deductive profits Dependent	0,313	0,100	2,845	.300[d]	0,580
		Sector Dependent	0,084	0,028	2,845	.300[d]	0,580

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,551	0,501	0,604
	Cramer's V	0,551	0,501	0,604
	Contingency Coefficient	0,483	0,501	0,604
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Environment as Motivation
Crosstabs and Chi-square test results for Sector and Image of the company as Motivation

Crosstab

			Sector											
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation deductive Image	not	Count	2$_a$	1$_a$	6$_a$	3$_a$	4$_a$	1$_a$	1$_a$	2$_a$	1$_a$	2$_a$	3$_a$	7$_a$	33
		Expected Count	1,9	1,0	5,8	2,9	4,9	1,0	1,0	1,9	1,0	1,9	2,9	6,8	33,0
		% within Motivation deductive Image	6,1%	3,0%	18,2%	9,1%	12,1%	3,0%	3,0%	6,1%	3,0%	6,1%	9,1%	21,2%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	80,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	97,1%
		% of Total	5,9%	2,9%	17,6%	8,8%	11,8%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	97,1%
		Standardized Residual	0,0	0,0	0,1	0,1	-0,4	0,0	0,0	0,0	0,0	0,0	0,1	0,1	
	yes	Count	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1
		Expected Count	0,1	0,0	0,2	0,1	0,1	0,0	0,0	0,1	0,0	0,1	0,1	0,2	1,0
		% within Motivation deductive Image	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	20,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%
		Standardized Residual	-0,2	-0,2	-0,4	-0,3	2,2	-0,2	-0,2	-0,2	-0,2	-0,2	-0,3	-0,5	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation deductive Image	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	5.976[a]	11	0,875	0,618		
Likelihood Ratio	4,019	11	0,969	0,618		
Fisher's Exact Test	16,638			0,618		
Linear-by-Linear Association	.358[b]	1	0,549	0,853	0,500	0,147
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .03.

b. The standardized statistic is -.599.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,036	0,034	1,015	0,310	
		Motivation deductive Image Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,036	1,015	0,310	
	Goodman and Kruskal tau	Motivation deductive Image Dependent	0,176	0,162		.886[d]	0,618
		Sector Dependent	0,029	0,004		.492[d]	0,618
	Uncertainty Coefficient	Symmetric	0,049	0,046	1,040	.969[e]	0,618
		Motivation deductive Image Dependent	0,445	0,121	1,040	.969[e]	0,618
		Sector Dependent	0,026	0,025	1,040	.969[e]	0,618

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,419	0,875	0,618
	Cramer's V	0,419	0,875	0,618
	Contingency Coefficient	0,387	0,875	0,618
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Subsidies as Motivation

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation deductive Subsidies	not	Count	2$_a$	1$_a$	6$_a$	3$_a$	5$_a$	1$_a$	1$_a$	2$_a$	1$_a$	1$_a$	3$_a$	6$_a$	32
		Expected Count	1,9	0,9	5,6	2,8	4,7	0,9	0,9	1,9	0,9	1,9	2,8	6,6	32,0
		% within Motivation deductive Subsidies	6,3%	3,1%	18,8%	9,4%	15,6%	3,1%	3,1%	6,3%	3,1%	3,1%	9,4%	18,8%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	50,0%	100,0%	85,7%	94,1%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	2,9%	8,8%	17,6%	94,1%
		Standardized Residual	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	-0,6	0,1	-0,2	
	yes	Count	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	0$_a$	1$_a$	2
		Expected Count	0,1	0,1	0,4	0,2	0,3	0,1	0,1	0,1	0,1	0,1	0,2	0,4	2,0
		% within Motivation deductive Subsidies	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	50,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	14,3%	5,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	2,9%	5,9%
		Standardized Residual	-0,3	-0,2	-0,6	-0,4	-0,5	-0,2	-0,2	-0,3	-0,2	2,6	-0,4	0,9	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation deductive Subsidies	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	9.487[a]	11	0,577	0,579		
Likelihood Ratio	6,699	11	0,823	0,617		
Fisher's Exact Test	12,899			0,553		
Linear-by-Linear Association	2.617[b]	1	0,106	0,111	0,105	0,030
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .06.

b. The standardized statistic is 1.618.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,000	0,129	0,000	1,000	
		Motivation deductive Subsidies Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,000	0,139	0,000	1,000	
	Goodman and Kruskal tau	Motivation deductive Subsidies Dependent	0,279	0,242		.603[d]	0,579
		Sector Dependent	0,026	0,008		.592[d]	0,734
	Uncertainty Coefficient	Symmetric	0,079	0,053	1,418	.823[e]	0,617
		Motivation deductive Subsidies Dependent	0,440	0,160	1,418	.823[e]	0,617
		Sector Dependent	0,044	0,031	1,418	.823[e]	0,617

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,528	0,577	0,579
	Cramer's V	0,528	0,577	0,579
	Contingency Coefficient	0,467	0,577	0,579
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Superior performance as Motivation

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation Inductive Superior Performance	not	Count	2$_a$	1$_a$	4$_a$	3$_a$	3$_a$	1$_a$	1$_a$	2$_a$	1$_a$	2$_a$	2$_a$	7$_a$	29
		Expected Count	1,7	0,9	5,1	2,6	4,3	0,9	0,9	1,7	0,9	1,7	2,6	6,0	29,0
		% within Motivation Inductive Superior Performance	6,9%	3,4%	13,8%	10,3%	10,3%	3,4%	3,4%	6,9%	3,4%	6,9%	6,9%	24,1%	100,0%
		% within Sector	100,0%	100,0%	66,7%	100,0%	60,0%	100,0%	100,0%	100,0%	100,0%	100,0%	66,7%	100,0%	85,3%
		% of Total	5,9%	2,9%	11,8%	8,8%	8,8%	2,9%	2,9%	5,9%	2,9%	5,9%	5,9%	20,6%	85,3%
		Standardized Residual	0,2	0,2	-0,5	0,3	-0,6	0,2	0,2	0,2	0,2	0,2	-0,3	0,4	
	yes	Count	0$_a$	0$_a$	2$_a$	0$_a$	2$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	0$_a$	5
		Expected Count	0,3	0,1	0,9	0,4	0,7	0,1	0,1	0,3	0,1	0,3	0,4	1,0	5,0
		% within Motivation Inductive Superior Performance	0,0%	0,0%	40,0%	0,0%	40,0%	0,0%	0,0%	0,0%	0,0%	0,0%	20,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	33,3%	0,0%	40,0%	0,0%	0,0%	0,0%	0,0%	0,0%	33,3%	0,0%	14,7%
		% of Total	0,0%	0,0%	5,9%	0,0%	5,9%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	14,7%
		Standardized Residual	-0,5	-0,4	1,2	-0,7	1,5	-0,4	-0,4	-0,5	-0,4	-0,5	0,8	-1,0	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation Inductive Superior Performance	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.488[a]	11	0,669	0,706		
Likelihood Ratio	10,208	11	0,512	0,607		
Fisher's Exact Test	9,376			0,703		
Linear-by-Linear Association	.873[b]	1	0,350	0,386	0,195	0,026
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .15.

b. The standardized statistic is -.934.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,063	0,040	1,458	0,145	
		Motivation Inductive Superior Performance Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,074	0,050	1,458	0,145	
	Goodman and Kruskal tau	Motivation Inductive Superior Performance Dependent	0,250	0,107		.692[d]	0,706
		Sector Dependent	0,038	0,013		.255[d]	0,248
	Uncertainty Coefficient	Symmetric	0,112	0,043	2,409	.512[e]	0,607
		Motivation Inductive Superior Performance Dependent	0,359	0,086	2,409	.512[e]	0,607
		Sector Dependent	0,067	0,028	2,409	.512[e]	0,607

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,500	0,669	0,706
	Cramer's V	0,500	0,669	0,706
	Contingency Coefficient	0,447	0,669	0,706
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Low-emission zones as Motivation

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation Inductive low-emission zones	not	Count	2$_a$	1$_a$	6$_a$	3$_a$	5$_a$	1$_a$	1$_a$	2$_a$	1$_a$	2$_a$	3$_a$	6$_a$	33
		Expected Count	1,9	1,0	5,8	2,9	4,9	1,0	1,0	1,9	1,0	1,9	2,9	6,8	33,0
		% within Motivation Inductive low-emission zones	6,1%	3,0%	18,2%	9,1%	15,2%	3,0%	3,0%	6,1%	3,0%	6,1%	9,1%	18,2%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	85,7%	97,1%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	17,6%	97,1%
		Standardized Residual	0,0	0,0	0,1	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,1	-0,3	
	yes	Count	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	1
		Expected Count	0,1	0,0	0,2	0,1	0,1	0,0	0,0	0,1	0,0	0,1	0,1	0,2	1,0
		% within Motivation Inductive low-emission zones	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	14,3%	2,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	2,9%
		Standardized Residual	-0,2	-0,2	-0,4	-0,3	-0,4	-0,2	-0,2	-0,2	-0,2	-0,2	-0,3	1,8	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation Inductive low-emission zones	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	3.974[a]	11	0,971	1,000		
Likelihood Ratio	3,281	11	0,986	1,000		
Fisher's Exact Test	15,965			1,000		
Linear-by-Linear Association	2.165[b]	1	0,141	0,206	0,206	0,206
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .03.

b. The standardized statistic is 1.471.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,000	0,124	0,000	1,000	
		Motivation Inductive low-emission zones Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,000	0,128	0,000	1,000	
	Goodman and Kruskal tau	Motivation Inductive low-emission zones Dependent	0,117	0,111		.974[d]	1,000
		Sector Dependent	0,025	0,004		.626[d]	1,000
	Uncertainty Coefficient	Symmetric	0,040	0,038	1,030	.986[e]	1,000
		Motivation Inductive low-emission zones Dependent	0,364	0,101	1,030	.986[e]	1,000
		Sector Dependent	0,021	0,021	1,030	.986[e]	1,000

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,342	0,971	1,000
	Cramer's V	0,342	0,971	1,000
	Contingency Coefficient	0,323	0,971	1,000
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Range as Motivation

Crosstab

			Sector											
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation Inductive Range	not	Count	2$_a$	1$_a$	4$_a$	2$_a$	5$_a$	1$_a$	1$_a$	2$_a$	1$_a$	2$_a$	3$_a$	6$_a$	30
		Expected Count	1,8	0,9	5,3	2,6	4,4	0,9	0,9	1,8	0,9	1,8	2,6	6,2	30,0
		% within Motivation Inductive Range	6,7%	3,3%	13,3%	6,7%	16,7%	3,3%	3,3%	6,7%	3,3%	6,7%	10,0%	20,0%	100,0%
		% within Sector	100,0%	100,0%	66,7%	66,7%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	85,7%	88,2%
		% of Total	5,9%	2,9%	11,8%	5,9%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	17,6%	88,2%
		Standardized Residual	0,2	0,1	-0,6	-0,4	0,3	0,1	0,1	0,2	0,1	0,2	0,2	-0,1	
	yes	Count	0$_a$	0$_a$	2$_a$	1$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	4
		Expected Count	0,2	0,1	0,7	0,4	0,6	0,1	0,1	0,2	0,1	0,2	0,4	0,8	4,0
		% within Motivation Inductive Range	0,0%	0,0%	50,0%	25,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	25,0%	100,0%
		% within Sector	0,0%	0,0%	33,3%	33,3%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	14,3%	11,8%
		% of Total	0,0%	0,0%	5,9%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	11,8%
		Standardized Residual	-0,5	-0,3	1,5	1,1	-0,8	-0,3	-0,3	-0,5	-0,3	-0,5	-0,6	0,2	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation Inductive Range	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.476[a]	11	0,840	0,861		
Likelihood Ratio	7,431	11	0,763	0,815		
Fisher's Exact Test	8,587			0,887		
Linear-by-Linear Association	.388[b]	1	0,534	0,573	0,296	0,038
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .12.

b. The standardized statistic is -.623.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,032	0,054	0,580	0,562	
		Motivation Inductive Range Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,063	0,580	0,562	
	Goodman and Kruskal tau	Motivation Inductive Range Dependent	0,190	0,117		.854[d]	0,861
		Sector Dependent	0,027	0,017		.555[d]	0,594
	Uncertainty Coefficient	Symmetric	0,083	0,040	1,947	.763[e]	0,815
		Motivation Inductive Range Dependent	0,302	0,098	1,947	.763[e]	0,815
		Sector Dependent	0,048	0,025	1,947	.763[e]	0,815

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,436	0,840	0,861
	Cramer's V	0,436	0,840	0,861
	Contingency Coefficient	0,400	0,840	0,861
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Vehicle availability as Motivation

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Motivation Inductive Vehicle availibility	not	Count	2$_{a,b}$	1$_{a,b}$	5$_{a,b}$	3$_{a,b}$	4$_{a,b}$	1$_{a,b}$	1$_{a,b}$	2$_{a,b}$	1$_{a,b}$	1$_{b}$	3$_{a,b}$	7$_{a}$	31
		Expected Count	1,8	0,9	5,5	2,7	4,6	0,9	0,9	1,8	0,9	1,8	2,7	6,4	31,0
		% within Motivation Inductive Vehicle availibility	6,5%	3,2%	16,1%	9,7%	12,9%	3,2%	3,2%	6,5%	3,2%	3,2%	9,7%	22,6%	100,0%
		% within Sector	100,0%	100,0%	83,3%	100,0%	80,0%	100,0%	100,0%	100,0%	100,0%	50,0%	100,0%	100,0%	91,2%
		% of Total	5,9%	2,9%	14,7%	8,8%	11,8%	2,9%	2,9%	5,9%	2,9%	2,9%	8,8%	20,6%	91,2%
		Standardized Residual	0,1	0,1	-0,2	0,2	-0,3	0,1	0,1	0,1	0,1	-0,6	0,2	0,2	
	yes	Count	0$_{a,b}$	0$_{a,b}$	1$_{a,b}$	0$_{a,b}$	1$_{a,b}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	1$_{b}$	0$_{a,b}$	0$_{a}$	3
		Expected Count	0,2	0,1	0,5	0,3	0,4	0,1	0,1	0,2	0,1	0,2	0,3	0,6	3,0
		% within Motivation Inductive Vehicle availibility	0,0%	0,0%	33,3%	0,0%	33,3%	0,0%	0,0%	0,0%	0,0%	33,3%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	16,7%	0,0%	20,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	0,0%	8,8%
		% of Total	0,0%	0,0%	2,9%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	8,8%
		Standardized Residual	-0,4	-0,3	0,6	-0,5	0,8	-0,3	-0,3	-0,4	-0,3	2,0	-0,5	-0,8	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Motivation Inductive Vehicle availibility	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.482[a]	11	0,759	0,705		
Likelihood Ratio	7,110	11	0,790	0,714		
Fisher's Exact Test	10,612			0,668		
Linear-by-Linear Association	.206[b]	1	0,650	0,659	0,336	0,045
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .09.

b. The standardized statistic is -.453.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,033	0,032	1,015	0,310	
		Motivation Inductive Vehicle availibility Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,036	1,015	0,310	
	Goodman and Kruskal tau	Motivation Inductive Vehicle availibility Dependent	0,220	0,167		.777[d]	0,705
		Sector Dependent	0,022	0,008		.700[d]	0,752
	Uncertainty Coefficient	Symmetric	0,082	0,045	1,703	.790[e]	0,714
		Motivation Inductive Vehicle availibility Dependent	0,350	0,120	1,703	.790[e]	0,714
		Sector Dependent	0,046	0,027	1,703	.790[e]	0,714

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,469	0,759	0,705
	Cramer's V	0,469	0,759	0,705
	Contingency Coefficient	0,425	0,759	0,705
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and Costly as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins deductive costly	not	Count	2_a	$0_{a,b}$	$3_{a,b}$	$1_{a,b}$	4_a	$0_{a,b}$	$0_{a,b}$	$1_{a,b}$	$1_{a,b}$	2_a	$2_{a,b}$	1_b	17
		Expected Count	1,0	0,5	3,0	1,5	2,5	0,5	0,5	1,0	0,5	1,0	1,5	3,5	17,0
		% within Lock-ins deductive costly	11,8%	0,0%	17,6%	5,9%	23,5%	0,0%	0,0%	5,9%	5,9%	11,8%	11,8%	5,9%	100,0%
		% within Sector	100,0%	0,0%	50,0%	33,3%	80,0%	0,0%	0,0%	50,0%	100,0%	100,0%	66,7%	14,3%	50,0%
		% of Total	5,9%	0,0%	8,8%	2,9%	11,8%	0,0%	0,0%	2,9%	2,9%	5,9%	5,9%	2,9%	50,0%
		Standardized Residual	1,0	-0,7	0,0	-0,4	0,9	-0,7	-0,7	0,0	0,7	1,0	0,4	-1,3	
	yes	Count	0_a	$1_{a,b}$	$3_{a,b}$	$2_{a,b}$	1_a	$1_{a,b}$	$1_{a,b}$	$1_{a,b}$	$0_{a,b}$	0_a	$1_{a,b}$	6_b	17
		Expected Count	1,0	0,5	3,0	1,5	2,5	0,5	0,5	1,0	0,5	1,0	1,5	3,5	17,0
		% within Lock-ins deductive costly	0,0%	5,9%	17,6%	11,8%	5,9%	5,9%	5,9%	5,9%	0,0%	0,0%	5,9%	35,3%	100,0%
		% within Sector	0,0%	100,0%	50,0%	66,7%	20,0%	100,0%	100,0%	50,0%	0,0%	0,0%	33,3%	85,7%	50,0%
		% of Total	0,0%	2,9%	8,8%	5,9%	2,9%	2,9%	2,9%	2,9%	0,0%	0,0%	2,9%	17,6%	50,0%
		Standardized Residual	-1,0	0,7	0,0	0,4	-0,9	0,7	0,7	0,0	-0,7	-1,0	-0,4	1,3	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins deductive costly	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	14.038[a]	11	0,231	0,189		
Likelihood Ratio	17,660	11	0,090	0,250		
Fisher's Exact Test	13,194			0,191		
Linear-by-Linear Association	1.101[b]	1	0,294	0,311	0,156	0,014
N of Valid Cases	34					

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,273	0,087	3,022	0,003	
		Lock-ins deductive costly Dependent	0,529	0,145	2,762	0,006	
		Sector Dependent	0,111	0,078	1,379	0,168	
	Goodman and Kruskal tau	Lock-ins deductive costly Dependent	0,413	0,110		.254[c]	0,189
		Sector Dependent	0,047	0,026		.102[c]	0,131
	Uncertainty Coefficient	Symmetric	0,176	0,052	3,280	.090[d]	0,250
		Lock-ins deductive costly Dependent	0,375	0,114	3,280	.090[d]	0,250
		Sector Dependent	0,115	0,034	3,280	.090[d]	0,250

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,643	0,231	0,189
	Cramer's V	0,643	0,231	0,189
	Contingency Coefficient	0,541	0,231	0,189
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the availability of hydrogen as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins deductive no availibility H2	not	Count	2$_{a,b}$	1$_{a,b}$	5$_{a,b}$	3$_{b}$	2$_{a,b}$	1$_{a,b}$	0$_{a}$	2$_{a,b}$	1$_{a,b}$	2$_{a,b}$	2$_{a,b}$	6$_{a,b}$	27
		Expected Count	1,6	0,8	4,8	2,4	4,0	0,8	0,8	1,6	0,8	1,6	2,4	5,6	27,0
		% within Lock-ins deductive no availibility H2	7,4%	3,7%	18,5%	11,1%	7,4%	3,7%	0,0%	7,4%	3,7%	7,4%	7,4%	22,2%	100,0%
		% within Sector	100,0%	100,0%	83,3%	100,0%	40,0%	100,0%	0,0%	100,0%	100,0%	100,0%	66,7%	85,7%	79,4%
		% of Total	5,9%	2,9%	14,7%	8,8%	5,9%	2,9%	0,0%	5,9%	2,9%	5,9%	5,9%	17,6%	79,4%
		Standardized Residual	0,3	0,2	0,1	0,4	-1,0	0,2	-0,9	0,3	0,2	0,3	-0,2	0,2	
	yes	Count	0$_{a,b}$	0$_{a,b}$	1$_{a,b}$	0$_{b}$	3$_{a,b}$	0$_{a,b}$	1$_{a}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	1$_{a,b}$	1$_{a,b}$	7
		Expected Count	0,4	0,2	1,2	0,6	1,0	0,2	0,2	0,4	0,2	0,4	0,6	1,4	7,0
		% within Lock-ins deductive no availibility H2	0,0%	0,0%	14,3%	0,0%	42,9%	0,0%	14,3%	0,0%	0,0%	0,0%	14,3%	14,3%	100,0%
		% within Sector	0,0%	0,0%	16,7%	0,0%	60,0%	0,0%	100,0%	0,0%	0,0%	0,0%	33,3%	14,3%	20,6%
		% of Total	0,0%	0,0%	2,9%	0,0%	8,8%	0,0%	2,9%	0,0%	0,0%	0,0%	2,9%	2,9%	20,6%
		Standardized Residual	-0,6	-0,5	-0,2	-0,8	1,9	-0,5	1,8	-0,6	-0,5	-0,6	0,5	-0,4	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins deductive no availibility H2	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.243[a]	11	0,346	0,387		
Likelihood Ratio	12,877	11	0,301	0,470		
Fisher's Exact Test	10,325			0,523		
Linear-by-Linear Association	.027[b]	1	0,869	0,894	0,458	0,027
N of Valid Cases	34					

a. 23 cells (95.8%) have expected count less than 5. The minimum expected count is .21.

b. The standardized statistic is -.165.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,118	0,110	1,015	0,310	
		Lock-ins deductive no availibility H2 Dependent	0,286	0,296	0,825	0,410	
		Sector Dependent	0,074	0,071	1,015	0,310	
	Goodman and Kruskal tau	Lock-ins deductive no availibility H2 Dependent	0,360	0,136		.373[c]	0,387
		Sector Dependent	0,036	0,026		.293[c]	0,296
	Uncertainty Coefficient	Symmetric	0,137	0,051	2,468	.301[d]	0,470
		Lock-ins deductive no availibility H2 Dependent	0,372	0,127	2,468	.301[d]	0,470
		Sector Dependent	0,084	0,033	2,468	.301[d]	0,470

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,600	0,346	0,387
	Cramer's V	0,600	0,346	0,387
	Contingency Coefficient	0,515	0,346	0,387

Bar Chart

Crosstabs and Chi-square test results for Sector and the dangerous as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins deductive dangerous	not	Count	2$_a$	1$_a$	4$_a$	3$_a$	5$_a$	1$_a$	1$_a$	2$_a$	1$_a$	1$_a$	2$_a$	6$_a$	29
		Expected Count	1,7	0,9	5,1	2,6	4,3	0,9	0,9	1,7	0,9	1,7	2,6	6,0	29,0
		% within Lock-ins deductive dangerous	6,9%	3,4%	13,8%	10,3%	17,2%	3,4%	3,4%	6,9%	3,4%	3,4%	6,9%	20,7%	100,0%
		% within Sector	100,0%	100,0%	66,7%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	50,0%	66,7%	85,7%	85,3%
		% of Total	5,9%	2,9%	11,8%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	2,9%	5,9%	17,6%	85,3%
		Standardized Residual	0,2	0,2	-0,5	0,3	0,4	0,2	0,2	0,2	0,2	-0,5	-0,3	0,0	
	yes	Count	0$_a$	0$_a$	2$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	1$_a$	1$_a$	1$_a$	5
		Expected Count	0,3	0,1	0,9	0,4	0,7	0,1	0,1	0,3	0,1	0,3	0,4	1,0	5,0
		% within Lock-ins deductive dangerous	0,0%	0,0%	40,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	20,0%	20,0%	20,0%	100,0%
		% within Sector	0,0%	0,0%	33,3%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	33,3%	14,3%	14,7%
		% of Total	0,0%	0,0%	5,9%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	2,9%	2,9%	14,7%
		Standardized Residual	-0,5	-0,4	1,2	-0,7	-0,9	-0,4	-0,4	-0,5	-0,4	1,3	0,8	0,0	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins deductive dangerous	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	7.235[a]	11	0,780	0,800		
Likelihood Ratio	8,424	11	0,675	0,803		
Fisher's Exact Test	8,703			0,824		
Linear-by-Linear Association	.506[b]	1	0,477	0,503	0,252	0,021
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .15.

b. The standardized statistic is .712.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,031	0,053	0,580	0,562	
		Lock-ins deductive dangerous Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,063	0,580	0,562	
	Goodman and Kruskal tau	Lock-ins deductive dangerous Dependent	0,213	0,123		.797[d]	0,800
		Sector Dependent	0,024	0,015		.646[d]	0,682
	Uncertainty Coefficient	Symmetric	0,093	0,041	2,095	.675[e]	0,803
		Lock-ins deductive dangerous Dependent	0,297	0,101	2,095	.675[e]	0,803
		Sector Dependent	0,055	0,026	2,095	.675[e]	0,803

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,461	0,780	0,800
	Cramer's V	0,461	0,780	0,800
	Contingency Coefficient	0,419	0,780	0,800
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the reliability as obstruction

Crosstab

			Sector											
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins deductive reliability	not	Count	2[a]	1[a]	5[a]	3[a]	5[a]	1[a]	1[a]	2[a]	1[a]	2[a]	3[a]	7[a]	33
		Expected Count	1,9	1,0	5,8	2,9	4,9	1,0	1,0	1,9	1,0	1,9	2,9	6,8	33,0
		% within Lock-ins deductive reliability	6,1%	3,0%	15,2%	9,1%	15,2%	3,0%	3,0%	6,1%	3,0%	6,1%	9,1%	21,2%	100,0%
		% within Sector	100,0%	100,0%	83,3%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	97,1%
		% of Total	5,9%	2,9%	14,7%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	97,1%
		Standardized Residual	0,0	0,0	-0,3	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,1	
	yes	Count	0[a]	0[a]	1[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	0[a]	1
		Expected Count	0,1	0,0	0,2	0,1	0,1	0,0	0,0	0,1	0,0	0,1	0,1	0,2	1,0
		% within Lock-ins deductive reliability	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	16,7%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%
		% of Total	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%
		Standardized Residual	-0,2	-0,2	2,0	-0,3	-0,4	-0,2	-0,2	-0,2	-0,2	-0,2	-0,3	-0,5	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins deductive reliability	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.808[a]	11	0,940	0,794		
Likelihood Ratio	3,616	11	0,980	0,794		
Fisher's Exact Test	16,273			0,794		
Linear-by-Linear Association	.891[b]	1	0,345	0,559	0,265	0,176
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .03.

b. The standardized statistic is -.944.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,036	0,034	1,015	0,310	
		Lock-ins deductive reliability Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,036	1,015	0,310	
	Goodman and Kruskal tau	Lock-ins deductive reliability Dependent	0,141	0,133		.946[d]	0,794
		Sector Dependent	0,027	0,004		.558[d]	0,794
	Uncertainty Coefficient	Symmetric	0,045	0,041	1,035	.980[e]	0,794
		Lock-ins deductive reliability Dependent	0,401	0,110	1,035	.980[e]	0,794
		Sector Dependent	0,024	0,023	1,035	.980[e]	0,794

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,376	0,940	0,794
	Cramer's V	0,376	0,940	0,794
	Contingency Coefficient	0,352	0,940	0,794
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the reliability as obstruction

Crosstab

			Sector											
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive No Subsidy	not	Count	2[a,b,c,d,e,f,g,h,i]	1[a,b,c,d,e,f,g,h,i]	6[f,g,h,i]	3[d,e,h,i]	5[c,e,g,i]	0[b]	1[a,b,c,d,e,f,g,h,i]	2[a,b,c,d,e,f,g,h,i]	1[a,b,c,d,e,f,g,h,i]	2[a,b,c,d,e,f,g,h,i]	3[a,c,d,e,f,g,h,i]	4[a,b,c,d,e,f,g,h,i]	30
		Expected Count	1,8	0,9	5,3	2,6	4,4	0,9	0,9	1,8	0,9	1,8	2,6	6,2	30,0
		% within Lock-ins inductive No Subsidy	6,7%	3,3%	20,0%	10,0%	16,7%	0,0%	3,3%	6,7%	3,3%	6,7%	10,0%	13,3%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	0,0%	100,0%	100,0%	100,0%	100,0%	100,0%	57,1%	88,2%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	0,0%	2,9%	5,9%	2,9%	5,9%	8,8%	11,8%	88,2%
		Standardized Residual	0,2	0,1	0,3	0,2	0,3	-0,9	0,1	0,2	0,1	0,2	0,2	-0,9	
	yes	Count	0[a,b,c,d,e,f,g,h,i]	0[a,b,c,d,e,f,g,h,i]	0[f,g,h,i]	0[d,e,h,i]	0[c,e,g,i]	1[b]	0[a,b,c,d,e,f,g,h,i]	0[a,b,c,d,e,f,g,h,i]	0[a,b,c,d,e,f,g,h,i]	0[a,b,c,d,e,f,g,h,i]	0[a,c,d,e,f,g,h,i]	3[a,b,c,d,e,f,g,h,i]	4
		Expected Count	0,2	0,1	0,7	0,4	0,6	0,1	0,1	0,2	0,1	0,2	0,4	0,8	4,0
		% within Lock-ins inductive No Subsidy	0,0%	0,0%	0,0%	0,0%	0,0%	25,0%	0,0%	0,0%	0,0%	0,0%	0,0%	75,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%	0,0%	0,0%	42,9%	11,8%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	8,8%	11,8%
		Standardized Residual	-0,5	-0,3	-0,8	-0,6	-0,8	2,6	-0,3	-0,5	-0,3	-0,5	-0,6	2,4	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive No Subsidy	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	17.486[a]	11	0,094	0,128		
Likelihood Ratio	15,070	11	0,179	0,107		
Fisher's Exact Test	12,982			0,181		
Linear-by-Linear Association	4.374[b]	1	0,036	0,024	0,020	0,005
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .12.

b. The standardized statistic is 2.091.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,097	0,101	0,916	0,360	
		Lock-ins inductive No Subsidy Dependent	0,250	0,217	1,015	0,310	
		Sector Dependent	0,074	0,113	0,636	0,525	
	Goodman and Kruskal tau	Lock-ins inductive No Subsidy Dependent	0,514	0,085		.109[c]	0,128
		Sector Dependent	0,065	0,022		.015[c]	0,019
	Uncertainty Coefficient	Symmetric	0,169	0,060	2,500	.179[d]	0,107
		Lock-ins inductive No Subsidy Dependent	0,612	0,109	2,500	.179[d]	0,107
		Sector Dependent	0,098	0,039	2,500	.179[d]	0,107

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,717	0,094	0,128
	Cramer's V	0,717	0,094	0,128
	Contingency Coefficient	0,583	0,094	0,128
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the lacking information as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive lacking information	not	Count	2$_a$	1$_a$	5$_a$	3$_a$	4$_a$	1$_a$	1$_a$	2$_a$	1$_a$	2$_a$	3$_a$	7$_a$	32
		Expected Count	1,9	0,9	5,6	2,8	4,7	0,9	0,9	1,9	0,9	1,9	2,8	6,6	32,0
		% within Lock-ins inductive lacking information	6,3%	3,1%	15,6%	9,4%	12,5%	3,1%	3,1%	6,3%	3,1%	6,3%	9,4%	21,9%	100,0%
		% within Sector	100,0%	100,0%	83,3%	100,0%	80,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	94,1%
		% of Total	5,9%	2,9%	14,7%	8,8%	11,8%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	94,1%
		Standardized Residual	0,1	0,1	-0,3	0,1	-0,3	0,1	0,1	0,1	0,1	0,1	0,1	0,2	
	yes	Count	0$_a$	0$_a$	1$_a$	0$_a$	1$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	0$_a$	2
		Expected Count	0,1	0,1	0,4	0,2	0,3	0,1	0,1	0,1	0,1	0,1	0,2	0,4	2,0
		% within Lock-ins inductive lacking information	0,0%	0,0%	50,0%	0,0%	50,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	16,7%	0,0%	20,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	5,9%
		% of Total	0,0%	0,0%	2,9%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	5,9%
		Standardized Residual	-0,3	-0,2	1,1	-0,4	1,3	-0,2	-0,2	-0,3	-0,2	-0,3	-0,4	-0,6	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive lacking information	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	4.498[a]	11	0,953	0,863		
Likelihood Ratio	4,802	11	0,940	0,863		
Fisher's Exact Test	11,375			0,863		
Linear-by-Linear Association	1.227[b]	1	0,268	0,337	0,207	0,064
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .06.

b. The standardized statistic is -1.108.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,034	0,033	1,015	0,310	
		Lock-ins inductive lacking information Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,036	1,015	0,310	
	Goodman and Kruskal tau	Lock-ins inductive lacking information Dependent	0,132	0,092		.958[d]	0,863
		Sector Dependent	0,021	0,005		.731[d]	0,863
	Uncertainty Coefficient	Symmetric	0,057	0,036	1,468	.940[e]	0,863
		Lock-ins inductive lacking information Dependent	0,316	0,083	1,468	.940[e]	0,863
		Sector Dependent	0,031	0,021	1,468	.940[e]	0,863

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Cannot be computed because the asymptotic standard error equals zero.

d. Based on chi-square approximation

e. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,364	0,953	0,863
	Cramer's V	0,364	0,953	0,863
	Contingency Coefficient	0,342	0,953	0,863
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the inferior performance as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive inferior performance	not	Count	$2_{a,b,c,d,e}$	$1_{a,b,c,d,e}$	$5_{a,b,c,d,e}$	$3_{d,e}$	$5_{c,e}$	$1_{a,b,c,d,e}$	$1_{a,b,c,d,e}$	$2_{a,b,c,d,e}$	0_{b}	$2_{a,b,c,d,e}$	$3_{a,c,d,e}$	$5_{a,b,c,d,e}$	30
		Expected Count	1,8	0,9	5,3	2,6	4,4	0,9	0,9	1,8	0,9	1,8	2,6	6,2	30,0
		% within Lock-ins inductive inferior performance	6,7%	3,3%	16,7%	10,0%	16,7%	3,3%	3,3%	6,7%	0,0%	6,7%	10,0%	16,7%	100,0%
		% within Sector	100,0%	100,0%	83,3%	100,0%	100,0%	100,0%	100,0%	100,0%	0,0%	100,0%	100,0%	71,4%	88,2%
		% of Total	5,9%	2,9%	14,7%	8,8%	14,7%	2,9%	2,9%	5,9%	0,0%	5,9%	8,8%	14,7%	88,2%
		Standardized Residual	0,2	0,1	-0,1	0,2	0,3	0,1	0,1	0,2	-0,9	0,2	0,2	-0,5	
	yes	Count	$0_{a,b,c,d,e}$	$0_{a,b,c,d,e}$	$1_{a,b,c,d,e}$	$0_{d,e}$	$0_{c,e}$	$0_{a,b,c,d,e}$	$0_{a,b,c,d,e}$	$0_{a,b,c,d,e}$	1_{b}	$0_{a,b,c,d,e}$	$0_{a,c,d,e}$	$2_{a,b,c,d,e}$	4
		Expected Count	0,2	0,1	0,7	0,4	0,6	0,1	0,1	0,2	0,1	0,2	0,4	0,8	4,0
		% within Lock-ins inductive inferior performance	0,0%	0,0%	25,0%	0,0%	0,0%	0,0%	0,0%	0,0%	25,0%	0,0%	0,0%	50,0%	100,0%
		% within Sector	0,0%	0,0%	16,7%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	28,6%	11,8%
		% of Total	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	5,9%	11,8%
		Standardized Residual	-0,5	-0,3	0,4	-0,6	-0,8	-0,3	-0,3	-0,5	2,6	-0,5	-0,6	1,3	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive inferior performance	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.210[a]	11	0,348	0,412		
Likelihood Ratio	10,848	11	0,456	0,413		
Fisher's Exact Test	10,420			0,605		
Linear-by-Linear Association	1.408[b]	1	0,235	0,252	0,131	0,013
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .12.

b. The standardized statistic is 1.187.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,032	0,105	0,302	0,763	
		Lock-ins inductive inferior performance Dependent	0,250	0,217	1,015	0,310	
		Sector Dependent	0,000	0,117	0,000	1,000	
	Goodman and Kruskal tau	Lock-ins inductive inferior performance Dependent	0,359	0,050		.375[c]	0,412
		Sector Dependent	0,029	0,014		.482[c]	0,504
	Uncertainty Coefficient	Symmetric	0,122	0,049	2,221	.456[d]	0,413
		Lock-ins inductive inferior performance Dependent	0,440	0,123	2,221	.456[d]	0,413
		Sector Dependent	0,071	0,031	2,221	.456[d]	0,413

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,599	0,348	0,412
	Cramer's V	0,599	0,348	0,412
	Contingency Coefficient	0,514	0,348	0,412
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the available vehicles as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive availible vehicles	not	Count	2$_{a,b}$	1$_{a,b}$	6$_{b}$	3$_{a,b}$	2$_{a}$	1$_{a,b}$	1$_{a,b}$	2$_{a,b}$	1$_{a,b}$	2$_{a,b}$	2$_{a,b}$	6$_{a,b}$	29
		Expected Count	1,7	0,9	5,1	2,6	4,3	0,9	0,9	1,7	0,9	1,7	2,6	6,0	29,0
		% within Lock-ins inductive availible vehicles	6,9%	3,4%	20,7%	10,3%	6,9%	3,4%	3,4%	6,9%	3,4%	6,9%	6,9%	20,7%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	40,0%	100,0%	100,0%	100,0%	100,0%	100,0%	66,7%	85,7%	85,3%
		% of Total	5,9%	2,9%	17,6%	8,8%	5,9%	2,9%	2,9%	5,9%	2,9%	5,9%	5,9%	17,6%	85,3%
		Standardized Residual	0,2	0,2	0,4	0,3	-1,1	0,2	0,2	0,2	0,2	0,2	-0,3	0,0	
	yes	Count	0$_{a,b}$	0$_{a,b}$	0$_{b}$	0$_{a,b}$	3$_{a}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	0$_{a,b}$	1$_{a,b}$	1$_{a,b}$	5
		Expected Count	0,3	0,1	0,9	0,4	0,7	0,1	0,1	0,3	0,1	0,3	0,4	1,0	5,0
		% within Lock-ins inductive availible vehicles	0,0%	0,0%	0,0%	0,0%	60,0%	0,0%	0,0%	0,0%	0,0%	0,0%	20,0%	20,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	60,0%	0,0%	0,0%	0,0%	0,0%	0,0%	33,3%	14,3%	14,7%
		% of Total	0,0%	0,0%	0,0%	0,0%	8,8%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	2,9%	14,7%
		Standardized Residual	-0,5	-0,4	-0,9	-0,7	2,6	-0,4	-0,4	-0,5	-0,4	-0,5	0,8	0,0	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive availible vehicles	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	12.285[a]	11	0,343	0,379		
Likelihood Ratio	12,104	11	0,356	0,402		
Fisher's Exact Test	10,900			0,457		
Linear-by-Linear Association	.146[b]	1	0,702	0,713	0,353	0,028
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .15.

b. The standardized statistic is .382.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,094	0,155	0,580	0,562	
		Lock-ins inductive availible vehicles Dependent	0,200	0,400	0,449	0,654	
		Sector Dependent	0,074	0,143	0,502	0,616	
	Goodman and Kruskal tau	Lock-ins inductive availible vehicles Dependent	0,361	0,178		.369[c]	0,379
		Sector Dependent	0,053	0,031		.055[c]	0,059
	Uncertainty Coefficient	Symmetric	0,133	0,056	2,244	.356[d]	0,402
		Lock-ins inductive availible vehicles Dependent	0,426	0,132	2,244	.356[d]	0,402
		Sector Dependent	0,079	0,035	2,244	.356[d]	0,402

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on chi-square approximation

d. Likelihood ratio chi-square probability.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,601	0,343	0,379
	Cramer's V	0,601	0,343	0,379
	Contingency Coefficient	0,515	0,343	0,379
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the conversion/grey hydrogen as obstruction

Crosstab

			Sector											
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive conversion/grey hydrogen	not	Count	$2_{a,b}$	$1_{a,b}$	$6_{a,b}$	$3_{a,b}$	$5_{a,b}$	$1_{a,b}$	$1_{a,b}$	1_{b}	$1_{a,b}$	$2_{a,b}$	$3_{a,b}$	7_{a}	33
		Expected Count	1,9	1,0	5,8	2,9	4,9	1,0	1,0	1,9	1,0	1,9	2,9	6,8	33,0
		% within Lock-ins inductive conversion/grey hydrogen	6,1%	3,0%	18,2%	9,1%	15,2%	3,0%	3,0%	3,0%	3,0%	6,1%	9,1%	21,2%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	50,0%	100,0%	100,0%	100,0%	100,0%	97,1%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	2,9%	2,9%	5,9%	8,8%	20,6%	97,1%
		Standardized Residual	0,0	0,0	0,1	0,1	0,1	0,0	0,0	-0,7	0,0	0,0	0,1	0,1	
	yes	Count	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	1_{b}	$0_{a,b}$	$0_{a,b}$	$0_{a,b}$	0_{a}	1
		Expected Count	0,1	0,0	0,2	0,1	0,1	0,0	0,0	0,1	0,0	0,1	0,1	0,2	1,0
		% within Lock-ins inductive conversion/grey hydrogen	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	0,0%	0,0%	0,0%	2,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	0,0%	0,0%	2,9%
		Standardized Residual	-0,2	-0,2	-0,4	-0,3	-0,4	-0,2	-0,2	3,9	-0,2	-0,2	-0,3	-0,5	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive conversion/grey hydrogen	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

Each subscript letter denotes a subset of Sector categories whose column proportions do not differ significantly from each other at the .05 level.

Directional Measures

			Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance	Exact Significance
Nominal by Nominal	Lambda	Symmetric	0,036	0,034	1,015	0,310	
		Lock-ins inductive conversion/grey hydrogen Dependent	0,000	0,000	.[c]	.[c]	
		Sector Dependent	0,037	0,036	1,015	0,310	
	Goodman and Kruskal tau	Lock-ins inductive conversion/grey hydrogen Dependent	0,485	0,353		.141[d]	0,294
		Sector Dependent	0,035	0,003		.317[d]	0,294
	Uncertainty Coefficient	Symmetric	0,077	0,067	1,091	.856[e]	0,294
		Lock-ins inductive conversion/grey hydrogen Dependent	0,693	0,175	1,091	.856[e]	0,294
		Sector Dependent	0,041	0,037	1,091	.856[e]	0,294

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	16.485[a]	11	0,124	0,294		
Likelihood Ratio	6,250	11	0,856	0,294		
Fisher's Exact Test	18,471			0,294		
Linear-by-Linear Association	.007[b]	1	0,935	1,000	0,618	0,059
N of Valid Cases	34					

a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .03.

b. The standardized statistic is -.081.

Symmetric Measures

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	0,696	0,124	0,294
	Cramer's V	0,696	0,124	0,294
	Contingency Coefficient	0,571	0,124	0,294
N of Valid Cases		34		

Crosstabs and Chi-square test results for Sector and the long fueling time as obstruction

Crosstab

			Sector												
			unknown	Waste collection	Car rental	Delivery services	Construction	Distribution center	Township	Agriculture	Maintenance company	Government/municipality	Horticulture	Other	Total
Lock-ins inductive Long fueling time	not	Count	2 a,b	1 a,b	6 a,b	3 a,b	5 a,b	1 a,b	1 a,b	2 a,b	1 a,b	1 b	3 a,b	7 a	33
		Expected Count	1,9	1,0	5,8	2,9	4,9	1,0	1,0	1,9	1,0	1,9	2,9	6,8	33,0
		% within Lock-ins inductive Long fueling time	6,1%	3,0%	18,2%	9,1%	15,2%	3,0%	3,0%	6,1%	3,0%	3,0%	9,1%	21,2%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	50,0%	100,0%	100,0%	97,1%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	2,9%	8,8%	20,6%	97,1%
		Standardized Residual	0,0	0,0	0,1	0,1	0,1	0,0	0,0	0,0	0,0	-0,7	0,1	0,1	
	yes	Count	0 a,b	0 a,b	0 a,b	0 a,b	0 a,b	0 a,b	0 a,b	0 a,b	0 a,b	1 b	0 a,b	0 a	1
		Expected Count	0,1	0,0	0,2	0,1	0,1	0,0	0,0	0,1	0,0	0,1	0,1	0,2	1,0
		% within Lock-ins inductive Long fueling time	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	100,0%	0,0%	0,0%	100,0%
		% within Sector	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	50,0%	0,0%	0,0%	2,9%
		% of Total	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	2,9%	0,0%	0,0%	2,9%
		Standardized Residual	-0,2	-0,2	-0,4	-0,3	-0,4	-0,2	-0,2	-0,2	-0,2	3,9	-0,3	-0,5	
Total		Count	2	1	6	3	5	1	1	2	1	2	3	7	34
		Expected Count	2,0	1,0	6,0	3,0	5,0	1,0	1,0	2,0	1,0	2,0	3,0	7,0	34,0
		% within Lock-ins inductive Long fueling time	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%
		% within Sector	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%
		% of Total	5,9%	2,9%	17,6%	8,8%	14,7%	2,9%	2,9%	5,9%	2,9%	5,9%	8,8%	20,6%	100,0%

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a. 22 cells (91.7%) have expected count less than 5. The minimum expected count is .03.

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