

MCB Bachelor thesis

Consumer Information Search on durable goods

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Introduction

In the last few decades climate change and sustainability gained more and more attention. The European Union wants to lower its emission of greenhouse gases in 2020 with 20% compared to 1990 (Tieben & Koopmans, 2011). In the Netherlands this is increasingly being invested in more sustainable production methods and ways to improve energy generation and therefore limiting the environmental impact. According to European guidelines the Netherlands should have realized 14% of renewable energy by 2020 (CBS, 2011). Partly due to this initiative, the Dutch government developed several measures to stimulate green energy. An important measure is the 'SDE-regulation'. This regulation is a subsidy for businesses and non-profit establishments which can be obtained when these organisations invest in renewable energy. At the consumer front there's an increasing trend visible. More and more consumers deliberately choose green electricity, buy fair-trade products or products with ecolabels¹. Solar energy is gaining interest amongst more and more people as well (CBS, 2011). People can have multiple reasons to invest in solar panels. Some might have the need to contribute to enhancing the state of environment and base their decision on the sustainability aspect of solar energy. Others might consider it a useful economic investment simply to make money in the long run. Another motivation might be that people like to be less dependent on energy companies in an interdependent society (Caird, Roy, & Herring, 2008).

Regardless of the motivation, people do not solely purchase solar panels on impulse. According to the consumer literature, consumers go through several stages in the purchasing process when products are bought. One of the most time consuming stages is the information search stage in the buying process. In this stage the consumer goes on the hunt for information with the aim of making better decisions.

In the literature much research has been done on the purchasing process and the information search process (Klein & Ford, 2003). In particular the purchase (process) of automobiles is intensively studied in consumer sciences (Rijnsoever, Farla, & Dijst, 2009) (Rijnsoever, Castaldi, & Dijst, 2012). Much research has been done into solar energy in general use as in solar energy in domestic use (Faiers & Neame, 2006). Furthermore much study has been done on the use of internet and information search. Yet there has been no research linking the information gathering process to solar panels itself. In particular, little research has been done to the application of different information sources regarding the information search. Again, some studies have been done to the information sources, but not regarding solar energy. Information search on the subject of solar panels has not been found in the literature. This research aims to identify how consumers go through the information search process regarding the purchase of solar panels and what information sources are used in their investigation. An extensive literature study is used as a means to investigate this research purpose and to give supported explanations.

These research findings can give insight into how consumers work themselves through information gathering in the process of purchasing solar panels. This can be useful to a wide variety of areas. It might be useful to companies in the solar industry. Insight in the way consumers gather information can give marketers ammunition to develop communication strategies for their offerings (Schmidt & Spreng, 1996) (Faiers, Neame, & Cook, 2007) (Strebel, Erdem, & Swait, 2004).

This research can also be of value to science. An attempt is made to clarify part of consumer behaviour, in particular the search behaviour of consumers on durable goods.

¹ <http://www.ncdo.nl/sites/default/files/NCDO%20Onderzoeksreeks%2011%20Fairtrade.pdf> ,

Research frame

Research question

“How do consumers gather information about solar panels from the moment they gain interest in solar panels?”

In the above research question several aspects need to be specified before the literature can be reviewed. The research question contains several concepts which can be approached and interpreted in different ways.

“Information” is used in the broad sense of the word. One can argue that consumer products or services embrace different types of information or attributes. For example solar panels embody technical information ‘how does it work?’ and economic information ‘what are the costs?’ ‘what is the payback time?’. In this research the different information types are ignored and not further deduced. ‘Information’ refers to any element of the concept ‘information’ as regarded by the consumer.

In this research ‘interest’ is based on the involvement construct. Involvement can be defined as “a person’s perceived relevance of the object based on inherent needs, values and interests” (Zaichkowsky, 1985). This is further explained in the upcoming literature study.

Solar panel: Solar panels come in a variety of forms. Some examples are phone chargers, flashlights, lamps, etc. In this study the focus is on solar panels consumer use for household energy purposes only. The solar panels which are placed on the roof or in any environment exposed to the sun for the generation of household energy or heat are meant in this case.

In the upcoming literature study an attempt will be made to clarify the concepts with respect to the research question. The answers to this question can help support a better understanding of consumer information search behaviour on durable consumer goods. Consumer behaviour is very diverse and complex, different goods bring different decision processes and relationships between product and consumer. Finding answers to this can help to certify and comprehend future search behaviour in an innovation rich environment regarding these durable technological consumer goods and bring the consumer literature another step forward.

For this study solar panels are chosen as case subject. In the extensive literature review the emphasis is on a cognitive perspective. This implies that the selected research focuses on how individuals deal with information processing rather than sociological phenomena. The reason is that it is a highly changing environment. Solar panels are relatively new technology and information search has changed dramatically since the internet including all the different devices having access to internet. Therefore establishing and revisiting earlier developed models gains insight into how consumers search in context of innovations, in this case adoption of solar panels. This will help to understand to what extent the continuing changing search environment influences individual search behaviour. The literature study will be followed by a conclusion and a discussion to comment on the findings. And Finally a design of a semi-structured interview is supplied. This semi-structured interview design is derived as a result of the literature review. It is developed to further investigate and test the conclusions regarding consumer information search on solar panels. The interview

should give insights in the influential factors, information search and information sources consulted. The design contains a qualitative component and a quantitative component. The quantitative component is based on the design used by Van Rijnsoever et al. (2012). Both parts should complement each other and support to give more profound conclusions.

Literature study

1. The technology adoption theory

Widely known and acknowledged by many scholars is the work of E.M. Rogers 'Diffusion of Innovations'. This work has been cited by many researchers and in this work Rogers explains how innovations are adopted among societies or communities. The theory explains that individual consumers adopt new technologies at different points in time after it has been introduced. Rogers states there are five adoption stages concerning the adoption of innovative technologies. These categories consist of (1) innovators, (2) early adopters, (3) early majority, (4) late majority and (5) laggards.

Innovators are consumers actively seeking for new innovative ideas and concepts. They gain much pleasure and satisfaction from searching and acquiring new ideas and developed technologies. They usually have sufficient financial resources to be able to tackle the risks involved in the new and not yet fully matured innovation. Innovators have adequate technical ability to understand the complexities which a new developed technology can bring. Furthermore this group is distinguished by the thrill of possessing new tech items and focus more on the technology than on the imperfections.

The early adopters come next. This category consists of consumers being one of the first in society to adopt the innovation. They are more closely integrated in local communities than innovators are. Therefore they have a higher degree of opinion leadership and are usually the ones who inform other peers at the local level. They ignite the high speed of adoption. They are trusted by peers and have much influence on others.

The early majority adopt the concept after the early adopters. They take more time adopting the idea and gather more information about the innovation before deciding to adopt or reject. They enjoy interacting and searching for new innovations but take more time to make a definitive decision. They are more risk avoidant than early adopters and tend to look more before they leap.

Late majority are the ones adopting an innovation when the concept is fairly integrated in the society. They are sceptical and risk avoidant. Pressure from others might push them over the line to adopt an innovation. They usually have less resources available in relation to the perceived risks. They want to make sure they won't regret the purchase at hand.

Laggards are at the tail of the adoption curve. They are the last ones from the community to go overboard and bring the concept into their lives. At this point it is likely the innovation has been further developed and newly (adapted) concepts built on this previous one are already being adopted by innovators. Laggards have limited resources to adopt such concepts and want to be sure it works appropriately to their needs. They are more traditional.

In Figure 1 on the next page is an overview of the adoption of an innovation curve. It follows an s-shape. At the beginning people gain awareness and the innovators acquire the innovation. At an increasing speed early adopters and early majority adopt the technology. At this point the innovation is fairly integrated in society and the adoption pace slows down. The late majority and finally the laggards follow (Rogers E. M., 1983).

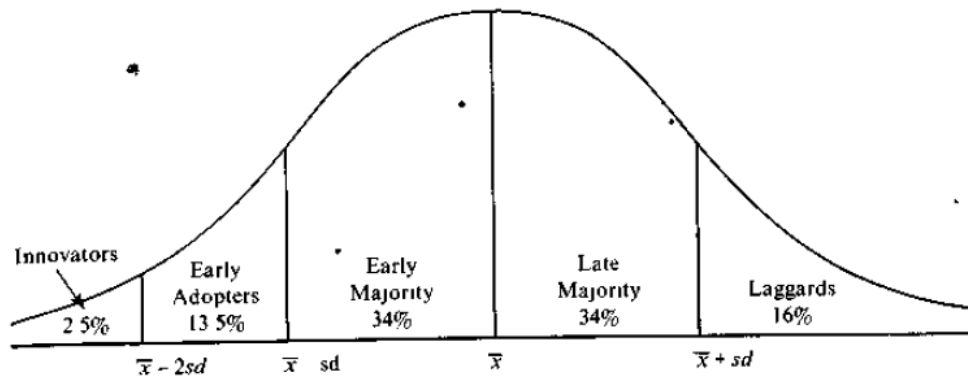


Figure 1. Innovation adoption in categories. Source: E.M. Rogers 1983.

One should note that in reality these categories aren't so strictly divided. In practice it is hard to point out differences between the 'early majority users' and the 'innovators' or the 'late majority' and 'laggards'. These categories are rather in favour of theory and on statistical basis.

Application on solar panels

Solar energy is a relatively new technology and especially for domestic use it's still in its early stages (Woersdorfer & Kaus, 2011) (Faiers, Neame, & Cook, 2007). When this is applied to Rogers adoption theory one can note that solar panels are still among the early adopters and early majority (Faiers & Neame, 2006).

Although Roger's theory is more a explanation for technology adoption from a sociological point of view it tells us something about the context. Solar panels are still in the beginning phases of its product life cycle and are far from mature. This means that the supplied information available about solar panels is relatively limited or might differ from available information for for instance smartphones. When we compare solar panels to smartphones there is a big difference in available information. For smartphones are all kinds of websites regarding the use, different types, consumer reports from consumer associations, different brands with information, different types, etc. The information supply for smartphones is bigger than for solar panels due to the life cycle phase. Smartphones are further in the adoption curve than solar panels, and thus there is also more demand for information regarding the attributes of smartphones.

The phase in which the product is located says something about consumer's information search. This sets the frame in which the purchasing process and in turn the information search stage takes place. But it is also likely to explain something about the information supply of solar energy and solar panels. It is possible that since the market developments and consumer demand are in its early stage, there is relatively little information available. Many aspects about solar energy and solar panels in particular are still unclear. Hence there is much inconsistent information which claim conflicting things about for instance the payback time and the economic lifetime. Whereas the quality levels between different types of solar systems and the quality between solar systems from different producers are hard to determine in the eyes of consumers (Caird, Roy, & Herring, 2008). Although this situation may have some limits in the present, this is likely to change in the future. When more consumers embrace solar panels as a part of their roof, further developments in the quality of solar systems should improve. The increase in development, popularity and future research on solar energy will have positive effect on the (quality of) information supplied about solar energy.

Regarding the topic of this research one should keep in mind the innovative context in which the search takes place.

2. The involvement construct

When consumers have a need to buy something they can be divided in terms of the degree of involvement with the purchase of goods. Involvement was already being investigated in as early as 1947 (Laurent & Kapferer, 1985). According to the consumer behaviour literature the level of involvement has impact on the way consumers make decisions (Petty, Cacioppo, & Schumann, 1983), (MacInnis, Moorman, & Jaworski, 1991). In the literature there is for instance 'enduring involvement' and 'situational involvement'. The first being a motivation and interest in certain product categories because it is part of central held values of this individual. The latter being a more context driven involvement. For instance one might not be typically interested in cigars itself but when this person has to buy cigars as a present for a friend he may be more directly involved (Laurent & Kapferer, 1985).

Low involvement

Low or no involvement is in effect when a consumer is interested in acquiring an item but does not regard it as highly important (Laurent & Kapferer, 1985). This means that the item is still wanted by the consumer but the degree to which the consumer will invest time, energy and capital is limited. A good example for instance is a pair of oven gloves. Oven gloves have proven itself to be of significant use. It is hard to imagine a world where oven gloves aren't used and it still comes down to man and woman's creative ability to find a way to get the hot pots and pans out of the oven. One might agree that many consumers today do not feel the need to outweigh all the costs and benefits of the different type of oven gloves. Although many people acknowledge there are differences between oven gloves in terms of quality or usability, a pair of oven gloves is usually bought with the sole purpose of its original functional use: protecting the skin and safely touching hot pots or pans. Thus one can say that generally speaking the purchasing process of oven gloves goes faster compared to, for instance, solar panels. Many might argue that this assumption is rather straightforward. In terms of consumer behaviour both mentioned products bring along a diverse set of consumer behaviour elements regarding the acquisition and use of the goods.

High involvement

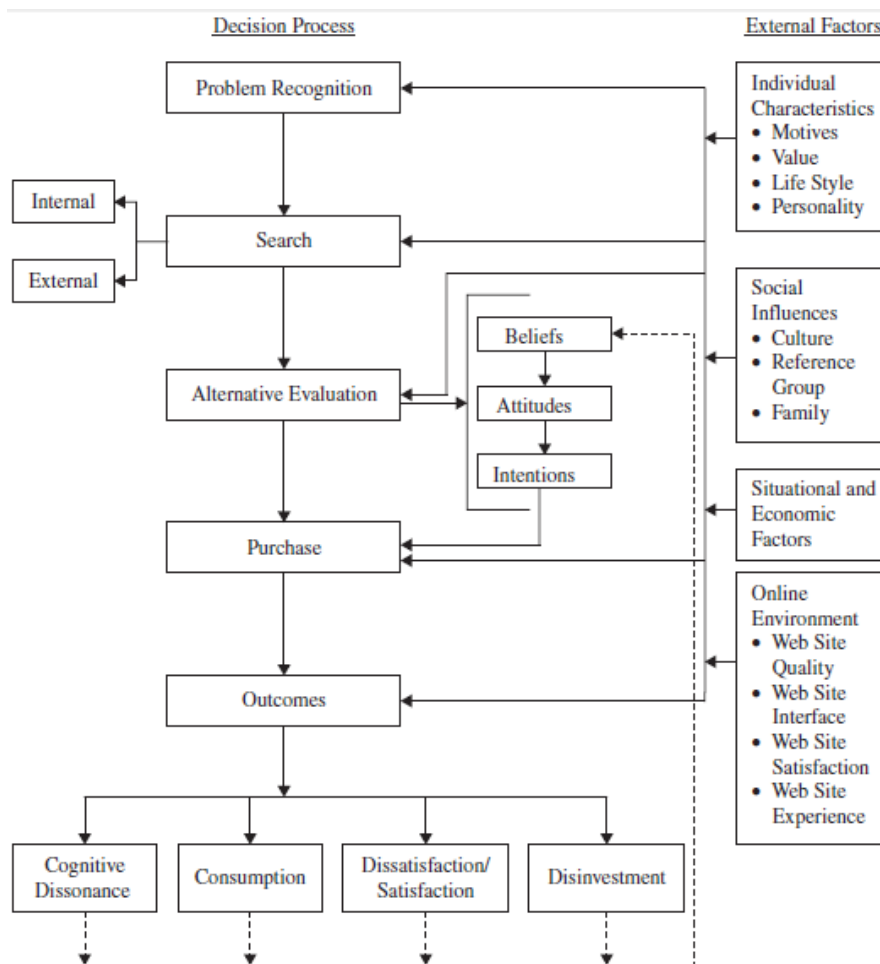
On the other hand high purchase involvement means that a consumer is highly invested in the process of purchasing a certain product. This product is important to the consumer and is regarded as being of high value and/or containing a perceived degree of risk. This value is based on the consumers perception of the product. If for instance a consumer is a collector of oven gloves this could mean that this consumer is in fact highly involved in purchases of oven gloves since this particular product category is of high value to the person. Therefore the involvement is explained through the perception and subjective importance of any individual consumer. The extent to which a person is highly involved in a purchase is explained by many factors. Laurent & Kapferer (1985) listed several facets as criteria of involvement: The perceived importance of the product, The perceived risk associated with the purchase; of which the following are lower level facets: negative consequences with regards to a poor choice and the perceived probability of making such a choice, the symbolic

value attributed by the consumer and the hedonic value of the product; its emotional appeal, pleasure and affect.

The purchase of solar panels amounts for thousands of euro's, especially in big orders of solar panels. The purchase normally doesn't stop at simply pointing out a set of panels. There are different sizes, models, additional services and installation procedures. Furthermore, solar panels are durable goods. Because higher priced items involve more risk (relatively much capital is used) a high involvement state is assumed in this study (Laurent & Kapferer, 1985).

The purchasing process

In the introduction the consumer decision making process has already been mentioned. Consumers go through a set of steps in the decision making process. Although there are multiple variations of the decision making process most of them contain, in some respect, the following stages: problem recognition, information search, evaluation of alternatives, product choice and outcomes (Kerstetter & Cho, 2004) (Darley, Blankson, & Luethge, 2010). See figure 2 below for an overview of the model.



Source: Adapted from Engel, Kollat, and Blackwell (1978) and Engel, Blackwell, and Miniard (1986).

Figure 2. A modified model of online consumer behaviour and decision making (source: Darley et al., 2010)

In the problem recognition phase the consumer becomes aware of something 'missing' in their lives. They are subject to tension. Tension raised by a perceived shortcoming. In the context of solar

energy this could be the need to have an independent energy supply or perhaps the urge of investing in something innovative and profitable. Another reason might be to make a statement to other consumers or for self fulfilment.

Information search is the phase where consumers actively search for information related to the perceived shortcoming. Information search is defined in this study as: “behaviour that occurs when an individual senses a problematic situation or information gap, in which his or her internal knowledge and beliefs, and model of environment, fail to suggest a path toward satisfaction of his or her goals” (Savolainen, 2013). Another definition in line of this study is from Schmidt & Spreng (1996) : “the stage of the decision-making process wherein consumers actively collect and integrate information from numerous sources, both internal and external, prior to making a choice”. Both definitions have been used and adopted in various studies on consumer behaviour. The first comes from the information seeking literature. The latter has been introduced from a more economical perspective on decision making. In the information search phase possibilities are discovered, options are investigated and the positives and negatives are being outlined. After the information search stage evaluation of alternatives takes place: Some set of potential options are extracted from information sources and the pro’s and cons are being evaluated among the individual possibilities. Some options are crossed out others are favoured. Then, a choice is made and one of the selected products is acquired. After the purchase it will be positioned and be part of the life of the consumer with additional evaluation of having made the right decision.

Now although this model consist of different ‘steps’ or ‘stages’, the process is in practice a more ongoing trial. Information is searched, alternatives are selected, others are rejected, new information is found and so forth. In this research the focus is on the information search stage and the consideration set formation in the purchasing process. In relation the use of information sources is also investigated.

3. The information search process

The information search process is an important phase in the decision making process. In this stage consumers search for attributes and aspects about products or services. This is done in order to reduce risk, uncertainty and outweigh costs and benefits. The way information is processed depends largely on involvement. Petty et al. (1983) and MacInnis & Jaworski (1991) did some extensive research on this subject: The Elaboration Likelihood model. This model explains that consumer information processing can go via the ‘central route’ and the ‘peripheral route’. The central route is taken when the consumer is highly involved. The peripheral route on the other hands is used when the consumer has low involvement in the purchase or situation.

For high risk purchases, being expensive and infrequently bought, such as cars, result in more extensive consumer search (Dowling & Staelin, 1994).

For businesses it is important to be part of the consumer information search stage. This is the phase where companies can differentiate themselves from others, show what they offer and convince consumers to buy their products or make use of their services. The informational search can be either ‘internal’ or ‘external’ (Mortimer & Pressey, 2013).

Types of search

Internal information search is the information retrieved from person's own memory. This is stored knowledge or earlier experiences related to the product. For instance one can derive a set of restaurants when one decides to go out to dinner and base a decision on the already stored information. External information search can be characterized as "consisting of (1) pre-purchase, goal-directed, or problem-solving activities, and (2) continuous, regular, general or ongoing activities" (Peterson & Merino, 2003). External search is the search of information at other sources than one's own memory. Examples are the consultation of friends or family, using the internet as a source, employees and salespeople, journals and magazines, etc. Generally speaking consumers make predominant use of external sources in the case of high involvement (Beatty & Smith, 1987) (Schmidt & Spreng, 1996). Although a distinction is made in the literature between internal and external search, in practice they are closely related and is external search dependent on memory (Peterson & Merino, 2003). Memory should be the starting point for every information search and thus the information search behaviour is influenced and even shaped by the memory (Peterson & Merino, 2003). In this study the emphasis is on external information search.

4. Information search models

In the previous section the purchasing process has been explained and in particular the information search stage has been described. The way consumers behave in relation to information search depends on many aspects. A highly involved state is assumed with regards to the purchase of solar panels. This in turn results in a more extensive search for information. In the literature there are multiple variations of information search models in circulation. Information search and strategies go back as far as 1954 (Peterson & Merino, 2003). According to the literature variables influencing consumer search can be classified in seven categories: market environment, situational variables, potential payoff, knowledge and experience, individual differences, conflict and conflict resolution, and cost of search (Srinivasan & Ratchford, 1991). Additional studies have pointed out there are nearly as many as 60 determinants divided over the seven categories. Which to a certain degree have an influence on consumer information search behaviour (Beatty & Smith, 1987) (Srinivasan & Ratchford, 1991). There is not an overall accepted model in the literature. Support and criticism is found for either one of these models. Below the important ones will be discussed in chronological order of time.

Economics of Information

The Economics of Information Theory is propounded by George J. Stigler (1961). The Economics of Information is a framework for consumer information search behaviour and is cited by many researchers. In this study Stigler investigated the use of information search in decision making with the emphasise on a consumer perspective. He states that the expected outcome is more positive when more information is searched. Doing additional search reduces the risk and therefore has a favourable effect on decision-making. Additionally, the more money spent on the goods, the greater the benefits of search and therefore the more search is done by consumers. Decisions are in this case based on more relevant information which generally (hopefully) leads to more money being saved and thus are enjoyed by the consumer (Stigler, 1961) (Punj & Staelin, 1983) . The main theory which can be deduced from this study in context of information search states that consumer search behaviour is formed by the 'perceived cost of extra search' and the 'expected

benefits of that search'. The perceived costs of extra search can be seen as the price one has to pay to continue to gather extra information. Many people are only able to do one thing at the time. Searching for information in favour of a certain decision deletes the opportunity to use that time to earn money with one's job or to go to that new movie from Steven Spielberg. Mental exhaustion is also the cost of information search typically because it can be quite a drain on mental processing and memory to store, read and interpret new information, especially if large amounts of information are worked through. Search costs are typically influenced by characteristics such as consumer experience, uncertainty, perceived risk and consumer's knowledge (Biswas, 2004) (Urbany J. E., 1986).

The perceived benefits are exactly the opposite of perceived costs. It is the expected advantage of gathering more information. These advantages can be translated into (perceived) reduction of risk. By continuing further search one obtains more knowledge to arm oneself for better decision making. More knowledge means having more information available and reducing the chance of overlooking possible important aspects regarding the decision. Expected benefits follow a diminishing marginal rate. This implies that perceived benefits decline as the search process continues (Goldman & Johansson, 1978).

According to this theory, consumers search for information up to the point where the marginal costs equal the marginal benefits (Stigler, 1961) (Urbany J. , 1986). At this point further information gathering will not result in any extra benefits. This is the optimal point for information search and according to this optimization one should discontinue to search for more information. One should note that further search still can be in favour of the decision being made. The (perceived) search costs make it inefficient to continue to search since one might be better off doing something else with this time.

Stigler's model is accepted by many scholars and has been the basis for many reformed and extended consumer information search models. Several scholars have since then been trying to find answers to what extent Stigler's economical model can be translated to real life situations. Urbany (1986) and Moorthy et al. (1997) found empirical evidence supporting Stigler's theory. Other studies have demonstrated different conclusions. These studies have indicated opposing results in contrast to the earlier studies. According to these studies consumers tend to make suboptimal or at least deviating choices in the extension of information search in terms of the marginal costs and benefits (Goldman & Johansson, 1978) (Sonnemans, 1998). Schmidt and Spreng (1996) proposed a model which builds on earlier developed models. Many of these models were established in context of consumer search for durable commodities such as automobiles. Some examples of studies are (Punj & Staelin, 1983), (Srinivasan & Ratchford, 1991) and (Klein & Ford, 2003).

Punj and Staelin (1983) were amongst the first to set up a descriptive model for consumer information search. In this study they investigated the relation between variables linked to consumer search which have found endorsement according to other studies in the literature (for an overview see (Beatty & Smith, 1987)). The model is aimed at explaining the relation and its strength between variables influencing the amount of search done by consumers and the result of this search on the actual price paid for a car (cost savings). One of the findings is that there are at least two types of prior knowledge concerning the purchase at hand. One construct includes the different attributes associated with the different models in the feasible set of alternatives. The other construct

encompasses knowledge structures about the product and purchase decision in general: in this case the purchase of a car. The first decreases the need to search for considerable amounts of information while the second construct translates to a decrease in cost of external search. Another finding is the significant negative relation between cost of search and the amount of information search and the positive relationship between amount of search and cost savings. Note that these last findings in part support the earlier discussed theory developed by Stigler. A third conclusion of their study is the importance of the tested variables on amount of information being searched. 'Prior relevant knowledge' appears to have the highest influence on amount of search relative to the other variables investigated in the study. 'Personality' was the second most influential: 'the desire to seek information'. 'Size of feasible set' and 'cost of external search' were third and fourth respectively in the influential hierarchy.

Another study by Srinivasan & Ratchford (1991) made an attempt to further refine the consumer information search model by Punj and Staelin. In this study the focus is on the determinants influencing the amount of search, neglecting the further results the amount of search in itself might have in the purchase decision making process. They proposed a model incorporating the majority of aspects introduced by Punj and Staelin with some slight modifications. Their results confirm the chosen variables to be appropriate determinants in influencing the information search. Their outcomes were consistent and thus strengthen results in earlier studies on consumer search.

Schmidt and Spreng's External Search Model

Schmidt and Spreng (1996) continued to further clarify the concepts regarding consumer information search. They proposed a model built on some of the discussed models developed in earlier studies. The model incorporates four dimensions as factors influencing the search behaviour. In separation these individual factors are influenced by a set of variables. These four dimensions are: 'perceived ability to search', 'motivation to search', 'perceived benefits of information search' and 'perceived cost of information search'. See figure 3 for a schematic overview. One's perceived ability to search has a positive influence on the amount of external search being done. People with a greater (perceived) ability appear to search more than people with lower (perceived) ability. This dimension is determined by three factors: educational level, objective product knowledge and subjective product knowledge. Educational level improves one's ability to organize, locate and extract information concerning the case. Objective knowledge is the amount of information a person actually possesses and subjective product knowledge being the amount a person thinks he or she possesses.

Motivation to search can be defined as "the desire to expend effort in the collection and processing of information, which is characterized by both direction and the intensity of the effort" (Schmidt & Spreng, 1996). How motivated a person is to search for information depends on several factors: enduring involvement, need for cognition and shopping enthusiasm. A critical reader might notice the link between the costs and benefits of search to motivation to search. Both of these influence the level of motivation to search. Unsurprisingly the 'perceived benefits' have a positive link on motivation and the 'perceived costs' have a negative relation with motivation to search.

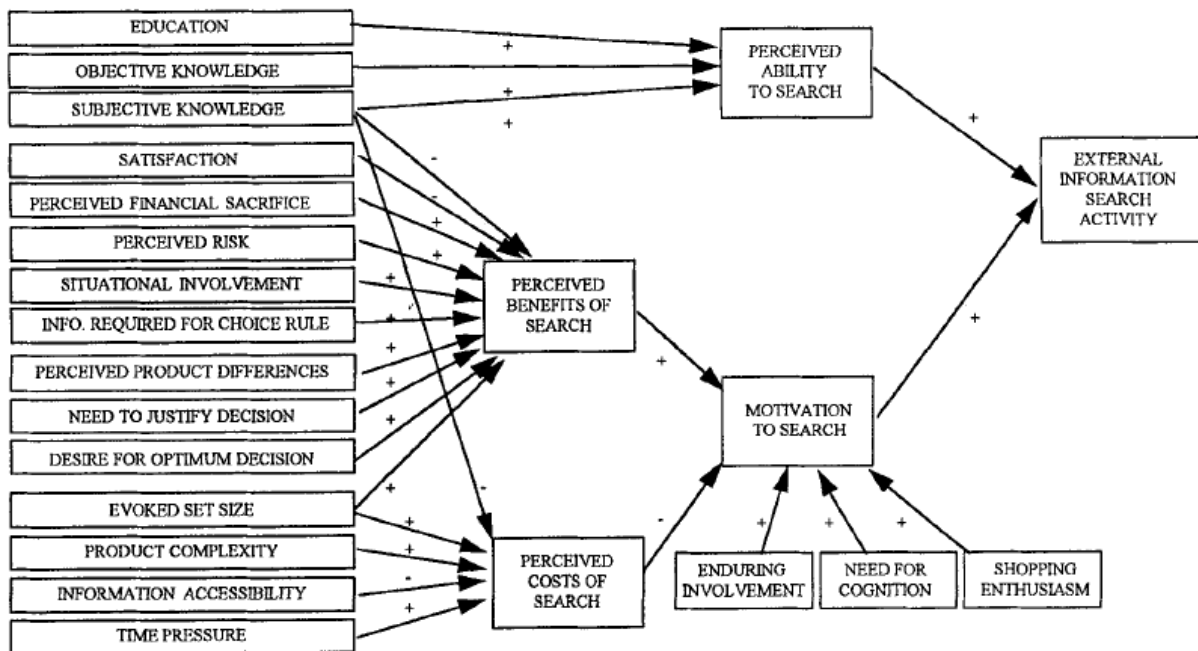


Figure 3 External Consumer Information Search Mode. Source: Smith & Spreng (1996).

The perceived benefits consists of the most underlying variables in the model. Note that these are by far not all variables involved in consumer search but merely the ones they were able to link. The determinants related are: subjective knowledge, satisfaction with previous purchases, perceived financial sacrifice, perceived risk, situational involvement, information required for choice rule, perceived product differences, need to justify decision, desire for optimum decision and evoked set size. We will explain some of these. For the complete explanation and scientific proof you are referred to Schmidt & Spreng (1996). Subjective knowledge has already been clarified. Notice that only subjective knowledge and satisfaction have a negative relationship with perceived benefits in contrast to the other determinants. 'Info required for choice rule' has been identified in the literature as individual choice rules people use in product choices. Studies have shown people use a variety of these 'choice rules' in context of consumer decision making. Furthermore the 'evoked set size' has a positive relationship with benefits of search. The bigger the evoked set (more alternatives) the more intention to search. This makes sense in a way. It is assumed that the more brands or alternatives there are, the more information is available.

Perceived cost of search just like benefits of search has been explained in an earlier section. In the model this dimension consists of: subjective knowledge, size of evoked set, product complexity and time pressure. An interesting observation is that 'size of evoked set' in this dimension is also positively related as with perceived benefits, this seems contradicting. A given explanation is that the bigger the evoked set, the more cognitive processing and effort. When this becomes large it can be intimidating for consumers to go through all those options and in their eyes the cost of search increase in such a case. Moreover it depends on the number of alternatives and of course is dependent on the degree of presence from other variables.

In conclusion the amount of search corresponds to the four main constructs and their underlying variables. Even when these underlying aspects and their main divisions would all be able to be quantified and measured in some way, one can wonder whether the amount or the approach of

external search could be estimated at all. Situational context and sociological influences could have significant influence but are insufficiently taken into account in this approach.

The inverted U Shape

In the consumer literature an interesting phenomenon was derived. The amount of search supposedly is related to consumer expertise. This is known as the 'inverted U shape'. It is believed people with low expertise (in the area of focus) search for little information. As an explanation it was stated that consumers aren't willing to go through elaborate amounts of information because of their low level of knowledge and expertise on the matter. All the information to go through is rather daunting and might make the consumers mind spin. On the other hand, it is believed that knowledgeable and experienced consumers, again in context of the decision, also search for little information since they already possess sufficient information to make a well judged decision. Mediocre experienced consumers tend to, according to this theory, search for the most amount of information: They hold more knowledge than the layman but less than the expert. The amount of available information is in this case not threatening and therefore these consumers look for the most information. Hence the inverted U shape is formed under two variables: expertise and amount of information search (Johnson & Russo, 1984). Interesting as this is for the consumer literature not all scholars seem to agree. Schmidt & Spreng (1996) discuss this theory and claim it is inconsistent. Moorthy et al. (1997) however did find empirical evidence supporting the inverted U shape. For an overview of the discussion see (Kerstetter & Cho, 2004) (Moorthy, Ratchford, & Talukdar, 1997).

5. The consultation of Information Sources

In previous sections explanation is given on the search process of consumers based on the strategies and cognitive processes involved. Multiple search models have been elaborated. The research question is focused on 'how' consumers search for information. The elements discussed in the previous section don't explain the actual use of information sources itself. The order of consulting information sources and the attached importance (weight) of these sources is an important aspect as well. Countless variables appear to be of influence on the types of sources, order of these sources and credibility of these sources consulted.

In the literature on consumer behaviour different classifications are used to assign information sources. Beatty & Smith (1987) distinguished four types: media (e.g. magazines or newspapers, television and radio), interpersonal (e.g. friends or family, experts and salespeople), sellers (e.g. stores and catalogs) and personal experience (e.g. product trials). Rijnsoever, Farla & Dijst (2009) identify four different types of external information search channels: personal channels, mass media channels, the internet, and retailers (Rijnsoever, Farla, & Dijst, 2009). Kiel & Layton (1981) classify sources in three different types of external information sources: interpersonal channels, mass media, and retailers (Kiel & Layton, 1981). Schmidt & Spreng (1996) categorised it in terms of who controls the input: marketers, resellers, third-party independent organisations or interpersonal sources. Personal channels are relations of the consumer with people in his or her social environment such as friends, family and colleagues. Mass media channels are sources which do not require any form of interaction such as radio, television and newspapers. The internet refers to all the information that consumers acquire from the world wide web. Retailers are employees of businesses delivering information to consumers as a part of their profession: for instance a sales agent for automobiles.

Additionally (Strebel, Erdem, & Swait, 2004) distinguish five different categories. In this last study internet was discussed as being a different medium for other information sources. For example consumer reports or newspaper articles can both be read offline and online without differences in content. Notice that Rijnsoever et al. (2009) took the source categorisation from Kiel & Layton (1981) and added the internet as a fourth source. There appears to be significant overlap between information source categorisation. As a reader one might recognize inconsistencies concerning the internet. Is it a different information source? Or should the internet be seen as an extension of the traditional channels but now accessible via the web? This will be discussed in the following section.

The Internet

Since the advent of the internet a lot has changed. This also applies to consumer behaviour. Several studies argued that the internet has influenced the purchasing process and in particular the information search stage of the model (Rijnsoever, Castaldi, & Dijst, 2012) (Ratchford, Lee, & Talukdar, 2003). The internet itself is a whole study on its own. The research on the internet is endless. In the literature on consumer search behaviour is discussion regarding the internet. Some researchers claim the internet should be interpreted as an individual information source. Others claim it is just an extension of the already existent information sources but now more effectively consultable. Some researchers state the internet helps consumers to more efficiently and effectively gather information with favourable effect on decision making (Ratchford, Lee, & Talukdar, 2003) (Park, Chung, & Yoo, 2009). Other scholars found a substitution effect between internet as an information source and offline traditional sources. For instance time spent at car dealers looking for various car models, amount of time for negotiations and printed information sources such as consumer reports were substituted by internet search (Ratchford, Lee, & Talukdar, 2003) (Ratchford, Talukdar, & Lee, 2007) (Klein & Ford, 2003).

One should note that the internet complicates the discussion of information sources. Should we consider the internet as an extension of the already available (offline) sources? Or should we categorize the internet as a different source on its own? For instance explanation about solar panels might be put in a magazine but also on a website. Forums about solar panels however are a typical phenomena on the internet and do not exist offline. To the authors knowledge there doesn't appear to be an overall accepted position in context of information sources. In this research the classification by Rijnsoever et al. (2009) is chosen: personal channels, mass media channels, the internet, and retailers.

Source credibility

Not all information sources are the same. There is much variety in terms of the purpose of supplied information as well as the degree of quality and credibility that sources hold. Credibility appears to have an effect on the persuasiveness of consumers and the confidence consumers have in their thoughts (Tormala, Brinol, & Petty, 2006). Highly credible sources are more persuasive than low credible sources when the message is powerful. When the message is weak, high credible sources actually can have a less persuasive effect than low credible sources. Source credibility is more important for experience attributes than for search attributes (Jain & Posavac, 2001). The source gives a strong(er) sense of trust therefore readers expect the message to be more firm. However when the message is of low quality readers are disappointed and actually are more convinced by a stronger message of a less credible source. Which characteristics separate a high credible source

from a low credible source is outside the scope of this research. The credibility however is not enough to convince or persuade the readers. There is an interplay between the credibility and the message. The quality of both contribute to a more persuasive result. This implies the higher the credibility of the source and the quality of the message, the higher the confidence in that particular source and thus a stronger persuasion.

Further findings on information sources

Demographics seem to be of relevance when consumers use information sources. Stebel et al. (2004) found for instance that male participants made use of all sources, which in turn could be explained by a higher involvement in the purchase (a personal computer). Also older consumers use more retail and advertising channels as a search place for information than younger consumers.

Some examples of other variables of influence on the information source exploitation are: education, availability and accessibility of information (sources), age and gender (Rijnsoever, Castaldi, & Dijst, 2012) (Kerstetter & Cho, 2004) (Bhatnagar & Ghose, 2004). Klein & Ford (2003) found a positive significant relation between education and the number of sources used. Furthermore they found a positive significant link between automobile experience and total number of sources consulted. In their research they also found support for the online – offline distinction in terms of search activity. Another connection they established is the years of experience with internet and the total amount searched online. A negative significant relation between experience and the number of dealers consulted was found. No difference was found between amount of search time between consumer groups. They found, however, a significant difference in number of sources consulted between consumer groups.

Hauser et al. (1993) investigated how consumers allocate their time and in what sequence they consult information sources. They set up an economic model for time allocation. This model contains the variables 'Time spend in source s ' and 'Value extracted from source s '. The value extracted depends on amount of time spend at that source. For the mathematics underlying this model we refer to Hauser et al. (1993). The model is subject to an amount of total available time to allocate between several activities, which should be optimized. In turn they expected that if a source has such a low marginal value that it does not exceed the marginal value of free time, this source will not be used. Consumers also appear to focus on the highest expected value sources first. When time pressure is high consumers make more use of negative source information.

Some sources are more appropriate to use than others for highly involved consumers. Van Rijnsoever (2012) found that high involvement consumers relied on a wider variety of sources than less involved consumers. Highly involved consumers appear to place less emphasis on a particular source. They search for information equally over all available information sources. In contrast, it was found that low involved consumers rely more on interpersonal and retail sources. In terms of the information source exploitation order Van Rijnsoever found that sources conducted at a later stage of the process were used more often than sources conducted as a first source. This contradicts the utilitarian approach (Hauser, Urban, & Weinberg, 1993). Here it was stated that the first exploited source is the most influential. Furthermore Van Rijnsoever found that consumers make less use of the media information than other sources. An additional result is the different search strategies for different segments of consumers. For an overview see Van Rijnsoever (2012). Overall consumers appear to rely mostly on interpersonal sources such as friends and close relatives. The internet is good

alternative where people extract information with regards to automobiles. One should note however that the different attributes to which search was performed, was not investigated in this study. Various types of information (e.g. technical or economic) may involve different strategies or relations regarding the individual search process. Van Rijnsoever et al. (2012) found empirical evidence suggesting the different consumer segments could also be divided in terms of search strategies characterizing these segments. Likewise Furse et al. (1984) identified different consumer categories which all have their own featuring aspects. These groups can be characterized by differing information search strategies (Furse, Punj, & Stewart, 1984). The way consumers handle information sources depends on many aspects. There is a lot of variety in source consulting among consumers in terms of order of consultation, influence per source, search strategies, number of sources consulted, and time spent per source.

Discussion

The purpose of this study is to find answers to the way consumers search for information on solar panels for domestic use. There are numerous ways consumers can search for information. As discussed it depends on many different aspects and variables. In the literature there is support in favour of scientific findings as there are findings contradicting and rejecting other scientific results. This complicates the discussion to give conclusive claims to what extent a certain behaviour is likely or heavily dependent on the situation and consumer.

In this paper the focus is only on external information search. Consumers have a cognitive framework where information continuously is processed, stored, accessed and changed. Because the consumer is highly involved they might search for information in multiple sessions. Perhaps they collect information for multiple months before the actual purchase of solar panels. The way consumer memory works, will have a strong influence on information search. The way we store, retrieve and interpret information is influenced by many factors. For instance the consumer searches for information, interprets the information and finally stores this in memory. Then a week later this knowledge is retrieved and modified when another search session is taking place: more influential information is found, new information is discovered, etc. This 'switching' between internal and external search appears to be neglected. The influence of differences in consumer memory and cognitive structures can have significant influence on this process.

The focus of the research paper is on the acquisition of solar panels in general. Consumer literature learns us that consumers purchase goods for the benefits they fulfil. So as much as information search is important for the acquisition, information is also searched for the actual use and what needs it should fulfil. Consumers also continue to search for information after purchase. Perhaps there are undiscovered links between the different underlying needs 'environmental', 'economical' or 'independence' related needs and the way consumers search for information. This hasn't been investigated here.

In the research there hasn't been made a distinction between different types of information. In the case of new technology in this instance solar panels, it might be useful to investigate the different types of information (attributes) in relation to the consulted sources. For instance technical attributes might be easier to extract from the internet rather than asking this to friends, depending on the expertise. On the other hand the procedure of placing solar panels might be better explained by a friend rather than a consumer review. When consumers search they might search for different types of information. This could heavily influence their search process.

The use of the internet as a self-standing information source can be questioned. Although the internet has more and different sources than offline has to offer, it has to some degree, an overlap with the offline sources. On the internet it is possible to check consumer reports, read newspaper articles, etc. This means that the internet cannot be regarded as a whole, but on the other hand the question is whether consumers consider the type of source on the internet being of same value as offline information sources of the same type. For instance newspaper articles online and offline or consumer reviews online and offline.

There are so many variables which have an influence on information search that it is almost difficult not to find a significant influence on the way consumers search for information. This set of variables

all have a certain degree of influence on the information search process. This implies there are innumerable different ways consumers can search. Perhaps a bigger question is how much these different ways of search deviate from one another. Yes all these variables have an influence, but to what extent? If it is only a slightly significant difference this could still mean that the majority follows a certain general approach to searching for information on solar panels with some deviation here and there. Instead of approaching this to find differences among segments and sets of variables, perhaps it is more interesting to look at similarities. This could give a more general view of the way (the majority of) consumers approach information search on durable goods instead of a highly fragmented model with a big set of all different variables but with only a minor deviation.

Conclusion

In this study an attempt is made to explain consumer behaviour regarding the acquisition of solar panels. The way consumers search for information has been the focus of this study. The foundation is an extensive literature review. Based on this research several conclusions can be drawn and hence this is the basis for the semi structured interview design.

The purchase environment is shaped by an innovative context. Solar panels are relatively new technology. This has its implications on the information search landscape and the information supply. The way consumers search for information works different in such a context than for products where innovation is absent.

As a result from the literature study we know that consumers can approach their search for information on solar panels in many different ways. For solar panels this will have a more extensive and explicit form than for products such as daily groceries or hygiene goods. This is because consumers are highly involved in the purchasing process for solar panels due to the perceived level of risk. This extensive form of search is being handled with different approaches. On the one hand perceived costs and benefits of continues search are considered. As a result consumers continue to search until the point where the marginal value of additional search is no longer above the marginal cost of search. According to Schmidt & Spreng (1996) the amount of search is explained by a large set of influential factors. Their model is based on many other studies investigating the influential factors for consumer search. Their model contains elements of the Economics of Information model and also many other factors such as: education, objective knowledge, evoked set size, time pressure, etc. As a result some other studies found supporting and some studies found contradicting evidence for these consumer search models. Overall conclusive patterns are therefore in context of information search hard to determine. This is due to cognitive component and the large set of variables influencing consumer search. The developed theories are in this sense an overall guide with, depending on context, deviating ways of search. As a result a bigger focus on the similarities among consumer segments and their search approach could potentially simplify this.

When one looks to the way consumers handle information sources there are multiple findings to outline. The quality perception and the credibility of the source are almost as important as the information itself. If the message is poorly communicated but the source is credible in the eyes of a consumer, then still consumers will not feel persuaded to take action or to agree with the message.

In fact, the consumer will actually be more persuaded by a low credible source with a strong message. This suggests the importance of both having a high perceived value source and high value perceived message in the eyes of consumers.

When consumers search for information they will mostly allocate their time in sources perceived having higher value than in sources being perceived as lower value. When consumers search for information on solar panels they will tend to use multiple sources and use a bigger set of sources than for products where the involvement is lower. This also means that they put less emphasis on individual sources because they consulted so many. In the literature review it is also found that in general terms, personal sources such as family, friends or colleagues have the biggest influence. A contradiction is the fact that the last consulted source usually has more influence than the earlier consulted sources. This contradicts the findings of Hauser et al. (1993) where the assumption holds that first consulted sources are perceived as more influential.

To give more conclusive insights in the way consumers search for information about solar panels, additional research is required. In the Appendix is a semi-standardized interview designed. This interview serves as a starting point for further research. It should give more in depth understanding of how consumers search for information about solar panels to complement the literature review.

Future research

Due to the complexity there are many areas of focus for further research. Many elements in the information search process aren't fully investigated and prevails discussion among researchers. An example for future research could be to investigate the influence of household characteristics in the search stage. Most importantly do other members have a say in the decision making process, to what extent and what is the influence of this. Solar panels are big purchases so usually the entire buying process involves multiple people in different stages. The influence of members in the household is an interesting case due to the close relationships and high expected influence.

Another research subject could be the relation between internet and solar panel information search by consumers. Much of the models are developed prior to the internet era. It would be interesting to further refine the model in context of internet. Studies have proven that the internet has changed the consumer information process in several ways. However, how these dynamics lie has insufficiently been researched. Perhaps it would be interesting to investigate to what extent the different information sources are accessible and consulted by consumers. Consumers are dependent on Search Engines and the queries they feed it. Website design might also influence the way consumers perceive the source's credibility and perceive the value. This could give additional insight in the influence of the internet.

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Appendix

Interview

introdactie:

Ik ben Paul Meijer en ik doe onderzoek naar de aanschaf van zonnepanelen door consumenten voor de Universiteit Wageningen. Ik wil graag een paar vragen stellen over de aankoop van uw zonnepanelen.

< uitleg geven over de procedure: Dit interview zal bestaan uit enige open vragen met betrekking tot uw aanschaf van zonnepanelen. Vervolgens wil ik u vragen daarna een korte gesloten vragenlijst in te vullen. Het kost u totaal 10minuten en u zou mij enorm helpen. >

Vragen:

1. Wanneer heeft u zonnepanelen aangeschaft?
 - Maand en jaartal

2. Hoe bent u op het idee gekomen om zonnepanelen aan te schaffen?

3. Wanneer bent u begonnen met het verzamelen van informatie over zonnepanelen?
 - Hoelang heeft u naar informatie gezocht voordat u uw zonnepanelen heeft aangeschaft?
 - o Maanden / weken ? dagen? hoeveel?

4. Wat voor informatie verzamelde u dan?

- Wat waren belangrijke aspecten bij het zoeken? Waar zocht u naar?

- Vooral info over technische (de werking), economische (TVT), financiële (prijzen), duurzame (milieu effecten) ?

5. Wat gaf de doorslag om zonnepanelen aan te schaffen?

6. Waar heeft u de informatie vandaan gehaald?

- Welke bronnen?

Bijv. Familie/vrienden, internet (waar op internet)?, tijdschriften?

7. Bent u weleens bij een informatieavond geweest van een zonnepanelenleverancier?
- Zo ja, wat heeft u tot de beslissing gebracht om die avond te bezoeken?
 - Zo nee, heeft u er wel eens over deze avonden gehoord? Zo ja, wat heeft u ertoe besloten niet deel te nemen aan deze informatieavond?
-
- Indien u bij de informatieavond was, wat vond u ervan?
 - Heeft u nuttige informatie gekregen?
 - Is deze informatieavond van invloed geweest op uw keuze om zonnepanelen aan te schaffen? (of had u dit al besloten voordat u de informatieavond bezocht had?)
-
8. Welke factoren speelden een rol in uw keuze van leverancier?
- Wat vond u belangrijk? (Bijv. Prijs/ vertrouwen in het bedrijf / het product / services / etc) ?

Het geslacht van de participant: _____

< Na deze vragen de gesloten vragenlijst overhandigen >

Vragenlijst zonnepanelen

De volgende vragen hebben betrekking op de verschillende informatiebronnen die geraadpleegd zijn om informatie te vergaren over zonnepanelen. Graag invullen wat van toepassing.

1. Raadplegen van informatiebronnen m.b.t. zonnepanelen

in hoeverre heeft u gebruik gemaakt van de volgende bronnen voor het verkrijgen van informatie over zonnepanelen.

1	2	3	Familie	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	Vrienden	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	Mensen uit mijn directe omgeving bijv. van werk/sport	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	Informatieavond(en) van leveranciers	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	Informatieavond(en) van gemeenten	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	kranten/ tijdschriften	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

1	2	3	Televisie programma's	5	6	7
Helemaal			4			Heel veel
niet gebruikt						gebruikt

			Radio/Tv reclames/ advertenties				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Internet websites over zonne-energie/panelen				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Internet forums over zonne-energie/panelen				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Zoekmachines als Google, Yahoo				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			medewerkers van een zonnepanelenbedrijf				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

2. Raadplegen van informatiebronnen m.b.t. leveranciers van zonnepanelen

in hoeverre heeft u gebruik gemaakt van de volgende bronnen voor het verkrijgen van informatie over leveranciers van zonnepanelen:

			Familie				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Vrienden				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Mensen uit mijn directe omgeving bijv. van werk/sport				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Informatieavond(en) van leveranciers				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Informatieavond(en) van gemeenten				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			kranten/ tijdschriften				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Televisie programma's				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Radio/Tv reclames/ advertenties				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Internet websites over zonne-energie/panelen				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Internet forums over zonne-energie/panelen				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			Zoekmachines als Google, Yahoo				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

			medewerkers van een zonnepanelenbedrijf				
1	2	3	4	5	6	7	
Helemaal niet gebruikt						Heel veel gebruikt	

3. Belangrijkheid van informatiebronnen

Kies uit de onderstaande lijst de 5 bronnen die het belangrijkste waren bij uw keuze van leverancier.
Met als nummer 1 de belangrijkste bron, met nummer 2 de op één na belangrijkste bron, nummer 3 de op twee na belangrijkste bron, etc.

- Familie _____
- Vrienden _____
- Mensen uit mijn directe omgeving bijv. van werk/sport _____
- Informatieavond(en) _____
- Advertenties / tijdschriften _____
- Televisie programma's _____
- Radio/Tv reclames _____
- Internet websites van leveranciers van zonnepanelen _____
- Internet forums over leveranciers van zonnepanelen _____
- Zoekmachines als Google, Yahoo _____
- medewerkers van een zonnepanelenbedrijf _____

4. Wat is uw geboortjaar? _____

Hartelijk dank voor uw medewerking. U mag de vragenlijst teruggeven aan de interviewer.