Climate decision-making and animal group decision-making

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Executive Summary

Climate Change is a global issue and may lead to several consequences such as inundations or crop failure. Actors gather at the United Nations Climate Change Conferences to make reach a climate agreement. However, this climate agreement may not always be successfully concluded. Animals also make decisions collectively, and it is said that the way they make decisions results in making good decisions without errors. Actors involved at the United Nations Climate Change Conferences could learn from animal decision-making in order to improve their decision-making skills. For this reason, the aim of this final project is to research for the company Societynetworks how behavior by actors involved in climate decision-making can be compared to animal group-decision-making

The research indicates that animal decision-making, especially bee decision-making demonstrates the following types of behavior which humans could learn from: the utilization of the quorum rule; the promotion of knowledge, opinions and ideas; and the organization of a fair competition in the decision-making process. Furthermore, changes in behavior by actors involved in the climate decision-making compared to animal decision-making are suggested and should be implemented, such as the attentiveness, the consideration of the effects of climate change when postponing climate decisions, the application of consensus decision-making, and the addition of delegates in climate decision-making. Although some of these changes are already implemented in the climate decision-making, this behavior and changes cannot be applied in the climate negotiations. Furthermore, this research shows that differences between humans and animals exist regarding language, communication, and optimality when making decisions. In addition to the differences between humans animals, changing the climate decision-making process can be regarded as difficult because of the interrelationship between climate negotiations and geopolitical issues, and international politics work completely different.

Moreover, several recommendations are proposed for solving or addressing stumbling blocks and factors that affect the climate negotiations. The following stumbling blocks may affect the climate negotiations: actors, issues, structures, processes, and outcomes. These stumbling blocks are composed of factors, such as leadership, outcome externalities, and other factors. In order to solve these stumbling blocks and their factors that affect the climate negotiations, the following recommendations should be used: using a strong and smart leadership, combining powers from countries, involving the next generations in time gaps, and having a spokesperson who speaks on behalf of all countries, and solving each issue step by step. Animal decision-making cannot be used in these recommendations, as animals cannot deal with these stumbling blocks and their

factors. For this reason, it can be said that behavior by actors involved in the climate decision-making cannot be compared to animal group decision-making.

1.Table of Contents

1.Introduction

Climate change is a global phenomenon. It may have its origins in several sources such as human interference, changes in ocean currents or volcano eruptions (Oorzaken klimaatveranderingen). On the other hand, climate change may result in effects. The IPCC (Klimaatverandering) outlined the following effects that are attributed to climate change: inundations, the rising sea level, loss of biodiversity, an decrease in cooling water, crop failure, an increase in algal bloom, and lack of salt water. In order to solve climate change and climate change issues, decision-makers make decisions at the UN Climate Change Conference. Last year, the United Nations Climate Change Conference in Paris was successful (The Paris Agreement), whereas the United Nations Climate Change Conference of Copenhagen failed because of the US political system, bad timing, the weather, the host country, wrong strategies, and EU politics (Why did Copenhagen fail to deliver a climate deal?, 2009)

Although sometimes no decisions can be made at the United Nations Climate Change Conference, animal behavior demonstrates how animals make good decisions and what could be learned from this behavior (Evans, 2009). In general, humans could learn from animal behavior in animal decision-making when making decisions. The same can be said for decisions made on a large scale such as on national or international level. Scholars such as Seeley, Visscher and Passino (2006) evaluated whether animal behavior in animal decision-making in this case bees' behavior could demonstrate what humans could learn from, and their research demonstrated that humans could learn from bees' behavior on how to make good decisions (Seeley, Visscher & Passino, 2006), while other studies reviewed that behavior in animal decision-making as a whole demonstrates what could be learned from could. In order to make good decisions, some scholars analyzed how animals make decisions with the aim of making good decisions. Conradt and List (2009) outlined several types of animal decision-making processes that are implemented by animals such as combined decision-making and consensus decision-making.

The objective of this final project is to ascertain for Societynetworks how actors involved in climate change decision-making, which is in this case the Climate Change Conference, may make decisions based upon animal group decision-making. For this reason, the purpose of this final project will be to figure out how animal decision-making is implemented by animals. In order to ascertain how behavior by actors in in climate decision-making compared actors can be compared animal group decision-making, the research question of this final project is:

"How may actors involved in the climate decision-making process make decisions based upon animal group decision-making?".

In order to answer the central question, this research is divided into the following sub questions:

-What is defined by decision?

-Which actors are involved in the climate decision-making process?

-How are decisions made in the climate decision-making process?

-How are decision made in the climate decision-making process in case of uncertainty?

-What aspects do influence the climate decision-making process?

-What do others think that should be changed in the climate decision-making process?

-How do animals make decisions?

-What does animal decision-making demonstrate?

This research is divided into several sections. Firstly, the abbreviations used in this research will be outlined. Afterwards, the methodology will be explained, followed by the literature review. Then the results of the research will be presented, and the discussion section will be given. At the end a conclusion will be drawn, followed by the recommendations

2. Abbreviations

G77 Group of 77 developing countries

COP Conference of the Parties

NGOs Non-governmental organizations

SB Subsidiary Body

UN The United Nations

UNEP United Nations Environment Programme

UNFCC United Nations Framework Convention on Climate Change

US The United States of America

3.Methology

In this chapter, the methodology will be explained. In order to examine and answer the central question and sub questions, the following research methods were required: desk and field research. The comparison of information of all collected data and gaining knowledge on the subject were possible due to both research methods.

3.1 Desk and field research

3.1.1 Secondary data

The use of secondary data helped to address the majority of the sub questions. Desk research was used for this research such as books, academic journals, organizational websites, reports and articles . All these types of secondary data were related to the sub questions such as climate decision-making process, climate change, decisions and animal decision-making. If difficulties occurred when searching for academic journals on The Hague University of Applied Sciences' website, Google was used to search for academic journals. The same can be said for books. Secondary data were used for the accessibility of information about the subject and the use of scholars' opinions

3.1.2. Primary data

Secondary data could not be considered as the sole research method. In order to gain a better understanding of the subject, primary data, known as field research, were used. A qualitative research method was used as field research. From this method interviews were chosen in order to obtain information related to the sub questions in case information could not be found through desk research. The interviews were used for the following sub questions: What is defined by decision?, Which actors are involved in the climate decision-making process?, How are decisions made in the climate decision-making process in case of uncertainty?, What aspects do influence the climate decision-making process?, How do animals make decisions?, What do others think that should be changed in the climate decision- making process?, and what does animal decision-making demonstrate?. An animal expert, professor Dooremalen, was interviewed for related to animal decision-making, and a climate teacher, mr Brinkman, was interviewed for sub questions related climate change decision-making, decision and animal decision-making. Mr Brinkman answered some interview questions by mail due to lack of time during the interview. The reason for the use of primary data was obtaining views from the interviewees regarding the subject and information in case this could not be found through desk research.

4.Literature review

In the previous chapter, the research methods were described that were utilized to evaluate and answer the central question and sub questions. In this chapter, various types of literature regarding the subject are analyzed. This literature review may provide information on what has already been written on the following subjects: decision-making, animal decision-making, and the climate change decision-making process. A conclusion will be drawn at the end.

4.1. Decision-making

4.1.1.The definition of decision

Every day humans make many decisions (Perry, 2009). For example, what (s)he is going to have for breakfast or what (s)he going to wear today. Decision can be defined in various ways. DuBrin (2011, p. 152) points out that decision revolves about selecting a preference . Another definition is provided by Griffin. His definition of decision referred to decision-making and states that decision-making can be considered as a selection of one alternative from alternatives (Griffin, 2012, p. 240).

4.1.2.Types of decision-making

Decisions that humans make can be made individually. For instance, the individual may decide whether (s)he will do sports today or how (s)he will get to work. However, according to Conradt and List (2009), humans live in cultured societies. For this reason, decisions are not only made individually, but also collectively, in groups of individuals such as a group of students who decide collectively on how a group assignment should be made, or politicians from different political parties deciding together on how the government will be ruled. The same observation has been emphasized by Kameda, Wisdom, Toyokawa and Inukei (2012) stating that human societies depend on human group decision-making. Committees and panels can be found all around humans such as local, regional or international communities like the United Nations or the European Union (Kameda, Wisdom, Toyokawa & Inukei, 2012).

Although humans do make use of group decision-making, it is considered as an important aspect for animals as well (Conradt & List, 2009). Animals such as bees make use of the group decision-making to search for nesting places in order to live and survive there (Seeley, Visscher & Passino, 2006). Another example of animals that utilize the group decision-making are ants. Temnothorax rugatulus ants decide collectively to search for nest sites where they all can live and survive (Pandika, 2013). Other animals that decide collectively are termites (Walker, 2015).

Conradt and List (2009) differentiate two categories of decisions in group decision-making. The first category of decision in group decision-making is all about that a group of members in group decision-making have to choose a decision on which all members have to abide by. For instance, a group of students has to choose one decision among several decisions regarding what punishment a fellow student could obtain in case (s)he does not cooperate in this group project (Conradt & List, 2009). The second category of decision in group decision-making revolves around how members in group decision-making do not have to choose one decision which applies to all members, but that is interrelated to all individual decisions. The first category of decision in group decision-making is called aggregate decisions, and the second category of decision in group decision-making is defined with the term interactive decisions. Conradt and Roper (2005) distinguish two various terms of decisions regarding group decision-making: consensus and combined decisions. Consensus decision can be considered as a decision-making where group members have to choose between various actions with the aim of reaching an agreement (Conradt & Roper, 2005). This consensus decision can be found in international agreements such as the Kyoto protocol. Combined decision revolves about that decisions are made without having reached a consensus, but they depend on every group members' behavior (Conradt & Roper, 2005). According to Conradt and Roper (2005), combined decision can be found in duties such as task allocation in eusocial insects like bees, ants, wasps and mammals; the reproductive study in animals; and the size and structure in animals due to animal leaving or joining group of animals. Conradt and Roper (2005) argue that humans and animals both make use of consensus decision in group decision-making. In addition to the use of consensus decision by animals, Conradt and Roper (2003) report that animals in group decision-making have to make relevant consensus. Additionally, Sumpter and Pratt (2008) assert that the use of consensus decision in group decision-making by humans and animals may be beneficial for them.

4.2. Animal decision-making

4.2.1 The animal decision-making process

Seeley and his colleagues have done much research in order to explain how bees make decisions (Seeley, Visscher & Passino, 2006). Seeley, Visscher and Passino (2006) propose that an example of decision-making in animals can be found in bees searching for a dwelling place to survive. Bees go out searching for a dwelling place when three conditions have been fulfilled (Seeley, 2010). First of all, a queen bee has to reach the pupal stage where she transforms (Seeley, 2010). Secondly, a queen bee has to seal her cells; and the final requirement is that the queen bee

announces a good weather forecast when she is outdoors. Hence, bees living in the nest will know it is time for a journey to search for another nesting site (Seeley, 2010). When the bee swarm goes outdoors looking for a dwelling place, the bee swarm is composed of 10, 000 bees including the queen bee (Seeley,2010; Seeley, Visscher & Passino, 2006). Some bees of the bee swarm go clinging to a branch of a tree with the queen bee, while other bee workers or bee scouts search for potential dwelling places (Seeley,2010; Seeley, Visscher & Passino, 2006). These bee scouts together decide together on the best nest sites (Seeley,2010). Afterwards, all bees go to the nest site which has chosen (Seeley, 2010). This decision-making is done through dancing (Seeley, 2010; Seeley,Visscher & Passino, 2006). Seeley, Visscher and Passino (2006) investigated whether bees make use of consensus decision-making or quorum decision-making. Seeley, Visscher and Passino (2006) report that bees make use of the quorum decision to choose a nest site during decision-making. The quorum decision can be defined in a way that a final decision is made in case a number of individuals choosing for a particular decision may have reached the threshold (Golman, Hagmann & Miller, 2015). On the other hand, Seeley, Visscher and Passino (2006) also highlight that bees do not only utilize quorum decisions, but consensus decision is applied as well.

Another group of animals that also have to search for a dwelling place like bees are ants. Ants, like bees do, send out scouts to look for nest sites of which could be their dwelling places (Shirkun, 2012). After having seen these potential nest sites, ant scouts return to their colony to indicate what their potential nest sites could be and whether each of them liked the various potential nest sites (Shirkun, 2012). If one of the scouts likes the potential nest site, another ant will be informed about the potential nest site and be requested to follow the ant that informed him (Shirkun, 2012). The second ant will view the potential site and report whether it likes it or not. If the ant does not like it, the ant will report the information to another ant (Shirkun, 2012). This continues till the potential dwelling place succeeds in reaching as many ants as possible (Shirkun,2012). Afterwards, all these ants return to their old home to return with the other ants and the queen to their new nest site (Shirkun, 2012). This is how consensus decision is applied by ants in nest migration (Kameda, Wisdom, Toyokawa & Inukei, 2012). In comparison to bees, quorum rules are being administered as well in order to succeed consensus decision in ants migration (Kameda, Wisdom, Toyokawa & Inukei, 2012). Franks, Mallon, Bray, Hamilton and Mischler (2003) report on how the quorum decision is administered in consensus decision-making in ants when searching for a nest. The study demonstrated the process of migration nest

sites as Shirkun (2012) did, and that ants go through the following four phases: exploration phase, examination phase, canvassing phase, and committed phase (Kameda, Wisdom, Toyokawa & Inukei, 2012). In the exploration phase, ants go outdoors and search individually for a potential nest site, whereas each ant checks the potential dwelling site it has found in the examination phase (Kameda, Wisdom, Toyokawa & Inukei, 2012). The ant will enter the canvassing phase, where the ant will return home and inform other ants about the potential dwelling site who will examine this potential dwelling site as well. It can be said that it is uncomplicated to welcome a new ant as it agrees quickly with high quality nest sites. The nest sites may have reached the quorum thresholds as many ants may have chosen for the potential nest site (Kameda, Wisdom, Toyokawa & Inukei, 2012). As a result, all ants will go to the new dwelling place in the committing phase. Pratt (as cited in Pandika, 2013) notes that ants make decisions as many ants choose a particular nest site. The better a particular nest site, the more ants this particular nest site receives (Pandika, 2013).

4.2.2 Lessons

List (2004) recommends that animals such as bees can be considered as an example for humans because of several reasons. Moreover, humans may learn from bees and from animals as a whole. One of the lessons is that in animal decision-making such as in bee decision-making democracy is applied through various bees that express the information they have (Dunn, 2012). In other words, all these bees have the possibility to say something. Furthermore, good information regarding the subject and decisions are being provided. Additionally, Seeley, Visscher and Passino (2006) note that bees make decisions very well and that humans may learn from them for three reasons. First of all, bees do accept diversity when making decisions. The decision-making process does not have a leader that guides decision-making (Seeley, Visscher and Passino, 2006). So every bee has the right to express its opinion (Seeley, Visscher and Passino ,2006). Besides, bees do not imitate others when making decisions or conform their decisions to others (Seeley, Visscher and Passino, 2006), and the application of the quorum rules enables to filter improper opinions of scouts. Seeley (as cited in Sutherland and Weyl, 2015) also argues that group decision-making of bees can be considered as the best way to make decisions, and it is much more democratic. Additionally, Seeley and Burhman (1999) review that the way of cooperating in bee swarm as an adaptive unit is one the most exceptional way. Furthermore, Seeley (2010) notes that bees can be regarded as an exemplar for humans in a sense that bees

are gathered in a community and cooperate together in order to achieve goals. Humans may make good decisions by taking these lessons into consideration during decision-making.

4.3 The climate change decision-making process

4.3.1 Climate change

Climate change has become a fact since 1950 (Climate Change 2014, 2014). The emergence of climate change may be a result of several reasons (Oorzaken klimaatveranderingen). In other words, these reasons can be natural variability and humans activities such as greenhouse emissions or the sun. (Climate Change 2014, 2014). Climate change can have an impact on nature and humans system such as the loss of biodiversity, an increase in floods and sea level, and warming seas (Klimaatverandering).

4.3.2 The impact of climate change factors

Jones et al (2014) state that climate decision-making does not exist. In order to make a climate decision in decision-making, information, potential risks and vulnerability are required (Jones et al., 2014). However, obtaining information can be difficult (Jones et al.,2014). Climate decision-making can vary or sometimes be similar to other decision-makings. According to Kahan and Brahan (as cited in Jones et al., 2014), there are various aspects or factors that are of great importance to climate decision-making in a way that they play a major role in climate decision-making through the use of information and the adaptation process. Kahan and Brahan (as cited in Jones et al., 2014) distinguish the following factors or aspects that may have an impact on climate decision-making: cultural values, psychology, languages, and ethics. Hofstede (as cited in Itim International) differentiates several cultural values: power distance, individualism or collectivism, uncertainty avoidance, long/short term orientation and femininity or masculinity. Power distance describes the equality in societies, whereas individualism and collectivism define the importance of the individual or group in societies (Itim International;Rompelman). Uncertainty avoidance implies that individuals try to prevent uncertainty by taking measures; however, uncertainty may also be avoided through the implementation of laws and rules (Rompelman). Long or short term orientation indicates the relation between society and its past (Itim International). Hofstede (Itim International) highlights that society may preserve its past or shift from the past. Femininity and masculinity all revolve about female and male characteristics societies may obtain (Rompelman). Psychology plays a major role in climate change decision-making through the provision of understanding on risk perception and adaptation process

(Rompelman). Languages may have a major role in decision-making related to framing, communication, learning, knowledge exchange, dialogue and discussion (Rompelman). They influence decision-making in a way that first of all various words are being utilized to describe the object (Rompelman). Hence, issues in communication and decision-making may occur (Rompelman). Furthermore, the use of the word risk and its definition may be utilized in different ways, and each of them having various meanings (Rompelman) . Ethics which is the last factor can have an important role in climate change decision-making because of its concerns it includes (Rompelman). Those concerns are intergenerational equity; distributional issues, the role of uncertainty in allocating fairness or equity; economic and policy decisions; international justice and law; voluntary and involuntary levels of risk; cross-cultural relation; and human relationships with nature, technology and the socio-cultural world (Rompelman).

It can be concluded that animal group decision-making can be regarded as an example to make decisions. Humans and animals consider group decision-making as an important aspect. Group decision-making can be divided into consensus decision-making and combined decision-making. Both of those decisions are applied in animals like bees and ants. The way how animals such as bees make group decision can be an example to humans in a way that every bee has the right to express its opinion. Besides, bees do no imitate others during decision-making, and the quorum decision filters improper opinions.

5. Results

In the previous chapter, various types of literature on the subject were analyzed. In this chapter, the results on the research will be presented. This research is subdivided into several subsections, and they embody the results regarding the sub questions.

5.1 What is defined by decision?

The definition of decision will be discussed in this section. Decision is embodied by the following aspects: categorization, decision-making process, and decision-makers. These aspects will be discussed as well.

5.1.1 The definition of decision

The word decision can be defined in various ways. According to Harisson (1996), decision is described as "a moment, in an ongoing process of evaluating alternatives for meeting an objective, at which expectations about a particular course of action impel a decision maker to result in attaining the objective"**.** Brinkman (personal interview, December 9, 2016) agreed with Harisson's definition of decision and stated that Harisson's definition covers the whole aspect of decision. According to Brinkman (personal interview, December 9, 2016), decision can best be described as "choosing an option, and decision should be formulated in words or on paper". Otherwise, it will be an empty air. In one of Baron's book (as cited in Sparke & Fisher, 2016), decision is viewed in the same way as in Harrison's definition; however, the term is considered to be about what should be done and what should not be done with the aim of achieving a specific goal. Another brief description of decision indicated that a decision-maker selects the best solution to a problem on which his or her outcomes of decision-making should be evaluated (Eilon, 1969).

Others referred to decision-making for a description of decision. Eilon's definition of decision is similar to Harris' definition of decision, which states that "decision-making is the study of identifying and choosing alternatives based on values and preferences of the decision maker" (Harris, 1998). The latter is the case in the climate decision-making process of the United Nations Climate Change Conference and animal decision-making process, where decision-makers are involved and select an alternative such as bees searching for various nest sites which are alternatives, and one nest site will be chosen based on the values and desires. Other researchers (Al-Tarawneh, 2012) described decision-making as a process of selecting a solution to an issue. Flynn and Williams (as cited in Williams & Kennedy, 2000) referred decision-making to

the selection of an alternative for a plan with the aim of reaching a goal. Brinkman (personal interview, December 9, 2016) claimed that Flynn and Williams' description of decision that refers to decision-making gives a good explanation of decision-making, because Brinkman (personal interview, December 9, 2016) pointed out that decision-making is selecting from all options or combined options. The same definition is given by Eisenfuhr. Eisenfuhr (as cited in Lunenburg, 2010) noted that the decision-making is "a process of making a choice from a number of alternatives to achieve a desired result". For instance, bees search for nest sites, and one site will be regarded as the most suitable and chosen. The decision-making can be described as "the allocation of scarce resources by individuals or groups to achieve goals under the conditions of uncertainty and risk" (Sylvie, LeBlanc, Hollifield, Lacy & Broadrick, 2009, p.2), as they include the environment, people and resources and aim at achieving a goal (Sylvie, LeBlanc, Hollifield, Lacy & Broadrick,2009, p.2),

5.1.2. The classification of decisions

All decisions can be categorized into classifications. Several researchers proposed various categorizations. One of the classifications is the division of decision into two categories: formal and informal decisions. Other researchers such as Simon, Scrinivas and Shekar, and Harrison (as cited in Sparke & Fisher, 2016) also classified decisions into two categories, but termed them differently with programmed and non-programmed decisions or structured and non-structured decisions. All these categorizations have a common aspect, and it is for this reason that Harisson (as cited in Sparke & Fisher, 2016) divided decisions into two categories: category one decision and category two decision. In category one, decision is described as "routine, recurring and certain" (Teale, Dispenza, Flynn & Currie, 2003, p. 8), whereas it is referred to as " nonroutine, nonrecurring and uncertain" in category two (Teale, Dispenza, Flynn & Currie 2003, p. 8).

5.1.3. The decision-making process

In spite decisions can be termed differently, the same can be said for decision-making process. Although the decision-making process can be referred by various terms, all decision-making processes offer similar stages through which a decision-maker goes through. Simon Herbert's model (as cited in Sparke & Fisher, 2016) divided the decision-making process into three phases: intelligence, design and choice. Another example of the decision-making process is given by Drucker. Drucker (as cited in Sparke & Fisher, 2016) proposed the following five stages of the decision-making process instead of three phases: identifying the problem, evaluating the problem, identifying the alternatives courses of action, selecting the course of action and

applying the course of action. Baker et al (as cited in Fülöp , 2005) suggested a decision-making process that starts with recognizing decision-makers, followed by determining conditions of a resolution, setting objectives, recognizing the alternative courses of action, identifying the criteria, selecting the decision-making tool, analyzing the alternative course of action, and authenticate the best decision.

5.1.4.Decision makers

Decisions in the decision-making process are made by decision-makers, and these decisions can be made individually or collectively. During the climate decision-making process of the COP, decisions are made collectively. As it will be discussed in the following section, various decision-makers are involved at this COP such as non-governmental organizations and governmental organizations. Nonetheless, decisions in animal decision-making can be made individually or collectively. For example, one elephant makes decisions individually in elephant decision-making, whereas some social insects make decisions collectively. Group decision-making can be done in several ways in case decisions are made by all members. Decision-makers may select from the following types of group decision-making: unanimity, consensus, authority rule, authority, minority rule, lack of response, and majority vote (Band & Partridge,1999,p. 3). As it will be described in section 5.7, sometimes, the majority voting system combined with consensus is applied in animal decision-making such as in ant decision-making, or the minority rule is applied in animal decision-making where the minority of a group makes decisions.

5.2. Which actors are involved in the climate decision-making process?

In the previous section, definition of decision and its aspects have been delineated. Actors that are involved in the climate decision-making process of the United Nations Climate Change Conference will be presented in this section. These actors may vary from governmental organizations to non-governmental organizations.

5.2.1 Businesses

As discussed in the previous section, decisions in the decision-making process are made by decision-makers. One decision-maker may be involved in this decision-making process and make decisions individually. It could also be that more decision-makers are involved in this decision-making process, and they make decisions collectively. As individual and group decision-making occur in animal decision-making such as one elephant that makes decisions individually for the whole group, or all bees make decisions collectively, it can also be said the collective decision-making is applied at the United Nations Climate Change Conference.

Bercovitch et al (as cited in Hernández, 2014, p.84) highlighted that various actors can be involved in a conflict. Bercovitch et al (as cited in Hernández, 2014, p. 84) stated that these actors can be referred to individuals or international organizations. For instance, an individual who works for the government. Hernández (2014, p. 84) differentiated several actors that are involved in the climate decision-making process. Companies are one of these actors which can be considered as interest groups. According to Burkeley and Newell (2010, p. 88), companies may be considered as important actors because of their political involvement and duty to offer solutions to climate change issues or climate change. Furthermore, the International Chamber of Commerce provided another reason for considering companies as key actors. The International Chamber of Commerce (as cited in Burkeley & Newell, 2010) stated:

> "Industry's involvement is a critical factor in the policy deliberations relating to climate change. It is industry that will meet the growing demands of consumers for goods and services. It is industry that develops and disseminates most of the world's technology. It is industry and the private financial community that marshal most of the financial resources that fund the world's economic growth. It is industry that develops, finances, and manages most of the investments that enhance and protect the environment. It is industry, therefore, that will be called upon to implement and finance a substantial part of governments' climate change policies" (p. 88).

In other words, companies are regarded as key actors due to a large amount of money they may have. Hence, they may have the ability to protect the environment. For this reason, businesses will be requested to introduce and support part of climate change policies. However, Brinkman (personal interview, December 9, 2016) claimed that industries are partly part of the climate decision-making process, because they lobby their national governments at the COP. On the other hand, these industries should not be considered as part of the process due to difficulty in having 200 countries that agree on an agreement. In addition to this difficulty, including companies in this process may be unfeasible (Brinkman, personal interview, December 9, 2016).As a consequence, companies should be represented by their countries through national governments (Brinkman, personal interview, December 9, 2016).

5.2.2. Non-state actors

Non-state actors are also involved in the climate decision-making process. Hernández (2014, p. 85) differentiated several non-state actors: non-governmental organizations, international governmental organizations, banks, sectorial associations, and businesses. The same list of non-state actors has been given by the UNFCC (as cited in Nasiritousi , Hjerpe & Linn, 2014) categorizing non-state actors into several groups: business and industry non-governmental organizations, environmental non-governmental organizations, indigenous peoples' organizations, local government and municipal authorities, research and independent non-governmental organizations, trade unions non-governmental organizations ,farmers and agricultural NGOs, women and gender, and youth organizations.

Nevertheless, according to Willets (as cited in Newell, 2006, p. 2), non-governmental actors have not received much academic attention regarding the importance these organizations could have on global level. Brinkman (personal interview, December 9, 2016) rejected Willets' perception of non-governmental actors that indicate the insufficient academic attention these organizations could have on global level regarding their importance, because non-state actors should lobby their national governments in order to deal with their interests. In spite non-state actors lobby their national governments, they should not be considered as part of the process (Brinkman, personal interview, December 9, 2016). Not being part of the climate decision-making process is attributed to difficulty in having 200 countries that agree on an agreement, and including other actors in this climate decision-making process may be unfeasible (Brinkman, personal interview, December 9, 2016). Furthermore, only countries are part of the process, as they are only part of the UN, which organize the climate change conferences (Brinkman, personal interview, December

9, 2016). Newell (2006, p .3) noticed the following reasons for this lack of academic attention: lack of political power, influence of non-state actors' pressures on foreign policy decision-making, and difficult duties. These non-state actors do not have resources to exert power. However, literature on international relations referred to several sources these non-governmental actors could obtain their resources from. According to Betsill and Corell (2001) and Keck and Sikkink (as cited in Nasiritousi, Hjerpe & Linn, 2014), non-governmental actors obtain their powers from knowledge and information. Others such as Falkner or Levy and Newell (as cited in Nasiritousi , Hjerpe & Linn, 2014) indicated that economic resources and world economy rankings are sources for their resources. Other power sources mentioned by Falkner (as cited in Nasiritousi , Hjerpe & Linn, 2014) are organizational capacity and transnational networking, and mobilization capacity. Gough and Shackley (as cited in Nasiritousi , Hjerpe & Linn, 2014) reported that authority can be considered as another source. In spite lack of NGOs' academic attention may be attributed to these reasons, some people made an attempt to provide a significance to NGOs such as Young did in his book *International Cooperation* (Newell 2006, p. 4), but Young (as cited in Newell, 2006, p. 4) argued that it all revolves about the emergence of non-governmental actors by regimes. However, it can be said that NGOs are not considered as important in a way that they are described by people that attempted to provide a significance to NGOs.

5.2.3. Countries

Countries participate in the climate decision-making process through their representation of national governments, and these countries are all part of regional groups. The United Nations categorized these countries into the following groups: Africa, Asia, Central and Eastern Europe, Latin America and the Caribbean, and Western Europe and other groups (Yamin & Depledge, 2004, p. 32). Candidates from these regional groups are elected to become nominees for the bureaux and specialized bodies. Furthermore, countries are members of the political negotiating coalitions. The political negotiating coalitions can be distinguished as well into the following groups: Group of 77 and China, Alliance of Small Island States and Small Island Developing States, African Group, Least developed countries, Organization of Petroleum Exporting Countries, Central Asia, Caucasus, Albania and Moldova Group, European Union, Umbrella Group, Central Group and Central Group-11, Environmental Integrity Group, and Open Balkan Group and other groups (Yamin & Depledge, 2004, p. 33-48). States send delegates to represent them at the COP. The UN organizations contribute to the climate decision-making of the COP. They are in charge of

several programs and activities related to the World bank, UNEP and climate change (Depledge & Yamin, 2004, p. 58).

5.2.4.The media

The media can be considered as participants in the climate decision-making process (Depledge & Yamin, 2004, p. 59). The media play an important role in policy development in climate decision-making, as they try to make the public aware of climate change issues by covering climate issues that results in creating public opinion. Moreover, actors may take measure to solve climate change issues because of public opinion. Caldwell (as cited in Newell, 2006) argued states do not take measures to solve climate change issues without public opinion. According to Mintzer (as cited in Newell, 2006, p. 71), public opinion is essential for unity and negotiations in the climate decision-making.

5.3 How are decisions made in the climate decision-making process?

In the previous section, actors have been described that are involved in climate decision-making process. In this section, a description will be given on how decisions are made during the climate decision-making process of the United Nations Climate Change Conference.

5.3.1 The definition of negotiation

Decisions in the climate decision-making process are made through negotiations. The use of the negotiations in decision-making can also be found in animal decision-making. For instance, some types of mammals make use of negotiations as a kind of decision-making. The use of negotiations as a kind of decision-making process in animal decision-making is related to global overview. According to Rittberger (as cited in Depledge, 2005), a negotiation can be referred to "the process of mutual persuasion and adjustment which aims at combining non-identical actor preferences into a single joint" (p. 5) or as described by Raiffa and Benedict (as cited in Hernandez, 2014) as "a communication mechanism that allows actor with a common goal to solve a problem or to find a strategy to address an issue that affects all" (p. 36).

5.3.2. The negotiation process

The negotiations take place in arenas at the United Nations Climate Change Conference. Depledge (2005, p. 105) distinguished several types of negotiations arenas in negotiations categories: formal open arenas, informal open arenas, informal closed arenas, and unofficial arenas. The negotiation process is composed of several stages (Depledge,2005, p. 7) . It may start with the agreement of the mandate or the agenda setting. Work will be done at national level prior to the agenda setting for business pressure groups. Industries will be consulted by governments for expertise. Santaholma (as cited in Newell, 2006,p. 102) observed that consulting companies has been essential regarding climate change. Business pressure groups will attempt to pressure national governments. Porter and Brown (as cited in Newell, 2006,p. 102) outlined that putting pressure on national governments has an impact on the policy process, as national governments may have a relationship with pressure groups. Moreover, Santaholma (as cited Newell, 2006, p. 102) reported that influencing the policy process in this way enables the agenda to be progressed. The agenda will be determined by individuals from governments who would advocate for the interests of pressure groups.

In the agenda setting, NGOs may be requested to explain issues on the agenda items and provide measures on how these issues may be solved such as the sea rising level. In case governments cannot provide explanations of these issues, Haas (as cited in Newell, 2006, p. 44) stated that NGOs will be required to interpret new issues. In order to persuade governments to deal with issues, Stairs and Taylor (as cited in Newell, 2006, p. 129) reviewed that NGOs may refer to unfamiliar reports and studies in order to set an issue on the agenda item. NGOs may contribute to the policy development, and they may contribute in various ways to the policy development. According to Spencer's questionnaires (as cited in Newell, 2006, p. 30) and Stanford and Kinrode (as cited in Newell, 2006, p. 30), NGOs may contribute to the policy development by having meetings with governments and civil servants. In this way, they can exert their influence over the policy development. Banuri (as cited in Newell, 2006, p. 132) noted that the impact of NGOs is contingent on the resources they use which can be considered as useful for governments to be utilized such as information and research. According to Robertson's interview(as cited in Newell, 2006, p. 134), NGOs may also exert their influence due to their relationship with governments. Nevertheless, the eco journal (as cited in Newell, 2006, p. 135) observed that some countries do not have environmental departments. In addition to this lack of environmental departments, Mc Cormick (as cited in Newell, 2006,p. 135) pointed out that these departments lack of political influence. Moreover, Kranjc and Nyiraby (as cited in Newell, 2006, p. 135) highlighted that NGOs have not much support for these issues.

Scientists play a major role in the agenda setting. Their influence is attributed to states which seek scientific advice for climate change issues, and scientific experts clarify these climate change issues for states which have done research on these specific issues (Newell, 2006, p. 44). It can be said that their research may have a political impact; however, this influence is contingent on the confirmation of scientists. All research, results and evaluations are done by these scientific experts, and they are included in the IPCC reports. However, not all scientists validate the content of these reports. Only ten scientific experts worldwide do not recognize the results reported in the IPCC reports (Newell, 2006, p. 45). Lunde (as cited in Newell, 2006,p. 45) differentiated two reasons for this scientific incredulity: the presence of diversion and lack of factual foundation. For this reason, disagreement among scientists may jeopardize scientific influence (Newell, 2006, p. 45). Scientific influence is not only attributed to states which seek advice, but also to the need of scientific research (Newell, 2006, p. 49). Funding plays here a major role. Scientists require more research in order to solve uncertainty, and money is needed

for this research. Moreover, external factors such as climate events are attributed to scientific influence.

The agenda-setting may also start with the exploration of issues. Afterwards, the bargaining phase will take place. Business pressure groups use the following methods in the bargaining phase to exert their influence at international level. Governments may be consulted, and this may lead to some changes in the policy draft texts (Newell, 2006,p. 107). Furthermore, according to Anderson's questionnaire (as cited in Newell, 2006,102), delegates will be recalled that national legislature always have to deal with agreements. This was the GCC's and Climate Council's case. Cooperating with other pressure groups and working in coalition with national governments are other methods for exerting influence (Newell, 2006, p. 108). For example, Don Pearlman, a lobbyist, approached delegates from various countries to work with them in coalition during a climate meeting. Creating a disagreement between countries at international level is another mean used by business lobby groups. Businesses lobby groups may also decelerate IPPCCs' duties (Newell, 2006, p. 111). For instance, some scientists were paid by some business lobby groups in 2007 to prevent the publication of an IPCC report. One organization funded by a business pressure group undermined the publication of this report in 2007.

Dowsdeswell and Kinley (as cited in Newell,2006,p. 137) explained that NGOs are not required to participate in the negotiation process during the bargaining phase; however, NGOs are able to be part of countries' delegations. Although NGOs may exert influence as part of the delegations, it can be said that countries' political objectives may remain unchangeable and limit the impact of NGOs. The way how NGOs exert influence in the negotiation process varies. Chatterjee and Finger (as cited in Newell, 2006, p 140) differentiated the way how NGOs exert influence into two groups: North and South. Newell (2006, p.140)stated that both groups can be subdivided into Northern political ecology groups like Friends of Earth and Southern groups like CSE. Conca (as cited in Newell, 2006, p. 140) used a different model where it is all about NGOs' access and power within the UN structure. NGOs may contribute to the negotiation process and exert influence by providing states expertise. Rahman and Rocerel (as cited in Newell, 2006, p. 141) observed that the NGOs' provision of expertise contributes to the process. In addition to the provision of expertise, NGOs may provide states with scientific and technical expertise. Scientific and technical expertise may aid NGOs' position in the negotiation process (Newell, 2006, p. 143). Following on this, using pressure on delegates may be another way of having an impact on the negotiation

process. For instance, NGOs warned African delegates regarding the use of Genetic Modified Technology, which may affect issues like global climate change, poverty and other issues in Africa (Foundation, 2006).The use of media by NGOs may demonstrate the exerting influence of NGOs. NGOs can also persuade governments that measures, which will be taken to solve an issue, may change and fail. Newell (2006, p. 148) observed that NGOs have more impact during the policy development and its development. In spite NGOs can exert influence on the negotiation process, it can be said that evaluating their influence is difficult. According to Newell (2006, p. 148), the relationship governments have with powerful NGOs may be accounted for this difficulty in assessing the impact of NGOs. Proposals are made in another stage, and it could also be that preferences or positions are shared in this stage. All these negotiations done in all these negotiations arenas will be concluded in an open plenary meeting where an agreement will be reached. This plenary meeting is the deal making arena and also the final phase

5.3.3.Consensus decision-making

As it has been indicated, decision-makers may choose from the following types of group decision-making in group decision-making: unanimity, consensus, authority rule, authority, minority rule, lack of response, and majority vote (Band & Partridge,1999,p. 3). Consensus is utilized at the COP in order to make decisions. The same types of decision-making is used by some animals like birds, and it could be that the majority voting system is used in animal decision-making next to consensus. In spite the use of consensus in climate decision-making, no adopted rules exist for making decisions in climate decision-making (Deplege, 2005, p. 91; Vihma, 2015; Deplegde and Yamina, 2004, p.442). Hence, Werksman (as cited in Depledge, 2005, p.7) emphasized that in case of lack of majority voting, decisions are made through the use of a consensus. Notwithstanding, the definition of consensus can be seen in the Convention or the rules of procedure (Yamin & Depledge, 2004, p. 443). In general, consensus includes the following aspects: the difference between consensus and unanimity, the inconvenience of consensus, and the dislike of the majority voting system. The difference between consensus and unanimity can be regarded as negative, because a decision has no formal disapproval (Depledge and Yamin, 2005, p. 443). Brinkman (personal interview, December 9, 2016) disagreed with Depledge and Yamin and reported that countries may disapprove in the negotiations, but they may not refuse due to consensus requirement. Nonetheless, the footer, which can be regarded as a disapproval in the negotiation texts ,indicates whether a country disagrees (Brinkman, personal interview, December 9, 2016). From that moment on, consensus can be regarded as a positive

aspect. According to Brinkman (personal interview, December 9, 2016), this is because a country may express its view stating that it disagrees on an aspect, but it agrees for the sake of the whole agreement (Brinkman, personal interview, December 9, 2016). Therefore, consensus can be viewed in a positive way. Consensus can be inconvenient because of more influence parties may gain and the ability they may have to reduce the effectiveness of agreements with brinkmanship strategies (Vihma, 2015). Brinkman (personal interview, December 9, 2016) argued that Vihma's statement can be regarded as true, and this disadvantage in consensus can be found in the importance each country has. Majority voting can be considered to be problematic due to dislike some countries may have of the majority voting system (Brinkman, personal interview, December 9, 2016). In spite countries may disagree on certain agreements, agreements will still be adopted in case of a majority. However, the majority voting system may be used as a last majority resort. The last majority resort prevents decisions to be taken; and therefore, they are taken by consensus. The COP president or the SB Chair is the only person who can decide on the existence of consensus (Yamin and Depledge, 2004, p. 443; Depledge, 2005, p. 92; Vihma, 2015). Nevertheless, consensus can be regarded as favorable as well. Consensus may lead to parties to maintain decisions, and parties will be unwilling to participate in a disagreement regarding voting (Depledge and Yamin, 2004, p. 444). Brinkman (personal interview, December 9, 2016) also asserted that consensus can be regarded as beneficial, as parties may maintain decisions and be unwilling to participate in a disagreement regarding voting. The fact that countries will not stop on very small details of an agreement, but they want to see the full agreement can be accounted for this convenience in consensus. In other word, consensus results in not blocking the agreement for a small detail in an agreement which a country dislikes.

5.4 How are decisions made in case of uncertainty in the climate decision-making process?

In the previous section, the decision-making process of the United Nations Climate Change Conference was delineated. In this section, an explanation will be given on how decisions are made in case of uncertainty during the climate decision-making process at the United Nations Climate Change Conference. A description of uncertainty should be given first, and types of uncertainties should be explained before explaining the decision-making process in case of uncertainty.

5.4.1The definitions of uncertainty

Climate change issues such as climate change include uncertainties. Uncertainty can be defined in various ways. A definition of uncertainty is given by the Global Commons Institute (2010) referring uncertainty to "situations in which the appropriate data might be fragmentary or unavailable"(p.9). According to Yehezkel's study (as cited in Fertel and Waaub, 2013), uncertainties can be described in terms of classifications. In one of these classifications, uncertainty revolves around qualitative and quantitative uncertainties where there is lack of information (Schneider, Rosencran, Mastrandrea & Kuntz-Duriseti ,2010,p. 55). In addition to this definition of uncertainty, Schneider,Rosencran, Mastrandrea and Kuntz-Duriseti (2010,p. 55) stated that uncertainty includes speculation, estimation and confidence. Predicting the future can be regarded as implausible, but uncertainty related to climate change focuses on the unforeseen effects of humanity and nature on climate (Fertel & Waaub, 2013). The uncertainty is utilized by Padilla et al (as cited in Lewandosky, Risbey, Smithson , Newell & Hunter, 2014) to refer to "the imprecision of our knowledge of various crucial climate variables which is typically captured by the variance of the variable's estimate".

Uncertainty should not be confused with risk. The latter is referred by Knight (as cited in Global Commons Institute 2010) to "cases for which probability of outcomes can be ascertained through well-established theories with reliable complete data" (p.9), whereas Schneider (as cited in Lewandosky, Risbey, Smithson, Newell & Hunter, 2014) defined risk as "a set of possible consequences of climate change, each with quantifiable probabilities and losses"

5.4.2. Contributors of uncertainty

These uncertainties can be found in scientific research. In order to predict the future of climate change, climate models or scenarios are used by scientists. However, these models or scenarios include uncertainties, and there are various reasons or sources four these uncertainties. These

uncertainties may have their origins in various models (Heal and Millner, 2014; Gooddess et al, 2007; Fernau, Makofske & South, 1993). Scientists make use of different models to predict the future of climate change, and they include different data. Other contributors to uncertainty in climate change GHG emissions and concentrations (Fernau, Makofske & South, 1993; Heal and Millner, 2014). Quantifying GHG emissions and concentrations can be difficult, as they hinge on factors such as population growth or energy which are difficult to be measured. Uncertainty in carbon sinks regarding GHG emissions and concentrations also contributes to their difficulty in quantifying them. The uncertainty in carbon sinks renders GHG emissions and concentrations assessment difficult due to its influence on GHG emissions and concentrations in a way it is unable to provide for the residence time of Co2 in the atmosphere (Fernau, Makofske & South, 1993). Feedback uncertainties can be considered as other contributors to uncertainties, which are part of scientific uncertainty. Climate modellers (O'Hare, 1999) make use of these feedbacks for transforming the warming effect. These feedbacks include water vapor, clouds, oceans, sea ice and snow. Notwithstanding, uncertainties are incorporated in these feedbacks (Fernau, Makofske & South, 1993). Models represent some of these feedbacks in a crude manner, whereas insufficient information and knowledge regarding these feedbacks are incorporated into other models. Other uncertainties such as the restriction on computer technology and cost, and horizontal grid resolution render it infeasible to include geographical elements in the models. Another source of uncertainty is the disagreement among scientific experts (Bradley & Steele, 2015). Scientists disagree on so many aspects such as the empirical claim or empirical issues. Ethical uncertainty may also be considered as a contributor to uncertainty. In this uncertainty, it is all about how benefits and costs of mitigation will be distributed among countries for the mitigation and the way of taking into consideration humans who hinge on measures that should be taken (Bradley & Steele, 2015).

Heal and Millner (2014) indicated other sources of uncertainties such as technological uncertainty and socioeconomic uncertainty. Technology affects economic growth and emission intensity of economic activities (Heal & Millner, 2014); however, assessing future economic growth through technical change cannot be possible. Socioeconomic uncertainty is related to limited research that has been done to explain the impact climate change has on economic growth and agriculture (Heal & Millner, 2014). Some research evaluated the negative impact climate change could have on economic growth and agriculture. Notwithstanding, the outcomes of these socioeconomic impacts from studies all vary. This was the case in Burke's study (as cited in Heal & Millner, 2014),

which demonstrated that this research utilized one model to predict the impact of climate change. Moreover, the results of these models varied. Compared to uncertainties that are included in climate change issues, animals may deal with uncertainty as well. The latter can be found in information each member obtains in animal decision-making. As it will be much more clear in section 5.7, one member may obtain inaccurate information in animal decision-making which may result in making errors, as the decision is made individually.

5.4.3. The decision-making in case of uncertainty

Decision-makers make use of models or scenarios in the climate decision-making process; and hence, have to deal with uncertainty. In case of uncertainty, three options may be utilized to manage uncertainty: go through the difficult issue and decide between probability and utility judgments, postpone decisions, and apply an alternative rule from the expected utility rule (Bradley & Steele, 2015). In spite these three options, decisions will not be taken (Gooddess et al, 2007). However, in this case, decisions will be postponed (Hernández, 2014, p. 109). As it will be much more clear in the following section, uncertainty can be regarded as an aspect that affects climate decision-making. Compared to how uncertainty is dealt with in the climate decision-making, animals deal differently with uncertainty in animal decision-making. As it will clear in the upcoming sections that in case of uncertainty, animals will make use of an equally shared decision-making, where the quorum rule is implemented (Conradt, 2011). Each animal will combine its information in this equally shared decision-making, resulting in making accurate decisions and avoiding making individual mistakes. Furthermore, according to Professor Dooremalen (personal interview, June 2, 2016), bees will first invest in getting information and then make decisions. Hence, scientists are recommended to invest in getting information, and then decisions should be made instead of being postponed in order to deal with uncertainty (Dooremalen, personal interview, June 2, 2016). Moreover, measures should be taken in order to deal with uncertainty (Dooremalen, personal interview, June 2, 2016). Brinkman (personal interview, December 9, 2016) rejected professor Dooremalen's perception of collecting more information and then make decisions in the climate negotiations. Brinkman (personal interview, June 2, 2016) reviewed that uncertainties do not exist anymore. They used to exist in the past, as scientists tend to do some research and collect this research. However, countries are able to reach an climate agreement due to the outcomes of this research. In other words, the outcomes of this research demonstrated what the cause could be for making climate change issue

uncertain. This research also demonstrate that reaching an climate agreement is possible and what the origins are of climate change issues.

5.5 What aspects do influence the climate decision-making process?

In the previous section, uncertainties have been described which could affect climate change. Moreover, the previous section explained how actors involved in the climate change decision-making process deal with these uncertainties. In this section, factors or aspects will be discussed that may affect the climate decision-making process.

5.5.1 The definition of stumbling block

Hernández (2014, p. 81) considered that climate decision-making is very complicated to understand due to a variety of negotiation characteristics and incorporation of science and technical aspects that are involved in climate decision-making. The factors or aspects that render climate decision-making complicated or affect the climate decision-making process can be referred to stumbling blocks. These stumbling blocks are described by Sjostedt and Penetrante (as cited in Hernández, 2014) as "impediments to the decision making process" (p. 391). The stumbling blocks can also be found in animal decision-making.

5.5.2. Types of stumbling blocks

These stumbling blocks can be classified into the following types of stumbling blocks: actors, issues, structures, processes, and outcomes. Actors involved in climate decision-making serve as obstacles for the climate decision-making due to incorporation of the aspects delegation size, leadership, interests and institutional memory. Delegates are sent on behalf of the government to the negotiation sessions. The number of persons in a delegation may vary from one to two persons or more (Depledge, 2005, p. 28). For instance, the US have a huge delegation size during the climate negotiations. The number of delegates depends upon poverty and wealth of countries which can be developed countries or developing countries. Depledge (2005, p .28) reviewed that a small delegation may also be due to lack of preparation and small expertise. Sjostedt (2013, p. 408) observed that developing countries lack of financial resources to send a large number of delegates to all climate negotiation sessions. Therefore, these countries cannot demonstrate their involvement in the climate decision-making process. In spite countries may have a huge delegation size, the latter entails challenges such as the rising financial costs, and the essential cooperation and preparation (Hernández, 2014, p. 87).

Leadership renders climate decision-making difficult. An administrative leadership, chair or political leader is required in order to make the climate negotiation sessions function well (Sjostedt, 2013, p. 410). Leadership's duties can only be performed by persons who are the chair, the secretary or the rapporteur. However, some persons lack of ability, experience or

skills to chair the climate negotiation sessions. Moreover, these persons may have a different process of chairing a negotiation session (Sjostedt, 2013, p. 410). In addition to the different process of chairing these persons may have, the elected person becoming a leader or chair needs to have the ability to carry out seven duties. Nevertheless, actors that are involved in the climate negotiations may only be able to perform a few duties (Sjosted, 2013, p. 411). The contribution of NGOs in the climate negotiations may render decision-making complicated as well. NGOs may provide expertise in the climate negotiation sessions, but their contribution may limit decisions through the use of national legal frameworks (Hernández, 2014, p. 85; Sjostedt, 2013, p. 413). The use of pressure on parties and communication channels to express NGOs' opinions may also render the climate negotiations complex (Depledge, 2005, p. 29).

Interests may be considered as reasons to impede climate decision-making. Actors involved in climate decision-making have various interest, and this may result in presenting different proposals based upon actors' interests (Hernández, 2014, p. 84; Depledge, 2005, p. 8). Institutional memory can also be considered as an obstacle that may impede the climate decision-making. Hernandez (2014) referred the institutional memory to "a collection of facts, norms, concepts, principles, experiences and know-how that actors collect within a specific course time" (p. 86). Institutional memory can be regarded as feasible for participants in climate decision-making, as they have to comprehend negotiation styles, acronyms and abbreviations. Despite the importance institutional memory can have, it can be disadvantageous as participants may not be able to avoid the framework of cognitive thinking (Hernandez, 2014, p. 86). In order to solve these factors, strong leadership is required. Brinkman (personal interview, December 9, 2016) argued that the majority voting system with a quorum is not of great importance, but one person can change many make a differences. A good, smart and strong chairman or a president of the meeting can make the negotiations work in a way that something will occur in the climate negotiations (Brinkman, personal interview, December 9, 2016). This situation of having a good, smart and strong chairman or a president of the meeting can also be found in animals such as gorillas. One male gorilla may offer his protection to his family against other males or predators (Brinkman, personal interview, December 9, 2016)

Issues may be linked to several aspects that make the climate decision-making difficult such as trans-boundary; the connection between issues; the interconnection between climate change, negotiations and issues; the immeasurability of issues; and the multidimensional aspects of

issues. Climate change is a transnational issue. In order to solve this issue, cooperation should be required and policies should be created at national and international level. However, Swarts and Randall (as cited in Sjostedt, 2013, p. 401) argued that transnational characteristic of climate change is a dilemma as different effects are included such as the rising sea level or deforestation. These effects may vary from country to country, and they may delay international policy-making. Various actors, interests, and decision-making may make policy-making complex. Furthermore, the transnational feature of climate change may strengthen the issue of blaming the actor for being responsible for climate change (Sjostedt, 2013, p. 401). Designating the actor or actors that may have the responsibility for ending climate change depends on the political aspects.

Issues that are discussed in climate decision-making are related, and this interrelationship renders the climate decision-making difficult. These issues are interconnected with policies in the environmental sector, the transport sector, the energy sector and the agricultural sector (Sjostedt, 2013, p. 406). These issues require to be taken into consideration by actors in the climate decision-making. In the meanwhile, this duty can be challenging, because these actors have to implement various systems for various interconnected issues. Some issues regarding climate change can be easily assessed. For instance, the amount of CO2 emissions can be evaluated. The same cannot be said for other climate issues, and this may lead to the difficulty in calculating rewards, also known as benefits and costs. Therefore, the immeasurability of issues, affect the climate negotiations. The above rewards and costs are values, and values and climate decision-making are interdependent (Hernández, 2014, p. 91). The miscalculation of benefits and costs due to incalculability of some climate issues may be an impediment. Actors may not be able to invest their money in a project or fund in case of miscalculation. Instead, decisions will be postponed.

As issues are connected to each other, a connection exists between climate negotiations, climate change, and issues. According to Sjostedt (2013, p. 406), change is required in order to facilitate the negotiations. For this reason, there should be a focus on these issues such as uncertainty (Sjostedt, 2013, p. 406). This interrelation within issues may impact the climate decision-making process. It could also be said that some issues that are discussed in the climate negotiations have an uncertainty dimension. Uncertainty is included in manifestations, measures, causes, and effects of these issues. According to Hernández (2014, p.89), these measures, effects, and manifestations may impede the climate decision-making. For instance,

participants in the climate negotiations do not have the capacity to predict when these effects of climate change will occur. Furthermore, the climate negotiations can be impeded in a sense that new issues can be discussed, as issues on the agenda have been solved (Yamin & Depledge, 2004, p. 31-32). This may turn into a vicious cycle where new issues will still be placed on the agenda and have to be resolved, while issues that have already been on the agenda are solved.

The above manifestations, measures, causes and consequences that complicate climate negotiations make the latter much more difficult because of the multidimensional aspects of issues. Manifestations, measures, causes and consequences are not only included in these multidimensional aspects of issues, but also in the implementation of technology, international laws, and economic instruments (Sjostedt, 2013, p. 404). Sjostedt (2013, p.404) suggested that scientific and technical knowledge are required in order to solve these multidimensional aspects. For example, poor developing countries lacked of scientific and technical information to offer their assistance during the climate talks in Kyoto. Furthermore, the utilized methods to deal with these dimensional aspects of issues can be inappropriate. Some developing countries cannot use these methods to cope with these dimensional aspects because of its unsuitability. In order to solve these factors linked to issues, animal group decision-making cannot be used to address or solve these factors. Brinkman (personal interview, December 9, 2016) pointed out that animals may not be able to solve or address these types of issues as they can be regarded as too complicated, and they are multidimensional, interdisciplinary, interrelated and connected. So to solve or address these factors, these issues should be to be solved or addressed step by step (Brinkman, personal interview, December 9, 2016). In other words, every issue needs to be solved or addressed into small pieces. This has been the case at the United Nations Climate Change Conference in Paris, where it took ten years to solve those factors.

Different elements within the stumbling block structures may hinder the climate negotiations. Sjostedt (2013, p. 392-400) identified several elements within structures: external structural aspects and internal structural aspects. Various external structural aspects may hinder the climate negotiations such as the world economy or the power structure, known as power distribution. Power distribution can be a blockage to the climate negotiations. It may result in political imbalance and the emergence of uncertainty in policy development (Sjostedt, 2013, p. 393). The definition of power in this context may vary. Scientists refer power to impacts, and it indicates the understanding of the actors' conduct (Hernández, 2014,p 95), whereas in the climate

negotiations, power is referred to the ability of convincing an actor to alter from view or maintain its view in the climate negotiations (Hernández 2014, p. 95). Each actor or country should be able to evaluate its own power. The incapability of not doing calculating its own power is an impediment to the climate negotiations. As a consequence, actors will not create suitable durable policies (Hernández, 2014, p. 95; Sjostedt, 2013, p. 393). In order to solve this power structure, countries need to combine their forces to stand up against a bigger country (Brinkman,personal interview, December 9, 2016). A small country which is affected by climate change and has less political power can combine its force with other countries to stand up against a huge country that has more political power. As a result, they both will be regarded as equal. Compared to external structural aspects, two internal structural aspects may serve as stumbling blocks: the negotiation effectiveness of institutions and the negotiation effectiveness of institutions as a whole is another internal aspect. . (Sjostedt, p.395, 2013). All institutions have their own rules, procedures and norms that should be applied. The United Nations' institutional template is used as a model for the decision-making process. On the other hand, the United Nations' organizational template is more ineffective than the World Trade Organization's template (Sjostedt, 2013, p. 395). According to Sjostedt (2013, p. 395), this ineffectiveness may be demonstrated at the UN Climate Change Conference in Copenhagen. For this reason, some scholars suggested changes. Experts recommended bodies to supplement the United Nations (Hernández, 2014, p. 97), whereas others suggested an interpretation of norms, rules and procedures from the United Nations. The structure can be considered as a blockage for the climate negotiations. This stumbling block is attributed to an increase in number of emerging institutions such as the Global Environmental Facility or the subsidiary body. Sjostedt (2013, p. 398) did not consider the emergence of institutions as a problem itself, but the slow and difficult organization among these institutions may be regarded as an issue and a blockage.

Obstacles that are part of actors, issues and the impediments of climate negotiations affect the processes. These obstacles are aspects included in processes, and they may have two negative impacts on the processes: time gaps and processes. Issues in climate decision-making affect all generations. Decisions regarding these issues for future generations will be delayed, and these issues will be transferred to these future generations. Furthermore, decisions will be postponed. The impediment here is the foresight of climate policy development. Processes are interconnected and interdependent just like issues. The variety of processes leads to the use of different approaches to deal with complex decision-making. Hernández (2014, p.103) stated that

one option is dividing difficult issues, and another alternative is the use of sectors. It can be said that these sectors can be divided into various subsectors such as transport, industry, services, buildings, land use and land utilization, and energy systems (Hernández, 2014,p. 103). The division of issues in sectors results in sectorial accords. Bodansky (as cited in Hernández, 2014, p.103) emphasized that these accords enable to structure policies. Additionally, some objectives within each sector are used. Bodansky (2007 as cited in Hernández, 2014, p. 103) outlined that the agreement reduces the number of actors and countries. Nevertheless, the agreement includes more participants. On the other hand, actors may not agree with the sectorial agreement, and this agreement may not be introduced. Moreover, the IPCC considers the use of double counting and under counting in the agreement as an obstruction (as cited in Hernández, 2014, p. 104). Climate focus (2015,p. 1) identified double counting as issues where the greenhouse gas emission is utilized twice or more. It is unknown for countries how those sectors could be responsible for those emissions.

Outcomes can be considered as obstacles, and it revolves about the achievement and its impact on the actors' conduct. Climate negotiations also have a negotiation outcome. According to Dahl (as cited in, Hernández 2014, p.105), a negotiation outcome refers to an agreement such as a treaty. The outcomes may impede the negotiation process due to several aspects: expectations of the negotiation outcome, change in power distribution and new governments, uncertainty, outcome externalities, and compliance and verification (Hernández, 2014, p. 104-111). Expectations of what the negotiation outcome will be may vary, and these expectations are one of these aspects. The variation of expectations may block or delay the negotiation process in several ways. Participants in climate decision-making may have high expectations of a negotiation outcome. Hence, participants will not be prepared for planning alternatives in case no agreement will be reached. This was the case at COP15, where participants expected that an agreement would be reached; however, it was not reached. Participants did not prepare for this, and there were no alternatives. Less expectation will block or delay the negotiation process. Consequently, less resources will be used or there will be less interest in cooperation in the negotiation process (Hernández, 2014 , p. 107). For example, countries may have less delegates. This was not the case for the United Nations Climate Change Conference of Paris, where there was low expectation, and this has been low since the United Nations Climate Change Conference Copenhagen failed (Brinkman, personal interview, December 9, 2016).

Outcome externalities may impede the climate decision-making. The negotiation process is composed of several stages. Several negotiation agreements are reach in each of these stages such as the agenda setting agreement or the formula agreement. Hernández (2014, p. 108) highlighted that these agreements are related to a puzzle. For instance, an agreement may explain the agenda and the issues on the agenda item. If some participants of the negotiation process have not participated or an agreement lacks of authority ,the negotiation process will be impeded. The negotiation process is also delayed due to change in power distribution and new governments. Nevertheless, the distribution of power contributed to the climate negotiations, as China and the US have become equal (Brinkman, personal interview, December 9). Uncertainty is also part of the aspect within outcomes that may have an impact on decision-making. Decision-makers have to cope with uncertainty in the negotiation outcomes. This uncertainty can be a dilemma for the decision-making process. In case of uncertainty, decisions will not be made. Therefore, some plans in the agreement require to be discussed and conditioned (Hernández,2014,p.109). As a result, the negotiation process will be blocked.

Compliance and verification may block the climate decision-making. An agreement with the aim of solving issues should be implemented. Moore (as cited in Hernández, 2014) proposed eight aspects that should be taken into account:

“a consensual agreement about the criteria used to measure successful compliance, the general and specific steps required to implement decision, identification of the actors (also those outside the negotiation process) who have the means to influence the necessary changes, an organizational structure (if applicable) to implement the agreement, provisions that will accommodate both future changes in the terms of the agreement and changes in disputing parties themselves(here identified as ‘contingency provisions’), procedures to manage unintended or unexpected problems, or violation of the settlement that may arise during implementation (‘additional contingency provisions’), methods to monitor compliance, as well as the identity of the monitor (s) (‘verification measures)’, determination of the monitor’s role’’ (p.109).

Compliance and verification methods may be a challenge for the negotiation process. They may enable countries to postpone their decisions or request more preparation. Furthermore, countries may see their rights be restricted due to lack of institutional power from of above to enforce penalties for misbehavior. In order to solve or address these factors that are part of the

stumbling block outcomes, animal group decision-making cannot be used (Brinkman, personal interview, December 9). Animals cannot deal with these factors, as it is too complicated due to involvement of these factors in an integrated decision-making (Brinkman, personal interview, December 9).

As the stumbling blocks actors, issues, structures, processes and outcomes may affect the climate negotiations or render them complicated, these stumbling blocks cannot be solved through group decision-making, where the majority voting system is implemented, like bees make use of group decision-making, where the quorum rule is applied**.** The majority voting system can be considered to be unfeasible to be implemented in the climate negotiations due to dislike of the US and China regarding the majority voting system, as it has already been indicated that China and the US may be opposed to an idea or an agreement. Nonetheless, an agreement will always be adopted in case of majority (Brinkman, personal interview, December 9, 2016). Despite these stumbling blocks cannot be solved or addressed through the use of the majority voting system, which is also used in animal group decision-making like bees do when searching for a nest site, these stumbling blocks have already been solved, because countries succeeded in reaching a climate agreement at the United Nations Climate Change Conference of Paris (Brinkman, personal interview, December 9, 2016). Brinkman (personal interview, December 9, 2016) analyzed that the use of consensus in the climate negotiations demonstrated that countries managed to overcome these stumbling blocks through an agreement China and the US concluded prior to the United Nations Climate Change Conference of Paris.

5.6 What do others think that should be changed in the climate decision-making process?

In the previous section, the following factors were discussed: actors, issues, structures, processes, and outcomes. In this section, opinions of people will be presented on what should be changed in behavior by actors involved in climate change decision-making compared to animal group-decision-making. These opinions are from interviewees.

5.6.1 Views

There should be changes in the behavior by actors in the climate decision-making compared to animal group-decision-making. Professor Dooremalen (personal interview, June 2, 2016) suggested the following alterations: attentiveness, consideration of the effects of climate change when postponing climate decisions, application of consensus decision-making, and an increase in delegates in the climate decision-making. According to professor Dooremalen (personal interview, June 2, 2016), information is dispersed in bee decision-making due to the attention bees pay to all opinions of bees. Therefore, actors that are involved in the climate decision-making should pay attention to all actors and not only to participants, who express their views or who do not express theirs, because an actor may have some knowledge or expertise another lacks. Furthermore, being attentive to all participants can be considered as a good idea when cooperating. This attentiveness may result in making a balanced decision where climate change issues such as the sea rising level have been viewed from different perspectives, and aspects have been taken into consideration. As the climate decisions tend to be postponed or not be made, the effects of climate change such as inundations or the rising sea level may get bigger . Postponing the climate decisions and not making them may be linked to lack of information. Scenarios or models are created by scientists, and they are utilized by decision-makers to obtain the information. Even though these scenarios or models may include uncertain information, they are still used. As climate decisions are immediately required (Dooremalen, personal interview, June 2, 2016), they will be made immediately, followed by an investment of collecting information (Dooremalen, personal interview, June 2, 2016). The effects of climate change, which are attributed to delay in the climate decisions should be taken into consideration. According to Brinkman (personal interview, December 9, 2016), bees do not take account of the effects of delaying decisions. However, animals like bees will first invest in getting information and then make decisions.

The climate decision-making process should take place in a kind of consensus decision-making. The latter should be a negotiation process where each country should be represented by delegates, because it is impossible to get individual votes from all people around the world in order to involve the whole world in the climate decision-making process. As discussed in section 5.3, negotiations are used by animals in the animal decision-making such as mammals. Each country should have one delegate; however, more delegates will be required in case a country is more affected by climate change issues such as pollution. In spite professor Dooremalen's recommendations regarding the changes in behavior by actors in the climate decision-making compared to animal behavior in the animal decision-making , it can be said that it is not how international politics work (Brinkman, personal interview, December 9, 2016). The US and China will always remain more powerful compared to Zimbabwe or any other developing country (Brinkman, personal interview, December 9, 2016).

5.7 How do animals make decisions?

In the previous section, opinions of people were discussed on what should be changed in behavior by actors involved in climate change decision-making compared to animal group-decision-making. In this section, animal decision-making will be discussed.

5.7.1. Animal decision-making

In order to make society work, humans do make decisions. These decisions can be made individually and collectively. Although humans make use of make use of individual and group decision-making, the latter is also utilized by animals and important for them. For example, bees decide together when searching a new nest site. According to Kameda, Wisdom and Toyokawa & Inukai (2012), animal group decision-making will be used in case of an emergency such as lack of food or search for nest sites.

5.7.2. Types of animal decision-making processes

Animal group decision-making can be divided into branches. Conradt and Roper (2005) distinguished two branches of the animal group decision-making: consensus and combined decision-making. The same branches can be found in human decision-making. The consensus decision-making, also known as aggregate decision-making, revolves around reaching a consensus. In this case, everyone involved in the decision-making process should participate and abide by the final decision. The combined decision-making, also known as interactive decision making, refers to the decision-making where all group members select individually an option from all options. It can also be said that this selection could affect the whole group. The combined decision-making is utilized by eusocial animals or other animals such as mammals. When it comes to the combined decision-making, Seeley, Camazine and Sneyd (1991) investigated how bees use this decision-making by evaluating how a colony of bees exploits nectar. Combined and consensus decision-making embody decision issues. These decision issues may include two options or more, and they vary from size and shape such as the option to select many directions (Conradt & List, 2009).

5.7.3. Types of consensus decision-making process

Consensus decision-making can be subdivided into two categories: the degree in which conflict of interest can be included between group members and the involvement of local or global communication in that conflict of interest between group members. Consensus may not be reached, because the involvement of local or global communication affects the consensus

decision-making (Conradt & Roper, 2005). Some animals could have a global overview. In this case, Austen-Smith and Feddersen (2008) noted that decisions are reached through negotiations, and the majority voting rule is implemented such as in deer decision-making. This is the case in small groups of animals. The use of negotiations combined with the majority voting system can be seen in human societies. However, decision-makers may lack of global overview in a large group (Conradt & List, 2009). In this case, animals communicate through self-organization, where they make use of their behavioral rules, local information and communication are used, and leadership does not exist such as in fish school (Conradt & List,2009; Conradt & Roper, 2005; Petit & Bon, 2010). According to Couzin et al's models (2005), information in a large group of animals, where communication is self-organized, is successfully transmitted. Moreover, this is the case when animals are not aware of who obtain information. Furthermore, less informed animals are required to guide such a large group.

In order to get a better understanding of animal group decision-making works, Conradt and Roper (2005) named several questions that should be asked in consensus and combined decision-making: who decides, what are the mechanisms, and what are the functions. The consensus decision-making can be differentiated into three groups: an equally shared decision-making, an unshared decision-making, and an intermediate decision-making (Conradt & Roper, 2005). In the equally shared decision-making, all group members in the decision-making, and the qualified majority voting system or the quorum rule is used in order to determine the decision (Conradt and Roper, 2005). Bees use this equally shared decision-making, and Seeley investigated how bees utilized it. The unshared decision-making is used by animals such as dolphins where one animal leader decides for the whole group. Compared to unshared and equally shared decision-makin, both shared and unshared decision-making processes are applied in an intermediate decision-making (Conradt & Roper, 2005). The leader could also be a minority group in an unshared decision-making.

5.7.4. Factors

In section 5.5, it has been clear that stumbling blocks may affect decisions in climate decision-making. The same can be said for decisions in consensus decision-making in animal group decision-making, where decisions are influenced by factors. List (2004), Mallon et al (2001), Conradt and Roper (2005), and Franks et al (2003) distinguished the following factors that affect consensus decision-making: time, information, cognitive skills of animals, and conflict of interest in a decision-making group. Time may enable animals to take the same decisions like their fellow animals. Laland (as cited in Kerth, 2010, p. 250) explained that animals will follow their fellow animal in case they benefit from the best informed animal, and decision is required. However, according to Laland (2004), following other members could also result in making the wrong decisions. Each member in the decision-making process obtains some information about a certain aspect; however, the information may include some mistakes due to lack of information (Conradt & Roper, 2005). As a result, a member makes mistakes (Conradt 2011). Nonetheless, animals can pool their information in a shared decision-making. As a result, the number of errors and bad decisions animals make decrease (Conradt, 2011). The quorum rule plays a role in this accuracy. Sumpter and Pratt's research on animal group decision-making (as cited in Conradt, 2011) noticed that the use of the quorum rule led to a high collective decision-making where no mistakes or less mistakes are being made compared to individual decision-making. Notwithstanding, the speed of making decisions was very slow. Furthermore, it plays an important role in making accurate decisions. Sumpter and Pratt's research (as cited in Conradt, 2011) also reviewed that speed increases with the number of decision-makers. Nevertheless, the more decision makers are involved, the more the decision-making process will be delayed (Petit & Bon, 2010). Thus, accuracy is contingent upon the number of decision-makers. Conflict of interests may emerge in the animal consensus decision-making process. Participants may have various interests in consensus decision-making (Conradt & List, 2009) or different views on the outcomes of consensus decision-making (Conradt & Roper, 2005). As a consequence, conflicts of interests will emerge. These conflicts of interests may occur in animals such as pigeons, whereas no or less conflict of interests can occur in an shared and mostly unshared decision-making such as in decisions regarding searching for new nest sites (Conradt & Roper 2005). According to Conradt & Roper (2005), the latter is attributed to common objectives animals have.

5.8. What does animal decision-making demonstrate?

In the previous section, animal decision-making was explained. In this section, animal behavior in animal decision-making will be discussed from which actors involved in climate decision-making could learn from. Moreover, this section will discuss how animal behavior in animal decision-making could be applied in climate decision-making process.

5.8.1. Lessons from bees

Animal behavior in animal decision-making how humans could make decide. According to Seeley (2010, p. 3), bees can be considered as a gift and an example to humans in a way they are a community where cooperation is of great importance with the aim of achieving goals. These bees are considered as a gift and an example to humans because of their self-organization, where no managers are required to guide them when making decisions (Dooremalen, personal interview, June 2, 2016). Seeley, Visscher and Passino (2006) asserted that individuals could learn from bee behavior in decision-making. Seeley, Visscher and Passino (2006) and Seeley (2010, p. 81) distinguish the following attitudes bees demonstrate which humans could learn from: the organization of a fair competition in the decision making process; the promotion of knowledge, opinions, and ideas; and the utilization of the quorum rule. According to Seeley (2010, p. 81), "an open and fair competition of all ideas" in a decision making can be a solution in a decision making where all information is dispersed among a group of individuals". An individual bee pools its information in a situation where the information is dispersed among a group of individuals (Dooremalen, personal interview, June 2, 2016). If a bee has found a nest site, it will inform other bees about the nest site that has been found. They will be requested to follow the bee that informed them (Dooremalen, personal interview, June 2, 2016). Actually, two nest sites are in competition with each other, and the nest site with a large number of recruiters will be chosen (Dooremalen, personal interview, June 2, 2016). Furthermore, bees do not conform their decisions to others, but each bee takes a look at a particular nest site before making decisions individually. The use of the quorum rule enables to collect opinions of bees. In general, the quorum rule is implemented in an equal decision-making. This quorum rule may improve decision accuracy (Pratt & Sumpter, 2008), resulting in avoiding making errors. Seeley, Visscher and Passino (2006) claimed that humans could cooperate better in group decision-making and make good decisions by taking the following attitudes of bees into account: the utilization of the quorum rule; the promotion of knowledge, opinions, and ideas; and the organization of a fair

competition within the decision making process. Professor Dooremalen (personal interview, June 2, 2016) stated that decision-making in bees also demonstrates that each expertise is valued.

5.8.2. lessons from animal collective decision-making

In general, several animal attitudes could be learned from animal group decision-making. Sumpter and Pratt (as cited in Petit & Bon, 2010) observed that collective decision-making in animals results in integrations and making quickly accurate decisions than in individual decision-making. A research on democracy and despotism in animals was done by Conradt and Roper. This research (as cited in Levine, 2013,p. 315) reported that better decision outcomes resulted from collective decision-making, whereas decisions were made by one individual in despotism. Conradt and Roper (as cited in Levine, 2013, p. 315) asserted that the collective decision-making can be regarded as beneficial, because this may result in less extreme decisions because of the impact each individual has on decision. Kameda and Nakanishi (as cited Levine, 2013, p. 315) emphasized the impact uncertainty could have on decisions. This uncertainty cannot only be addressed by one individual who makes decides for the whole group, as this is difficult (Conradt & Roper, 2003); however, uncertainty could easily be addressed through collective decision-making ,as all members pool their opinions. As a result, making errors could be avoided (Hastie & Kameda, 2005). Computer simulation studies (Hastie & Kameda, 2005) indicated that the majority voting system resulted in higher accuracy in decision-making under uncertainty.

5.8.3. The application of lessons on climate decision-making

In the previous subsections, it has been clear that bee decision-making and animal group decision-making in animals attest behavior, which humans and actors involved in climate decision-making process could learn from, and this animal behavior could be implemented in the climate decision-making process. The main question here is how this animal behavior demonstrated from animal decision-making can be applied in the climate decision-making process. As indicated in the previous sub section that the use of the quorum rule in animal decision-making results in avoiding errors, collective decision-making is already utilized at the COP, where the majority voting is used. Collective decision-making in climate decision-making takes place through negotiations, which are utilized by some animals, and decisions in the climate decision-making process are already made through the use of consensus decision-making. The use of collective decision-making in the climate decision-making process can be considered as difficult in order to end uncertainty. This difficulty is attributed to the use of scientific scenarios and models by actors to manage uncertainty, and these scientific scenarios may include

uncertainties. For this reason, professor Dooremalen (personal interview, June 2, 2016) recommended an investment in collecting more research, and climate decisions should not be postponed but made. In addition to professor Dooremalen's recommendation, an open and fair competition of all ideas in bee decision-making can be applied in the climate decision-making by giving all actors the opportunity to express their views.

Although animal collective decision-making can be beneficial, differences between animals and humans exist in decision-making (Conradt & List, 2009). These differences can be discovered in rationality, language and most effective concepts. Humans can be regarded as rational, because they make rational decisions. The latter is not the case for animals. Conradt and List (2009) claimed that animals lack of ability to make rational decisions due to the evolutionary processes animals go through. As a result, animals make decisions, as they go through the evolutionary process. Both humans and animals make use of language in decision-making; however, the use of language in decision-making differs from humans and animals (Conradt & List, 2009). Animals use language to communicate through the use of signals, and they vote through a behavioural strategy for a particular decision. In contrast to the use of animal communication, human communication enables humans to express their views and information (Conradt & List, 2009). Furthermore, humans may rank their options through human communication, and it may render decision-making complicated, because not everyone may agree with the rank order. The most effective concepts, also known as the survival of the fittest, may restrict natural selection processes. These processes differ from animals and humans. It can be said that climate negotiations cannot operate independently from each other because of their relationship with geopolitical issues (Brinkman, personal interview, December 9, 2016). In other words, the negotiation process can be viewed as difficult to be altered (Brinkman, personal interview, December 9, 2016). However, Brinkman (personal interview, December 9, 2016) noted that the reality demonstrate that negotiations can work. Countries are capable of concluding an agreement. This can be seen at the Paris United Nations Climate Change Conference.

6.Discussion

The objective of this research was to ascertain and explain how behavior by actors involved in climate decision-making may be compared to animal decision-making. In the previous chapter, results on the climate decision-making and the animal group decision-making were presented, and these results demonstrated how behavior by actors involved in climate decision-making may be compared to animal decision-making. It cannot be confirmed that behavior by actors may be compared to animal decision-making. Nevertheless, there are some animal attitudes in animal decision-making that are already used in the climate decision-making, and that attitudes should be taken into consideration. In this subsection the results of this research will be analyzed.

6.1 Analysis

6.1.1 Decisions

This research states that the term definition can be defined in various ways. It can be described as the selection of one alternative. This definition resembles Brinkman's definition (personal interview, December 9, 2016), which describes decision as selecting an option. However, this decision should be well formulated, and this could be in words or on paper (Brinkman, personal interview, December 9, 2016). Eilon (1969) also utilizes the selection of alternatives for defining decision, and the same can be said for Harisson's definition of decision (1996), which delineates decision as "a moment, in an ongoing process of evaluating alternatives for meeting an objective, at which expectations about a particular course of action impel a decision maker to result in attaining the objective". Brinkman (personal interview, December 9, 2016) states that Harrison's definition of decision covers the whole aspect of decision. However, decision can also be referred to decision-making to describe decision, and it can be defined as the selection of an option to attain a goal. This definition resembles Flynn and Williams' definition of decision-making (as cited in Williams & Kennedy, 2000, which refers to the selection of an alternative for a plan with the aim of reaching a goal. According to Brinkman (personal interview, December 9, 2016), Flynn and Williams' definition of decision-making is similar to his description of definition, which outlines decision-making as the selection of an option from other options or combined options.

6.1.2. Climate decision-making

This research demonstrates that various actors participate in climate decision-making process at the COP. Nevertheless, some of these actors are partly involved in climate decision-making such as companies and non-state actors. They lobby national governments in order to make their

voice hear. Brinkman (personal interview, December 9, 2016) states that only countries participate in the climate decision-making, as the UN are composed of countries and not of actors such as media, businesses, and non-governmental organizations. Moreover, including media, businesses, and non-governmental actors in the climate decision-making will render concluding an agreement undoable, as it is already difficult for countries that are involved in the climate decision-making to agree on agreement (Brinkman, personal interview, December 9, 2016). This climate decision-making process takes place through the negotiation process, where the majority voting is implemented. The latter resembles Conradt and List's observation. Conradt and List (2009) observe that the use of negotiations combined with the majority voting systems can be seen in human societies. Consensus is used in these climate negotiations . Consensus includes several aspects which make consensus inconvenient, and one of them is the difference between consensus and unanimity. This difference can be regarded as negative due to lack of formal disapproval (Depledge and Yamin, 2005, p. 443). Nevertheless, this may not be the case as Brinkman (personal interview, December 9, 2016) states that a formal disapproval exists in a form of a footer, and consensus will become positive in a way that countries express their dislike for the agreement, but they agree for the sake of the entire agreement.

This research also states that negotiations at the Climate Change Conference can be affected by several stumbling blocks, which may render climate decision-making complex, through factors which are embodied in these stumbling blocks. These stumbling blocks can be categorized into the following types of stumbling blocks: actors, issues, structures, processes and outcomes. However, these stumbling blocks differed from the stumbling blocks stated by Kahan and Brahan (as cited in Jones et al., 2014), who distinguish the following factors that may affect the negotiation process: cultural values, psychology, languages, and ethics. The stumbling blocks actors, issues, structures, processes and outcomes are all composed of factors which render the climate negotiations difficult such leadership, interests or outcome externalities. Brinkman (personal interview, December 9, 2016) reviews that these factors cannot be solved or addressed through animal decision-making, as animals may have difficulty in solving issues that are multidimensional, interdisciplinary or related. Moreover, animals will always think on a short-term instead of a long-term (Brinkman, personal interview, December 9, 2016). Nonetheless, the stumbling blocks actors, issues, structures, processes and outcomes can be solved or addressed through the use of consensus (Brinkman, personal interview, December 9, 2016). Consensus is

also used by animals. Conradt and Roper (2005) distinguish two branches of animal group decision-making: consensus and combined decision- making.

Uncertainty, which is part of the stumbling block outcomes, is difficult to be dealt with. Countries have to deal with uncertainty during the climate negotiations. Uncertainty which is described by Yehezkel's study (as cited in Fertel and Waaub, 2013) or scholars such as Padilla et al (as cited in Lewandosky, Risbey, Smithson , Newell & Hunter, 2014) in various terms, but all terms have the same meanings. The uncertainty renders the climate decision-making process complex as it has its origins in the following sources: scientific uncertainty, technological uncertainty, socioeconomic and ethical uncertainty. The uncertainties are represented in scientific scenarios and models, which are used by decision-makers. A similar statement is given by professor Dooremalen (personal interview, June 2, 2016), who states that these models will be used by decision-makers, even though they include uncertainties. In order to make decisions under uncertainty in the climate decision-making process, the following three strategies could be used: go through the difficult issue and decide between probability and utility judgments, postpone decisions, and apply an alternative rule from the expected utility rule. The strategy postponing decision will be used. This replicates professor Dooremalen's statement (personal interview, June 2, 2016), which emphasizes that decisions will be postponed. However, animals like bees will first search for information and then make decisions. Therefore, professor Dooremalen (personal interview, June 2, 2016) suggests that an investment in collecting research should be required in order to deal with uncertainty instead of still postponing decisions. Nonetheless, Brinkman (personal interview, December 9, 2016) reports that uncertainty is not important anymore, because uncertainty does not exist at this moment. The collection of scientific research can be accounted for the non-existence of uncertainty at this moment (Brinkman, personal interview, December 2016).

6.1.3 Animal decision-making

This research outlines that animals also make use of group decision-making. Conradt and Roper (2005) differentiate two branches of animal group decision-making: consensus decision-making and combined decision-making. Conradt and List (2009) divide animal group decision-making into the same branches of animal group decision-making. Humans and actors involved in climate decision-making can learn from animal behaviour in animal group decision-making. Seeley (2010) points out that bees demonstrate that "an open and fair competition of all ideas" in a decision

making can be a solution in a decision-making where all information is dispersed among a group of individuals" (p.81). Professor Dooremalen (personal interview, June 2, 2016) explains that an individual bee pools its information in a situation where information is dispersed among a group of individuals. Moreover, the use of the quorum rule enables bees to express their views and to make quickly and accurate decisions. In addition to the use of the quorum rule, bees do not conform their decision to others bees, but each bee inspects a nest site before selecting a nest site. Furthermore, this research indicates that bees can be regarded as an example to humans in a way these bees are regarded as a community where cooperation is of great importance in order to achieve goals. Professor Dooremalen (personal interview, June 2, 2016) agrees with the latter and reports that considering bees as an example to humans is attributed to their self-organization where no leader is involved.

This research also indicates that animal behaviour in animal group decision-making demonstrates the following attitudes: the ability to deal with uncertainty when all members pool their information, and the use of the majority voting to make accurate decisions in decision-making under uncertainty. Professor Dooremalen (personal interview, June 2, 2016) suggests the following changes in behaviour by actors involved in the climate decision-making compared to animal decision-making: attentiveness, consideration of the effects of climate change when postponing climate decisions, application of consensus decision-making, and an increase in delegates in the climate decision-making. Despite these recommendations, Brinkman (personal interview, December 9, 2016) states that international politics do not work this way, and changing the negotiation process in the COP can be regarded as difficult, as climate negotiations include geopolitical issues. These climate negotiations and geopolitical issues are also interrelated. Furthermore, some of the recommendations proposed by professor Dooremalen are already implemented at the Climate Change Conference.

7.Conclusion

The objective of this research was to ascertain how behavior by actors involved in climate decision-making should be compared to animal group decision-making. The use of literature and interviews confirm in how behavior by actors involved in the climate decision-making should be compared to the animal group decision-making; however, it is not possible to compare the behaviour by actors involved in the climate decision-making to animal group decision-making, because changing climate decision-making process can be regarded as difficult because of the interrelation between the climate negotiations and geopolitical issues. Furthermore, international politics works completely different, and differences between humans animals exist.

This research has outlined that the term decision can be described in various ways. Some researchers described decision as selecting an alternative from other alternatives with the aim of reaching a specific goal, or they provided a similar description of decision. It can also be said that the decision can be referred to decision-making to define decision which can be described in various ways. Some researchers referred decision-making to the selection of an alternative by a decision-maker to resolve a problem, while other researchers identified decision-making in another way. Furthermore, it has been clear that decisions can be made individually or collectively. In case decisions are made collectively, decision-makers may select various types of group decision-making: unanimity, consensus, authority rule, authority, minority rule, lack of response, and majority vote.

Moreover, this research demonstrated that the climate decision-making process takes place through the use of the negotiation process where the following actors are involved: international governments of countries, businesses, NGOs, and media. Only countries participate in the climate negotiations, as they can be regarded as the only actors, which are members of the UN. Furthermore, succeeding in making an agreement with countries is difficult. In addition to this difficulty, including actors like media, businesses and non-state actors in the negotiations will make reaching an agreement undoable. So other actors are partly involved in the climate negotiations. Consensus is used in the climate negotiations. In order to reach a consensus, decision-making and the majority voting system are used in the climate negotiations. Consensus can be considered as inconvenient due to difference between unanimity and consensus, which may be regarded in a negative way as a consequence of lack of formal disapproval; more influence parties may obtain and the decrease in effectiveness of agreements with brinkmanship

strategies; and the dislike of the majority voting system. In spite the difference between unanimity and consensus, which is regarded in a negative way due to lack of formal disapproval, the difference can be seen in a positive way due to a footer which is a kind of formal disapproval. On the other hand, consensus can be viewed as positive, as it may result in parties maintaining decisions and being unwilling to participate in a disagreement regarding voting

According to this research, the climate negotiations may be affected by several aspects with may render decision-making complicated. These aspects can be referred to stumbling blocks. The following aspects affect the climate negotiations: actors, structures, processes, outcomes and issues. Each of these stumbling blocks can be divided into factors which complicate the climate negotiations. These stumbling blocks cannot be solved or addressed through animal decision-making, because animals cannot deal with complex issues that are related, multidimensional and interdisciplinary. Moreover, these stumbling blocks include too many factors. In order to solve or address these stumbling blocks, consensus is required. One of the factors countries have to deal with in the climate negotiations is uncertainty, and uncertainty has its origin in scientific research, technology and economics. In case of uncertainty, decisions will be postponed or no decisions will be made.

Group decision-making is also applied by animals. Animal group decision-making can be divided into the following branches: combined and consensus decision-making. The latter can be subdivided into three groups: equally shared decision-making, unshared decision-making and intermediate decision- making. In order to determine a decision, the qualified majority voting system is implemented. The way how animals make group decision demonstrates several lessons which humans could learn from. Animals like bees demonstrate that through the utilization of the quorum rule; the promotion of knowledge, opinions, and ideas; and the organization of a fair competition within the decision making process, humans can make better decision. Collective decision-making used by animals as a whole demonstrated that the use of collective decision-making results in accurate decisions, and it could be used to deal with uncertainty. Some aspects which are based on animal decision-making and which should be implemented in the climate negotiations were recommended. Some of these recommendations are already implemented in climate decision-making. In spite these recommendations were offered, it has been clear that international politics does not work this way, and changing the climate negotiations will be difficult , because climate negotiations and geopolitical issues are interrelated. Further,

differences between humans and animals exist . It can be said that the way how negotiations are done should not be changed, but leave it as it is .

8. Recommendations

The climate negotiations are affected by stumbling blocks that render the climate negotiations complicated. The following stumbling blocks render the climate negotiations complicated: actors, issues, structures, processes and outcomes. Each of these stumbling blocks includes factors that affect the climate negotiations. In order to solve these stumbling blocks, animal decision-making cannot be used to solve or address them. Several recommendations are proposed to resolve them, and thoee recommendations are not based upon animal decision-making. In order to solve the factors that are part of the stumbling block actors, strong and smart leadership will be required to address or solve these factors. The factors that are part of the stumbling block issues can be addressed or resolved by addressing or solving each issue step by step. Aspects within the stumbling block structures can be solved through the combination of forces by countries and having a spokesperson who speaks on behalf of all countries. Factors within processes can be solved through the involvement of the next generations. In general, the use of consensus may be used to overcome these stumbling blocks. It can be said that the way of negotiating in the climate negotiations should not be changed as in reality the process of negotiating at the climate summit demonstrates that it works, and countries are able to succeed in making an agreement as the latter was the case at the Paris Climate Summit last year. Moreover, changing the decision-making process can be regarded as difficult because of the interrelation between the climate negotiations and geopolitical issues.

9.References

Al-Tarawneh, H.A. (2012). The main factors beyond decision making. Journal of Management Research, 4(1),1-16. Retrieved August 01, 2016, from Research gate Web site: https://www.researchgate.net/ publication/267297 959_The_Main_Factors_beyond_Decision_Making

Austen-Smith, D., & Feddersen, T.J. (2008) Information aggregation and communication in committees. *Philosophical Transactions of the Royal Society B: Biological Sciences,* 364 *(1518)*,763–769. Retrieved March 16, 2016, from NCBI Web site: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2689719/

Band, J., & Partridge, L. (1999). *Advanced Decision Making.* London: Select Knowledge Limited.

Betsill, M., & Corell, E. (2001). NGO Influence in International Environmental Negotiations: A Framework for Analysis. *Global Environmental Politics*, 1(4), 65-85. Retrieved May 05, 2016, from Research gate Web site: https://www.researchgate.net/publication/ 24089732_NGO_Influence_in_International_Environmental_Negotiations_A_Frame work_for_Analysis

Bradley, R. & Steele, K. (2015). Making climate decisions. *Philosophy compass, 10 (11),* 799-810. Retrieved August 03, 2016, from Wiley Online Library Web site: http://onlinelibrary.wiley.com/doi/10.1111/phc3.12259/full

Bulkeley, H., & Newell, P. (2010). Governing Climate Change. Oxon; New York: Routledge.

Climate Change 2014. (2014).Retrieved March 21, 2016, from IPCC: https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_ FINAL_SPM.pdf

Conradt, L. (2011) Models in animal collective decision-making: information uncertainty and conflicting preferences. *Interface focus,* 2 (*2),* 226-240. Retrieved May 10, 2016 from Royal Society Publishing Web site: http://rsfs.royalsocietypublishing. org/content/3/ 6/20130029

Conradt, L.,&List, C. (2009). Group decisions in humans and animals: a survey. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364 *(1518),* 719 - 742. Retrieved March 15, 2016, from NCBI Web site: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2689721/?tool=pmcentrez

Conradt, L., & Roper, T.J. (2005). Consensus decision making in animals. *Trends in Ecology Evolution,20 (8),* 449-456*.* Retrieved March 21, 2016, from Science direct Web site: http://www.sciencedirect.com.ezproxy.hhs.nl/science/ article/pii/S0169534705001564

Conradt, L., & Roper , T.J. (2003). Group decision-making in animals. *Nature, 421* (6919) 155-158.Retrieved March 21, 2016 from mpimf-heidelberg Web site: http://homes.mpimf-heidelberg.mpg.de/~mhelmsta/pdf/2003%20[Democracy%20is%20beneficial]%20Nature.pdf

Couzin, I.D, et al., (2005). Effective leadership and decision-making in animal groups on the move. *Nature,* 433, 513-516. Retrieved March 20, 2016 from Icouzin Web site: http://icouzin.princeton.edu/wp-content/uploads/file/PDFs/Couzin%20et%20al,%202005.pdf

Depledge, J. (2005). *The Organization of Global Negotiations: Constructing the Climate hange Regime. London: Earthscan.*

DuBrin. (2011). Essentials of Management. Mason: South-Western Cengage Learning.

Eilon, S. (1969). What is a decision. *Management Science, 16(4),* 172-189. Retrieved September 13, 2016, from Proquest Web site: http://search.proquest.com. gcu.idm.oclc.org/docview/205852365?pq-origsite=summon

Fernau, M. E., Makofske, W. J., & South, D. W. (1993). Review and impacts of climate change uncertainties. *Futures*, 25*(8*), 50-863 . Retrieved August 28, 2016 from Science direct Web site:http://www.sciencedirect.com/science/article/pii/001632879390034Q

Evans, M. (2009, February 13). *Decisions, decisions*. Retrieved September 6, 2016, from Economist: http://www.economist.com/node/13097814

Fertel, C., & Waaub, J. (2013). Climate change uncertainty and ethical perspectives: the role of decision-making tools: Climate change uncertainty and ethical perspectives. *International Science Journal,* 64 (*211-212),* 39-54. Retrieved August 22, 2016, from Wiley Online Library Website: http://onlinelibrary.wiley.com/doi/10.1111/issj.12059/epdf?r3_referer=wol&tracking_action=preview_click&show_checkout=1&purchase_referrer=onlinelibrary.wiley.com&purchase_site_licence=LICENSE_DENIED_NO_CUSTOMER

Franks, N.R., Dornhaus, D., Fitzsimmons, J.P., & Stevens, M. (2003). Speed versus accuracy in collective decision making. *Royal Society,* 270, 2457–2463. Retrieved May 06, 2016 from NCBI Web site:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1691524/pdf/14667335.pdf

Franks, N.R., Mallon, E.B., Bray, H., Hamilton, M.J., & Mischler, T.C. (2003). Strategies for choosing between alternatives with different attributes: exemplified by house-hunting ant. *Animal Behaviour* 65 (*1)*215-223. Retrieved March 23, 2016 from Leicester Web site: http://www2.leicester.ac.uk/projects/selab/documents/Franks%20et%20al%202003.pdf

Foundation, T. G. (2006, November 13). *Climate Change*. Retrieved April 5 , 2016, from World Rain Forest Movement: http://wrm.org.uy/oldsite/actors/CCC/Nairobi/Biofuels.html

Global Commons Institute (2011). *Climate uncertainty and policymaking.* Retrieved August 27 from Yumpu Web site: https://www.yumpu.com/en/document/view/21380890/climate-uncertainty-and-policymaking-global-commons-institute

Goldman, R., Hagmann, D. & Miller, J. H (2015). Polya' bees: A model of decentralized decision-making. Sciences Advances, 1(8), 1-7. Retrieved March 19, 2016, from: http://advances.sciencemag.org/content/advances/1/8/e1500253.full.pdf

Goodess, C.M., Hall, T., Best. M., Betts, R., Cabantous, L., JONES, P.D., Kilsby, C.G., Pearman, A. & Wallace, C.J. (2007). Climate Scenarios and Decision Making under Uncertainty. *Climate change and cities, 33(1),* 10-30. Retrieved August 30, 2016 from JTOR Web site: https://www.jstor.org/stable/23289470?seq=h =1#page_ scan_tab_contents

Griffin, R. W. (2012). Management. Mason: South-Western Cengage Learning.

Harrison, E.F. (1996). A process perspective on strategic decision making. *Management Decision, 34(1), 46-53.* Retrieved September 2 , 2016, from Almomahady Web site:http://www.almohamady.com/main/upload/00251749610106972.pdf

Hastie, R., & Kameda, Tatsuya. (2005). The robust beauty of majority rules in group decisions. *Psychological review, 112(2),*494-508. Retrieved September 14, 2016, from Lynx.let.hokudai Web site: http://lynx.let.hokudai.ac.jp/~kameda/Hastie_ Kameda_PsychReview_2005.pdf

Hernández, A. M. (2014). *Strategic Facilitation of Complex Decision-making.* Switzerland: Springer International Publishing.

Heal, G. & Millner, A. (2014). Uncertainty and Decision-making in Climate Change Economics *Rev Environ Econ Policy, 8(1),* 120-137. Retrieved August 28, 2016, from the national bureau of economics research Web site: http://www.nber. org/paper/w18929

International, I. (n.d.). *National Culture*. Retrieved March 16, 2016, from Geert Hofstede: http://geert-hofstede.com/national-culture.html

Jones, N. R.,et al (2014). *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Retrieved March 17, 2016, from IPCC: https://ipcc- https://ipcc- wg2.gov/AR5/ /images/uploads/ IPCC_WG2AR5_SPM_Approved.pdf

Klimaatverandering. (n.d.). Retrieved March 22, 2016, from Milieucentraal: https://www. milieucentraal.nl/klimaat-en-aarde/klimaatverandering/

Kameda, T., Wisdom, T., Toyokawa, W., & Inukai, K. (2012). Is consensus-seeking unique to humans? A selective review of animal group--decision making and its implica tion (human) social psychology. *Group Processes & Intergroup* Relations, 15 (5), 673-689). Retrieved March 20, 2016, from Lynx Web site: lynx.let. hokudai ac.jp/~kameda/Kameda_AnimalGDM.pdf

Kappele, P. (2010). *Animal behaviour: Evolution and mechanisms.* Berlin Heidelberg:

Laland, K.N. (2004). Social learning strategies. *Learning & Behavior,* 32 *(1)*, 4-14. Retrieved June 20, 2016, from Lalandlab st Andrews Web site: http://lalandlab.st-andrews.ac.uk/files/2015/08/laland_LB_2004.pdf

Levine, J. M. (2013). *Group processes.* New York; Sussex: Routledge.

Lewandowsky, S., Risbey, J.S., Smithson, M., Newell, B.N., & Hunter, J,. Scientific uncertainty and climate change: Part I. Uncertainty and un abated emissions. Climate Change, 124(1),21-37. Retrieved September 16, 2016, from Springer Web site: http://download.springer.com.ezproxy.hhs.nl/static/ pdf/34/art t%253 A10.1007%252F s10584-014-1082-7.pdf?originUrl=http%3A%2F%2Flink.springer .com%2Farticle%2F10.1007%2Fs10584-014-1082-7&token2=exp=1481762013~a cl=%2Fstatic%2Fpdf%2F34%2Fart%25253A10.1007%25252Fs10584-014-1082-7.pd3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com%252Farticle%252F10.10%252Flink.springer.com%252Farticle%252F10.1007%252Fs10584-014-108. springer.com%252Farticle%252F10.1007%252Fs10584-014-1082-7*~hmac=d1b585ffc86bc5a0187b90a65da4badd1c08077b5cb26c d29e2f09fe377f30

List, C. (2004). Democracy in animal groups: a political science perspective. *Trends in Ecology&Evolution,* 19 *(4)*, 168-169. Retrieved June 20, 2016, from Research gate Web site:https://www.researchgate.net/publication/7080775_Democracy_in_animal__groups_A_political_science_perspective

Lunenberg, F.C. (2010). The decision making process.*National Forum Educational Administration and Supervision and Supervision Journal,* 27 *(4),* 1-12. Retrieved September 12, 2016, from Nationalforum Web site:http://www.nationalforum.

com/Electronic%20Journal%20Volumes/Lunenburg,%20Fred%20C.%20Group%20Decision%20Making%20NFTEJ%20V20%20N3%202010.pdf

Mallon, E. B., Pratt, S.C.,Franks, N.R. (2001). Individual and collective decision-making during nest site selection by the ant Leptothorax albipennis. *Behavioral Ecology and Sociobiology.* 50 (4), 352–359. Retrieved June 11, 2016, from Springer Web site:http://download.springer.com/static/pdf/818/art%253A10.1007%252Fs002650077.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Fartticle%2F10.1007%2Fs002650100377&token2=exp=1482506711~acl=%2Fstatic%2Fpdf%2F818%2Fart%25253Astatic%2Fpdf%2F818%2Fart%25253A10.1007%25252Fs002650100377.pdf%3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com%252Farticle%252F10.1007%252Fs002650100377*~hmac=782d14d56a330e82dd86cdc7a2a83611c505f9424ff2aeb840746cec01833434

Nasiritousi, N., Hjerpe, M., & Linner, B. (2014). The roles of non-state actors in climate change governance: understanding agency through change governance:understanding agency through governance profiles. *Int Environ Agreements, 16(1),* 109-126. Retrieved May 5, 2016, from Springer Web site: http://download.springer.com.ezproxy.hhs.nl/static/pdf/80/art%253A10.1007%252Fs10784-014-9243-.pdf?originUrl=http%3A%2F%2Flink.springer.com%2Farticle%2F10.1007%2rl=http%3A%%2F%2Flink.springer.com%2Farticle%2F10.1007%2 Fs10784-014-9243-8&token2=exp=1481762323~a cl=%2Fstatic%2Fpdf%2F80%2Fart%25253 A10.1007%25252Fs10784-014-9243-8.pdf%3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com%252Farticle%252F10.1007%252Fs10784-014-9243-8*~hmac=0ff9891b5241d8a22fc01cf136e0ce8e1cf4c1fd16ebe9aafc4db1236ec970d9

Newell, P. (2000). *Climate for change.* Cambridge: Cambridge Universty Press .

O'Hare, G. (1999). Reviewing the uncertainties in climate change sciences. *Area, 32(4),* 357-368. Retrieved August 26, 2016, from Wiley Online lIbrary Web site: http://onlinelibrary.wiley.com/doi/10.1111/j.1475-4762.2000.tb00152.x/pdf

Oorzaken klimaatveranderingen. (n.d.). Retrieved March 2016, 21, from KNMI: https://www.knmi.nl/kennis-en-datacentrum/achtergrond/oorzaken-klimaatveranderingen

Pandika, M. (2013, July 30). *Ants make tough choices better when working in groups, study says.* Retrieved March 13 , 2016, from Los Angeles Times: http://articles.latimes..com/2013/jul/30/science/la-sci-sn-ants-group-decision-making-20130729

Perry, S. (2009, October 1). *Decision-Making*. Retrieved March 12, 2016, from Brainfacts: http://www.brainfacts.org/sensing-thinking-behaving/awareness-and-attention/articles/2009/decision-making/

Petit, O., & Bon, R. (2010). *Behavioural Processe, 84 (3),* 635-647. Retrieved July 5, 2016, from Science direct Web site: http://www.sciencedirect.com.ezproxy.hhs.nl/science/article/pii/S0376635710001221

Rompelman, O. (n.d.). *De culturele dimensies volgens Hofstede*. Retrieved March 14, 2016, from Hansonexperience Web site: http://www.hansonexperience.com/blog/de_culturele_dimensies_volgens_hofstede.pdf.

Schneider,S.T., Rosencranz,A.,Mastrandrea, M.D., & K Kuntz-Duriseti (2010). Climate Change Science and Policy. Washington: Island Press:

Seeley, T. (2010). Honeybee democracy. Princeton: Princeton University Press

Seeley, T. D. & Buhrman, S. C. (1999) Group decision making in swarms of honey bees. Behavioral Ecology and Sociobiology,45 (1), 19–31.Retrieved March 17, 2016, from Springer Web site: http://download.springer.com.ezproxy.hhs.nl/static/pdf/69/art%253A10.1007%252Fs002650050536.pdf?originUrl= http%3A%2F%2Flink.springercom%2Farticle%2F10.1007%2Fs002650050536&token2= exp=1481763227~ acl=%2 exp=1481763227~acl=%2Fstatic% 2Fpdf%2F69%2Fart%25253A10.100 7%2522Fs002650050536.pdf%3ForiginUrl%3Dhttp%253A%252F%252Flink.springer.com %252Farticle%252F10.1007%252Fs007%252Fs002650050536*~hmac =3cc280bf58f96f0dbacfb935ab067f7ed 5f80b58e2ac0c51484e0673ed7807a7

Seeley, T.D., Camazine. S., & Sneyd, J. (1991). Collective decision-making in honey bees: how colonles choose among nectar sources. *Behavioral Ecology and Sociobiology ,* 28 (4), 277–290. Retrieved from April 20, 2016, from Springer Link Web site: http:// easy.squareis. com/http/link.springer.com/article/10.1007/BF00175101? ____A=article&____x=0710

Seeley, T.D., Visscher, P.K., & Passino, K.M. (2006). Group Decision Making in Honey Bee Swarms. *American Scientist,* 9 (3), 220-229. Retrieved March 18, 2016, from American scientist Web site: http://www.americanscientist.org/issues/ page2/group -decision-making-in-honey-bee-swarms

Sjöstedt, G. (2013). *Climate change negotiations.* Oxon; New York: Routledge.

Schneider, S. H., Rosencranz, A., & Niles, J. O. (2002). *Climate change science policy.* Washington D.C: Island Press.

Shirkun, J. (2012, November 5). *When Ants Get Together to Make a Decision*. Retrieved March 16, 2016, from Inside Science: https://www.insidescience.org/content/

Sparke, P. &. (2016). The Routledge Companion to Design Studies. Oxford: Routledge.

Sumpter, D.J.T., & Pratt, S. C. (2008). Quorum responses and consensus decision making *Philosophical Transactions of the Royal Society B: Biological Science, 36*(1518), 1243 -1251. Retrieved April 23, 2016, from NCBI Web site: https://www.ncbi.nlm. nih.gov/pmc/articles/PMC2689713/?tool=pmcentrez

Sutherland, R., & Weyl, G. (2015, May 2). *Humans are doing democracy wrong. Bees are doing it right.* Retrieved March 12, 2016, from The Spectator:http://www.spectato r.co.uk/2015/05/humans-are-doing-democracy-wrong-bees-are-doing-it-right/

Sylvie, G., LeBlanc, J. W., Hollifield, C., Lacy, S., & Broadrick, A. S. (2009). *Media Management. Oxford: Routledge.*

Teale, M., Dispenza, V., Flynn, J., & Currie, D. (2003). *Management Decision-making: Towards an Integrated Approach. London*

The Paris Agreement. (n.d.). Retrieved September 4, 2016, from United Nations Framework Convention on Climate Change: http://unfccc.int/paris_agreement/items/9485.php

The Paris Agreement (2015). Retrieved June 5, 2016, from Climate Focus: http://www.climatefocus.com/sites/default/files/20151228%20COP%2021%20briefing%20FIN.pdf

Vihma, A. (2015). Climate of consensus: Managing decision-making in the UN Climate Change Negotiations *Review of European, Comparative & International Environ mental Law,24 (1)* 58-68. Retrieved June 5, 2016, from Wiley Online library Web http://onlinelibrary.wiley.com/doi/10.1111/reel.12093/pdf

Walker, M. (2015, February 4). *The oldest society on earth*. Retrieved March 14, 2016, from BBC:http://www.bbc.com/earth/story/20150202-the-oldest-society-on-earth

Why did Copenhagen fail to deliver a climate deal? (2009, December 22). Retrieved September 5, 2016, from BBC: http://news.bbc.co.uk/2/hi/8426835.stm

Yamin, F., Depledge, J. (2004). The International Climate Change Regime. Cambridge: Cambridge University Press

10. Appendices

10.1 Appendix 1 Student Ethics forms

Appendix 6.3 – Student Ethics Form

European Studies
Student Ethics Form
Your name: Gracia Mambeke
Supervisor: Mr Nixon
Instructions/checklist
Before completing this form you should read the APA Ethics Code (http://www.apa.org/ethics/code/index.aspx). If you are planning research with human subjects you should also look at the sample consent form available in the Final Project and Dissertation Guide.

a. [ ] Read section 3 that your supervisor will have to sign. Make sure that you cover all these issues in section 1.

b. [ ] Complete sections 1 and, if you are using human subjects, section 2, of this form, and sign it.

c. [ ] Ask your project supervisor to read these sections (and the draft consent form if you have one) and sign the form.

d. [ ] Append this signed form as an appendix to your dissertation.
Section 1. Project Outline (to be completed by student)
(i) Title of Project: The title of the project is how may actors involved in climate decision-making make decisions based upon animal group decision-making?

(ii) Aims of project: I would like to obtain some answers to the interview questions which are related to the project which is also the research question. Therefore, I will be able to answer the research question and the sub questions.

(iii) Will you involve other people in your project – e.g. via formal or informal interviews, group discussions, questionnaires, internet surveys etc. (Note: if you are using data that has already been collected by another researcher – e.g. recordings OR transcripts of conversations given to you by your supervisor, you should answer 'No' to this question.)

YES

If no: you should now sign the statement below and return the form to your supervisor. You have completed this form.
This project is not designed to include research with human subjects . I understand that I do not have ethical clearance to interview people (formally or informally) about the topic of my research, to carry out internet research (e.g. on chat rooms or discussion boards) or in any other way to use people as subjects in my research.
Student's signature _____- date _____

Section 2 Complete this section only if you answered YES to question (iii) above.

(i) **What will the participants have to do? (v. brief outline of procedure):**

The participant has to answer the interview questions

(ii) **What sort of people will the participants be and how will they be recruited?**

They will be recruited by mail and they will be Dr or Professor

(iii) What sort stimuli or materials will your participants be exposed to, tick the appropriate boxes and then state what they are in the space below?

Questionnaires[ ]; Pictures[ ]; Sounds [x]; Words[x]; Other[x]. I will use my mobile phone to record the interview or a dictaphone

(iv) Consent: Informed consent must be obtained for all participants before they take part in your project. Either verbally or by means of an informed consent form you should state what participants will be doing, drawing attention to anything they could conceivably object to subsequently. You should also state how they can withdraw from the study at any time and the measures you are taking to ensure the confidentiality of data. A standard informed consent form is available in the Dissertation Manual.

(vi) What procedures will you follow in order to guarantee the confidentiality of participants' data? Personal data (name, addresses etc.) should not be stored in such a way that they can be associated with the participant's data.

I will not mention the personal data of the person I would like to interview. I will just mention the title like Dr, Professor or Ms without the last name. The name of the interviewee will be mentioned, unless permission is granted by the interviewee.

Student's signature: Mosaka Tkay **date:** 27/5/16

Supervisor's signature (if satisfied with the proposed procedures): ..... **date:** 1/6/16

Appendix 6.4 – Informed Consent Form

Informed Consent Form

1) Project Title

How may actors involved in climate decision-making make decision based upon animal group decision-making?

2) Project Description (1 paragraph)

Climate Change is a global issue and may lead to several consequences. In order to solve climate change issues, actors gather together in the Climate Change Conference to make decisions and reach an agreement. However, actors do not always succeed in reaching an agreement and making decisions. Animals also make decisions, and these decisions can be made collectively like bees do. The way how animals make decisions can result in making good decisions. Actors involved in climate decision-making may learn from animals how to make group decisions with the aim of making good decisions. The aim of this final project is to research how actors involved in the climate decision-making process may make decisions based upon animal group decision-making.

If you agree to take part in this study please read the following statement and sign this form.
I am 16 years of age or older.

I can confirm that I have read and understood the description and aims of this research. The researcher has answered all the questions that I had to my satisfaction.
I agree to the audio recording of my interview with the researcher.
I understand that the researcher offers me the following guarantees:
All information will be treated in the strictest confidence. My name will not be used in the study unless I give permission for it.
Recordings will be accessible only by the researcher. Unless otherwise agreed, anonymity will be ensured at all times. Pseudonyms will be used in the transcriptions.
I can ask for the recording to be stopped at any time and anything to be deleted from it.
I consent to take part in the research on the basis of the guarantees outlined above.

Signed: _____ Date: 1 june 2016

Appendix 6.4 – Informed Consent Form

Informed Consent Form

1) Project Title

How may actors involved in climate decision-making make decision based upon animal group decision-making?

2) Project Description (1 paragraph)

Climate Change is a global issue and may lead to several consequences. In order to solve climate change issues, actors gather together in the Climate Change Conference to make decisions and reach an agreement. However, actors do not always succeed in reaching an agreement and making decisions. Animals also make decisions, and these decisions can be made collectively like bees do. The way how animals make decisions can result in making good decisions. Actors involved in climate decision-making may learn from animals how to make group decisions with the aim of making good decisions. The aim of this final project is to research how actors involved in the climate decision-making process may make decisions based upon animal group decision-making.

If you agree to take part in this study please read the following statement and sign this form.
I am 16 years of age or older.

I can confirm that I have read and understood the description and aims of this research. The researcher has answered all the questions that I had to my satisfaction.
I agree to the audio recording of my interview with the researcher.
I understand that the researcher offers me the following guarantees:
All information will be treated in the strictest confidence. My name will not be used in the study unless I give permission for it.
Recordings will be accessible only by the researcher. Unless otherwise agreed, anonymity will be ensured at all times. Pseudonyms will be used in the transcriptions.
I can ask for the recording to be stopped at any time and anything to be deleted from it.
I consent to take part in the research on the basis of the guarantees outlined above.

Signed: _____ **Date:** 9/12/16

10.2 Appendix 2 Interviews

Interview 1

G: The first question is according to Seeley (2010, p. 3), bees can be regarded as a gift and an example to humans in a way that bees are a community where cooperation is considered to be of great importance with the aim of achieving goals. Do you (dis) agree with Seeley?

D: Yes, I very much agree with him

G: Why do you agree with him?

D: I think it is very nice, because decision-making in bees is very organized in a self-organized way. It means that they work without managers purely from the base of what do we need for the great collectivity , and how we will achieve that . So they have a very specific goal which is very clear, and all other processes are just regulated in way that they can achieve that in the best way possible.

G: Do you also think that only bees can be regarded as a gift and an example to humans in a way these bees cooperate?

D: Do you mean compared to other animals?

G: Yes, compared to other animals

D:Well, I do think they can be regarded as a very nice example, because they also have various duties. Besides, they change these duties within their life. So compared to social ants that also have various tasks, ants obtain their duties at birth that are unchangeable. Bees are more flexible in division of labor. They start doing one task, and then they learn, develop and shift to another one. They are very special in that way, and the parallels with human communities are large. I think the same can be said for other animals such as mammals.

G:Thus, bees can be considered as a good example compared to other animals.

D: I have not read the book yet, but you have already read the book.

G: The second question is Seeley states that humans could learn from bees. One of the lesson is that bees make use of a “fair and open competition of all ideas in decision-making”(Seeley, 2010,

p. 81). This can be “a solution in a decision-making where all information is dispersed among a group of animals” (Seeley, 2010, p. 81). The question is how could the usage of “a fair and open competition of all ideas in decision-making be a solution in a decision-making where all information is dispersed among a group of individuals?” (Seeley, 2010, p. 81).

D: Bees gather information, and they are basically trying to lobby for other bees to join them to show commitments. So if they find a very nice field, they will be very enthusiastic. They will just come and inform the others about the nest site. So if you have two spots which both look great, bees will be competing for both of them within decision-making. However, the decision is even made on substantial distances. So if a nest site is slightly of high quantity or quality, more bees will be going that way. At the same time, the colony will just use both resources. In other words, you will get the best of the environment. Further, using your environment such as getting the best of all in a self-supported or self-organized way could be very nice for people. So you use both resources, however, you just use more of the one of high quality and highest amount in ratio that is available in the field. This can also be regarded as very good. So you are not excluding the one or the other. You use the best of all, and that would also be very nice for people.

G:So basically, you are trying to say that bees try to get some information from the environment. Afterwards, they go informing other bees about the nest site.

D: That is right.

G:And they indicate other bees that they should be following them

D: Yes, so they dance. They have a kind of dance language, which is used to communicate on how far it is, what way it is and what the quality is. So those things can be considered as the most important information that is used by bees to inform other bees to join them and to collect food at those nest sites. A nest site of high quality will recruit more followers. These followers will return to the colony and inform other bees that they should be following them.

G: In other words, bees’ dance moves demonstrate that they have found the right nest site.

D: Yes, it could be a house or food source. Moreover, both of them.

G: And if other bees join them, then they will also get a recruited group.

D: That is right. You get a kind of a recruited group, and the size depends on the quality and the distance of the new house or food source. You can use both sources for food source. However, if you are looking for a new house, you will have to go there as one group or as part of the group. So the whole swarm will be required to go to one house, and the question will be the largest group will decide. Bees will go to the nest site and checkout with more bees ,and the nest site will have a double check

G: In order words, bees composed of many recruiters indicate that a particular nest site has been chosen.

D: It is similar with the elections in the US. The person who obtains the most votes is going to be the leader. This is the nest site in bee decision-making.

G: What do you mean with sources?

D: Resources. So flowers or food sources.

G: The next question is as previously mentioned in the second question, bees demonstrate that the usage of "an open and fair competition of all ideas in a decision-making can be a solution in a decision-making where all information is dispersed among a group of individuals" (Seeley, 2010, p. 81). Other researchers noted other lessons bees demonstrated as well. According to List, bees demonstrate that they analyze information very well, and this analysis should be taken into consideration before making decisions. The question is should information always be taken into consideration when making group decisions?

D: Actually, I do not know. The thing that is very nice about bees is that they really listen to all bees. So everyone has an equal chance to indicate what house is the best house. It means that all information from the environment is taken into consideration, which is very nice, but I am not sure how they analyze it. I think what they mean is that bees recruit based on the information they gather and then make the right decision. Nonetheless, I do not know how they make the right decision.

G: The question is that bees pay attention to what fellow bees have to say

D:Ok.

G: And the question is do you think that information should always be taken into consideration?

D: Yes, of course. If you work in a group, it will be considered to be good to listen to all participants of the group. Sometimes, there may be options that may not be in competition for being the right decision. However, they may help you to look at problems from different perspectives.

G: But, why do you think that?

D: It is, because you can make a very balanced decision by taking into account all aspects instead of only one criteria or more criterions.

G: However, for example, what should be done in case of lack of information or views.

D: I think bees will wait and not act. I think they need information, but I am not sure. I think that they will wait until there is information. For example, if they cannot get information, because it is raining, they will not go out. They will just wait until it stops raining. Afterwards, they will go out.

G: Do you also think that it would be the same for humans if they make decisions?

D: No, my experience is that they also make decisions, because they just want to make decisions and not wait. Bees will train or recruit new bees that are able to perform a duty for which no bee could be found to perform the duty. Then they will gather information and act. On the other hand, humans take the shortest road and make decisions.

G:Thus, although they lack information, humans just make decision.

D: Yes.

D: They use a limited amount of information they have to make a decision instead of first trying to invest in getting the information and then make a balanced decision. Bees will not do that. They have more patience, and they are willing to invest more.

G: Actors involved in climate decision-making do not have information, because they do not know what will occur in the future due to climate change. Furthermore, they really cannot predict the effects of climate change.

D: I expect that decisions will be made anyway. Even though the scenarios are not very trustworthy, they will use them anyway. I think they will invest in getting more information on decisions on such a large skill, but they want to obtain decision immediately . So they will first make a decision and gather more information during the coming years or the coming decades. Afterwards, the decision will be checked on whether it was the right or wrong decision. In case of a wrong decision, a new decision will be made. Nevertheless, bees will first invest unless their survival is at stake. Then they may act.

G: Do you mean bees?

D: Yes, on the other hand, bees are more willing to sacrifice individuals for the group than humans are. So they wait longer before making a decision based on a limited amount of information than humans will.

G: In order words, you just indicated that scenarios will be used in climate decision-making to make a decision, and the decision will then be made. A few years later, the decision will be checked.

D: On whether it was the right decision.

G: Ok.

D: Notwithstanding, bees will first invest in getting information and then make the decision.

G: The fourth question is researchers observed another lesson that could be learned from bees ,which is that they do not conform their opinions to other bees. Humans can learn from all these lessons of bees. My question is are there any other lessons that bees demonstrate to humans, and how are these lessons demonstrated? Do you think that there are any other lessons that humans can learn from bees?

D: Well, what I really like is that their self-organized way is really interesting from a parallel perspective to humans. They work completely without managers, and group decisions are really group decisions and not affected by managers, leaders or chair members. Further, I think that bees value each other for their expertise without judging them on their inabilities. If you are good at something, you will be able to do something. Thus, you really add some additional values. If

you are very good at dragging out dead bodies from the colony, you are the one going to do. So in spite you may be very bad at other chores like cleaning cells, bees really let you demonstrate your expertise

G: So they do not judge you on your inabilities like humans do?

D: Yes, they really focus on what you are good at, and that is what people can learn from bees.

G: How are these lessons demonstrated?

D: I have just mentioned that. If you are very good at a specific task, you can even skip duties by performing the one you are good at. Bees demonstrated this through the use of multi drones and single drones. A queen bee is composed of drones. In other words, she has one mother and various fathers. According to a study, there will be lack of expertise if a queen has one father. However, everything will be done. It just works as a normal colony. A queen bee with various fathers may result in a broader genetic basis. In other words, there is more variation in personalities and expertise because of the large diversity in genetic backgrounds. Those colonies are doing better due to a variation in expertise which can be used. For humans, it does not mean that everyone has to have half sisters instead of sisters, but at least if they work in a group, it is good to have diversity. The latter may provide different kind of expertise with the aim of achieving your goals.

G: So queen bees with one father lack of expertise.

D: Yes, there are various types of people who may result in different types of humans if you have more fathers. In other words, the chances of getting additional expertise is larger. For humans, that means that if you have a group of decision makers , it is good to have a very diverse group that will assist you to get the best performance of the group due to a lot of expertise which can be used to reach your goal

G: These bees have different types of knowledge.

D: Yes, they do not only have different types of knowledge, but also expertise. In order words, they are very good at organizing or listening. Some bees are very into depth more on content, while some have more knowledge. You have all kinds of different types of people with different

kind of expertise. If you want to get a decision made, it will be insufficient to have only people with knowledge

G:Ok.

D: And bees are also very good at using that expertise in a group. They listen to everyone, and everyone gets time to perform its duty.

G: So bees are better at using these expertise than other animals.

D: Yes, due to combination with flexibility of task performance. So they perform various duties within their lives, and they quickly end up with the task they are good at. If there are very good nurse bees, they will probably remain longer nurse bees compared to other bees. First they nurse, and then they forage. Good nurse bees are allowed to nurse longer than other bees. If they are very good at foraging , they are allowed to go out sooner and forage.

G: So bees are better than other animals in a way they use expertise due to flexibility of duties. As, a result, they can be good at performing various duties, and they will perform them till the end of their lives.

D: The foraging?

G: What for?

D: They will search for food till the end of their life.

G: Ok.

D: That is an example. If you are good at foraging, you can start foraging early in life. On the other hand, if you are good at nursing, you will have the quality. You will remain performing that duty until you cannot perform it anymore. Nonetheless , you can remain performing longer than other bees. Other social animals often have duties that are fixed on their individuality. So they cannot shift from one task to another. Mammals may shift, but I am not sure due to lack of knowledge .

G: The fifth question is bees make use of consensus decision to make decisions. The same can be said for actors involved in climate decision-making. The quorum rule is being applied in consensus decision-making of bees which enables bees to make quick and accurate decisions.

Other animals such as ants and fishes do implement the quorum rule as well. Do you think that the usage of the quorum rule may enable humans or actors in the climate decision-making process to make accurate and quick decisions?

D: I am not sure I can answer that one, because…

G: The quorum rule is just what you mentioned.

D: So the nest site that recruits more followers is going to be one that will be chosen.

G: Yes, that is the quorum.

D: Ok. Yes, you have a kind of a voting system.

G: Voting system

D: Yes, I think so. I will do a little bit of management talk. What we are trying to do in our group, our business unit group, is that we have a sociocratic election instead of deciding on who is going to be chair of a group or who is going to be in a special team. In other words, everyone of the group indicates a reason for who is supposed to be in that group. You just have a kind of a voting system. You just write the name down on a paper and the reason you think that a person is supposed to be in that group. Afterwards, all the pieces of paper will be collected, and you make a list and turf. For instance, that person has four votes, and another person has 20 votes. The person with the most votes will be chosen , and five persons will be required to be in each group. The top five persons of your voting list will be part of your group. It is a very quick way, and it is also a very balanced way, because you listen to the whole group. I think that kind of system is similar to those of bees. It can be said that it really works well, because you have the whole group deciding on who is going to be in that project team or who is going to be chair of a large group; and it is very quick. Further, it is very transparent. You know how decision is made. It is based on everyone's opinion. So there is not much trouble due to everyone's involvement in the decision-making process , and the acceptance level is very high. It is similar if you want to make a decision based on a referendum or something like that.

G: Yes, they use the qualified majority voting.

D: Yes, it is very similar to how bees work.

G: The sixth question is Seely, Visscher and Passchino (2006) observed how bees made group decisions and suggested that the following points humans should take into account when making group decisions: the utilisation of the quorum rule which is the majority voting system you have just mentioned; the promotion of knowledge, opinions, and ideas; and organizing a fair competition within the decision-making process. As a consequence, humans will be able to cooperate better and make good decisions. Do you think that humans should take these aspects into account in order to make good decisions and cooperate better?

D: Yes, I completely agree with that?

G: Why do you agree with that?

D: I personally really like, for example , in a sociocratic election that everybody's voice is heard, and everybody can express his or her own opinion. Even though you maybe just voted for the person that only got one vote, it adds to the group decision . However, you still see the ranking compared to the others, and it has been shown that you gave that person a vote. Actually, you see and participate that other people got more votes, and it is nicer to accept or easier to accept that a person is going to be the one in a group or the leader. It could also be that a decision is going to be the decision that is made or that option is going to be the one.

G: Basically, you are trying to say that humans should take these aspects into consideration, because everyone can express his or her own view. Furthermore, you can see that you have participated in decision-making.

D: Yes, Yes.

G: And you also accept that a decision has been made.

D: Yes, you really accept that . If you participated in a decision-making and see what option a majority of the votes has then it is much more easier to accept that decision. For instance, you want to have a decision on how we are going to give up that populated area for sea level rise. It is much easier to accept if the majority of the population in that area accepted and say ok let's go and let's give up this area. Nonetheless, some people will not agree, but they are in the minority. So they just have to deal with it.

G: By they are really glad that they have participated in decision-making.

D: Yes, at least, they participated. If they had more people, they just had enough chance to turn the decision the other way around.

G:The next question is what aspects do you think that human should take into consideration in order to make better group decisions?

D: Listening to all participants and not only to the people

G: Who make decisions?

D: Who cry the loudest in the group, but also to the people who are silent, because they may have expertise you did not know because you did not ask. Moreover, not doing anything is a decision in itself. If you choose not to act, it can also be regarded as a decision. People tend to forget that.

G: Ok. So if you do not take a decision..

D: If you choose not to act, it is also a decision. If you choose not to say or act or do anything, it also has an impact on what happens next. It may have consequences, and people tend to forget that thing in decision-making.

G: So you mean that the consequences will get bigger.

D: Yes. So if there is an occurrence such as an accident on a road and you decide not to do anything, it also has consequences. That wounded person may die due to lack of assistance.

G: Do you also think that these aspects should also be taken into consideration by actors involved in the climate decision-making process?

D: Yes. Yes.

G: OK

D: It should be taken more into consideration the decision not to act what the consequences does that have, but also when to act. Acting later and postponing decision may result in consequences, and then you come back to the bees will first gather all information than make a decision. So they may heavily invest in getting enough information, and they quickly want to

make decisions due to its importance. Nevertheless, they are willing to invest more and take more losses now. Thus, to make quickly decision. If the decision is important and more information is required, more time should be invested in getting quickly information. This should be the case in climate issues.

G: In other words, if measures are not taken in climate decision-making , consequences may get bigger

D: Besides, it may result in consequences until they realize and think of that. People usually forget thinking of results by not doing anything or postponing things later.

G:What should they do if they do not have a lot of information?

D: If they do not have a lot of information, they should invest in getting that information and balance out the importance of the decision that is made. The consequences of not making the decision now or choosing to make a decision now based upon a limited amount of information, but that is what people do. Bees will invest in getting the information and then make the decision.

G: Ok. The final question is how do you think that humans or actors involved in climate decision-making can make decisions based upon the way animals make decision.

D: I think we have already discussed that.

G: I know that other animals make use of leadership in decision-making where the leader makes the decision.

D: So they follow the monarch, but in bees it works totally different. They do not have a leadership. Actually, I would preferred the bee way. In order words, group decision-making without leadership. Thus, you have a specific purpose or goal that should be reached collectively. So you get there together and everyone participates.

G: Ok. Moreover, you think that this should be used by actors involved in climate decision-making and humans. Do you think they should only be using decision-making which used by bees?

D: Well, if you quickly want to have decisions, a leader might force that decision, but you will

never know whether the decision was the right one. This may be attributed to not having heard anything. In general, I would prefer collective decision-making than the to the bottom up ,which is better than the top down leadership.

G: Is that the best method above all the other methods?

D: Yes, it is. It may be a bit over the top if you want to involve the whole world to make a decision. So you should question everyone worldwide, and it is not going to be manageable to get all those votes. It means that those people should be represented by representatives who have been chosen from the bottom up. Every country will choose a representative who is chosen in a sociocratic way. Group decision will be done in a new group, and representatives will go to a new group.

G: Do you mean the negotiation session?

D: Yes, and the whole country will be represented by that person in decision-making. That decision-making could also be done based on the whole the group in order to implement democracy with the aim of decreasing your group size. On the other hand, the method behind it can still remain.

G: Good decisions in climate decision-making will be made by using that method

D: Yes.

G: Ok.

D: The countries should…..

G: Choose delegates.

D: Yes, delegates and representatives should be the ones who really have expertise that can be added to the group .

G: Ok.

D:Either by being good at organising the process or having very nice content knowledge.

G: So you consider that collective decision-making is the best method to make good decisions for humans and also in climate decision-making. Further, it is the manner that should be utilized instead of the usage of a leader.

D: Yes, I think we should not stop at choosing leaders, delegates or representatives at such a point that you will always have a kind of a group. So it should always be a group decision. If you have a moment of making your group smaller, you should always stop at a limited kind of group size. You do not end up with one chosen person, because (s)he will obtain too much power and not enough information. One person can never obtain a lot of information.

G: So one person cannot have all that information you need.

D: A group is always required to make decisions. You can discuss on the limited and smallest group that you would need, however, it depends on the situation.

G: Can you repeat what you mentioned?

D: So if I say you always need a group to have a decision, you should define the group. So how many people is a group. So if you are with two people, do you have a group or do you need three or four as a minimum to have a decision. I think it depends on the decision you want to make and the impact the decision will have on the environment including the people who live in the environment. So I think you need a relatively large group to make the final decisions for climate issues, because they are affecting the world.

G: What do you mean?

D: If you want to make decisions on what is going to be the party cake during a party of sixty people, and then I think you can have a smaller group to make decisions. It depends on the topic.

G: Actually, you mean that there should be a group in climate decision making

D: A relatively large group to participate in decision-making

G: So a large group of delegates.

D: Yes.

G: It is due to the fact that a large topic affects everyone.

D:Yes, it is an important decision which can affect the survival of people on a long-term. It is a long-term decision, and it affects the whole world. For this reason, a large group is required to make decisions.

G: I know that some countries do have one delegate who participates.

D:Yes, each country should at least have one delegate, but perhaps more. In case a country is more affected, more delegates are required for that country.

G:Ok. Thank you for your participation.

D: Your welcome.

Interview 2

G: The first question is that the term decision can be described in various ways. According to Harisson (1996), decision can be described as "a moment, in an ongoing process of evaluating alternatives for meeting an objective, at which expectations about a particular course of action impel a decision maker to result in attaining the objective". Others provided a similar definition of decision, whereas others like Flynn and Williams referred to decision-making for the description of decision. Flynn and Williams (as cited in Williams & Kennedy, 2000) defined decision as selecting an alternative for a plan with the aim of reaching a goal. The question is do you agree with Harisson's description of decision and Flynn and Williams' definition which refers to decision-making?

B: I can perfectly live with Harisson's description. I agree with them, because the first one covers the whole aspect of decision. It is even more complete than I could have imagine prior reading it, and decision-making is you have many options and among them you have to choose between these options or combined options. That is exactly what they state.

G: How can the term decision best be described?

B:A decision is when you have chosen an option, and this decision should be like well formulated. So on paper or in words, because otherwise it is a kind of empty air.

G: What do you mean with the latter one?

B: If you make a decision, but you do not note it somewhere or you do not speak it out loud. Nobody knows it is all about, and you can change this decision and whatever. So someone can change a decision.

G: The second question is that several actors are involved in climate decision-making which is the climate negotiations. Those actors are businesses, media, non-state actors, and countries. Burkeley and Newell (2010, p. 88) considered companies as an important actor because of their political involvement and duty to provide solutions for climate issues or climate change. The International Chamber of Commerce provides another reason for considering businesses as a key actor, and it (as cited in Burkeley & Newell, 2010) stated that companies are regarded as a key actor due to a large amount of money they may have, and thus they may have the ability to provide protection to the environment. For this reason, companies will be requested to

introduce and support a part of climate change policies. Do you (dis)agree with Burkeley and Newell, and the International Chamber of Commerce?

B: I think they are partly part of the process, because they are lobbying at those climate summits, and they are lobbying for their national governments. So they are sort of represented through the lobby system, but I would oppose to making them really part of the climate negotiations since it is hard enough to have 200 countries trying to agree on this pair of agreements. If you include companies as well, that will be undoable. So countries really need to represent these companies.

G: In other words, companies should be represented by people.

B: Companies should be represented by their governments, and companies do take care of that by lobbying their governments. Even at the climate summits themselves, these big companies are still there lobbying to get their message out.

G: Ok

B:However, they are not part of the climate decision-making process.

G: So the only actors in climate decision-making are media, non-state actors and countries .

B:I think this overview of countries is accurate, but they should not be part of decision-making Actors should only be countries otherwise you will not get an agreement, and those climate summits or climate agreements are organized by the UN. The UN is per definition composed of countries, because countries are members of the UN and not the media or companies. That is why nations do take part in decision-making.

G:OK

G. The next is question is as it has been said in the previous question, the following actors are involved in the climate decision-making process: businesses, media, non-state actors and countries. Hernández (2014, p. 85) differentiated the following non-state actors: non-governmental organizations, international governmental organizations, banks, sectorial associations and businesses. A similar distinction of non-state actors has been made by UNFCC. In spite its involvement in the climate decision-making process, Willets (as cited in Newell, 2006, p.

2) argued that non-state actors have not received much attention regarding the significance these organizations could have on global level. This is because of lack of political power as these non-state actors do not have resources to exert power, and foreign policy decision-making may be affected by non-state actors' pressures. Moreover, researchers may be dealing with difficult duties. Do you (dis)agree with Willets and the reasons that has been mentioned?

B: I do not agree with Willets, because if non-state actors want their interests covered, they should lobby their national governments. You cannot have more parties at the table for negotiations. The same answer like the previous one can be applied here. Non-state actors can lobby to influence their governments or all governments. However, they are not part of the decision-making process, because that is too complicated. You already have 200 countries and you cannot make either media, businesses or non-state actors part of decision-making. That is not doable.

G: Why is it not doable?

B: You already have 200 countries. So you have 200 various parties and 200 various stakes. They have to agree on the same agreement. If you include other actors, you will have thousands of actors like businesses, media or non-state actors. And you will not get an agreement, because it is already hard with 200 countries.

G:The fourth question is decisions in the climate decision-making process are made through negotiations, where consensus is applied. Consensus includes several aspects which may render it disadvantageous. One of them is the difference between unanimity and consensus. Depledge and Yamin (2005, p. 443) observed that this difference may be considered as negative due to lack of formal disapproval in a decision. How may the difference between unanimity and consensus be regarded as negative due to lack of formal disapproval in a decision? Do you (dis)agree with Depledge and Yamin and why do you (dis)agree?

B: They can formally disapprove in these climate negotiations. Nonetheless not in saying no, because you need consensus. However, sometimes there is this footer in which they say Denmark disagrees on whatever or the US disagree on whatever. So this disapproval is possible in these negotiation texts, but that is a footer instead of a formal disagreement.

G: So the difference between unanimity and consensus can be regarded as negative due to this footer.

B: No, it is not negative anymore, because you can have decision in consensus. So everyone agrees on a decision, but then a country can say this is not my point of view. However, the country will agree on including this for the sake of the whole process. So that makes consensus positive in a sense of you can say that you do not like this part of the text, but you agree for the sake of the whole agreement. You unblow the whole agreement on that sentence.

G: Therefore, you disagree with them.

B: Yes, therefore I disagree with them.

G: As it has been said in the previous question, consensus includes several aspects which may render consensus disadvantageous. Vihma (2015) observed another aspect which renders consensus disadvantageous. Vihma (2015) stated that consensus is discommoding as parties may gain more influence and be able to reduce the effectiveness of agreements with brinkmanship strategies. Further, majority voting may be problematic as well. How can consensus be inconvenient as parties obtain the influence and the ability to reduce the effectiveness of agreements with brinkmanship? How can majority voting be problematic? Do you (dis)agree with Vihma and why do you (dis)agree?

B:The inconvenient part is that each and every country is as important as the other in consensus. For example, the United States of America are important as Zimbabwe in consensus voting, and that might be seen as a downside. Majority voting is the second question. Some countries will not agree to do majority voting like the United States and China. They will not agree with it, because it might mean that if they are opposed to certain ideas or agreements, they can still be adopted. The agreements can still get into force, because the majority voted to do so, while the United States or China are against. For that reason, China and the United States will never accept the majority voting. Basically, I do agree with Vihma's statements.

G: In short, the majority voting system can be problematic due to the fact that some countries will disagree with consensus. Consensus can be regarded as inconvenient due to the fact that every participant has consensus.

B: No, all votes are equal in consensus. In reality, the vote such as that of the US is more important than that of Zimbabwe. So you do not have a difference between those two powers in consensus which may be a downside. On the other hand, China and US will never accept the majority voting system, because the majority might vote differently than they want. So they will never accept that.

G: The next question is as it has been said in the previous question, consensus includes several aspects which may render it disadvantageous, however, it may be considered as advantageous as well. Yamin and Depledge (2004, p. 444) observed that consensus may result in parties to maintain decisions, and parties will be unwilling to participate in a disagreement regarding voting. Do you (dis)agree with Yamin and Depledge and why do you (dis) agree?

B: I agree with them, because you need to see the full picture, the full agreement, if you do consensus. If you disagree on just a tiny little detail within the agreement, you will just say let it be for the sake of the whole agreement for the bigger picture. I think that this is the big advantage by doing it by consensus. So countries will never stop an agreement on very tiny details because of consensus. That is a good thing.

G: Thus, you are saying that consensus can be considered as advantageous due to the fact that countries will never stop an agreement due to consensus.

B: Yes, on tiny details

G: Can you give an example of this?

B:The Paris agreement is about 50 pages or so. If there is one little detail that you do not like, you are not going to blow up the whole agreement because of that little detail. If you do consensus, that does not stimulate to block the whole deal for details.

G: Are there any other reasons for considering consensus as advantageous?

B: I think these are the most important ones.

G:Do you mean those mentioned by Yamin and Depledge?

B: Yes, what they mentioned.

G: The next question is actors involved in the climate negotiations have to deal with uncertainty. In case of uncertainty, decisions will be delayed, postponed or not taken. Animals like bees also have to deal with uncertainty. However, prior to making decisions, information will be obtained. The same cannot be said for the climate negotiations. For this reason, professor Dooremalen (personal interview, June 2, 2016) proposed that there should be an investment in collecting more research, and decisions should not be postponed but measures should be managed for climate issues with the aim of dealing with uncertainty. Do you (dis)agree with the professor and why do you (dis)agree?

B: I disagree, because these uncertainties are not relevant anymore. There were many uncertainties ten years ago as people started questioning whether human beings were causing climate change and stuff like that, but there is no uncertainty left anymore on that issue. It is clear we have to act on climate change, and these uncertainties do not play a role anymore.

G: Because the professor mentioned that bees will first search for information and then make decisions, while this is not the case in climate decision-making. They will delay, postpone the decision or not make any decision.

B: That might have been true, but that might say why it took so long to take a climate agreement. For now, there are no uncertainties anymore. So we filled the gap. Maybe what we did was we got all information ready by collecting more research. That is what we did the past ten years. Now, we were able to have a climate agreement due to results of that research. So these uncertainties were there ten years ago, however, they are not here anymore.

G:Ok. So there are no uncertainties due to collection of scientific research.

B: Not for these climate negotiations now.

G: Ok. Can you give an example of a situation where there is no uncertainty anymore?

B: There was uncertainty about whether the connection between greenhouse gases emitted by fossils fuels was really that strongly related to global warming. We are now completely sure that it is the case and that is us human beings causing this global warming. If you are completely sure about that, it is more easy to get that Paris agreement, because there is no doubt we are doing this.

G: So actually you do not agree with her.

B: No, I disagree

G: The next question is Hernández (2014, p. 81) considered that climate decision-making is very complicated to understand due to a variety of negotiation characteristics and the inclusion of science and technical aspects that are involved in climate decision-making. The factors or aspects that render climate decision-making complicated can be referred to stumbling blocks. The following stumbling blocks render the climate negotiations, climate decision-making, complicated: actors, issues, structures, processes and outcomes. Each of these stumbling blocks consists of factors which have an impact on climate decision-making or make it complex. Do you think that these stumbling blocks could be addressed by the use of animal decision-making such as the use of collective decision-making with the quorum rule which is utilized by bees?

B: What is the quorum rule?

G: It is the majority voting system

B: Ok. It is never going to happen that we will have the majority voting system. For the reason I explained earlier that China and the US will not allow it, because they want to have the right to veto. They really want to have it; and if they do not want it, it is not included.

G: So actually the majority voting system will not take place in climate decision-making, because China and the United States dislike the majority voting system.

B:Yes.

G: Why do they not like the majority voting system?

B:Because if others say yes and they say no, it still can happen. They are not in the majority, and they will not allow that.

G: In case these stumbling blocks cannot be addressed through the use of animal decision-making, how should these stumbling blocks then be addressed or solved?

B: They have been solved, because we have a Paris agreement. So we made it, and we overcame these stumbling blocks like actors, issues, structures, processes and outcomes. Somehow we

managed in Paris to overcome those stumbling blocks. So it is possible with the use of the consensus system to overcome these blocks.

G: So it is possible with the majority voting system to overcome those blocks.

B: No, with the consensus system.

G:Thus, it is not with the use of majority voting system, but with the consensus system that it is possible to overcome these stumbling blocks.

B: Yes.

G: How did they overcome those stumbling blocks with the use of consensus.

B:If the big parties like US and China really want an agreement, it is going to happen. That is exactly what happened, because US and China already agreed together on climate measures prior to the Paris Climate Summit . This helped the agreement for the whole world.

G: As it has been said in the previous question, the stumbling block actors render the climate negotiations difficult, and this stumbling block is composed of the following factors: delegation size, leadership and interest and institutional memory. Each of these factors make climate decision-making complicated in various ways. The delegation size makes climate decision-making complicated as some countries may have a small delegation size due to poverty, lack of financial resources, small expertise and lack of preparation which may result in those countries not demonstrating their political involvement. Leadership renders in various ways climate decision-making complicated. One way has been observed by Sjostedt (2013, p. 410) stating that some persons lack of ability, experience or skills to chair the negotiations or the elected chair may not have the ability to execute all the required seven duties. Others ways do come from NGOs. Sjostedt (2013, p. 413) and Hernandez (2014, p. 85) both noted that NGOs may limit decisions through national legal frameworks, and they use pressure on parties and communication channels to make climate decision-making difficult. Interest affects climate decision-making as actors have various interests resulting in proposing various proposals based on interests. According to Hernandez, institutional memory can be disadvantageous due to participants' lack of ability to avoid cognitive thinking. In case these factors cannot be addressed or solved by the use animal decision-making such as bees' collective decision-making where quorum is implemented, how should these factors be solved or addressed?

B: They refer to the role of the president or the chairman of the meeting. (S)He is indeed very important, and I think that the chairman at the Paris Climate Summit was very good. So I do not think that this collective decision-making including the quorum is important, but one person can make the difference. So if you have one man or woman who is a good chairman or president of the meeting that could save or break the meeting. This is sometimes the case in animal world as well like with gorillas. If you have this strong silverback male who is protecting each and every one out of the group, that will help. If this president or chairman of such a meeting is strong and smart, then (s)he can make it work. In 2009, the Copenhagen Climate Summit had a very bad presidency. So there was a very bad chairman who broke the whole meeting and nothing occurred. Thus, the chairman is very important.

G: In other words, these factors can be solved through the presence of a strong chair.

B: Yes.

G: I do know that some animals make use of group decision-making where one animal who is the leader makes the decision for the whole group. So actually it is the same.

B: No, it is not. It is all about the process in climate decision-making. The chairman makes sure everyone is involved and everyone is there at the right time to make the right decision. (S)he does not make the decision himself/herself, but (s)he facilitates, helps and coordinates.

G:The next question is as it has been said in question eight, the stumbling block issues render the climate negotiations difficult, and this stumbling block is composed of the following factors: trans-boundary, interrelation with climate change, interconnection of issues, immeasurability of issues, multidimensionality and issues. Each of these factors makes climate decision-making complicated in various ways. Transboundary makes climate decision-making complicated as Swarts and Randall (as cited in Sjostedt, 2013, p. 401) argued through transnational features of climate change which include consequences which vary per country resulting in a delay in international policy-making. Furthermore, Sjostedt (2013, p. 401)noted that these features affect climate decision-making by strengthening the issue of blaming the actor being responsible for climate change. The interconnection of issues which should be taken into account renders climate decision-making complex as this can be considered to be challenging as various systems have to be implemented for each interconnected issue. Immeasurability of issues makes climate decision-making complex due to the fact that some issues can be easily measured while others

cannot. Therefore, benefits and cost may not be calculated. In case values, benefit and cost are miscalculated, decisions will be postponed. The interrelation of issues affects climate decision-making as some issues include uncertainty which can be found in manifestations, measures, causes and consequences. Those manifestations, measures, causes and consequences impede the decision-making as issues are multidimensional. Further, Yamin and Depledge (2004, p. 31-32) stated that as new issues are discussed in the negotiations as issues have been solved, resulting in new issues to be placed on the agenda, and issues on the agenda are already solved. In case these stumbling blocks cannot be addressed through the use of animal decision-making, how should these stumbling blocks then be addressed or solved?

B: I think that this one is not comparable to any animal group decision-making since you are talking about very complex issues. So it is really very complex. It is interdisciplinary, multidimensional etcetera, and animals are not capable of solving this kind of very complex issues where everything is related to everything. In Paris, we succeeded in doing so, but that was hard as well.

G: How should these factors then be solved or addressed?

B:Well, this took about ten years of negotiations on climate change .So it is really step by step. You are going to solve this little issue that little issue in small little steps. At the end, that Paris agreement took over ten years to get this agreement. So you have to solve these complex issues step by step, and then it is possible.

G: So these factors should be solved step by step in very small pieces.

B: Yes, in very small pieces.

G: As it has been said in question eight, the stumbling block structures render climate negotiations difficult, and this stumbling block is composed of the following factors: external structural aspects and internal structural aspects. Each of these factors makes climate decision-making complicated in various ways. Power structure can be regarded as an external structure which impedes climate decision-making. According to Sjostedt (2013, p. 393), power structure may result in political imbalance and the emergence of uncertainty in policy development. Negotiation effectiveness of institutions and negotiation effectiveness of institutions as a whole are examples of internal structural aspects. The negotiation effectiveness of institutions impedes

the climate decision-making process as institutions have their own rules and norms which should be implemented. The model of the UN is utilized, however, it is considered to be ineffective. In contrast to the negotiation effectiveness of institutions, the negotiations effectiveness of institutions as a whole impedes climate decision-making as Sjostedt (2013, p. 393) stated that due to the fact that institutions may have a slow and difficult organization and the position climate negotiations have in these organizations. In case these stumbling blocks cannot be addressed through the use of animal decision-making, how should these stumbling blocks then be addressed or solved?

B:If you have these political powers like the USA, which has much more political power than Zimbabwe has. Well, their interests are maybe equal, because Zimbabwe has more problems due to impacts of climate change than the US have. That makes it not an equal situation to negotiate, because the powers are different, and that is something that was really a problem in the climate negotiations. What might help that is not only Zimbabwe but all developing countries put their forces together .So the G77 is a famous group , which is composed of 77 developing countries. So the poor countries together make a big political force, because they are 77 poor countries. That helps, because you get a kind of equal powers such as the big United States of America against 77 other countries. Powers are equal.

G: So actually if countries combine their powers together, they will be much more stronger.

B: Yes, they will be much more stronger.

G: How should the negotiation effectiveness of institutions be solved or addressed?

B: You can just join forces within the institutions or organizations of the UN. So that is the answer to that question. If countries join forces within the institutions of the UN, you can make the process work. It is not by having a group of 200 countries, but a group of 88 countries. Further, the European Union should have one spokesperson.

G: So they can be solved by reducing the participants in institutions and by having one spokesperson who speaks on behalf of all countries.

B: Yes, of all forming groups.

G: Thank you for you participation to this interview.

B: Your welcome.

Interview answers by mail

Question 12

As it has been said in question eight, the stumbling block processes render the climate negotiations difficult, and this stumbling block is composed of the following factors: obstacles and processes. Each of these factors makes climate decision-making complicated in various ways. Time gaps can be regarded as an example of obstacles and affect the climate decision-making process as issues may affect all generations, and decisions regarding those issues will be delayed. Processes may also be regarded as obstacles, and they impede climate decision-making as different approaches have to be used to deal with climate decision-making. In case these stumbling blocks cannot be addressed through the use of animal decision-making, how should these stumbling blocks then be addressed or solved?

Animals cannot do this. They are not going to think on the long-term. They will always think on the short-term like tomorrow I need food or water. I do not think we are going to learn something from animals. However, what we can do is including the next generation into the problems. If you talk about your kids, who are the children of tomorrow, then people might want to act. This is about the time gaps. If you include sustainability and future generations, people want to cover this issue.

Question 13

As it has been said in question eight , the stumbling block outcomes render the climate negotiations difficult, and this stumbling block is composed of the following factors: outcome expectations, outcome externalities, uncertainty; and compliance and verification. Each of these factors make climate decision-making complicated in various ways. The negotiation outcomes vary, and actors involved in climate decision-making have high expectations outcomes. This may result in no preparation of alternatives or no agreement may be reached. Further, in case actors

have less or low expectations, the negotiation process will be blocked or delayed. The negotiation process is also delayed due to change in power distribution and new governments. Outcome externalities may affect decision-making in other ways. The negotiation process is composed of several stages where agreements should be made. Outcome externalities affect the process as some participants of the negotiation process have not participated or an agreement lacks of authority. Uncertainty impedes the negotiation process as actors have to deal with it, but in case of uncertainty decisions will not be made. Compliance and verification methods may be a challenge for the negotiation process. They may enable countries to postpone their decisions or request more preparation. Further, countries may see their rights be restricted due to lack of institutional power from of above to enforce penalties for misbehavior. In case these stumbling blocks cannot be addressed through the use of animal decision-making, how should these stumbling blocks then be addressed or solved?

It is much too complex for animals to deal with it due to the fact that too many factors are involved to do integrated decision-making. The expectation for Paris were low. So the theory regarding expectation does not apply here, because the USA and China are more equal now since the Copenhagen Climate Summit

Question 14

According to professor Dooremalen (personal interview, June 2, 2016), several aspects in climate decision-making should be changed. These changes should be based on animal decision-making. The professors argues that based on how information is dispersed in bees due to the fact that bees listen to all bees during the decision-making process, actors should be able to listen to others and not only to those who have the most to say or do not express their voice, because an actor may have the expertise or knowledge that another does not have. Further, listening to others enables to make an imbalanced decision as issues have been viewed from different perspectives. Another change which should be implemented is that the consequences of not taking measures and postponing decisions should be taken into account. So the results of not taking measures and postponing decisions during climate decision-making should be taken into account. Moreover, there should be a group decision-making in such as negotiations where no leadership is required in the climate negotiations , and each country should have two or more than two delegates. Do you agree or disagree with those changes based on animal group

decision-making which should be implemented in the climate negotiations and proposed by the professor ? Why do you (dis) agree with the professor?

I do not believe animals in this case bees take the consequence of not taking action into consideration. The above is just not how international politics work. USA and China will always remain more powerful in negotiations compared to Zimbabwe or other developing countries.

Question 15

As previously said, professor Dooremalen (personal interview, June 2, 2016) proposed suggestions based on animal decision-making which should be applied in climate decision-making . Do you suggests other aspects which should be changed in climate decision-making and based upon animal decision-making? What are these aspects which are based on animal decision-making that should be implemented in climate decision-making, and how should they be implemented?

I have no idea

Question 16

Animal decision-making demonstrates lesson to humans**.** According to Seeley (2010, p. 3), bees can be considered as a gift and an example to humans in way that bees are a community where cooperation is of great importance with the aim of achieving goals due to lack of managers guiding them. Furthermore, Seeley, Visscher and Passino (2006) claimed that by taking the following lessons of bees into account: the utilization of the quorum rule; the promotion of knowledge, opinions, and ideas; and organizing a fair competition within the decision making process, humans could cooperate better when making group decision and make good decisions. Professor Dooremalen (personal interview, June 2, 2016) also observed that decision-making in bees also demonstrates that each expertise are valued. Collective decision-making utilized by animals indicates several lessons. Sumpter and Pratt (2008) observed that collective decision-making in animals results in integrations and in making quickly accurate decisions than in individual decision-making. Conradt and Roper (as cited in Levine, 2013, p. 315) asserted that collective decision-making can be regarded as advantageous as this may result in less extreme decisions due to the impact each individual has on the decision. This uncertainty cannot only be

addressed by one individual making decisions for all the group as this is difficult, whereas through collective decision-making in animals uncertainty could be easily addressed as all members pool their opinions resulting in making less mistakes. Computer simulation observed that the majority voting system resulted in higher accuracy in decision-making under uncertainty. In spite the differences that exist between animal and humans on rationality, language and the survival of the fittest, how can these lessons which animal decision-making demonstrate to humans mentioned above with your suggestions answered in question 15 and the professor's suggestions indicated in question 14 based on animal decision-making be implemented in climate decision-making?

Reality shows that climate change negotiations do not stand alone. They are connected to other geopolitical issues. This means that the UN way of negotiating is difficult to change, and the reality tells us that the current way of negotiating can work, since we have a Paris Agreement!!!