THE OUTLOOK OF SMES IN IRELAND TOWARDS GREEN CLOUD COMPUTING

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DECLARATION

I, Sanem Say, declare that this research is my original work and that it has never been presented to any institution or university for the award of Degree or Diploma. In addition, I have referenced correctly all literature and sources used in this work and this work is fully compliant with the Dublin Business School’s academic honesty policy.

Signed: __________ Sanem Say __________

Date: __________ 21 May 2018 __________
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I would like to express my deep gratitude for few people starting with my supervisor Dr. Brid Lane. I am grateful for her patience and guidance at all time. This research could not reach this stage without her.

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ABSTRACT

This research is aimed to find an answer to what extent green solutions are influencing adoption of cloud computing in Small and Medium Enterprises, SMEs, in Ireland with secondary analysis including, books, journal articles and so on. and primary analysis containing 104 survey responses from SMEs in Ireland.

Value free analysis is maintained through adopted philosophy, positivism. Thus, deductive approach is applied to provide more structured analysis resulted with the unavailability of the research topic within literature.

Secondary data analysis underlined the ongoing environmental concerns around the world, Ireland’s current situation regarding environmental issues, the effect of IT sector on the environment and particularly aimed to highlight the difference that can be achieved by cloud vendors, and SMEs.

Primary data analysis based on quantitative data retrieved from SME employees including information about their demographics, their view of cloud computing and green cloud computing seek an answer whether green solutions have a role in SMEs adoption of cloud computing or not and if so to what extent.

This research highlighted the existence of value given to green cloud computing even though it does not reflect all of the SMEs. In addition, it observed the effect of green awareness on SMEs decision making and found to be promising for the future to lessen negative environmental contribution of SMEs.
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CHAPTER 1: INTRODUCTION
1.1 BACKGROUND OF THE DISSERTATION TOPIC

World is facing serious environmental issues which can be clearly observed through ongoing climate changes (Tercek, 2017). Those issues underline the essentiality of acting on them in a timely manner. Thus, it requires any single positive contribution from every individual while revealing the need to be environmental aware and act reasonably. The current worldwide climate change is shown in the figure below taken from NASA website and human activities found to be representing more than 95% of those changes (NASA, 2017).

![Figure 1: Carbon dioxide level changes within years (NASA, 2017)](image)

The most substantial and considerable change on the environment could be achieved through instilling green awareness into the most effectual industries, which can be differentiated from their negative contribution. Information Technology, IT, industry can be considered to be one of the most non-environmental friendly industry due to its negative contribution to the environment with data centers being the major contributor (Greenpeace, 2017, Statista, 2018).

Even though major IT companies known to be aware of the results of their actions, and they pursue related changes to some extent, their impact on the environment found to be not lessen enough to be ignored (Kozlowicz, 2015). It could be because of the reason behind of IT companies’ adoption of environmental friendly options. They are assumed to be adopted those options primarily to save cost (Kozlowicz, 2015). Therefore, as their main intention is not about protecting the environment but to be cost efficient, their environmental outcome is not green enough and stays limited with the amount that can be achieved by cost saving options.
In addition, according to Prasanna et al., 2016, the fact that the size of data centers caused a notable increase in energy efficiency due to existing high demand on cloud computing is concerning. Thus, as long as data center size increases, their contribution increases along with it.

For this particular reason, green cloud computing could be used as an identifier for cloud vendors of their minimal environmental impact usage (Prasanna et al., 2016). Mainly because green cloud computing is known to be energy efficient, environmentally responsible, in short, minimises the wastage resulted in any computer resource usage (ibid, 2016).

The need of adoption and having significantly less impact is aimed to be achieved through SMEs perspective. In Ireland, SMEs are considered to be crucially important in the country’s economy (European Commission, 2016) and because of this fact, for this research project, SMEs in Ireland are targeted.

Even though the possible cost benefits, better resource usage, mobility, and collaboration features of cloud computing exist, it is likely to find SMEs that are not adopted it due to some concerns such as; security, low adoption rate within the industry, lack of time and so on (Carcary et al., 2014, p261). However, acknowledging the necessary information about the steps taken to adopt cloud computing found to be leading SMEs to take those steps securely because similar number of SMEs found to be adopted cloud computing (ibid, 2014).

It should be noted that, there is no academic information about the acknowledgment of green solutions of cloud computing by SMEs, instead, as it is mentioned the other reasons behind of SMEs adoption is known such as; its well-known cost benefits, to have competitive advantage and so on. (Prasanna et al., 2016).

In this project it is aimed to focus on the SMEs whose either adopted cloud computing or not to also have a chance to reveal the difference between SMEs whose adopted cloud computing services and non-adopted SMEs choices. Therefore, for this concept, the Outlook of SMEs towards green cloud computing is chosen as a research topic as the attitude of SMEs towards green cloud computing is unknown.

The essentiality of SMEs engagement with green cloud computing arises with the purpose of sustaining the environment, and socio-economic factors as it is emphasized by Goyal et al., 2016. For instance, through green service level agreements between the cloud computing user
and cloud computing service provider, it can be possible to set minimum energy consumption level for the cloud service users (Goyal et al., 2016, p 951).

In order to set minimum energy consumption level as mentioned in the previous paragraph there is a need to have green cloud awareness. Therefore, in terms of having green cloud awareness, this research could play an important role by contributing in increasing the green awareness while determining the demand on green initiatives.

Knowing this information is particularly important because SMEs point of view, by just being the major contributors of the economy could play a key role in the future of cloud computing. Furthermore, existing green awareness among the SMEs concerning green cloud computing is important to know as it is will shape this research.

1.2 RESEARCH AIM

This dissertation proposal is focused on understanding SMEs point of view through their insights whether they are aware of the green benefits of cloud computing, if so to what extent they value it while adopting cloud computing and more are directly gathered through primary research. Also, this dissertation provides information about SMEs possible environmental contribution with adoption of cloud computing in literature review chapter.

Although, the most focused information related to this research topic is gathered from primary research, the conclusion of this research is not only depended on their responses, but also it depends on the secondary research analysis and it’s in depth evaluation along with primary research.

Deep understanding behind SMEs point of view towards green cloud computing by highlighting the gaps and overlaps between SMEs expressions is also provided within this research paper. The demonstration of this information can be found through primary research Data Analysis Chapter.

The aim of the paper in the following chapters is based on the figure given below. The construction of this research, from general to specific like it is shown in the following figure; general information about green cloud computing and specialised information focused in Ireland are covered.
Thus, considering the aim of this paper the topic of this research named after ‘The Outlook of SMEs in Ireland Towards Green Cloud Computing’. In literature review, the general section, green cloud computing is focused while more specific area, the insights from the SMEs in Ireland is evaluated through the findings gathered through primary research.

![Diagram: The Focus of The Project]

**Figure 2: The Focus of The Project**

### 1.3 Research Question

After going through relevant literature review, the research question determined as given below:

*‘To what extent greener solutions influences SMEs’ adoption of cloud computing in Ireland?’*

Through this research question it is aimed to understand the SMEs attitude towards green cloud computing. Desired information is intended to be achieved by conducting quantitative research.

Quantitative research is focusing around the preference of SMEs, such as; whether they consider the cloud vendors green initiatives before agreeing to work with them or do they even aware of green benefits of cloud computing.
These underlined questions represent the basis knowledge needed to be covered through the questionnaire, so that proper conclusion can be made. More in depth details about the primary research can be found in the Research Methodology Chapter.

1.4 RESEARCH HYPOTHESIS/OBJECTIVES

1.4.1 RESEARCH HYPOTHESIS

Green awareness among SMEs can significantly impact the adoption of cloud computing. Therefore, knowing their insights could play a valuable role in influencing the renewable source adoption among cloud vendors.

This research hypothesis will be critically analysed after getting insights from SMEs whether it is found to be valid or not.

1.4.2 RESEARCH OBJECTIVES

The objectives that are adopted throughout this dissertation proposal are given below in order.

Objective 1:

☐ To examine whether environmental awareness affected or affecting the SMEs adoption of cloud computing in Ireland

Objective 2:

☐ To investigate whether SMEs in Ireland value their cloud providers green initiatives while deciding on migrating to cloud

Objective 3:

☐ To examine if there is a positive relation between environmental friendliness of SMEs in Ireland, and the reasoning behind their cloud adoption

These three objectives are essential for the progress of this research paper in order to answer the research question fully. This research will be beneficial to increase green awareness and provide customer insights (SMEs that are adopted or could adopt cloud computing) so that even though SMEs have little bargaining power, necessary initiatives towards renewable sources could be improved, boosted or implemented by cloud vendors.
Therefore, this research is expected to be helpful to understand the actual value given by the SMEs towards green cloud computing and more as it could contribute in academic researches as there is a gap in this area.

1.5 DISSERTATION OUTLINE

This dissertation project consists of eight chapters as displayed in the figure below. First six chapters are where the main knowledge is expressed, and it is followed with self-reflection chapter in which the experience encountered throughout this project drawn attention with a weekly diary format, and a personal evaluation is presented with a personal SWOT analysis.

The rest of the chapters includes references that is used and appendices where ethical forms, sample version of the questionnaire and other essential instruments that are used throughout the make of this dissertation project along with a timeline is presented. The content summary of each chapter given right after this figure in an order.

Figure 3: Roadmap of the paper
1.5.1 INTRODUCTION

Introduction chapter provides background information about this dissertation paper and its structure. It underlines the importance and the rationale behind of this research paper by stating adopted research question, its aim and the related objectives with research scope and limitations.

1.5.2 LITERATURE REVIEW

Secondary analysis is conducted in literature review chapter with providing general information about environmental facts to emphasize the importance of this research paper. Moreover, it will also provide information about cloud adoption, its environmental effects, green benefits of cloud computing, SMEs cloud adoption in Ireland, the environmental contribution of cloud providers.

This chapter is important not only because it shaped the research question but also it justifies the gap within the literature and emphasizes the need of conducting this research.

1.5.3 RESEARCH METHODOLOGY

Research methodology chapter reflects the method adopted while research was carried out. The methodology covers research design, adopted sampling method, data collection for primary research and its analysis with possible ethical research issues and research limitations.

In data collection and analysis sub-chapter, secondary (academic articles) and primary research methods, questionnaire, are mentioned. Whereas, in research limitations sub-chapter, the limitations encountered, and the ways used to overcome those limitations are highlighted.

1.5.4 DATA ANALYSIS AND FINDINGS

In this chapter the illustrations of the findings from 104 respondents can be found. The questionnaire is built containing three sections, their demographics, questions about cloud computing and green cloud computing.

Therefore, in this section, the findings will be presented under those relevant section while also including more sub-chapter to represent cross-analysis of the answers. These sub-chapters are critical to coherently introduce findings so that further on in discussion chapter,
necessary referring can be undertaken; such as the importance given to green solutions based on the size of the company, namely; micro, small, medium and so on.

The size of company, as one of the cross-analysis element, is selected as the contribution to the environment is found to be significantly effective, thus, existing awareness is important to point out.

1.5.5 DISCUSSIONS

The detailed analysis of the highlighted results in data analysis and finding section is conducted. In detail, some of the validation of the statements given in literature review is evaluated and also, the possible answers to the research question is tried to be given by discussing the results.

In order to achieve proper representation, the sub-chapters are named as sub-questions so that the possible conclusions could be made later on. To summarise, this chapter reflects the contribution of the primary research.

1.5.6 CONCLUSIONS AND RECOMMENDATIONS

In this chapter, main conclusions gathered from all findings including primary and secondary research, and also the highlights from the discussion chapters are summarised. Additionally, some recommendations that could be useful for future related topics are given by the gap found within the answers and what is needed to be done based on the findings.

A sub-chapter with recommendations is created for a future researcher who might be interested in a similar topic. That sub-chapter includes suggestions about the creation of a questionnaire based an idea obtained after analysing the responses for this research paper.

1.5.7 REFLECTION

In this section, the information about the researcher and the self-assessment of the experience throughout the dissertation process in a diary format is provided, along with the evaluation of personal development through a SWOT analysis.

This research is undertaken by trying to follow up with the deadlines emphasized in Gantt Chart that is created before started this project, and the changes with estimated Gantt Chart and actual Gantt Chart are also highlighted to reflect on project management skills. Both Gantt Charts are highlighted in Appendices Chapter.
1.6 SCOPE AND LIMITATIONS

This dissertation paper is expected to analyse the outlook of SMEs in Ireland towards green cloud computing as it is the title of this project. The concepts of cloud computing, adoption of SMEs in Ireland, and green cloud computing are presented and discussed in detail after collecting primary data from SMEs in Ireland. The primary research is found to be used to fulfil the gap within the literature review to some extent.

The insights only from SME employees is gathered and they are accepted to be representative of their company. The research is only focused from SMEs perspective even though at the early stages desired primary research contained cloud vendors perceived opinion of SME as well.

However, due to time constraints and difficulty to reach out sufficient amount of cloud vendors that are willing to share their opinion about their SME customers, affected the primary research method and led it to be only quantitative research that is conducted among employees of SMEs in Ireland.

1.7 CONTRIBUTION OF THE STUDY

This research is beneficial to increase green awareness by providing existing and possible customer insights (SMEs that are adopted or could adopt cloud computing) to increase the green energy demand from cloud vendors or increase the adoption of cloud computing so that SMEs could become greener.

If there will be a demand for green solutions from SMEs, necessary initiatives towards renewable sources may be improved, boosted or implemented by cloud vendors (only by assuming the value given to their customers regarding their size do exist).

In addition, cloud vendors awareness about the SMEs point of view could be important for them since according to the findings, satisfied cloud users’ decision making found to be affected by the energy patterns of their cloud vendors.

However, mainly, this research is expected to be helpful to understand the actual value given towards green cloud computing by the SMEs, and more from that insight could contribute in literature as there is a highlighted gap in this area.
CHAPTER 2: LITERATURE REVIEW
2.1 LITERATURE INTRODUCTION

In this section, firstly, general background about ongoing environmental facts including highlights from Ireland with relevant figures are presented. Secondly, IT sector, the reason behind of selecting cloud computing as a research topic, and increasing environmental concerns related IT sector are provided. Then, green benefits of cloud computing along with the need of green data centers are explained.

The environmental contribution of cloud providers with their worldwide renewable energy adoption and specifically in Ireland are mentioned. Lastly, SMEs, as the target population, perception of cloud computing with the importance of their adoption related with the environment are given.

The summary of this chapter can be found at the end of this chapter with the highlights that is used in the discussion chapter.

2.2 ENVIRONMENTAL FACTS

Some environmental facts are important to highlight to have an understanding about ongoing issues. Worldwide electric power consumption sharply increased throughout the years and based on a statistic covering more than 150 countries worldwide, maximum power in kWh per capita found to be consumed by Iceland with around 54,000, followed by Norway and Bahrain (IEA Statistics, 2014).

Figure 4: Worldwide electric power consumption kWh per capita (IEA Statistics, 2014)
In 2014, Ireland was the 38th major electric power consumer with around 5,800 kWh per capita (IEA Statistics, 2014). Therefore, Ireland is not considered to be the most impactful country on the environment with its electricity consumption. Its energy efficiency levels are reached above European average in 2017, with a sustainable energy growth by approximately 9% within the years of 2012 and 2017 (Passport, 2018).

However, even though it is not the most impactful country, with the Paris Agreement in 2015 (Harvey, 2015), they also agreed on reducing their carbon emission levels which is also related with electricity usage. Ireland’s energy efficiency found to be not enough to reduce their non-renewable energy need, therefore, its impact on climate change is not yet preventable (SEAI, 2017).

Hence, the businesses along with the individuals are expected to be responsible in terms of their energy usage (SEAI, 2017). These businesses engagements could also result in portraying positive image of their organisations with their socially responsible behaviour (Valacich and Schneider 2017, p.216).

Overall, the energy share needed to generate electricity in Ireland represents the 33.5% of overall primary energy (SEAI, 2017). Almost half of it lost while generation, whereas the source of electricity generation found to be made from smaller amount of renewable energy sources while majority is from non-renewable sources such as; Natural Gas and Coal. (SEAI, 2017).

Figure 5: Electricity generated in Ireland, 56,143 GWh, which is 33.5% of overall energy and its proportions (SEAI, 2017)
The carbon emission level based on the kWh of electricity supplied in Ireland with its relative fuel components are represented in the figure below. Considerable decrease in CO2 emission is undeniable, however, slight increase after 2015 can clearly be observed and important to highlight (SEAI, 2017).

![Figure 6: CO2 emissions in Ireland per kWh of Electricity Supplied based on the fuel components (SEAI, 2017)](image)

This research paper is focused on the SMEs; therefore, it should be noted that on average carbon footprint of an SME in Ireland is estimated to be around 647.40 tonnes of CO2 (Carbonfootprint, 2018). Hence, for a medium sized company with 249 employee this equals to 2.60 tonnes of CO2 (Carbonfootprint, 2018).

Paris Agreement which mentioned before is a global climate deal adopted by 195 countries to keep global warming level below 20C. Through the agreement, critical importance of the emission levels and the need for reducing them are underlined (Harvey, 2015). Therefore, continuing dependence on Neutral Gas and coal is one of the concerning factors needed to be acted on (Müller et al., 2017).

In order to fulfil the requirements that are agreed on, not only increasing the usage of renewable energy source is essential, but also neutralising the residual emission levels from heavily industries is crucial (Müller et al., 2017).
2.3 IT SECTOR

Even though IT sector is not the heaviest industry in terms of its contribution, it has a significant involvement as it is assumed to be covering around 7% of global electricity consumption (Greenpeace, 2017, Statista, 2018). In detail, the percentage breakdown for electricity consumption and its change within 5 years for global IT sector underlines considerable growth in data centers as it is given in the figure below (Statista, 2018). It can be clearly seen that data centers’ energy consumption percentage is increased from 15% to 21% within the years of 2012 and 2017 (Statista, 2018).

![Figure 7: Electricity consumption share (%) based on components of global IT sector (Statista, 2018)](image)

Furthermore, the fact that in 2015, worldwide data center electricity consumption exceeded UK’s total consumption by being more than 415 terawatt hours of electricity (Bawden, 2016) could point IT sector to be one of the key sectors that negatively contributes to the environment. Another fact about the electricity consumption value of IT sector and the expectation of its increment by 2026 (Bawden, 2016) indicates its environmental threat.

50% of the world’s CO₂ emission is due to the world’s computer considering internet-based activities (Chowdhury et al., 2013). The carbon footprint of internet itself covers around 2% of the world’s overall emission (Avgerinou et al., 2017), which is around 830 million tons of CO₂ per year (CustomMade, 2015). This value is considerably high due to the fact that it represents more than a consumption of coal, oil and gas together by Turkey or Poland (ibid, 2013).
The wide range usage of the internet makes it almost central to every activity and the demand on internet is increasing momentarily (Valacich and Schneider, 2017, p145). Thus, with the increments in internet traffic, its energy footprint is expected to increase one billion by 2020 and result in reaching more than 4 billion globally (Greenpeace, 2017). For instance, the value of carbon emission generated by Information and Communication Technologies industry alone is found to be equivalent to aviation industry, which is extensively high (Balasooriya L.N, Wibowo and Wells, 2016; Vaughan, 2015).

Overall, in order to maintain the standard limits for global temperature increments, decrement in carbon emission volume from 15% to 30% is decided to be necessary by European Union (Kalange, 2013). For this reason, environmental side of cloud computing is preferred to be used as a research topic.

2.3.1 DATA CENTERS

The energy needed to provide cloud computing applications through data centers is vast. It does not only contribute highly in operational, but also contributes to the environment with its carbon footprint (Chowdhury et al., 2013; Kalange, 2013, Jacob, 2017). Its significant impact on the environment makes it one of the key issues considering existing energy shortages and global climate change (Chowdhury et al., 2013; Kalange, 2013).

Overall, for cloud providers high energy consumption is neither economic nor environmental friendly due to its carbon emission. Moreover, even efficiently build data centers are not sufficient enough to eliminate carbon dioxide emission, on the contrary, highest utilization rate will escalate its rate, mainly because the interest of cloud providers is mostly focused on the electricity cost (Chowdhury et al., 2013). Thus, their electricity supply to their data centers become a threat for a sustainable future (Greenpeace, 2017).

The demand on cloud computing technology is enhancing along with the environmental sustainability concerns (Chowdhury et al., 2013). This brings the need for greener solutions to not only to reduce operational costs but also to save energy, so that minimizing the environmental impact of cloud computing could be possible (ibid, 2013). The current demand on data centers are estimated to increase up to 10 times more in 2030 than what it is now (Greenpeace, 2017). Hence, the electricity needed to supply that demand could represent 13% of global electricity consumption in 2030 (ibid, 2017).
2.4 GREEN BENEFITS OF CLOUD COMPUTING

The nature of cloud computing allows its users to reduce their carbon emission level through less energy consumption (Chowdhury et al., 2013). Its adoption results show that it is possible to achieve the least carbon emission level by the users, therefore, it is characterized to be a green service (Domdouzis, 2015, p 107). To elaborate, the estimation of $12.3 billion energy saving along with annual carbon reduction, representing 200 million barrels of crude oil resulted through the migration of large companies to cloud computing (Chowdhury et al., 2013).

Moreover, by 2020, adopted cloud services, which reduces the waste usage on servers, is expected to lower carbon emission level by 85.7 million metric tons (Phatak, 2017). Thus, if companies with more than 100 employees consider using cloud services, at least with one application, could contribute in 90% of reduction of global emission (Comtrade, 2017).

Large energy savings is offered by multiple green cloud framework providers with high performance and availability which could be achieved through adoption of cloud computing. However, maintaining that service by cloud providers should also be considered due to data centers significant impact on the environment (Chowdhury et al., 2013; Kalange, 2013).

Some of the known main green features of cloud computing are highlighted as they are given below with relative brief information;

- **Virtualization**
  
  Energy consumption resulted by e-waste could be reduced through virtualization (Kalange, 2013), which is a single server that allows multiple operating systems to operate at the same time. 90% of the global IT organizations are already implemented it (Chowdhury et al., 2013).

- **Multi-tenancy**
  
  This feature of cloud computing, allocating same resource to multiple users for certain cloud service types such as; public cloud, allows users to share the energy resources, in return the energy consumption is reduced (Choumin Nguemaleu et al., 2014, p 197).

- **Pay-per-use**
  
  The nature of cloud computing allows consumers to only use the resources when they need it and therefore, they are charged based on the amount of time that they are consumed the
necessary resources (Chowdhury et al., 2013). Through this feature of cloud computing not only acceleration in developments is possible for SMEs (Choumin Nguemaleu et al., 2014, p 184) but also decrements in energy and resource wastage is possible (Chowdhury et al., 2013).

Companies who own their servers, mostly waste their own server usage capacity tremendously (Phatak, 2017). For instance, the server owners often represent using only up to 15% of their maximum capacity (ibid, 2017). Thus, around 30% of the servers assumed to be not used at all while energy amount needed is provided to them. Therefore, it results in extreme and unnecessary power consumption (ibid, 2017). However, through cloud computing the demand could be perfectly match to the needs than through in-house infrastructure. In return, the waste will be almost non-exist (Valacich and Schneider, 2017, p 147).

In addition, it is found that, through the public cloud computing’s adoption, smaller organisations could save more energy and carbon emission rather than larger sized companies (Chowdhury et al., 2013). For instance, medium size companies could achieve 90% savings whereas large companies could achieve only 30% (ibid, 2013). This significant difference is due to the server utilization level needed by those companies, therefore, the smaller, the less, the larger, the more energy could be needed (ibid., 2013). For this reason, in the case of businesses having their own servers, the storage space could get wasted and the utility needed to maintain their servers could reflect highly on wastage (ibid., 2013).

Therefore, it could be stated as cloud adoption could decrease the energy wastage and carbon footprint, especially by considering the pages of documents used by companies rather than online sources (ibid, 2013). Overall, if cloud computing is used efficiently, the significant amount of carbon footprint reduction could be achieved (ibid, 2013).

Green benefits of cloud computing should also be considered by the point of view of cloud service providers, who maintains data centers, in order to achieve the full environmental benefits of cloud computing. For this reason, in the following section, data centers with respect to their environmental effects are highlighted.

2.4.1 CLOUD DATA CENTERS

Green cloud computing is essential for its sustainable future growth as it is not only providing efficient computing process but also minimizing energy consumption (Kalange, 2013). For this particular reason, managing the data centers in an energy efficient manner is the key driver
for green cloud computing (ibid, 2013). Starting from satisfactory allocations of cloud resources regarding the quality of service is important to not only fulfil the service level agreements (ibid, 2013) but also due to lessen the energy usage as highlighted before.

Existing traditional data centers are not energy efficient enough compared to efficiency that could be achieved by technologies provided by cloud computing, namely through; resource virtualization and workload consolidation (Chowdhury et al., 2013; Kalange, 2013). Therefore, in that case, only the servers that are needed could be used while others who are not needed could be switched off.

For instance, the figure below represents the carbon emission level per user in a year, the difference of cloud services with its feature of virtualisation could clearly be seen (WSP and NRDC, 2012). It could be said that the best practise of no virtualization both for on-premise and colocation is worse than the average carbon emission level that could result in virtualized server usage (WSP and NRDC, 2012). This example represents the positive and significant effect of cloud data servers.

![Figure 8: Carbon Emission per User considering office productivity apps (WSP and NRDC, 2012)](image-url)
The increased adoption rate of cloud and its popularity supports virtualisation adoption among data centers and their updates on their infrastructure could result in possible reductions in their carbon emission levels (Jacob, 2017). For this reason, cloud computing could be considered as an example of green IT.

Therefore, through cloud computing, companies use the server space they need, thus, reducing the consumption of energy in comparison to that used by on-site servers becomes possible (Domdouzis, 2015, p 97). However, it is another fact that many cloud vendors are not disclosing their energy footprint data due to increased demand on their products (Greenpeace 2017, Greenpeace, 2010, p6). Even though because of this an exact comparison could not be made, the estimated energy reduction cannot be disregarded.

The energy needed for data centers regarding several scenarios from no virtualization to cloud services are provided below. In the light of the information provided, it could be concluded as virtualization and cloud services, even with their worst energy efficiency, their power need is almost half of what is needed for no virtualization (WSP and NRDC, 2012).

![Energy efficiency scenario for office productivity apps (WSP and NRDC, 2012)](image)

**Figure 9**: Energy efficiency scenario for office productivity apps (WSP and NRDC, 2012)
2.4.1.1 GREEN DATA CENTERS

Green data centers, another way of reducing environmental impact, could start by being constructed on smart locations in terms of considering renewable energy supply; such as wind and the sun, and energy efficiency of the equipment (Garg and Buyya, 2011). It is a fact that majority of the total energy consumption results because of data centers’ cooling system. For instance, for this particular issue, air or water-based cooling systems which focuses on cooling the equipment could be considered along with the energy requirement of the cooling system rather than cooling the room itself (Garg and Buyya, 2011).

However, there are some challenges arises with green cloud computing (Domdouzis, 2015, pp 98-99) and those are mentioned below as bullet points;

- Energy-aware dynamic resource allocation
- Quality of service
- Optimization of virtual network topologies
- **Enhancing awareness of environmental issues**
- SLAs
- Cloud data management
- Interoperability
- Security

Throughout this research the positive contribution for the challenge of increasing green awareness is aimed. That challenge mentioned in Domdouzis’s article is about making green cloud computing technology users aware about the positive environmental effect that could be achieved through green cloud computing such as the possibility of reducing carbon emission that is possible through adopting green cloud computing services (Domdouzis, 2015, p 98). Therefore, this research might be helpful to address that challenge and contribute in enhancing green awareness on environmental issues.

2.5 THE ENVIRONMENTAL CONTRIBUTION OF CLOUD PROVIDERS

The known attitude of the cloud vendors towards taking green initiatives is given in the figure below. The most cleaner energy provided to the cloud data-centers are found to be mostly supplied by Apple, and it followed by Facebook and Google (Gonzalez 2017, Greenpeace, 2017).
Cloud providers support to the environment is crucial as it is mentioned before as data centers could consume tremendous amount of electricity. Therefore, for greener environment there is a high-expectance of clean energy usage from cloud vendors as not only their efficient usage of electricity plays a crucial role on energy savings but also the source of electricity has a role in it (Cook, 2012).

Figure 10: Energy supply mix percentage to cloud data centers (Gonzalez 2017, Greenpeace, 2017)

There is a fact that, even though the switch to complete renewable energy by cloud providers could achieved in the future, it could not be enough to remove pressure from world’s power systems (Bawden, 2016). Furthermore, although the most known cloud vendors are leading by example to be environmental responsible (Greenpeace 2017), at this stage, the environmental actions taken place are not enough to stop contributing in climate change (Bawden, 2016).

Thus, among the major cloud vendors, the least clean one of the key players is Amazon as shown in the figure above, however, it should be noted that their clean energy value was 25% in 2015 (Gonzalez 2017). The reason behind of the decrements in clean source is because of the expansion on their data centers while keeping their renewable energy initiatives on the same level. Since they did not enhanced/expanded their initiatives enough along with new data centers, it was not enough to compensate their environmental damage, and resulted in the percentage decrease within years in their clean energy supply (Gonzalez 2017).
However, it should be noted all of the cloud vendors mentioned before supply 100% renewable energy at least to one location of their existing data centers (Greenpeace 2017). Furthermore, Microsoft is even experimenting in building underwater datacenter in order to reduce the cooling expenses and to be environmental friendly (Vincent, 2016).

2.5.1 IRELAND

Cloud vendors mentioned before, namely; Apple, Facebook, Amazon, Google and Microsoft have their existing data centers in Ireland. Even though it is not applicable for all of them, most of them are more environmental responsible (Greenpeace, 2017) than their overall green resource usage as shown in the previous figure. Thus, overall, while Facebook, Apple supplies 100% and Amazon, supplies 61% renewable energy source, which is more than their average renewable energy supply as highlighted before, Google and Microsoft found to be supplying less renewable energy source in their data centers in Ireland than their overall average renewable energy supply. Their renewable energy adoption percentage are shown in the figure below.

![Figure 11: Energy supply mix percentage to cloud data centers in Ireland (Greenpeace, 2017)](image)

Location of Ireland, having colder environment, makes it close to green energy sources, however, the location itself might not be enough as it can be understood from the lack in green energy adoption highlighted in the figure above. The companys’ real values and initiatives plays a crucial role in this adoption rate.

For instance, Apple was planning to open its 100% green data center in Ireland costing $1 billion, and they decided not to progress with it because of the legal delays lasted approximately for three years (Ong, 2018).
Having the power of adopting green energy does not necessarily mean that it will be adopted by cloud vendors as they can be affected by external factors like the decision-making time for the case of Apple.

This legal delay did not affect Apple’s green considerations since they will move to the project to Denmark (Bach, 2018) which satisfies the required conditions to provide green source (Smith, 2015). Hence, this did not change the fact that their initiative to provide green energy is mainly because to cut costs (Smith, 2015).

2.6 SMES CLOUD ADOPTION IN IRELAND

The argument of ‘there is a need of enhancement in green awareness of cloud computing’ that is mentioned before within this chapter, could be supported with the survey result, which is conducted among cloud vendors and Irish SMEs in Construction Industry. According to the results of that survey green solutions of cloud computing received the lowest ranking as a driver among all other factors in favour of cloud computing (Redmond, Hore and West, 2010). From this example, it could be concluded that there is a need to increase green awareness not only among cloud vendors but also among their customers. Thus, for this research paper cloud vendors’ main customers are assumed to be SMEs as SMEs in Ireland makes the 99.8% of all businesses (Paula, 2016).

Furthermore, in 2015, 71% of SMEs in Ireland are acknowledged by their interest or their adoption of cloud computing technologies (John, 2015), which is another reason to make them ideal target for this research project. Thus, the environmental advantages of SMEs in terms of possible carbon emission level reduction improvement could be as high as 48 times more depending on the location of the cloud vendors data center (Lozano, 2016).

It is stated that even if cloud vendors overall renewable energy adoption seems to be satisfying, their adoption levels are changing from one place to another (Greenpeace, 2017). Therefore, it is important to be aware of their corporate social initiatives rather than vaguely having idea of it.

In 2016, majority usage of the cloud computing services among EU enterprises found to be for the e-mail services (Giannakouris and Smihily, 2016). Its usage is resulted by not having a server infrastructure for their system in term of maintenance cost, and other expenditures, as a result these led them to prefer cloud computing (Giannakouris and Smihily, 2016).
According to a survey done by Carcary et al., 2014, in Ireland, the purpose of having an efficient competition is found to be the major reason on the adoption rate of cloud computing services specifically among micro companies. Furthermore, even though cost benefits, mobility, better resource utilisation, collaborative working could be achieved through adoption of cloud computing, they are found to be ineffective among SMEs in Ireland as their overall adoption rate according to the survey is representing only 52% (Carcary et al., 2014).

2.7 LITERATURE CONCLUSION

In the light of the information given in the literature review section, the idea of green solutions and their influence on their adoption of cloud computing from SMEs point of view found to be not known. Providing the insights through SMEs outlook, as their attitude is unknown, could be an asset for future of the cloud computing if the aim of this paper could be achieved.

Throughout this research paper, it is aimed to increase the green awareness of cloud computing among SMEs in Ireland, and through the findings from this research paper positive impact on cloud vendors green energy adoption speed is aimed to have because of the demand from their customers, as SMEs.

This topic is important because of the highlighted need for enhancement on environmental awareness and its possible contribution of green cloud computing. The effect of cloud computing could be significantly positive on the environment, while, the challenge of increasing the green awareness could be overcome. However, the negative contribution of the data centers to the environment is high but the possibility of data centers to become completely green or at least greener enough to reduce their negative environmental effect could not be overlooked.

Therefore, being aware of cloud vendors corporate social initiatives regarding data centers rather than vaguely having idea of them plays a crucial role for SMEs to fully reduce their impact on the environment. This brings the need of knowing SMEs’ environmental awareness, their friendliness, and the reasoning behind of their cloud computing adoption if applicable.

Additionally, knowing whether SMEs are aware of green solutions of cloud computing is also important to discover to understand whether they are aware of their possibility to reduce their carbon footprint like it was mentioned, even by only preferring virtualisation rather than on-premise option, significant positive impact on the environment could be achieved by SMEs.
CHAPTER 3: RESEARCH METHODOLOGY
3.1 RESEARCH METHODOLOGY INTRODUCTION

In this chapter the strengths and weaknesses of the selected research methodology will be presented with essential justification of every method used. Objectives of this research paper, that are mentioned in introduction chapter are considered to be main decision-making factors for the research methodology. They represent the rationale behind of this research paper, and useful to understand how the concept of green cloud computing perceived by SMEs in Ireland. Overall, finding an answer to the research question, “To what extend green solutions influences SMEs’ adoption of cloud computing in Ireland?” is the only aim of this research paper.

3.2 RESEARCH DESIGN

The representation of the elements of this research paper, shown in the figure below within an onion ring figure which is adopted from Saunders et al., 2015. The direction of the onion goes from the philosophy, the outer circle of the onion, to techniques and procedures, the inner circle of the onion (ibid, 2015). For the aim of this research paper, those highlighted elements from the Saunders et al. 2015 found to be the most suitable ones. Each selected element, that are shown up within the figure will be summarised under relevant sections of this research methodology chapter.

Figure 12: Research onion for this research project (Saunders, Lewis & Thornhill 2015, p 124)
3.2.1 RESEARCH PHILOSOPHY

The need of unbiased behaviour is not discarded while undertaking the research. The existing reality, environmental issues are perceived objectively, and this research is carried out in a critical and value-free manner, and obtained measurable, and credible data from primary research is conducted with upmost neutral behaviour. The nature of the reality to be an external and real situation, the fact that acceptable knowledge is observable and measurable, and the role of the researcher to maintain a value-free research makes positivism the most suitable philosophy among others like critical realism, interpretivism, postmodernism and pragmatism (Saunders et al. 2015, p 136).

More detailed information about positivism philosophy in business and management research is provided in the figure below. It is a figurative representation of the table provided in Saunders et al. 2015, p136.

![Figure 13: Positivism and information on its components; ontology, epistemology, axiology, adopted from Saunders et al. 2015, p 136.](image)

Therefore, through this research it is aimed to find an objective answer to a certain main research question to understand SMEs green values as it is also mentioned in introduction chapter in more detail.

3.2.2 RESEARCH APPROACH

By the nature of the paper aim, the research philosophy that is adopted throughout this research, typically adopts deductive method (Saunders et al. 2015, p 136). Additionally, the
While environmental perspective of this research aimed to be sustained throughout this research paper, it is highly emphasized through literature review chapter and discussion chapter, where a critical analysis of primary data and secondary data is presented. Whilst the general to specific area approached within literature review chapter, within overall structure of this research paper literature review presents the generic section while primary data and its analysis represents more specific information.

This is mainly because of the adopted deductive approach, and not sustaining it only within chapters but also within the structure of the research paper, even within the applied logic among the survey questions.

3.2.3 METHODOLOGICAL CHOICE

The methodology of the research chosen to be mono method – quantitative considering the best possible way to reach out the SMEs in Ireland and to conduct in-depth research regarding their values towards green cloud solutions. Hence, single data collection technique from questionnaire is conducted. In this way, the relationship of the variables provided through questionnaire are critically analysed in addition to the comparison with the findings from literature review chapter.

In order to evaluate the responses from the SMEs to understand whether there is an ongoing dilemma between their values and their choices, the questions are arranged accordingly, so that the analysis to evaluate the relationship within questions in an efficient manner could be possible.

Furthermore, the analysis of whether SMEs in Ireland value the green initiatives of cloud vendors and the reason behind on their decision-making factor became possible. In order to achieve the most dependable answers, the questions within survey set to address the existing gap in the literature.
Additionally, the questions provided thoroughly analysed before conducting the survey to express clear and concise understanding for the respondent. The details of the questionnaire creation are provided under data collection – questionnaire sub-chapter.

3.2.4 RESEARCH STRATEGY

It is mentioned that research approach is decided to be deductive approach and this research paper is intended to answer the main research question “To what extend green solutions influences SMEs’ adoption of cloud computing in Ireland?”. Also, it was highlighted that in order to answer that question, quantitative analysis will be conducted through obtained results from questionnaires.

According to Saunders et al., (2015, p 181), questionnaires are common data collection technique for survey strategy and this strategy normally follows deductive approach. In addition, survey strategy is often used for exploratory research (ibid, p 181).

As survey strategy allows to analyse the behaviour pattern for certain issues (ibid, p 181) and this research paper can be considered as an exploratory research to understand the point of view of SMEs in Ireland towards green cloud computing, each feature of survey strategy mentioned in this paragraph can be accepted to be representing the main reasons why survey strategy is a good fit for this research project.

3.2.5 TIME HORIZON

Existing time constraints, specifically the need to complete this research project within three months, made cross-sectional study to be the most reasonable time horizon. Additionally, the employment of the survey as primary research method, is the most common data collection technique for cross-sectional study (Saunders et al. 2015, p 200). To illustrate, within three months’ time it was possible to conduct in depth analysis that fits the boundaries of the research.

3.2.6 TECHNIQUES AND PROCEDURES

It is highlighted in the figure at the beginning of the research design chapter that secondary and primary analysis are the selected to be the data collection instruments. Therefore, in the following sections the information regarding those data collection instruments are provided.
3.2.6.1 SECONDARY ANALYSIS

The secondary analysis, mainly in the literature review and as supportive arguments throughout the paper, is frequently used. Secondary analysis includes, journal articles -mostly peer reviewed-, news, books, cloud and environment related websites and such.

Information provided within secondary analysis can be practical example of resource saving in terms of time and money (Saunders et al., 2015, p 330), thus, some journals, like Carcary et al., 2014, are found to be reasonably useful for this project. Moreover, without secondary analysis, it would not be possible to notice the gap within literature.

To elaborate, the article from Redmond, Hore and West in 2010, provided an insight from construction industry. According to their findings, construction SMEs that are adopted cloud computing in Ireland, considers the green solutions the least concerning area on of cloud computing. Therefore, for this research paper it could be said that the secondary research constructed the basis for the research topic.

However, as it is pointed as a possible disadvantage of secondary research in Saunders et al. 2015, p 332, it was difficult to find exact secondary resources that matches the need, therefore the secondary analysis especially in literature review tried to be used in a collaborative manner. Furthermore, the data access provided by Dublin Business School Library services, made the secondary research process easy to sustain, with no cost involved.

3.2.6.2 PRIMARY ANALYSIS

The primary analysis is conducted by the responses received by surveys and all are focused on the SMEs in Ireland. The analysis of the surveys is the only conducted primary analysis and it built up the research paper.

It was essential to conduct the primary analysis for this research paper due to the gap within the literature. It was not possible to reach any knowledge related with the information needed as there was no research done specifically for this topic, green solutions, to this target area, SMEs in Ireland.

3.3 SAMPLING – SELECTING RESPONDENTS

Characteristic of the quantitative research unambiguously make probability sampling the most suitable sampling technique in general (Saunders et al., 2015, p 166). However, also according
to Saunders et al., in-depth understanding could be achieved through non-probability sampling as well (Saunders et al., 2015, p 296). Therefore, the fact that the nature of this research contains in-depth understanding of SMEs value of green cloud computing makes non-probability sampling to be the most suitable sampling technique particularly for this research project.

Furthermore, in-depth focus on green cloud solution from the point of view of SMEs, companies with less than 250 employees, which located in Ireland, have a key role for selecting the sample. Thus, having clear target population makes the use of homogeneous purposive sampling the most appropriate technique (Saunders et al., 2015, p 296).

Throughout the sampling process, full time employees of SMEs and the business owners are reached out by aiming to satisfy the specified quota of 100 SMEs. The population is selected only to be including both full-time employees and business owners with necessary elimination of part-time employees as it is desired to reach employees who knows well about the company. Furthermore, to meet the criteria, the employees of SMEs within the age of 25-65, with education higher than bachelor’s degree and work in Ireland is selected to be the sampling frame.

Even though purposive homogeneous data collection technique has low likelihood of sample to be representative (Saunders et al., 2015, p 298), survey strategy, in terms of aiming SMEs in Ireland, within certain criteria makes it possible to explore the similarities and differences in depth (Saunders et al., 2015, p 302).

The sample amount for SMEs is decided according to survey response percentages from a survey conducted by Carcary, Doherty and Conway in 2014. Their research was based on 95 responses from SMEs in Ireland. Carcary, Doherty and Conway are one of the main authors in literature review chapter with their similar focus in two of their articles, which is about SMEs in Ireland. Thus, in order to have coherence with literature review and to maintain the feasibility of the research, questionnaires are provided to around 100 employees of SMEs in Ireland.

An overview of the research population with sampling process is provided in the following figure with summarises each section of the sampling.
Figure 14: Research Population and Sampling Process (Saunders et al., 2015)

3.4 DATA COLLECTION

Data collection for the questionnaires conducted through Survey Monkey. Consequently, around 100 questionnaire responses from the SMEs in Ireland are received through Survey Monkey services. The suitable criteria are selected through Survey Monkey’s service by using their “Select Target” feature (SurveyMonkey Inc., 2018), with the purpose of reaching the most accurate respondents by achieving enough response rate.

At first, for the questionnaire, a sample version with up to 12 questions is tested to validate the sampling method. According to insights from the results, necessary changes, like: within the sampling method, making sure the logic of the questionnaire is working, or checking the
improvements needed to describe the question better, and necessary re-allocations of the questions to their relevant sections are accomplished.

In detail, through the used feature of Survey Monkey respondent criteria was able to be selected including; the respondent location, the size of the company. In this case, SMEs, the age range, their education level, and their occupation within the company. More information about targeting audience can be found in Appendices chapter.

Survey Monkey is preferred to be used due to difficulty in finding participants for specified criteria needed for this research project. Therefore, the feature of Survey monkey targeted criteria is met the specified research requirements.

The figure below reflects the data collection process for this research paper. Since this research paper is based on both primary and secondary data, the data collection techniques for both methods are highlighted.

For secondary data, academic articles, news and relevant websites are the data collection method, while the questionnaire is collected through third party, Survey Monkey as shown in the figure below.

![Data Collection Diagram]

Figure 15: Data Collection

3.4.1 QUESTIONNAIRE

The questionnaire sample, which can be found in Appendices, separated into two pages and covered three main sections. In order to make the survey fluent as possible for the respondent, a relevant logic is added in certain questions. Moreover, according to their adoption of cloud computing services, they are allocated to relevant questions in page 2. Therefore, if the Q4 is
answered YES, the respondent will be replying to all 12 questions, whereas, the other responses to Q4 will result in replying to 9 questions in total.

These three separated questions are only replied by the Yes respondents of Q4 requires cloud knowledge and experience.

Relevant logic that is mentioned can be found in the figure below presented right after the detailed explanation of the sections.

- **Respondent’s demographic**
  
  Q1. Insights about the size of the SME, whether it is micro, small or medium
  
  Q2. Job of the respondent within the company
  
  Q3. Respondent’s professional position, whether the respondent is a director, manager, or other decision maker.

Apart from the created questions, after completion of the questionnaires, survey monkey provides additional demographics including the respondent’s gender, age and the device that is used for completion of the survey. However, as they are not relevant for this research, they are not highlighted in data analysis chapter.

- **Respondent’s opinion about cloud computing**
  
  Q4. Whether their company are using cloud services; Google Cloud Platform, Microsoft Azure, VMware, SoftLayer, Security-As-Service, Alert Logic, Amazon Web Services as such.

This question is adopted based on the most common cloud service usage among companies (Jain, 2017). Therefore, it could be possible the eliminate the possibility of not knowing what cloud computing is.

  
  Q5. Their satisfaction level from their cloud vendor’s service
  
  Q6. The importance ranking of 5 cloud features; security, green solution, availability, cost, customer service
  
  Q7. Their likeliness to switch cloud vendor based on their energy consumption

This question is important to analyse with their answer in Q5, and Q6.

- **Respondent’s opinion about green cloud computing**

  Q8. Ranking their reason behind of their existing/ possible preference of cloud computing

Even though the question itself do not seem to be a question about green cloud computing, according to their answer, it can be linked with green cloud computing. The statement of “to
have better resource utilisation” is among the options needed to be ranked, and it may be linked with green solution preference.

**Q9.** Green awareness of the respondent

**Q10.** Environmental friendliness of their company

This question is important to be analysed with Q5, Q6, Q7 (if applicable)

**Q11.** Respondents environmental concern about a fact related with internet-based activities

**Q12.** Considering sufficiently efficient service provider, the effect of their corporate social responsibility initiatives on SMEs decision making

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**Figure 16: Applied logic to the questionnaire**

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<th>SMEs (not adopted cloud services)</th>
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<td>Q12</td>
<td>Q12</td>
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</tbody>
</table>

**3.5 DATA ANALYSIS**

Quantitative analysis that is mentioned will be done through the data results provided in survey monkey. Survey monkey allows users to see the insights from the responses, therefore, at the end of completion of the questionnaire, the desired type of graph graphs including frequency analysis to conduct basis analysis of each question, and cross analysis within questions to
understand existing correlations and their strength is created. These will be done through Excel and in addition, some specialised analysis for certain answers are done through Survey Monkey services.

In addition, for individualised graphs that are needed, and survey monkey was not enough, creation of those graphs to highlight certain results also done through Excel. Overall, collaborative use of Survey Monkey and Excel become possible due to extractable feature of the data from survey monkey.

For the graph and table development through Excel for detailed analysis of those figures and tables are found to be sufficient enough.

3.6 RESEARCH ETHICS

The confidentiality of the data received through primary research might have be an ethical issue if the ethical consent form and information sheet about the research project is not provided by the researcher or not signed by the responded. Therefore, the allocated ethical consent form and information sheet that is used before collecting the answers can be found in Appendices Chapter.

If respondent changes its mind about a conducted survey, and would like to destroy the responses, as the data received in the digital format and the respondent’s information is anonymous for the case of Survey Monkey, it is not possible to destroy it. However, an option to leave the survey at any stage is left to their free choice.

This research paper satisfies the ethics checklist provided in the Appendices, both from Dublin Business School, DBS, and Saunders et al., 2015, p 201. Furthermore, for more detailed research ethics information, in particular to primary data collection and analysis, related document attached to the Appendices, and could be found under Ethics Check Lists (DBS & Saunders et al.).

3.7 LIMITATIONS OF METHODOLOGY

It is highlighted that secondary research and primary research are significantly important for this dissertation project. However, the difficulty of finding up-to-date resources at most three
to four years old was difficult to obtain. Therefore, the limitation encountered resulted in usage of topic related websites and few articles that can be considered to be old.

Even though it did not fully limit the research, another challenge was regarding the primary data collection. It was the availability of the selected respondent criteria through Survey Monkey. In order to have dependable research paper, it is mentioned that respondent targeting option of Survey Monkey is considered. Consequently, unavailability of the respondents could have presented a limitation as there is no guarantee at all time to be able to reach out specified criteria, see Sampling – Selecting Respondents section. However, early start of response collection when it was available eliminated the challenge and gave enough time to find available and suitable respondent criteria.

On the other hand, as it is mentioned the number of respondents selected to be 100 in order to have coherence with the literature review findings. However, even though it could have been considered to reach hundreds of responses, Survey Monkey did not allow to reach the response amount more than 100 as the maximum number of respondents available for the specified target area was around 100.

Moreover, time was a limitation itself. However, as it is mentioned before within this chapter, the reason behind cross-sectional preference; doing primary research via questionnaires is to overcome the time restrictions. So that, not only time restriction is eliminated but also, deep insight from the primary research is obtained through efficient use of primary data analysis.
CHAPTER 4: DATA ANALYSIS/ FINDINGS
4.1 DATA ANALYSIS/ FINDINGS INTRODUCTION

In this chapter, the findings from survey responses represented in the same order within the questionnaire. Firstly, frequency findings are represented in their individual chapter, and also some notable figures obtained from pivot tables are provided. Secondly, the correlations within certain questions are provided in a separate sub-chapter.

Overall among 104 respondents, only one of them did not complete the half of the survey. However, since every respondent contributed at least the first part of the survey which is the beginning of the survey, the answers of the one who quit the survey is not eliminated and counted among others.

4.1.1 DEMOGRAPHICS OF THE RESPONDENTS

The set boundaries of the research topic, being in Ireland and containing information about SMEs point of view resulted in conducting the survey in Ireland. This factor highlighted before in detail in Research Methodology Chapter. Therefore, the criteria of the respondents are decided before conducting the survey.

Thus, in order to receive more dependable results, the education level is decided to be minimum bachelor, including MBA, Magister/Master and PhD level of studies within the age range between 25 – 65 with the condition of either working as full-time employee or owning the business. These criteria also can be found in the table given below and in Research Methodology Chapter with the reasoning behind.

Table 1: Selected criteria for survey respondent

<table>
<thead>
<tr>
<th>Country</th>
<th>Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of studies - University</td>
<td>Bachelor, MBA, Magister/Master, PhD</td>
</tr>
<tr>
<td>Age</td>
<td>25-65</td>
</tr>
<tr>
<td>Occupation</td>
<td>Full-time work, Own business</td>
</tr>
</tbody>
</table>
4.1.1.1 POSITION WITHIN COMPANY

The respondents’ job area are mostly from customer service, administration, sales and finance. Even though, the overall percentage of those areas that are mentioned covers around 66% of the responses and individually those percentages are not higher than 20%.

Therefore, the responses received from variety of departments possibly with different educational backgrounds is gathered. All of the received job areas are shown in the following figure along with their relative percentages.

![Figure 18: Respondents job area within the company](image)

As it is highlighted before within Research Methodology Section, the survey is separated for two kinds of respondents, namely; SMEs that are adopted cloud computing and the ones that are not adopted.
4.1.2.1 CLOUD USAGE

According to the insights gathered from the question relative to the usage of cloud services; such as Google Cloud Platform, Microsoft Azure, VMware, SoftLayer, Security-As-Service, Alert Logic and Amazon Web Services; it is found that 76 of the respondents out of 104 found to be aware of the services and the company they work in adopted those services. That percentage reflects almost 73% of the responses. The obtained ratio for that particular question is given on the left.

4.1.2.2 SATISFACTION OF CLOUD SERVICES

Among those who are aware of their company’s adoption of cloud computing, even though considerable neutral satisfaction exists, with the allocated weight to each answer, just satisfied customers are found to be the dominant answer. Therefore, perceived satisfaction is found to be high as expressed in the figure below.

Figure 20: Left - Satisfaction answer per response (out of 75) & Right - overall satisfaction rate represented by weight

4.1.2.3 RANKING OF CLOUD FEATURES

On the other hand, the importance of the features of cloud computing found to be showing differences. For instance, particularly for the purpose of the research, green solutions are
provided among cloud computing features to be ranked. For some, it was ranked as the first option, however, for majority of the respondents it was the least important feature of cloud computing as shown in figure below.

Therefore, the insights from the survey represents the importance of the features in the order that is given in the figure below right. Security is the most important feature followed with availability, customer service, cost and leave the green solutions of cloud computing to be the least important of the feature.

![Figure 21: Left: the ranking of the features of cloud computing [1-the most important (the bottom), 5- the least important (the top)] & Right: the overall result representation of that ranking](image)

4.1.2.4 LIKELIHOOD OF SWITCHING CLOUD VENDOR

The most dominant response for switching cloud vendor based on their energy level is neither likely nor unlikely option, however, significant response percentage to the likeliness is important to point as it covers around 29 responses while neutral option covers 36.

Furthermore, based on respondents who are satisfied or more than satisfied with their cloud computing services found to be covering the likelihood of switching their cloud vendor based on their energy consumption patterns whereas significant amount of those respondents is neutral or unlikely to change. The responses of very satisfied users are shown in pink, and the responses of just satisfied cloud computing service users are shown in orange with allocated amount of responses.
4.1.3 GREEN CLOUD COMPUTING

In this section, responses from the second part of the survey will be presented. Furthermore, the analysis of this section is based on 103 responses as one of the respondent did not participate in the second part of the survey.

4.1.3.1 REASONS TO ADOPT CLOUD COMPUTING

Even though, the reason behind of cloud computing adoption share almost equivalent value based on received responses, it is mostly to have better resource utilisation along with the others highlighted in the figure below.

Figure 23: The order of the statements based on responses

The ranking of the adoption reasons mentioned above is concluded based on the weight of the answers received and they are provided in the figure below. The amount of the responses for
the relevancy of the statements which mentioned before ranked from 1, to be the most relevant, to 4, to be the least relevant. The responses received for each statement based on their relevancy is shown in terms of number of responses.

Figure 24: The relevancy of the statements [1- the most relevant (the bottom), 4 – the least relevant (the top)]

4.1.3.2 ENVIRONMENTAL AWARENESS

Based on the received responses, the green benefits of cloud computing in terms of reducing carbon emission level of the companies are not widely known, furthermore, the percentage that is aware of it only represents around 50% of the respondents.

4.1.3.3 ENVIRONMENTAL FRIENDLINESS

On the other hand, the environmental friendliness of the SMEs seemed to be somewhat friendly based on the majority of the responses, covering around 50% of the overall responses. The ones who stated the SME they are working for either is extremely or very environmental friendly found to be neither likely nor unlikely to switch their cloud vendor based on their energy consumption pattern.
4.1.3.4 CONCERN LEVEL FOR CO₂ EMISSION

Every respondent found to be mainly concerned about the CO₂ emission statistics with high satisfaction level of their service provider. The ones who are very concerned and just concerned about the statistics, found not to be considering green solution among the most important features of cloud computing, rather among the least important ones.

![Pie chart showing respondents concern levels](image)

**Figure 26: Respondents concern level based on the fact "50% of the worlds CO₂ emission results from internet-based activities"**

Most of the respondents whom selected better resource utilisation as their first choice found to be concerned by the fact that 50% of CO₂ emissions results from internet-based activities. In addition, 60% of those concerned respondents are aware of what cloud computing can offer in terms of reducing carbon emission levels.

4.1.3.5 ATTITUDE TOWARDS CORPORATE SOCIAL RESPONSIBILITY

The most dominant response among the statements provided to the respondents found to be the likelihood of signing a contract if the efficiency of the service and the corporate social responsibility, CSR, initiatives of the service provider is satisfactory. Furthermore, it followed by just having efficient service without having any knowledge about the service provider’s CSR initiatives. The relative response rate for the statements are shown below.
Based on the individual responses, all of the ones who prefer cloud services to have better utilisation are not willing to sign a contract with service provider if their corporate social responsibilities are not good enough.

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### 4.1.4 CORRELATIONS WITHIN ANSWERS

In this sub-chapter, certain correlations within the answers are presented. It includes more detailed cross-analysis of the questions as well. The nature of this report gives green awareness of the respondents and its influence on their cloud adoption (if applicable) a crucial role. For instance, for non-cloud adopters, their green awareness and their past service adoption behaviour is an important asset needed to be analysed.

The table below identifies the variable names and relative information needed to know to analyse the figures in this chapter.

**Table 2: Variable Name and Labels used in the correlation figure**

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Variable Label</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switch</strong></td>
<td>How likely are you to switch your cloud vendor based on their energy consumption pattern</td>
</tr>
<tr>
<td>Fact</td>
<td>How concerned are you about the fact that 50% of the world's CO2 emission results from internet-based activities</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Satisfy</td>
<td>How satisfied are you with your cloud services</td>
</tr>
<tr>
<td>Friendly</td>
<td>Do you consider your company to be environmentally friendly</td>
</tr>
<tr>
<td>Agreement</td>
<td>Based on your past agreements in working with a service provider, please select from the following statements all that are relevant</td>
</tr>
<tr>
<td>Cloud</td>
<td>Does your company use cloud computing services</td>
</tr>
<tr>
<td>Reduce</td>
<td>Do you know that cloud computing can allow its users to reduce their carbon emission level</td>
</tr>
</tbody>
</table>

### 4.1.4.1 FOR CLOUD ADOPTERS

First correlation, the one on the left, represents the satisfaction of the cloud adopters with their cloud vendors and likeliness to switch an existing cloud vendor based on their energy pattern found to have weak positive correlation. Even though, their consideration to switch the cloud vendor and their concern towards negative environmental contribution of internet-based activities have also weak positive correlation, it is more positive than their satisfaction with their cloud vendor.

Thus, switching their existing cloud vendor and the environmental friendliness of their company have the weakest positive correlation among other correlations.

Furthermore, their consideration to switch their cloud vendor and the fact that cloud computing could reduce the carbon emission level of their users found to have weak negative correlation along with the comparison of switching their cloud vendor and their knowledge about the corporate social responsibility initiatives of their service provider.

Lastly, the satisfaction level with their cloud provider and with their knowledge about corporate social responsibility initiatives of their service provider have a weak negative correlation.
Figure 28: Correlation within certain variables among cloud adopters

4.1.4.2 FOR NON-CLOUD ADOPTERS

For non-cloud adopters eliminating the ones who does not know whether their company adopted cloud computing services or not, the friendliness of their company and their knowledge about corporate social responsibility of their service provider found to have a very week positive correlation, whereas, the environmental friendliness of their company and their concern towards negative environmental effect of internet-based activities found to have a weak positive correlation as it shown in the figure below.

Moreover, their concern level to those environmental effect and their knowledge about the corporate social responsibility initiatives of their service provider before agreeing on a service found to have weak negative correlation.

Figure 29: Correlation within certain variables among non-cloud adopters
4.1.5 ADDITIONAL HIGHLIGHTS

4.1.5.1 GREEN AWARENESS BASED ON CLOUD ADOPTION

The green benefits of cloud computing found to be known mostly by the cloud computing adopters and followed with the ones who did not adopt and the ones who does not have knowledge about cloud computing. Furthermore, even though the ratio of green awareness within cloud adopters represents the highest, within themselves, this ratio is almost 4:3 as shown in the figure below.

Figure 30: Green awareness vs. cloud adoption

Thus, additional analysis regarding “to have better utilisation” option and companies’ value of green solutions is conducted and presented in the following figure. The first peak of answer is occurred when a link found between highly prioritised green solutions and moderate evaluation of considering better utilisation. The second peak is presented in green squared response number and the highest peak presented in yellow squared number. Therefore, it could be said that even though the option of having better utilisation is ranked first among all of the respondents, no strong correlation found between the importance of green solutions.
4.1.5.2 CHANGES WITH THE SIZE OF THE COMPANY

According to survey responses it could be said that the concern level shows a significant change with the size of the company. In the light of the information gathered from the figure below, it is found that the bigger the size of the company the more concern towards the negative environmental factor resulted because of internet-based activities.
In detail, discarding the response amount and considering the concern level based on the company size, the majority of the concern level is peaked on concerned for small to medium enterprises, whereas, the majority of the concern level is peaked on Somewhat concern for Micro Enterprises. Therefore, this analysis could support the one that is indicated before.

Figure 33: The concern levels, [5- Very Concerned, 1- Not at all Concerned], and the response rate based on the size of the company

Furthermore, the cloud adoption rate based on the company size found to be mostly dominated by Medium size companies and followed by small and micro. Like it is done in the previous analysis, only considering the answers within their own size also is important. Therefore, another figure representing the adoption rate within their size is also presented.

Figure 34: Cloud adoption vs. size of the company

Furthermore, Medium and Small Size Enterprises found to be majorly adopted the cloud computing services, whereas Micro Size Enterprises’ adoption is representing weak adoption compared to their response rate.
Figure 35: Cloud adoption, [1-Yes, 2-No, 3-Don’t have knowledge], and the response rate based on the size of the company

Along with the other analysis results, medium size companies are the most considerate of the satisfaction of the corporate social responsibility initiatives of their service provider before having an agreement. Like with the other analysis, this figure is also analysed with the individual response rate based on the size of the company.

Figure 36: Size of the company and corporate social responsibility consideration while agreeing with a service provider
Overall, a service provider with a satisfactory CSR, Corporate Social Responsibility found to be preferred to agree working with, Medium and Micro Enterprises found to be the main supporters of this argument, whereas Medium Enterprises could agree working with a service provider with vague CSR initiatives.

Figure 37: Corporate social responsibility consideration while agreeing with a service provider and the response rate based on the size of the company

The graphical figures below represent the priority given to the five features of cloud computing based on the ranking given depending on the size of the company. In order to present better, the individual percentages given for each rank considered. To elaborate, the percentages received by Micro, Small and Medium Enterprises for ranking of each feature is analysed separately, and the features with highest percentage on a rank number presented within the following figures.

Therefore, the order of the features based on the majority of percentage received for the ranking number of that certain feature. Since the percentage plays an important role in discussion chapter, they also highlighted within the figure.

Micro Enterprises found to value the most availability feature of cloud computing followed by customer service and cost feature. Furthermore, cost feature as much it was the second important feature of cloud services, it is also found to be considered as important as the most prior feature as well.
Figure 38: Micro Enterprises and the ranking of features of cloud computing based on their importance.

For Small Enterprises, the most importance is given to security feature of cloud computing followed by availability and cost feature. Furthermore, availability feature as much it was the second important feature of cloud services, it is also found to be considered as important as the most prior feature and third important feature as well.

Figure 39: Small Enterprises and the ranking of features of cloud computing based on their importance.

For Medium Enterprises, the most importance is given to security feature of cloud computing followed by customer service and availability feature.
Figure 40: Medium Enterprises and the ranking of features of cloud computing based on their importance.

Among all of them it is visible that green solutions valued the least, furthermore, it is considered as the least important feature of cloud computing. However, the significant percentage difference between Micro, Small, and Medium importance cannot be ignored. Therefore, it could be said that the increase in the size of the enterprise, found to be increasing the importance given to green solutions.

Furthermore, considering the percentage for green solutions to be ranked as the least among medium size enterprises, it could also be said that around 65% considers it not to be the least important factor. Therefore, for micro enterprises the majority of the ranking, 60% resulted in making green solutions the least important even though half of the 40%, who ranked differently, considers it to be the second important factor. The detailed version of the responses received for each feature is provided below.

Figure 41: Importance of security feature, [1- the most important, 5- the least important] and response number based on the size of the company.
Figure 42: Importance of availability feature, [1- the most important, 5- the least important] and response number based on the size of the company

Figure 43: Importance of cost feature, [1- the most important, 5- the least important] and response number based on the size of the company

Figure 44: Importance of customer service feature, [1- the most important, 5- the least important] and response number based on the size of the company
It is mentioned in previous data analysis within this chapter that the relevance of the possible or existent adoption reason of cloud computing is mostly dominated by “to have better resource utilisation” by the average weight on the ranking. In order to analyse in detail, the differences regarding the company size is also considered for this analysis in the order of their preference mentioned before.

To have better resource option found to be mostly preferred by medium and micro size enterprises, followed by small size enterprises.
To be cost efficient option is mostly preferred to be one of the important reason to adopt cloud computing by micro companies and small companies.

**Figure 47: The ranking of “to be cost efficient” on relevance for the existent/possible adoption of cloud computing**

Whereas, to have competitive advantage found to be considered neither very important option nor not important option. Unified weight on this option for all size of SMEs does exist.

**Figure 48: The ranking of “to have a competitive advantage” on relevance for the existent/possible adoption of cloud computing**

Thus, the option of to be able to work collaboratively has more importance for medium size companies whereas the smaller sizes found to evaluate that option as the least influencing reasoning behind adoption of cloud computing.
Figure 49: The ranking of “to be able to work collaboratively” on relevance for the existent/possible adoption of cloud computing

4.1.5.3 THE VALUES OF THE MANAGEMENT

The responses received based on the managing position within the company divided into three sections, the ones who are not in a managing position, director/manager or other decision makers. The results highlighted an overall importance given to satisfactory CSR initiatives before agreeing with cloud service providers. However, it is undeniable that for other decision makers, vague CSR initiatives found to be enough to agree with service providers.

Figure 50: The position within the company and its connection with the evaluation of CSR initiatives of a service provider
CHAPTER 5: DISCUSSIONS
5.1 DISCUSSION INTRODUCTION

The chapter is dedicated to make a critical evaluation of the responses and the discussion of the findings which are presented in data analysis chapter with the highlights given in literature review chapter. In addition, as the availability of informationparticularly for this research topic is non-exist, some statements that are provided solely based on primary research findings.

Received response rate from different company sizes (micro, small and medium) and position provided enough insights from management to non-management positions as shown in the table below.

Table 3: Response rate based on selected criteria

<table>
<thead>
<tr>
<th>Company Size</th>
<th>Position</th>
<th>#Responses</th>
<th>Total%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>Not a managing position</td>
<td>5</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>Other decision maker</td>
<td>3</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Director/Manager</td>
<td>4</td>
<td>33%</td>
</tr>
<tr>
<td>Small</td>
<td>Not a managing position</td>
<td>8</td>
<td>32%</td>
</tr>
<tr>
<td></td>
<td>Other decision maker</td>
<td>7</td>
<td>28%</td>
</tr>
<tr>
<td></td>
<td>Director/Manager</td>
<td>10</td>
<td>40%</td>
</tr>
<tr>
<td>Medium</td>
<td>Not a managing position</td>
<td>25</td>
<td>37%</td>
</tr>
<tr>
<td></td>
<td>Other decision maker</td>
<td>23</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td>Director/Manager</td>
<td>19</td>
<td>28%</td>
</tr>
</tbody>
</table>

The green awareness and its effect on SMEs adoption of cloud computing is evaluated based on the hypothesis of positive relation among the green awareness and adoption as it is remarked in introduction chapter. In order to analyse the possible correlation, the discussion is made considering three identified objectives in introduction sections and presented in the following sub-chapters.

Therefore, within the set boundaries, being in Ireland and reflecting the point of view of SMEs, the sub chapters of the discussions are covering SMEs environmental awareness, their cloud adoption, their given value to green initiatives and its link between their environmental friendliness and the importance of CSR initiatives of their service provider.
Through these sub chapters it is desired to find an answer to the main research question; “to what extent green solutions influences SMEs’ adoption of cloud computing”.

5.2 WHAT IS THE EXISTING CLOUD ADOPTION RATE?

The insights from literature review, reflected the adoption rate mostly to be dominantly existent among micro sized companies (Carcary, Doherty and Conway, 2014) whereas the primary analysis represented the contrary by the finding of dominant adoption rate’s decrements with company size, therefore, medium sized companies found to have the most adoption rate while micro sized companies found to have the least adoption rate.

Survey contribution from both cloud adopters and non-adopters this did not limit the possibility to understand the correlation between SMEs environmental awareness and their cloud adoption due to provided questionnaire logic.

5.3 DOES ENVIRONMENTAL AWARENESS EXIST AMONG SMES?

The changes between the reason of adopting cloud computing is found. In literature review, chapter the most dominating reason behind of cloud computing adoption is referred to be to have efficient competition (Carcary, Doherty and Conway, 2014). In primary data analysis, the SMEs found to be preferring cloud services to have better resource utilisation while to have competitive advantage found to be the third reason out of four.

In literature review, it was also highlighted that cost efficiency is among the main reasons of preferring cloud services, especially for SMEs (Giannakouris and Smihily, 2016). Providing both “to have cost efficiency” and “to have better resource utilisation” under same question and letting them to rank the reasons of adoption based on their relevancy, eliminated the possibility of preferring better resource utilisation option for its cost benefits.

Thus, the reason behind of this change could be strongly linked with the importance given to energy usage. Moreover, the signal of existence of a significance importance given by very satisfied cloud users by their response in willingness to change their existing cloud vendors based on their energy patterns should not be ignored.

5.4 ARE SMES MAKING ENVIRONMENTAL CONSCIOUS DECISIONS?

The need for knowing the green initiatives of cloud vendors to fully contribute to the environment (Greenpeace, 2017) is covered in literature review chapter with its reasons. This
also brings the need of understanding their reasoning behind of adopting cloud computing, their value given to environmental factors by analysing the changes within the size of the SMEs, the satisfaction rate and the value of decision makers in SMEs. Those are presented under relevant sub-chapters.

5.4.1 DOES THE SIZE OF SMEs MAKE DIFFERENCE?

Although, majority of SMEs would like to be fully aware of the green initiatives of service provider before agreeing to work with them, the conscious decision making found to be changing with the size of the company. The largest ones found to be making more aware decisions rather than smaller size companies, even though all of them give less importance to green solutions. However, these findings seem to be needing more in-depth analysis to make a strong decision as there is no existing secondary analysis that could be compared with the primary analysis.

Although, it can be said that, the larger companies are evaluating service providers more than smaller size companies, while they also evaluate less than smaller size companies. This could represent the difference within the ratios are not differentiating enough the actual value given, while that the change within the size of SMEs are not promising enough to state a strong existence of green values.

Thus, regarding the size of the companies, even though changes with other features of cloud computing is observable their value to green solution is always the least for all size of SMEs while have the weakest position with the largest size of the company. This could support the argument of the value given by largest size companies is highest as their reason behind of adopting cloud computing is also predominately exist based on their green preference.

Therefore, it can be said that the size of SMES makes difference on their decision making as the changes within their environmental conscious decisions do not exist evenly and shows changes with their size.

5.4.2 DOES CLOUD SERVICE SATISFACTION MAKE DIFFERENCE FOR SMEs?

The findings represented that there is high satisfaction rate on cloud services. Moreover, those findings also underlined the loyalty towards the cloud service provider and supported with their unwillingness to change their cloud vendor based on their energy patterns.
However, this do not change the fact that environmental concerns and SMEs cloud adoption reasons are in line with each other and this could show that majority of SMEs do mindful actions.

Even though, non-effectiveness of green values on SMEs decision making can be supported with the fact that SMEs environmental concern do not make the feature of green solution important, majority of concerned SMEs are aware of green solutions which promote their mindful decision.

Based on the findings it can be said that, loyalty of SMEs is important on their decision making, and the reason of SMEs to adopt cloud computing caused by environmental concerns. Though, SMEs found to be valuing loyalty on their decision making, the ones who adopted or could adopt cloud computing decide their service provider based on satisfactory CSR initiatives.

This could mean that the reason behind of SMEs’ loyalty, for the ones who are already using cloud services, is because they are already evaluated their cloud vendors based on their energy patters, or their related CSR initiatives.

However, for the ones who did not adopted cloud services yet, a statement based on loyalty cannot be made. Hence, it can be said that their consideration of adopting cloud computing to have better resource utilisation is positively related with their evaluation of service providers CSR initiatives. This could mean that pattern of SMEs that are adopted cloud services might exist among non-adopters as well.

It should be noted that not all SMEs are environmental concern, therefore, even though the discussion that are made under this sub-chapter are representing some significant part of SMEs, there is a considerable ration of SMEs that are not concerned, and not green aware. The statistics that are used are depending on highest ratios, but this does not make the lowest ratios to be ignorable.

5.4.3 DOES ENVIRONMENTAL AWARENESS EFFECT SMES CHOICE OF CLOUD SERVICE PROVIDER?

SMEs environmental values and their decision making while agreeing with a cloud provider found to be not strongly related with each other. The possible relation is arisen with the statistic about Irish Construction SMEs’ provided by Redmond et al., 2010 and those SMEs
given importance to green solutions. However, SMEs existing environmental awareness found to be leading their adoption of cloud computing along with their existing knowledge of green cloud computing, whereas considerable amount of environmental unaware SMEs with lack in knowledge about green solutions are already exist.

In addition, majority of the decision makers would like to work with service providers with satisfactory CSR initiatives rather than vague ones. Therefore, it could prove that there is an ongoing demand in satisfactory CSR initiatives while presence of few SMEs who would consider vague CSR initiatives enough to work with a service maintains their existence.

5.5 DISCUSSION SUMMARY

Throughout the discussion chapter, changes and similarities are observed with literature review findings as highlighted below.

Table 4: Comparison of findings with literature review

<table>
<thead>
<tr>
<th>Topics</th>
<th>Secondary Research</th>
<th>Primary Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud Adoption Rate</td>
<td>Micro Size Companies</td>
<td>Medium Size Companies</td>
</tr>
<tr>
<td>Cloud Adoption Reason</td>
<td>To have efficient competition</td>
<td>To have better resource utilisation</td>
</tr>
<tr>
<td>Environmental Awareness</td>
<td>N/A</td>
<td>Vague but have the signal of existence</td>
</tr>
<tr>
<td>Need for Green Awareness</td>
<td>Yes</td>
<td>Yes (Depending on the size of the company regarding the management, it changes)</td>
</tr>
</tbody>
</table>

More importantly, some additional remarks can be made from this chapter.

ADDITIONAL REMARKS

- Overall, existing weak environmental awareness supports the need of enhancement.
The size of SME matters in their decision making, as the environmental consciousness predominantly exists among medium size companies, though this do not change the need of enhancement.

There is an existence of loyalty along with environmental conscious SMEs strong value to CSR initiatives of their service provider. This urges the need of environmental awareness so that a positive effect could be supported with a possible demand from cloud vendors.

Overall, neither strong relation of environmental awareness nor green awareness is found. Only their existence along together is supported through the findings which supports the hypothesis of this research paper.

Therefore, green awareness found to have an effect on cloud adoption as the demands and the decision makings found to be changing along with it. Therefore, as the demand from service provider found to be changing related with existing green awareness, it could play a role in renewable source adoption by cloud vendors if SMEs demand have value for them.
CHAPTER 6: CONCLUSIONS /
RECOMMENDATIONS
The conclusion is made through answering objectives and the main research question. The summary for those three objectives and for the main research question are provided in the order mentioned. Furthermore, general conclusion of this research paper and suggested recommendations are provided at the end of this chapter.

**Objective 1: To examine whether environmental awareness affected or affecting the SMEs adoption of cloud computing in Ireland**

Cloud service adopted SMEs located in Ireland found to be aware about green solution feature of cloud computing. However, when their environmental awareness and the adoption rate is analysed, although their environmental awareness found to be mostly existing among adopters, it is not making enough difference.

Furthermore, their environmental awareness including their cloud service providers energy patterns found to be affecting SMEs adoption as they found to be valuing environmental patterns of their cloud vendors and accordingly they could consider changing from one cloud service provider to another if it is found not sufficient enough. It is possible to claim that environmental awareness affects SMEs adoption of cloud computing, hence, to what extend it affects cannot be said.

**Objective 2: To investigate whether SMEs in Ireland value their cloud providers green initiatives while deciding on migrating to cloud**

According to the findings, research underlined a positive relationship between high satisfaction rate and the value given to green initiatives of their cloud vendors. This is promising as the reason behind of SMEs satisfaction could be related with the green initiatives of their cloud vendors. However, the findings also underlined the priority given to the satisfaction which could reflect the loyalty where energy patterns of their cloud service provider do not make any difference.

Secondary analysis underlined the importance of the cloud adoption of SMEs, especially with their green aware choices like; deciding on working with greener cloud vendor which could make a significant change on the environment. Therefore, not only SMES who is satisfied with the services should be valuing the green initiatives, all of them should be supporting as their environmental conscious adoption of cloud computing could be positively and effectively
contribute to the changes needed for the environment, briefly to maintain the world we live in as a liveable place.

**Objective 3: To examine if there is a positive relation between environmental friendliness of SMEs in Ireland, and the reasoning behind their cloud adoption**

Even though the signals of true environmental friendliness in SMEs values, and their decision making found to be existing. Not having strong enough connection draw attention to the need of enhancing environmental awareness. Furthermore, considering the number of functioning SMEs, dominating economical source of Ireland, emphasizes the missing possible opportunity that should not be missed. Thus, it urges the enhancements in green awareness.

The feature of green solutions still under the shadow of other useful features of cloud computing, like availability, or security, although, their importance proved to be changing based on the size of the SMEs. To elaborate, the position of green solution among other features, in other words the priority of green solutions, is the least for all sizes of SMEs.

Hence, the reason behind of influencing adoption of cloud services found to be related with having better resource utilisation. This fact underlines the need for further analysis because its existence among the other insights could be the representing a possible initiative taken by SMEs to reduce their carbon footprint, thus, this information could be promising for the future of the world.

**To what extent green solutions influences SMEs’ adoption of cloud computing?**

To answer the main research question which is shaped by secondary analysis, highlights from the primary research is used. Both positive and negative correlations related with green solutions that are influencing SMEs adoption of cloud computing are found, and further investigation is needed.

In detail, mentioned weak value given to green solutions, and SMEs cloud adoption reason to have better resource utilisation among other reasons like; cost efficiency, competitive advantage and to work collaboratively, found to be contradicting itself.

Although no strong conclusion could be made as green advantage of cloud computing is predominant reason of cloud adoption by SMEs, the possibility of green solutions’ influence on SMEs adoption of cloud computing cannot be denied as a signal of that does exist.
Thus, the value given to the strong CSR initiatives of the service provider could support the hypothesis as this existing demand could lead cloud vendors to adopt more green resources in return. However, this could be better analysed if insights from cloud vendors and their perception of SMEs could be obtained in future analysis.

Overall, in the light of the information it can be summarised as the findings are signalling the promising cloud computing adoption reasons even for some of the SMEs it does not exist. Furthermore, emphasize the need of green awareness as it is found to be affecting the adoption choice of SMEs.

**What is next?**

- There is a need for further analysis to evaluate SMEs understanding of green solutions
  
The negative evaluation received from primary analysis could be resulted by not knowing the green solutions of cloud computing. Thus, if a primary analysis could be done to understand their perception of green solutions could eliminate the possible lack of knowledge.

- There is a need to increase green awareness among SMEs
  
The need of increasing green awareness still maintains its importance as the statistics are not satisfactory. Thus, an existing awareness found only within certain criteria; satisfied and very satisfied cloud users. This could be increased with many ways such as; training the employees and having shared values within company. Since the findings highlighted that there are SMEs who are not aware of the green feature of cloud computing, related training could improve their knowledge and could result in more conscious decisions from their side.

**6.1 RECOMMENDATIONS FOR THE FUTURE RESEARCHER**

This recommendation is given based on the first highlight provided under “What’s Next?”.

1. **Need of doing further analysis to evaluate SMEs understanding of green solutions**

   To evaluate SMEs understanding of green solutions, if possible it is suggested to get responses from two different questionnaires that is completed by same targeted respondents, if not it is suggested to conduct a questionnaire with three different sections like shown in the figure right after related explanations are provided.

   - Two different questionnaires
If the respondents are reachable, it is suggested to conduct two different questionnaires with at least 10 questions to get more in-depth understanding from each question. However, there are some pros and cons that could not be ignored while considering this option, such as efficiency of the responses and time needed.

If it is possible to reach the same respondents and if the time allocations are enough to conduct two different questionnaires one before providing information to the SMEs (the ones who are doing the survey) about green awareness and another one after that, this option is highly recommended as the insights could provide very valuable information.

- One questionnaire with three sections

If the first option is not suitable for the respondent, this option is suggested even though it might have its own advantages and disadvantages. For instance, the number of questions might affect the respondent’s attention to the questions however, with efficient use of questions this could be eliminated. Thus, reaching the same respondents will be easily possible through this method.

For instance, like it is shown in the figure below, the primary research could be broken down into three steps. First, asking desired questions that would like to be compared first which is either as survey one or as section one of a questionnaire. Secondly, as step two, it is suggested to provide information about green cloud computing, like; green solutions, how it could contribute to environment, the effect of SMEs and how it can change with adoption. This could be provide directly sending the information sheet to SMEs or within the questionnaire template as section two. Lastly, same questions from the step one could be presented again, or any other questions that would like to be analysed to see whether a change in their decision making is observable or not.

Figure 51: Suggested order for questionnaire design
CHAPTER 7: REFLECTION
7.1 INFORMATION ABOUT RESEARCHER

It should be noted that, this research particularly an interesting topic for the researcher, I, Sanem Say, not only because it is related with cloud computing but also environment is a key concern for chemical engineers, and since my bachelor’s degree is from chemical engineering, great interest and contribution is granted to this research project.

The information about this research project does not exist, in other words, it is a unique research. Therefore, it is not completely learned/known by the researcher yet. In this stage, it is learned through adequate literature review and more from in-depth analysis of the information gathered through the respondents of the primary research questions.

7.2 DIARY FROM EACH WEEK

WEEK 1

Entry date: 3rd of March

As it is shown on the Gantt Chart in Appendices, my first aim was to meet with my supervisor. Rather than meeting in person, at first, we got in touch with my supervisor through e-mail and scheduled a meeting date for the following week.

According to constructive feedback that I received from my dissertation proposal through word document I started to update it. I organise the layout of my dissertation to make it have more efficient progress while I find myself struggling to find a way to reach the SMEs while I have the similar concern regarding reaching the cloud vendors.

Firstly, I used my network who works for Google Cloud whether it is possible for me to ask question about customer behaviour. While I am waiting for an answer I am actively updating the dissertation in terms of enhancing academic articles and adding missing information that is asked from me to fill.

Therefore, right now, I am at the stage of updating the report while looking at the data collection tools as well as preparing the questionnaire and interview questions to get feedback from my supervisor. Accordingly, I will be more active on reaching out people with already ready questions on my hand.
Entry date: 12 March

I decided to purchase the respondents that matches the criteria (the information about this provided in appendices under Survey Monkey Audience Selection), and after meeting with my supervisor, Brid Lane, I became more confident about handling this project. Currently I designed the sample of the survey which contains 10 questions. I am waiting for a second feedback on my questions within the survey.

Accordingly, I will either conduct the questionnaire or improve it. Considering my timeline, I can say I am going on track. Time to time, purchasing the respondents unavailable in survey monkey. For this particular situation I am trying to manage the collecting responses part early as possible. While waiting, I am also keep updating the research paper and organising its layout. So far, I found the Gantt Chart method I have done in previous stage useful in terms of project management.

WEEK 3

Entry date: 17 March

In order to receive the most dependable answers and prevent from losing any valuable respondents I decided to purchase membership in survey monkey so that I can more personalise the questions by adding images and also ask more questions if necessary.

Even though 10 questions are the most decent number of questions in terms of maintaining the full attention of the respondents I may change it to 12, or 15 if necessary. Furthermore, I got an update from the employee of a cloud vendor, and he told me that he will look for the relevant employee that I could ask the questions.

So far, it seems it is promising. Apart from that I found myself in challenge of finding up-to-date research papers. However, I started to look from other sources other than DBS library as I find it limited particularly for my research topic.

WEEK 4

Entry date: 24 March

I updated the questionnaire number to be 12 in order to be able to cross analysis with literature review more efficiently. Furthermore, the research will be more effective as it is suitable for cloud adopters and non-cloud adopters. Also, I updated the introduction section based on the
feedback I received before. According to the new feedback I will do necessary changes in both introduction and questionnaire preparation.

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**WEEK 5**

Entry date: 31 March

I updated the research methodology section to highlight the logic I applied in my survey, it seems sufficient enough to start the survey as the questions address both cloud and non-cloud adopters. Thus, in case I will not hear from my network, I will be able to work with the responses I get from the survey.

Therefore, I started the conduction of the survey by purchasing the suitable criteria through survey monkey responses. While I am waiting at least 100 responses, I will be updating Research Methodology section with highlighting the implemented logic in my survey.

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**WEEK 6**

Entry date: 2 April

I received 104 responses, the research methodology is updated, however, further changes are needed in limitations sections. Meanwhile, I encountered a difficulty of doing interview, as I believe time will be a challenge in this sense. As I recently received the responses from my questionnaires, and even though I am on time in analysing data analysis, not being able to hear from my network in a cloud vendor makes me feel reluctant to do interview in this research.

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**WEEK 7**

Entry date: 9 April

I started data analysis section and waiting to receive a feedback before continuing with discussion sections of the data. Meanwhile, I started re re-reading the literature review and try to add more references in that section.

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**WEEK 8**

Entry date: 16 April

Based on the feedback I received I created correlation graphs added them in data analysis section and with its necessary analysis. However, I am left behind of time as I should be doing the results section by now based on the Gant Chart I have created before starting this project.
I find the mailing bit stressful and time consuming in terms of communicating with supervisor. Mainly because I do not want to implement something wrong, I found myself waiting with uncertainty which makes me stressed most of the times. That is why I decided to implement as much as I understand. Therefore, I expect to move on with result section by next week.

WEEK 9

Entry date: 24 April

Not waiting and keep implementing seemed to be a correct option based on the second feedback I received for data analysis section. However, while doing that section I noticed the results are not good enough to make a solid conclusion. Thus, it was easy to see what could have been done differently in the future.

Next days I will be sending complete version of introduction, research methodology and data analysis to receive another feedback. Meanwhile I got a response from cloud vendor as the customer service employee for cloud services was reluctant to contribute in the research, which make me remove the sections about interview and reshape the entire dissertation.

WEEK 10

Entry date: 2 May

According to the feedback I implemented every necessary change and I am done with data analysis section and this week I will be working on discussion, conclusion and literature review chapter. My references were too low in amount, so I noticed before jumping in to giving information about environmental effects of cloud computing, some environmental issues can be good to highlight and also, more information about SMEs will be good to mention as Ms. Brid suggested before. This way my research paper will be more dependable.

WEEK 11

Entry date: 11 May

I am done with the data analysis, discussion, conclusions/recommendations and literature review chapter. Ms Brid suggested me to complete the introduction section the last, that is why right know it is not completed, thus, it needs minor changes. Discussion and
conclusions/recommendations are one of the most challenging section for me and I am not certain whether I was able to do what was required.

To make sure, I mailed my supervisor again but there is only one week left to complete the assignment. That is why I will be moving on introduction section and updating the rest of the sections in case I may need to make sudden changes within the chapters I have completed. So, if I did good job in the sections I have sent to get a feedback, it means I can manage my timing with the rest of the assignment otherwise, I may need more time depending on the time I will receive the feedback.

WEEK 12

Entry date: 16 May

I combined the chapters and re-organised the figures and tables. This is the last week, that is why I also updated the introduction and abstract sections. The timetable to complete this project including the steps taken shown in Appendices chapter under relevant sub-chapter and created this week to see how efficient the progress.

The feedback I received made me feel more confident and motivated to complete the rest of the project as the draft version is ready and only certain changes needed to be made. This was comforting for me because I am not really good at handling uncertainties. I can say that this dissertation project did not only increased my knowledge in green cloud computing but also contributed in my personal development in managing projects.

7.3 SWOT ANALYSIS

Personal SWOT analysis grounded on the experiences I have during the preparation of this research paper to understand my weaknesses, strengths and so on. In order to reflect my experience properly. I consider my self-management skills such as willingness to learn new knowledge, completing my work within the specified time limit while my self-control while I am facing difficulties are not sufficient enough as I experienced a lot of stress throughout the dissertation report preparation time. However, at those times, I used my self-motivation skills to cope with the stress, such as allocating certain times to study and at the rest of the time, I was focusing on myself. For instance, as a hobby I am learning android development, therefore, on weekends I was focusing on android development, which is fun for me, while on weekdays
I focus on my dissertation for three to four hours per day. Thus, I can consider the fact that the reason I am doing this master’s degree is to work on dissertation paper makes me motivated and willing to make this project professional enough to be presented to others if possible.

This is not my first report writing experience, especially considering this is my second master. Therefore, I believe I am sufficient enough to apply my knowledge and skills I have for the development of this research. However, the challenge of expressing myself because English is my second language is undeniable. Therefore, I consider it as a weakness. This weakness may result in not being able to reflect my knowledge in a way that it could make a difference.

Other than that, getting in touch with my supervisor through e-mail was not time efficient even though in knowledge base it was more efficient than meeting face to face. Thus, I experienced the time limitations as a challenged mostly at this case. The summary of my SWOT analysis is presented below.

**Figure 52:** Personal SWOT analysis

- **Strengths**
  - Self-management
  - Monitoring progress
  - Self-motivation
  - Applying knowledge and skills

- **Weaknesses**
  - Dealing with difficulties
  - English as second language

- **Opportunities**
  - Personal improvement

- **Threats**
  - Not being reflective
  - Communication method - emailing
  - Time limitations


9.1 ETHICS CHECKLIST

9.1.1 DBS

Your Identifier: ☒

Introduction:
1. Have all key variables been presented in the introduction? ☐
2. Is the research focus plausible? ☒
3. Is the research focus implementable? ☐
4. Does your research proposal lend to Primary Research? ☒

Research Question:
1. Have you included a research question? ☒
2. Have you Googled your research question? ☒
3. Is the research question original and unique? ☒
4. Is your research question likely answerable in existing literature and thereby doesn’t require primary research? ☐
5. Do you really need sub-research-questions? ☐
6. Do you really need hypotheses? ☐

Sub-questions and hypotheses are not always needed.

Literature:
1. Have you reviewed the literature, not merely presented it? ☒
2. Are the sources used up-to-date? ☒
3. Are the sources you used relevant? ☒
4. Have you pointed out how your research adds onto / is different from what’s gone already? ☒

Referencing & Bibliography
1. Have you included in the bibliography all items that you used? ☒
2. Does the bibliography contain only all items that were used? ☒
3. Is the bibliography in alphabetical order of surname? ☒
4. Have you avoided the full-stop problem with referencing? ☒
5. Have you avoided the end-of-paragraph problem with referencing? ☒
6. Are journal names spelled out properly? ☒
7. Have you excluded any no-name no-date sources? ☒

Other:
1. Have you thought about potential obstacles you might come across? ☒
2. Have you grammar / spell-checked the document? ☒
3.  Is there just one point per paragraph? ☒

9.1.2 SAUNDERS ET AL.

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**Box 6.18 Checklist**

**To help anticipate and deal with ethical issues**

- Attempt to recognise potential ethical issues that will affect your proposed research.
- Utilise your university’s code on research ethics to guide the design and conduct of your research.
- Anticipate ethical issues at the design stage of your research and discuss how you will seek to control these in your research proposal.
- Seek informed consent through the use of openness and honesty, rather than using deception.
- Do not exaggerate the likely benefits of your research for participating organisations or individuals.
- Respect others’ rights to privacy at all stages of your research project.
- Maintain objectivity and quality in relation to the processes you use to collect data.
- Recognise that the nature of an interview-based approach to research will mean that there is greater scope for ethical issues to arise, and seek to avoid the particular problems related to interviews and observation.
- Avoid referring to data gained from a particular participant when talking to others, where this would allow the individual to be identified with potentially harmful consequences to that person.
- Covert research should be considered only where reactivity is likely to be a significant issue or where access is denied (and a covert presence is practical). However, other ethical aspects of your research should still be respected when using this approach.
- Maintain your objectivity during the stages of analysing and reporting your research.
- Maintain the assurances that you gave to participating organisations with regard to confidentiality of the data obtained and their organisational anonymity.
- Consider the implications of using the Internet and email carefully in relation to the maintenance of confidentiality and anonymity of your research participants and their data, before using this means to collect any data.
- Protect individual participants by taking great care to ensure their anonymity in relation to anything that you refer to in your project report unless you have their explicit permission to do otherwise.
- Consider how the collective interests of your research participants may be adversely affected by the nature of the data that you are proposing to collect, and alter the nature of your research question and objectives where this possibility is likely. Alternatively, declare this possibility to those whom you wish to participate in your proposed research.
- Consider how you will use secondary data in order to protect the identities of those who contributed to its collection or who are named within it.
- Unless necessary, base your research on genuinely anonymised data. Where it is necessary to process personal data, comply with all of the data protection legal requirements carefully.

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**Figure 53: Ethics checklist provided by Saunders et al, 2015**

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9.2 SUPPORT DOCUMENTATION

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9.2.1 INFORMATION SHEET FOR PARTICIPANT/ CONSENT FORM

It was mentioned that the primary research is conducted through Survey Monkey services. The information sheet for participant and the consent form is provided as a first page of the survey
and their approval to continue the research only if they agree with pursuing is asked as given below.

1. Dissertation Research Questionnaire

PROJECT TITLE: THE OUTLOOK OF SMES IN IRELAND TOWARDS GREEN CLOUD COMPUTING

You are being asked to take part in a case study on “The outlook of SMEs in Ireland” towards green cloud computing. I am a post-graduate, MBA student at Dublin Business School, and Dr. Brid Lane is supervising the project.

WHAT WILL HAPPEN

In this study, you will be asked to answer a series of questions about your point of view on cloud computing, and green cloud computing.

TIME COMMITMENT

The study typically takes 5-7 minutes and consists of two pages.

CONFIDENTIALITY/ANONYMITY

The data collected will not be shared with any third party or used for any purposes other than the study/research mentioned in this document (The Outlook of SMEs Towards Green Cloud Computing).

Any personal information such as phone number, e-mails, names, etc. will not be collected through this survey, therefore, its confidentiality will be maintained.

FOR FURTHER INFORMATION

I will be glad to answer your questions about this study at any time at 10360584@mydbs.ie or you may contact my supervisor at brid.lane@dbs.ie.

PROJECT SUMMARY

Dissertation about the outlook of SMEs towards green cloud computing will be conducted based on secondary and primary data analysis, including: literature review, research methodology, primary data analysis. From the information gathered a theory will be developed majorly according to insights from the respondents.

Please click OK to receive the questions: (1) if you read and understood the participant information page, and (2) you are taking part in this research study voluntarily (without coercion).

Figure 54: Information sheet for participants and consent form.
9.3 QUESTIONNAIRE SAMPLE

The survey sample is provided below. It contains all of the questions even though questions provided response basis.

* 1. Please select the size of the company you work for
   - 1-9 employees
   - 10-49 employees
   - 50-250 employees

* 2. What is your job area in this company
   - Human Resource
   - Finance
   - Marketing
   - Administration
   - Research and Development
   - Other (please specify)

* 3. What is your professional position in the company
   - Director/Manager
   - Other decision maker
   - Not a managing position

* 4. Does your company use cloud computing services, such as: Google Cloud Platform, Microsoft Azure, VMware, SoftLayer, Security-As-Service, Alert Logic, Amazon Web Services
   - Yes
   - No
   - I don’t have any knowledge about this question

Figure 55: First four questions that are provided to every respondent
5. How satisfied are you with your cloud services

<table>
<thead>
<tr>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neither satisfied nor dissatisfied</th>
<th>Dissatisfied</th>
<th>Very dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Please rank the importance of the cloud service features [1-the most important, 5-the least important]

- Security
- Green Solutions
- Availability
- Cost
- Customer Service

7. How likely are you to switch your cloud vendor based on their energy consumption pattern

<table>
<thead>
<tr>
<th>Very Likely</th>
<th>Likely</th>
<th>Neither likely nor unlikely</th>
<th>Unlikely</th>
<th>Very unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Do you know that cloud computing can allow its users to reduce their carbon emission level

- Yes
- No

9. Do you consider your company to be environmental friendly

<table>
<thead>
<tr>
<th>Extremely friendly</th>
<th>Very friendly</th>
<th>Somewhat friendly</th>
<th>Not so friendly</th>
<th>Not at all friendly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. How concerned are you about the fact that 50% of the world's CO2 emission results from internet-based activities

<table>
<thead>
<tr>
<th>Very concerned</th>
<th>Concerned</th>
<th>Somewhat concerned</th>
<th>Not concerned</th>
<th>Not at all concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. If you adopted or were to adopt cloud computing, rank the suitability of the following statements to your preference/consideration [1 - the most relevant, 4 - the least relevant]

- To have competitive advantage
- To have better resource utilisation
- To be cost-efficient (e.g. not paying for the maintenance)
- To be able to work collaboratively

12. Based on your past agreements to work with a service provider, please select the most relevant statements

- I am likely to agree with them if I find both the efficiency of the service and the corporate social responsibility of the company satisfactory
- I am likely to agree with them if I find the efficiency of the service satisfactory without any knowledge about their corporate social responsibility initiatives
- I am likely to agree with them if I find the efficiency of the service satisfactory even though their corporate social responsibility initiatives are not good enough

Figure 56: Second part that is presented according to the responses
The process of Survey Monkey audience selection for receiving responses are shown in the figure below with the illustrations. These steps are taken after completion of the research questions, it is only possible to proceed the end step after the survey structure is completed.

Figure 57: Survey Monkey audience targeting process with screenshots of the steps taken for research project
9.5 RESEARCH TIMELINE

The research paper consists of two sections, each part consists of 12 weeks’ time period for the second part of the dissertation. First part is referred in self-reflection chapter by being the expected Gantt Chart to be followed through the creation of the dissertation paper. The second one, represents the actual Gantt Chart of the project. Therefore, while the first one used to keep track of the progress, the other one reflected the actual timeline needed to finish the project at 21st of May 2018.

Figure 58: Previously created Gantt chart, numbers within the coloured sections reflects the days needed to complete.
The feedback received in order to provide necessary information about keeping the supervisor up to date is also highlighted as “!” in the Gantt chart below.

[Diagram of a Gantt chart showing project timeline and milestones]

**Figure 59: Used Gantt Chart, reflects the timeline. Numbers within the coloured sections reflects the days needed to complete.**