Impact of National Culture Dimensions on Scrum Implementations

Chengqian Zhao
This thesis is submitted to the Faculty of Computing at Blekinge Institute of Technology in partial fulfillment of the requirements for the degree of Master of Science in Software Engineering. The thesis is equivalent to 20 weeks of full time studies.

Contact Information:
Author: Chengqian Zhao
E-mail: chzh12@student.bth.se

University advisor:
Dr. Darja Šmite
Associate Professor

Faculty of Computing
Blekinge Institute of Technology
SE-371 79 Karlskrona, Sweden
Internet: www.bth.se
Phone: +46 455 38 50 00
Fax: +46 455 38 50 57
ABSTRACT

Context. Scrum is one of the most common used Agile method. It is based on empiricism. Scrum only provides a framework but the detailed implementations in practice are very different, and the environment has a big influence on it. National culture is proven to have an impact on Agile methodology. The implementation of Scrum practices should be influenced by national culture as well.

Objectives. This paper reveals the relationship between national culture and Scrum implementation. It explores in which aspects that national culture has an influence on the implementation of Scrum practices and how the different national culture dimensions affect the implementations.

Methods. A literature review is used to build a theoretical framework. This framework includes the potential relationships between national culture and Scrum practices, which are our hypotheses. Afterward, interview is used in a company that has Scrum teams in both Sweden and China. Their implementations of Scrum practices are interviewed and analyzed based on our hypotheses.

Results. A framework of deducted relationship between Hofstede’s national culture dimensions and Scrum practices is built. National culture is found to have an influence on the implementations of five Scrum practices.

Conclusions. National culture is found to have an influence on Scrum implementations. National culture through power distance dimension has the most impact on implementations of no title practice, manage burn down chart practice and no interference practice. National culture differences in the aspect of individualism dimension also affect the practice like no title in teams. Uncertainty avoidance degree in different nations also has the most impact on Scrum implementation such as using burn down chart practice and time-boxed dimensions. Moreover, influence from national culture in China makes the Scrum implementations more consistency than the influence from national culture in Sweden.

Keywords: Agile, Scrum Implementation, National Culture Dimension
ACKNOWLEDGEMENT

I would like to offer my sincere and heartfelt thanks to my supervisor Dr. Darja Šmite, for her guidance and support through this study. She always provides me timely advices during the whole process working on the thesis. Without her help, I would not have been able to complete my thesis.

I would also like to thank to those who participated in our research. They gave out their time, took the interviews, and provided their experience and insight openly. This study would not have been possible without their help.

Finally, I would like to thank my parents and friends. They provide me with support and encouragement all the time.

Thank you to all!
# CONTENTS

ABSTRACT ......................................................................................................................... I

ACKNOWLEDGEMENT ........................................................................................................ II

CONTENTS .......................................................................................................................... III

1 INTRODUCTION ........................................................................................................... 5

1.1 RESEARCH INTEREST AND MOTIVATION .............................................................. 5

1.2 SIGNIFICANCE OF THE STUDY ............................................................................. 7

1.3 RESEARCH QUESTIONS ......................................................................................... 7

1.4 THESIS STRUCTURE .............................................................................................. 8

2 RELATED WORK ......................................................................................................... 9

2.1 AGILE ...................................................................................................................... 9

2.2 SCRUN .................................................................................................................. 10

2.2.1 What is Scrum? ............................................................................................... 10

2.2.2 Scrum Practices .............................................................................................. 10

2.3 CULTURE ............................................................................................................... 15

2.3.1 Definitions of Culture .................................................................................... 15

2.3.2 National Culture ............................................................................................. 16

2.3.3 National Culture Dimensions ....................................................................... 17

2.3.4 Comparative Analysis between Hofstede and Schwartz’s Dimensions .......... 20

2.3.5 Western and Eastern Cultures ......................................................................... 22

2.4 THE RELATIONSHIP BETWEEN SCRUM IMPLEMENTATION AND NATIONAL CULTURE .... 25

2.4.1 Global Software Development and National Culture ..................................... 25

2.4.2 Agile and National Culture ............................................................................ 26

2.4.3 Scrum and National Culture .......................................................................... 26

3 RESEARCH METHODOLOGY AND DESIGN .......................................................... 34

3.1 RESEARCH APPROACH ....................................................................................... 34

3.2 RESEARCH STRATEGY ......................................................................................... 34
3.3 RESEARCH DESIGN ........................................................................................................... 36
  3.3.1 Data Collection ............................................................................................................. 36
  3.3.2 Interview Design Interview Session ............................................................................. 39
  3.3.3 Data Analysis ................................................................................................................ 40
3.4 RESEARCH VALIDITY ........................................................................................................ 40
  3.4.1 Construct Validity .......................................................................................................... 41
  3.4.2 Internal Validity ............................................................................................................ 41
  3.4.3 External Validity ............................................................................................................ 42
  3.4.4 Reliability Validity ......................................................................................................... 42
4 FINDINGS AND ANALYSIS ........................................................................................................ 43
  4.1 SCRUM IMPLEMENTATIONS AND ANALYSIS ............................................................... 43
    4.1.1 Scrum Team ................................................................................................................ 43
    4.1.2 Scrum Master ............................................................................................................. 44
    4.1.3 Sprint ........................................................................................................................ 45
    4.1.4 Sprint Plan Meeting ..................................................................................................... 46
    4.1.5 Scrum Daily Meeting ................................................................................................ 47
    4.1.6 Sprint Review Meeting ............................................................................................... 48
    4.1.7 Sprint Retrospective Meeting ...................................................................................... 49
    4.1.8 Burn Down Chart ....................................................................................................... 49
  4.2 ANALYSIS .......................................................................................................................... 50
  4.3 SUMMARY ........................................................................................................................ 57
5 DISCUSSION ............................................................................................................................. 59
  5.1 WHY FEWER DIFFERENCES ARE FOUND? ................................................................. 59
  5.2 HOW TO USE THE RESULTS? ....................................................................................... 59
6 CONCLUSION AND FUTURE WORK ...................................................................................... 61
  6.1 CONCLUSION .................................................................................................................... 61
  6.2 FUTURE WORK ................................................................................................................ 62
REFERENCES .................................................................................................................................. 63
1 INTRODUCTION

The purpose of this chapter is to introduce what is the research interest and the motivation. In other words, why author is interested in discovering the influence which national culture might have on the implementation of Scrum. Based on that, the significance and also the research questions will be presented to make the purpose of this research clearer. In the next segment, a clear structure of the whole paper will be introduced to give out a brief picture of the thesis.

1.1 Research Interest and Motivation

It is acknowledged that it is difficult for a software project to be successfully implemented [1]. In order to get a software project succeed, there are several aspects need to be focused which include the process, technology and also the people meanwhile the human factor has not got enough attention [2]. Nowadays, we are living in a global market and multi-national society which makes the software development more complex. A lot of the software projects, due to the internalization reason, need to be implemented based on one organization but across several nations which means the qualified resources need to be selected from various geographical locations all over the world [1].

Under this global context, which one between organizational factors and national factors plays a more important role in the software development becomes a problem. According to Siakas, Balstrup, Georgiadou and Berki [3], there are two views on managing information system in the globalization: one view states that managers will show similar managerial values despite the nationalities because the organizational structure is more important than the national culture meanwhile another view does not agree this and it states that organizations are affected by national culture. There is a correlation between the project management methodologies and national culture because all the management activities are carried out by human who are always driven by their values and beliefs [4].

Global software development are growing trends in today’s software business environment, and Agile as a software development methodology has been a hot topic since the manifesto claimed in 2001. Agile methodology values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, responding to change over following a plan [5]. Many researchers have proven that Agile has a positive impact on the software development productivity and software quality.

However, there are varying success in global software development to apply management methodology based on Agile value and its principles [6]. It might because that Agile is based upon Western culture so it might not be suitable for cultures which are different, it might not be suitable for all cultures [1]. For instance, Agile methodology advocates ‘individuals’, which encourages self-organizing team. The team should be fully authorized and empowered. As Bredillet, Yatim and Ruiz [4] stated, a management technique or philosophy that is appropriate in one national culture might not necessarily appropriate in another. Since Agile is also a software development methodology, despite the strong de-emphasis on management, it is still a management philosophy so that it might not fit all the national cultures when it comes to the implementation.

National culture’s or society culture’s influence on Agile software development and its implementation has been agreed by many researches [7-9]. From the perspective of Agile values, Palokangas [10] discussed the influence of national culture on Agile values. His
thesis proved that national cultures used to explain the Agile values. However, since culture is also about people’s common value in groups, this paper tried to connect Agile’s values and national culture values together, it is still stand on the point of values but not detailed implementation in practice. Differently, Sutharshan and Maj’s research[11] starts from the theories of Agile implementation and Hofstede’s national culture dimensions and aims to find out how cultural differences affect the Agile software methodology implementation. They concluded the Agile cultural attributes that can be connected to national culture dimensions so that they can use the national culture to explain the detailed Agile practice in the real implementation. However, they only provided the probable research method but it did not prove by any real study. Later, in Sutharshan’s Ph.D. thesis[1], through the cross-national survey he successfully filled this gap.

Although Agile is already a software development methodology, it contains several different methods for example Crystal, XP, and Scrum. Scrum is an iterative and incremental framework to manage software development [12]. The goal of Scrum is to deliver more suitable software in a shorter time than traditional project management [13]. Compared to other Agile methods, Scrum can increase customer’s satisfaction, lower defects rates, accelerate the development process and has faster response to the rapidly changing requirements [14]. As a result, Scrum is one of the most common used Agile methods [15, 16].

Since Scrum is one of Agile’s method, Scrum somehow shares Agile’s values and principles. We can infer that if Agile’s implementation can be influenced by national culture, then national culture might have the same influence on Scrum as well. However, there is rare research that emphasizes on the relationship between national culture and Agile’s specific methods for example Scrum. Vodde [17] found in his research that Scrum does also work in China even though all Agile’s method is originally based on Western culture. However, his research was based on his personal interpretation of survey but lacks the relevant academic validity.

Moreover, Scrum is based on empiricism [16]. Hence, it can be different from each project. Scrum only provides a framework but the detailed implementations in practice are very different, and the environment have a big influence on it [18]. Girot [19] also agrees that the Scrum only has a metal process, but the implementation should considered with the practical projects. Therefore, Schwaber and Beedle [16] concluded that Scrum implementations are recommended to be adjusted according to their situation after Scrum is fully adopted, and people have accepted the value of Scrum.

Due to Scrum’s flexible adjustment in implementation and the lack in academic research, this thesis thinks it is a very interesting topic to discuss with. Actually there are only a few researches which discuss the national cultures influence on Agile’s implementation. Sutharshan and Maj [11] and Sutharshan [1] did a nice job in this area. Their research gave out both theoretical and empirical prove to support their conclusion that national culture do have an influence on Agile’s implementation. Based on the review in the field, this paper finds it would be a very interesting research direction to discuss national culture’s probable influence on the implementation of Scrum. The reason could be like this: the influence national culture on Agile’s implementation has been proved; Scrum is one of Agile’s method which means Scrum’s implementation might get same influence from culture; Scrum implementation is a very adjustable according to the different environment which increases the possibility that it might get influenced by different nations’ cultures in practice.

Back to Agile’s Western based value for example individualism, self-organizing and so on. It somehow implies that Agile includes Scrum fits Western culture more and have better implementation performance in Western countries. However, nowadays, more and more
Chinese companies have adopted Scrum software development methodology in practice. As we know, the Eastern cultures (represented mainly by China) and Western cultures have big differences in many aspects, so the implementations of Scrum in Eastern and Western becomes an interesting research field to discover whether the national culture differences will affect Scrum implementations in these two areas. The author comes from China and is studying software engineering in Sweden. Experienced two very different cultures, the author of this thesis thinks it is interesting to discover national culture’s influence on Scrum implementation under the scenes of Sweden and China which two countries can represent the Western and Eastern Cultures.

1.2 Significance of the Study

National culture’s influence on software development methodologies includes the popular Agile methodology has been proved by many researches. This thesis focuses on Scrum which is a relatively more flexible and adjustable Agile method. There is no previous research discover the relationship between national culture and the implementation of Scrum. It makes this thesis become creative and also enrich the research field of Agile and culture.

From another perspective, there are few researches that emphasize on the relationship between national culture and Agile’s implementation. Most of them put research focus on the Agile’s value or Agile team member’s behaviors. Since national culture is showed in the form of people’s values and therefore the behaviors that directly affected by values, the interaction between two values (national culture values and Agile value) is more direct and easier to be observed. Differently, this thesis chooses a more practical perspective-implementation, which the relationship between culture and Scrum method is not that obvious but need to be detected from how people implement Scrum practices. These are the theoretical significances of this thesis.

In the end, due to the growing international collaboration in software development field, it is very necessary to set this research under this global context. Due to author’s personal experience, it could be a good comparison research to choose two nations Sweden and China to do the survey. Besides, Sweden and China has a big gap in national culture (explained in section 2.3.5.2). These two countries can somehow represent the culture differences between Western and Eastern. It gives this thesis stronger practical significance. However, according to Hofstede, “East is East and West is West”. No country can fully represent Eastern or Western. The main purpose of this study is to arouse the researchers’ awareness of impact of national culture on Scrum implementations, instead of generalization of the research results.

1.3 Research Questions

Based on all the discussion above, here from the perspective of national culture and Scrum, our research questions are as following:

**RQ1**: Does national culture have an influence on Scrum implementation?

If the answer for RQ1 is yes, here comes RQ2 and RQ3

**RQ2**: In which aspects national cultures have an influence on Scrum implementation?

**RQ3**: How national culture affect Scrum implementation?
1.4 Thesis Structure

This thesis is structured in 5 chapters. Chapter 1, the research interest, motivations, and significance are discussed, and three research questions are presented. In Chapter 2, the related work is presented. Firstly, it starts with the literature reviews of both Scrum and national cultures. Based on that, the probable theoretical relationship between national culture and Scrum implementation or we say Scrum practices will be given out, and this thesis will also explain the reasons. It will be the theoretical base for the interview question design and also analysis part. Chapter 3 is the research methodology and design. The research approach, how this research collect, analyze the data as well as the validity of this research. Chapter 4 is the finding part. At the beginning of this part, the empirical finding of the interviews will be presented according to the Scrum implementation practice. After that, it will be followed with an analysis or we say discussion. In this part, the theoretical assumption will be tested through the empirical. In the end, in Chapter 5, the answers for all three research questions are concluded. New findings from the analysis are also described. Future opportunities of work are introduced at the last.
2 RELATED WORK

2.1 Agile

Software failure is a widespread issue for a long time [20]. A survey that was conducted in 8000 projects in US showed that one third of projects were not able to be accomplished, half of the projects were only partially succeed with issues in cost and delay [21]. Another research which was conducted in France, Germany, UK and US, containing 875 projects, also indicated that 42.5% of projects did not full-fill the requirements, 44% projects were finished with cost overrun and 42% projects were delayed [22].

The frequent changes in requirements and the nature of business are regarded as the most concerned reasons for software project failure. Developing software is often compared with developing building in literature. The difference is that there is a blueprint before developing building, and the blueprint is not often rapidly changed. However, the changes for software project requirements often occur during the development. Traditional software development methods are found cumbersome to meet rapidly changing requirements [23]. On the other hand, daily operations of the business depend more and more on information techniques. As the complex nature of business, developing software to meeting business purpose become more difficult and expensive [24]. Traditional software development methodologies were found not working with the business environment [25]. There is a need for a new methodology which can put more attention on adapting to frequent changes, delivering fast products, satisfying customers, etc. [26] [27] [28].

Agile is proposed to fulfill all the new requirements. In 2001, 17 software developers announced the Manifesto for Agile Software Development. The manifesto for ASD [5]is listed below:

- Individuals and interactions over processes and tools.
- Working software over comprehensive documentation.
- Customer collaboration over contract negotiation.
- Responding to change over following a plan.

These points tell a clear concept about quickly development and satisfying customers. Individuals and interactions and working software are apparently speaking to the quick development whereas customer collaboration and responding to change can satisfy customers. Furthermore, there are also 12 principles [29] behind ASD.

1) Highest priority is given to satisfying the customer through early and continuous delivery of valuable software.

2) Changing requirements are welcome, even late in development. Agile processes harness change for the customer’s competitive advantage.

3) Working software is delivered frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

4) Business people and developers work together daily throughout the project.
Projects are built around motivated individuals. They are given the environment and support they need, and trusted to get the job done.

It is believed that the most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

It is believed that working software is the primary measure of progress.

It is believed that Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

It is believed that continuous attention to technical excellence and good design enhances agility.

It is believed that simplicity – the art of maximizing the amount of work not done – is essential.

It is believed that the best architectures, requirements, and designs emerge from self-organizing teams.

It is believed that success is achieved when at regular intervals the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Positive results were found from several studies. In a global survey, which was conducted in 2003, improved productivity, improved product quality of software products, decreased cost, and business satisfaction were found as the result of adopting an Agile methodology [30]. Successful stories also indicated Agile methodology can benefit software project in meeting rapidly changing requirements [31], managing relationships within the project team [32] and lowering defect rate [14].

### 2.2 Scrum

#### 2.2.1 What is Scrum?

Scrum is an iterative and incremental framework to manage software development in terms of Agile methodology [12]. It is one of the most common used Agile methods[15, 16]. The goal of Scrum is to deliver more suitable software in a shorter time than traditional project management. Software development is complex. Nowadays, more and more software systems are required to be fast developed. However, there are much chaos and conflicting interests within project teams. Scrum uses intentionally iterative and incremental processes to control these chaos and conflicts [13].

The name of Scrum is derived from the comparison of developers and rugby plays. Scrum in rugby is the name of the quick meeting players when they are about the start of a move. In rugby, each team acts as a whole, an integrated unit. Each member contributes a role in a team and helps to reach a common goal. It is the same with the software project teams which adopt Scrum process [33].

#### 2.2.2 Scrum Practices

The implementations of Scrum are varied in different projects. On one hand, Scrum is a framework rather than a process. Its implementations are not straightforward [19]. There are not many constraints in Scrum [34]. On the other hand, Scrum is based on empiricism.
Scrum implementations are recommended to be adjusted according to their situation after Scrum is fully adopted [16]. Therefore, different teams and different project may implement Scrum very differently in practice. In the following sections, most common used Scrum practices from the literature are described.

### 2.2.2.1 Scrum Roles

The Scrum roles include Product Owner, Scrum team and Scrum Master [13].

- **Product Owner**

  The Product Owner represents interests of everyone with a stake in the project and its resulting system. He defines the priority of requirements and makes sure to development the most valuable functionalities at first [12]. The responsibility of Product Owner includes maximizing the value of business value which are produced by the team, maintaining and prioritizing the items in Product Backlog, regularly reporting the process of the product to stakeholders [35].

  **Solely Authorized for Product Backlog** Product owner is the only one can add items into Product Backlog and change the prioritization of each item [16, 35].

  **Attend Daily Meeting** In order to see incremental progress of the product and support the Scrum Master, Product Owner is recommended to attend Scrum Daily Meeting [35].

- **Scrum Team**

  The team is normally self-organizing, self-managing and cross-functional [12]. Each team member should represent different functional role in the team. The Scrum Team is mainly responsible for turning Product Backlog items into potential shippable increment within a Sprint [35].

  **Team Size** The team sized should be seven, plus or minus two [36]. If the team size is too small, it will decrease the productivity gains. If it is too large, the complexity will reduce the empirical process [16].

  **No Title** There are no titles, no job descriptions other than team member. Scrum avoids team members refusing to code because he is a systems architect or designer [16].

  **No Leader** Team self-organized to turn the items in Product Backlog to functionalities. This kind of state-less, ego-less, self-organizing team make the team address any problem that is raised during development [16].

  **Full Authorized** The team has full authority to do whatever they need to turn the requirements and techniques into functionalities [16].

  **Collective Responsibility** All the team members are collectively responsible for the success of the iteration and the whole project [12]. The team can reduce the functionalities and still reach the goal [16].

  **Use Burn Down Chart** Scrum team is recommended to use burn down chart to visibly remind the Sprint progress [35].

  **Daily Meeting** During the Sprint, the Scrum team hold meeting every day, to synchronize the process and report the impediments [35].
**Authorized to Terminate Sprint** If the team found the assumption made during the Sprint planning meeting is incorrect and the goal is unrealistic to accomplish, the team has right to terminate the Sprint and call for another Sprint planning meeting [16].

- Scrum Master

The Scrum Master represents the management and team to each other [16]. The Scrum Master’s responsibilities include ensuring the team follow Scrum process adopting Scrum to fit their culture, at the same time Scrum still provide its benefits [12], making sure the team away from interruption and removing impediments [33].

**Leader/ Manager Assumes the Role** Project manager, project leader or team leader often takes the role of Scrum Master [16].

**Responsible for Decision** When the team needs to make a decision, the Scrum master should make a decision immediately, even without full information [16].

**Only One or Two Teams** A novice Scrum should be only responsible for one single team, while a skilled Scrum Master should be responsible for no more than two teams [35].

**Manage Burn Down Chart** Scrum Master is responsible for creating and managing the Burn Down Chart [35].

**Remove Impediments** Scrum Master’s first priority is to remove the impediments for the team during the development. When team member raised an impediment, Scrum Master should remove it personally or make it removed as soon as possible[16].

**Facilitate Meetings** In order to help improve the team’s productivity, Scrum Master should help to organize Daily Meeting, Sprint Plan Meeting, Sprint Review Meeting, and Retrospective Meeting [35].

### 2.2.2.2 Scrum Process

The activities, which construct Scrum Process are listed below.

- **The Kickoff**

  The project starts from the vision of the product to be developed [12]. In the initial point, all the stakeholders and project partners get together. All the business requirements and technique demands are pointed out. A Product Backlog is generated, which is a list of activities that will be developed during this project [33].

- **Sprint**

  Sprint is defined as a team works for a fixed period of time [16]. It is considered as the main practice of Scrum. All work tasks, which are defined in Product Backlog, are developed by Scrum team in Sprints [33].

  **Time Boxed** Sprint lasts from one to four weeks [35].

  **Authorized to Decide Work Load** The team has full authority during the Sprint. They can decide how many hours they want to work every day [35].
No Interference No one is allowed to add more functionalities to the Sprint [16]. No outside influence should be allowed to interfere the work of Scrum team [13].

Chance to be terminated The Sprint can be canceled before its accomplishment. The situation can be business change, management decision or better understanding of requirements. It is very important to empower the team to cancel the Sprint. It enables the team stays focus on work as they know the Sprint can be canceled if the scope or the nature of the work is changed. Cancellation of the Sprint consumes resource. It seldom happens in practice [16].

- Sprint Plan Meeting

In Sprint Meeting is held at the beginning of each Sprint [35]. Users, Product Owner, and Scrum Team collectively decide the Sprint goal and functionalities. Afterward, the team breaks down each task to build the product increment [16].

Two Parts Planning Meeting The Sprint Plan Meeting consists of two parts. The first meeting is the team held with Product Owner. Product Owner explains the items in Product Backlog including business requirements, technical demands, purpose, meaning, etc. The team members question everything about the items. After the team gets clear about what are desired from Product Backlog. Then the team members decide which items can be turned into functionalities in the next Sprint. The Sprint goal is drafted after the items have been set. The second Sprint plan meeting is held afterward; the team builds an initial plan to develop all the items, which results in Sprint Backlog. All team members are required to be present when make the plan. [12].

Time-Boxed Meeting Each of the Sprint Plan Meeting is recommended to be four-hour, time-boxed [12].

4-16 Hours Task The team generates a list of tasks, in which each task can be finished within 4 to 16 hours. These tasks are detailed pieces of work which can turn Product Backlog into working software. This list of tasks compose the Sprint Backlog [16].

- Scrum Daily Meeting

The purpose of Scrum Daily Meeting is to synchronize the progress of each team member’s work and spread out the impediments that they met during development [13]. Scrum Daily Meeting makes team members reaffirm their commitment to Sprint goal and make adjustment to meet the Sprint Goal [35].

15 Minutes Time-Boxed Every daily, the team holds a meeting for less 15 minutes [12].

Attendees Scrum is direct and open. Manager can attend the daily meeting to get a sense of what the team is doing and how likely it is going to succeed [16].

Time and Location Constance It is recommended that the location and time of having Daily Scrum Meeting should be constant [16].

Standing Up Meeting The meeting is also called Stand Up Meeting, since all the team members are encouraged to stand up during the meeting. Standing makes the meeting short and people more concentrated [16].
**Meeting in Circle** Team members stand in a circle, normally around a table. Team members stand in the order that they arrived. They are not recommend to stand periphery, outside the circle, as it will make them feel not participated physically [16].

**Write Impediments on White Board** The top priority job of Scrum Master is to remove the impediments. When team members raise the impediments, Scrum Master is recommended to write it down on the white board immediately. If the impediments can’t be resolved promptly, team should report the impediment in the next Daily Meeting [16].

**Short Conversation** The Scrum Master is responsible for making the Daily Meeting held successfully. It requires Scrum Master to stop the one who is talking long on the meeting, so that the Daily Meeting can be kept in short and efficiency. This applies to everyone even he is a Chief Executive Officer [16].

**Three Questions** There questions are must be answered by every team member [37]:

1) What was done yesterday?
2) What will be done today?
3) Is there any obstacle to the accomplishment of your tasks?

- **Sprint Review Meeting**

At the end of each Sprint, a Sprint Review Meeting is held. It is an informal meeting, which aims to present to Product Owner and relevant stakeholders about what functionalities were developed in this Sprint. This meeting should not be a distraction to team members [13].

**Informal Meeting** Sprint Review Meeting is informal. The PowerPoint presentation and its ilk are not recommended. The team should not be extensively prepared for the Sprint Review Meeting. What matters is the product that the team has created, instead of a fancy meeting [16].

- **Sprint Retrospective Meeting**

After the review meeting and before the next Sprint, the Sprint Retrospective. Team, Scrum Master, and Product Owner are required to attend this meeting. Meeting is held by Scrum Master. All team members are encouraged to revise the development process, practice and Scrum process Framework, in order to make the next Sprint more efficient and enjoyable [12].

**Conversation between Team Members** Sprint Retrospective Meeting should be a conversation between team members. The team owns the information generated by the retrospective meeting. No one is allowed to share the information except the team [35].

### 2.2.2.3 Scrum artifacts

- **Product Backlog**
The Product Backlog is a list of functional and non-functional requirements which are necessary to develop the product. It is a living document reflects the evolving understanding of stakeholders [35].

**Prioritized** The items in Product Backlog are prioritized by business value, from top to bottom [35].

**Never Finished** The Product Backlog is never finished. It evolves as the product, or the environment evolves [12].

- **Sprint Backlog**
  
  Sprint Backlog is like the subset of the Product Backlog, which is selected particularly for that Sprint [13]. The item that is selected from Product Backlog is further divided by tasks. Each task normally takes from 4 hours to 16 hours [12].

- **Only Managed by Scrum Team** The Sprint Backlog is created on the second Sprint Plan Meeting and managed by the Scrum team [16].

- **Burn Down Chart**
  
  The burn down chart shows how much work is left across time [12]. There are normally three types of burn down chart. The Sprint burn down chart shows the progress of the Sprint. The release burn down chart documents the progress of the release. The project burn down chart records the overall progress of project [13].

**Update Every Day** Ideally, the Sprint burn down chart should be updated every day and burn down to zero by the end of the Sprint [16].

### 2.3 Culture

The related academic work about culture especially the concept national culture will be discussed in this part. Since culture is critical for this paper, its definitions will be presented in the beginning. Through reviewing different national culture models, this part will focus on the national culture dimensions. After all these dimensions, this paper will present how to differ different cultures with the help of national culture dimensions that have been discussed by several researchers. In the end, this paper will introduce the culture differences come from some done researches to give out a brief picture of the differences between Eastern (especially China) and Western (especially Sweden).

#### 2.3.1 Definitions of Culture

There are a number of national cultural definitions, and each of these definitions shows a relevant claim to a meaningful understanding of culture [1]. However, most management researchers agree that culture is a set of ideas that shared by members of a group [38].

According to Kroeber and Kluckhohn [39], the concept of culture contains patterns, explicit and implicit, of and for behaviors required and transmitted by symbols for example embodiments in artifacts. The essential core of culture includes such as traditional ideas and the relevant attached values. They also pointed out the culture system is the results of actions and the conditioning elements of further actions. In addition, in their book, they also stated culture as an abstraction of forms or patterns from behavior and an essentially logical construct. However, this definition limited the concept as a distinctively human mode of living and acting while actual human action is not a precondition of culture.
The anthropologist Roger Keesing [40] defined culture as individual’s theory about what his or her fellows know, believe and mean, as individual’s theory of the code being followed and the game being played. Therefore, according to his definition, culture is not an individual characteristic, but more or less like a set of common theories of behaviors of mental programs which shared by group of individuals.

“Culture has been defined in many ways”, according to Hofstede [41], culture is “A collective programming of the mind which distinguishes the members of one human group from another”. At the same time, Hofstede [42] also stated that this programming influence people’s patterns of thinking which are reflected in the meaning people attach to various aspects of life for example the way people look the world and their roles and which become crystallized in the institutions of a society. It is easily to associate culture with language and religion which are actually the identity and symbol of a nation.

Schein [43] discussed the definition of culture from three levels: basic assumptions and premises, values and ideology, artifacts and creations. The first level includes the issues such as the relationship between man and nature, beliefs about human nature, time orientation, the concept and man’s position in it. The value and ideology level contains goals and the ways to reach them. The third level contains for example language, technology, and social organizations. All three levels are interrelated. Later, Schein [44] summarized culture from a sociological perspective: culture is a basic set of assumption of defining people from the aspects for example what they pay attention to, what things mean to them, how they react to things and what kind of actions people take according to different situations. This definition extended culture’s concept from just shared interpretations of behaviors to the actual difference in behaviors.

Triandis [45] defined culture as a shared meaning system that can be found people who speak the same language dialect, during a specific historic period and in a definable geographic region. The function of culture is to improve the adaption of people of the culture to a particular ecology. Culture also includes the knowledge that people need to function more effectively in the social environment [46].

Focused on problem solving, Trompenaars and Hampden-Turner [47] claimed that culture is the way in which a group of people solve problems and reconciles dilemmas. The problems that people of a group regularly solve disappear from consciousness and finally it becomes a basic assumption and an underlying premise, which is a culture.

From all these culture definitions, we can see they contain some common elements that make up of culture. After studying a literature review about the culture definitions, House, Wright and Aditya [48] gave out a universally accepted definition related to the shared ways of thinking, feeling and reacting, shared meaning and identities, shared social constructed environments, common ways in which for example technology are used.

2.3.2 National Culture

There are many culture definitions. However, there is no specific and accurate definitions of national culture. Hofstede pointed out that national culture can be defined as values, beliefs, and assumptions learned in people’s early childhood that can distinguish one group from another [41]. Actually we can see that Hofstede did not distinguish the definition of culture and national culture very clear.

However, Hofstede [49] also mentioned that everyone in the society belongs to several groups and categories at the same time therefore people unavoidably carry several layers
mental programming which means different culture levels and national is one of the level (national level according to one’s country for people who migrated during their lifetime).

Similarly, Trompenaars and Hampden-Turner [47] agreed that national culture is the presentation of culture on a national level, and it is the highest level of culture. National culture is something that profoundly rooted in the individual and collective consciousness and therefore it is difficult to change [38].

“Culture only exists by comparison” [41], it gave us the clue of how to distinguish one national culture from another. All societies, no matter modern or traditional, face the same problems, only the answers differ them [49]. These problems are actually defined as cultural factors culture dimensions that can separate or unknit different nations.

2.3.3 National Culture Dimensions

There are several national culture models which define the dimensions can be used to describe the culture differences between nations. House, Javidan, Hanges and Dorfman’s [50] nine dimensions are basically root from Hofstede meanwhile Trompenaars and Hampden-Turner’s [47] dimensions followed Schwartz’s earlier work but partly has not been reliably measured [51].

In this part, we mainly introduce Hofstede and Schwartz’s national culture models and their various dimensions. After that, a comparative analysis will be given out to see the common dimensions that been discussed by both models, as well as the differences.

2.3.3.1 Hofstede’s Culture Dimensions

After more than 15 years research, based on abundant multinational study, Hofstede concluded five dimensions can be used to differ one national culture from another.

- Power Distance

“Power distance is the extent to which the members of a society accept that power in institutions and organizations is distributed equally” [42]. Power distance describes the degree to which unequal distribution of power and wealth is tolerated [52] and how a society handle inequalities when it happens. Power distance affects both people who have more or less power in one society. People in Large Power Distance societies have their own place, no further justification is needed, and people accept a hierarchical order. Power distance has an obvious effect on the way people build their institutions and organizations [42].

- Uncertainty Avoidance

“Uncertainty is the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity” [42]. Uncertainty avoidance is the degree to which people in a country prefer structured over unstructured situations [41], is the degree to which people are threatened by uncertain, unknown and unstructured situations [53], is also the way people deal with future, whether they have inherent control or weather situations are out of their control [52]. Uncertainty avoidance also has a consequence for the way people build institutions or organizations [42]. “Strong Uncertainty Avoidance societies maintain rigid codes of belief and behavior and are intolerant towards deviant persons and ideas; Weak Uncertainty Avoidance societies maintain a more relaxed atmosphere in which practice counts more than principles and deviance is more easily tolerated” [42].

- Individualism
Individualism stands for “a preference for a loosely knit social framework in society wherein individuals are supposed to take care of themselves and their immediate families only” [42]. Differently, collectivism means the culture more rely in groups, for example, social classes, communities, religions or related families for the sake of social identities and status. Meanwhile, people in the collective culture are protected by the groups and are expected to act in the group’s interests [53]. The individualism and collectivism dimension is the degree of interdependence a society maintains among individuals [42]. The individualism dimension is an important way to differentiate national cultures [54].

- Masculinity

“Masculinity stands for a preference in society for achievement, heroism, assertiveness, and material success” [42], it is the “the degree to which values like assertiveness, performance, success and competition, which in nearly all societies are associated with the role of men, prevail over values like the quality of life, maintaining warm personal relationships, service, care for the weak and solidarity, which in nearly all societies are more associated with the role of women” [41]. To the contrary, people live in the feminism society prefer relationships, modesty, caring for weak and the quality of life. Masculinity dimension does not only related to social difference between genders.

- Long-term Orientation

Long-term orientation is “the fostering of virtues oriented toward future rewards—in particular, perseverance and thrift” [49]. It refers to a country’s time orientation. According to Hofstede [49], long-term oriented cultures are characterized by patience, perseverance, respects for older, tradition and ancestors, obedience sense and the duty towards the larger good. In long-term orientation societies, people more share the values such as learning, honesty, adaptiveness, and self-discipline, they see things from an overall perspective. Meanwhile in short-term societies people appreciate more freedom, rights, achievement, thinking of oneself and focus more on the elements of things Hofstede [49].

This dimension came from Hofstede’s cross-cultural research on Western and Asian cultures. It is noteworthy that from the research, except the new dimension “long-term orientation” was founded, the dimension “uncertainty avoidance” did not get proved [53].

2.3.3.2 Schwartz’s Culture Dimensions

Schwartz [55] also summarized up seven value types, or we can say national culture dimensions on which cultures can be compared. In addition, he divided these dimensions into three issue groups. In each group, two or three dimensions are opposite to each other.

Issue I

The first basic issue is related to how societies define the nature of relations between individuals and groups.

- Conservatism (also called Embeddedness)

According to Schwartz, in a Conservatism society, people emphasize on maintenance of status quo, propriety and at the same time have negative attitudes to actions and inclinations that might change the solidary group or the traditional orders such as social order, the respect for tradition and the family security [55]. In a conservatism society, people are viewed as entities embedded in the collectivity and the meaning of life is tightly related to the social
relationships through identifying groups and participating in shared way of life as well as goals [56].

- **Autonomy**

In autonomy culture, people are viewed as autonomous, they understand their own uniqueness; they cultivate and express their own preferences, feelings, ideas and abilities [56]. Autonomy can be divided into Intellectual Autonomy and Effective Autonomy.

Intellectual Autonomy means that the society have strong desirability of individuals’ independent choices to chase their own ideas and the society also highly emphasizes on the intellectual directions for example curiosity, broadmindedness, and creativity [55].

Effective Autonomy usually presents a culture that encourages individuals independently purchase the experiences that have a positive effect for example pleasure, exciting lifestyle or varied life [55].

**Issue II**

The second basic issue is related to how society to guarantee responsible behavior that can preserve the social fabric, for example, considering social welfare of others, coordinating with others and managing unavoidable social interdependencies.

- **Hierarchy**

Hierarchy culture means there is unequal power, roles and resources distributions in the society, which can be seen in the aspects, for example, social power, authority, humility and wealth [55].

- **Egalitarianism**

In an Egalitarianism society, people are expected to sacrifice selfish interests in order to reach the voluntary commitment to promote the social welfare for all people in the aspects of for example quality, social justice, freedom, social responsibility and honesty [55].

**Issue III**

The third basic issue is related to how society sees the relation of humankind to natural and social world for example people actively change the world and society for the sake of further personal or group interests.

- **Mastery**

In a Mastery society, the active self-assertion for example ambition, success, daring and competence is highly admired, and people believe the society development needs to go through it [55].

- **Harmony**

Harmony represents the culture that desires to reach a harmony in the environment which includes, for example, keeping unity with nature, protecting the environment and making the world better [55].
### 2.3.4 Comparative Analysis between Hofstede and Schwartz’s Dimensions

Based on the understandings of both Hofstede’s and Schwartz’s national culture dimensions, we find they have a lot of common parts. For example, when both authors have dimensions to discuss the relationships between individuals and their groups, one author’s dimension can be fully explained by another’s. However, we also find few dimensions from both authors are hard to elaborate by each other. We summarized a table to explain the comparative analysis.

**Table 2.1 Comparison between Hofstede’s and Schwartz’s Dimensions**

<table>
<thead>
<tr>
<th>Schwartz's Dimensions</th>
<th>Conservatism</th>
<th>Autonomy</th>
<th>Hierarchy</th>
<th>Egalitarianism</th>
<th>Mastery</th>
<th>Harmony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hofstede's Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Power Distance</td>
<td></td>
<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Power Distance</td>
<td></td>
<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weak Uncertainty Avoidance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strong Uncertainty Avoidance</td>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualism</td>
<td></td>
<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collectivism</td>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masculinity</td>
<td></td>
<td></td>
<td></td>
<td>Strong</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feminism</td>
<td>Strong</td>
<td></td>
<td></td>
<td></td>
<td>Weak</td>
<td></td>
</tr>
<tr>
<td>Short-term Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weak</td>
</tr>
<tr>
<td>Long-term Orientation</td>
<td>Weak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weak</td>
</tr>
</tbody>
</table>

In this table, it directly marked whether two authors’ dimensions have “strong” or “weak” connections. Based on that, this thesis continues to analyze the connections one by one. We try to use Hofstede’s dimensions to explain Schwartz’s dimensions.

- **Conservatism—** Collectivism, Strong Uncertainty Avoidance and Long-term Orientation

  We think Schwartz’s Conservatism dimension has a strong connection with Hofstede’s Collectivism. Both Conservatism and Collectivism discuss the relationships between people and the groups they are in, how people see their positions in the group, how they see their identities and meanings of life through the groups they participate.

  As Hofstede [42] said, strong uncertainty avoidance prefer structured situations than unstructured situations and people in this kind of society have very rigid codes for shared beliefs, behaviors and they also have low tolerance towards deviant persons and ideas. This explanation fits Schwartz’s understanding for Conservatism as it is a culture that emphasize the maintenance of the status and also the restraint of actions or inclinations that might disrupt the group order [55].

  Conservatism also includes the restraint of actions and inclinations might disrupt the traditional orders for example traditions [55]. In Hofstede’s long-term orientation dimension, he also mentioned that long-term oriented cultures are characterized by patience, perseverance, respects for older, tradition and ancestors [49]. We can say that the conservatism dimension can be partly explained by long-term orientation dimension however the connection is not that strong.
• **Autonomy— Individualism**

Autonomy can be strongly explained by Individualism. Schwatz [56] stated that intellectual autonomy encourages individuals to pursue their own ideas and intellectual directions independently meanwhile affective autonomy encourages individuals to pursue affectively positive experience for themselves. It highly fits Hofstede’s opinion on Individualism. He said, in an individualist society, individual’s interest prevail over group interest, everyone has right to privacy and everyone is expected to have private opinions, freedom, self-interests and self-actualization are import [49].

• **Hierarchy— Large Power Distance and Long-term Orientation**

“Hierarchy defines the unequal distribution of power, roles and resources as legitimate. People are socialized to take hierarchical distribution of roles for granted and to comply with the obligations and rules attached to their roles” [56]. Obviously, it is similar to Hofstede’s understanding of Large Power Distance dimension. He pointed out that in large power distance society, the way power is distributed is usually explained from the behavior of more powerful members, people have their own positions and also accept hierarchy [49].

Originally came from the research on Asian culture, the long-term orientation dimension also contains the values that people ordering relationships by status and also observe this order [49] which fits Schwartz’s opinion that people in hierarchy society “comply with the obligations and rules attached to their roles”.

• **Egalitarianism— Small Power Distance, Feminism**

Egalitarianism culture seeks to induce people to recognize one another as moral equals who share basic interests as human beings [56]. Similarly, in a small power distance society, people believe that everyone should have equal rights, inequalities among people should be minimized, privileges and status symbols are frowned upon [49].

Egalitarianism emphasizes on transcendence of selfish interests in favor of voluntary commitment to promoting the welfare of others [55]. In a feminist society, dominant values are caring for other and preservations, people and warm relationship are important, welfare society is the ideal, the needy should be helped [49].

• **Mastery— Masculinity**

In mastery society, people believe they can change society or even nature by through active self-assertion, values like ambitions, success, daring and competence are highly praised [55, 56]. According to Hofstede, masculinity society’s ideal is performance, for example, material success, progress, and competition [49].

• **Harmony— Collectivism, Feminism and Long-term Orientation**

Harmony emphasizes to fit the world as it is, try to understand it and appreciate rather than change or exploit [56]. In Hofstede’s [49] two dimensions Collectivism and Feminism, we can also find something can be related to harmony. In a collectivist society, “Harmony should always be maintained and direct Confrontations avoided” “Harmony and consensus in society are ultimate goals”. 
An in the feminism society, conflicts are more solved by compromise and negotiation [49].

Long-term orientation dimension is based on the Asian culture, especially Chinese which highly related to Confucian dynamism. From the comparative research between Western and China, Hofstede [49] found that Chinese who live in a long-term orientation society are more harmony with others and have higher adaptability for example they can easily adopt elements from different religious or adhere to more than one religion at the same time. This can also be used to explain Schwartz’s Harmony dimension.

From the comparative analysis above, we can see that Hofstede’s and Schwartz’s national culture dimensions strong connections to each other, especially most of Schwartz’s dimensions can be explained by Hofstede’s dimensions. The difference is that they summarized their dimensions from different perspectives. However, we can’t deny that, the only part that is missing in Hofstede’s dimensions but can be found in Schwartz’s dimensions, is the relationship between human and nature. Schwartz discussed this point in his dimension Harmony which can’t be explained by Hofstede’s dimensions directly.

2.3.5 Western and Eastern Cultures

“East is East and West is West, and never the twain shall meet...” cited by Hofstede [49] in his book. Obviously Western and Eastern cultures are very different. However, when the globalization started, Western and Eastern need to cooperate with each if any of them want to survive. Therefore, it is very important to understand the differences between them. At the same time, this paper also focuses on the culture difference between Sweden and China who somehow can present Western and Eastern cultures. As a consequence, this part starts with Hofstede’s research about this. Later, a national culture comparison between Sweden and China from a general sense done by Hofstede will be introduced.

2.3.5.1 The Finding of “Long-term Orientation”

Hofstede’s famous IBM cross-national culture study also has its limitations and the cultural biases is one of them. The cultural questionnaire, they made, was composed by Western minds since all the team members who designed this questionnaire all come from Western countries. Obviously, when they use this Western mind based questionnaire to do the survey on Asian countries, the result of the research might have biases.

Almost at the same time, Bond [57], who has been lived in East Asian since 1971, launched a survey based on Chinese culture which named Chinese Value Survey (CVS). He gathered researchers from Hong Kong and Taiwan to design the questionnaire since Hong Kong and Taiwan share the same Chinese values as China mainland [49]. The questionnaire was based on basic Chinese values and philosophies. They launched the CVS survey not only in China but also other 22 countries all over the world.

The value base of this survey was opposite to Hofstede’s survey which based on Western minds. The result was interesting, and Hofstede did a comparison between Bond’s research results and his. Bond [57] also concluded several culture dimensions from the survey. Hofstede found three of his first four dimensions can be found from Bond’s research, or we can say, can be explained by Bond’s dimensions. They are Power Distance, Individualism, and Masculinity.
However, through the answers from all around the world to the Chinese mind based questions, a dimension from Bond’s conclusion could not be found in Hofstede. Bond named it as “Confucian Dynamism”. In practice, it refers to a long-term versus a short-term orientation life. The founding of this dimension means that the nature of this dimension depends on the culture of the designers of the questionnaire [49]. In the end, Hofstede decided to take this dimension into his first four and named it “Long-term Orientation”. Western countries’ culture is more close to Short-term Orientation, and Eastern especially Chinese culture fits Long-term Orientation more.

Therefore, the value differences between Short-term and Long-term Orientations can be seen as an obvious difference between Western and Eastern (mainly Chinese) cultures.

### Table 2.2 Key Difference between Short-term and Long-term Orientation Societies by Hofstede (1997)

<table>
<thead>
<tr>
<th>Short-term Orientation</th>
<th>Long-term Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respect for traditions</td>
<td>Adaptation of traditions to a modern context</td>
</tr>
<tr>
<td>Respect for social and status obligations regardless of cost</td>
<td>Respect for social and status obligations within limits</td>
</tr>
<tr>
<td>Social pressure to “Keep up with the Joneses’ even if it means overspending</td>
<td>Thrift, being sparing with available for investment</td>
</tr>
<tr>
<td>Small saving quote, little money for investment</td>
<td>Large saving quote, funds available for investment</td>
</tr>
<tr>
<td>Quick result expected</td>
<td>Perseverance towards slow results</td>
</tr>
<tr>
<td>Concern with “face”</td>
<td>Willingness to subordinate oneself for a purpose</td>
</tr>
<tr>
<td>Concern with possessing the Truth</td>
<td>Concern with respecting the demands of Virtue</td>
</tr>
</tbody>
</table>

2.3.5.2 Culture Differences Comparison between Sweden and China

In Hofstede’s earliest IBM value surveys, China was not included, and the national culture dimensions were only four. Along with the finding of the dimension Long-term Orientation, it is necessary that expand the survey to a bigger scale which includes China and the new Chinese value based dimension. World Value Survey (WVS), which is explored by Minkov, solved this problem [58]. From their latest published book, we found the national culture scores under five dimensions for both Sweden and China.
Chart 2.1  Culture Comparison between Sweden and China

Source: Hofstede, Hofstede and Minkov [58] Organization and Culture

- **Power Distance, Sweden (31) VS China (80)**

  In the power distance value index, according to Hofstede’s IBM survey, Malaysia got the highest score 104 and Austria ranked the lowest as 11. The country group which includes the Latin countries, Africa countries, and Asian countries have higher scores meanwhile USA, UK and Nordic countries like Sweden have lower scores [58]. It is an obvious difference between Swedish culture and Chinese culture. Compare to China, Sweden has a flatter society structure, the distributions of powers and resources between members are much more equal than China.

- **Individualism, Sweden (71) VS China (20)**

  Sweden scores 71 on the dimension of individualism. The highest score 91 belongs to USA, and the lowest Guatemala has only 6, averagely Arab countries has the score 38. Compare to China’s 20, it shows that Sweden is a more individualism country than China. However, according to the whole survey, most countries have relatively lower individualism score than for example USA and Nordic countries so collectivism is the rule in the world and individualism is the exception [58].

- **Masculinity, Sweden (5) VS China (66)**

  Sweden has the lowest score 5 in this culture dimension. Meanwhile, Japan got the highest score 95 and the average score belongs to Brazil, which is 49. Therefore, Sweden is the most feminist society in the world and China who get 66 belongs to the masculinity country group. Hofstede [58] also found that masculinity is unrelated to a country’s degree of economics development, they found both rich and poor masculine and rich and poor feminine countries. For example, Switzerland is one of the richest countries in the world however its masculinity score is 70, even higher than China.
• Uncertainty Avoidance, Sweden (29) VS China (30)

The highest score of uncertainty avoidance belongs to Greece, which is 112 and Singapore got the lowest score only 8. Japan and South Korea got 92 and 85, which are kind of the high score. Latin American countries and Latin European also ranked in the higher score group. However, Sweden and China have almost same uncertainty avoidance index which means these two countries has almost none culture difference under this dimension.

• Long-term Orientation, Sweden (33) VS China (118)

As we discussed before, the Long-term Orientation dimension is based on the Eastern especially Chinese values so there is no surprise that East Asian Countries whose cultures got huge influence from China have much higher scores than Western countries. In this evaluation, China got the highest score 118 and Sweden got 33. Hofstede [49] also stated that the long-term orientation score directly relate to countries’ economic growth after Second World War.

From the comparison, we can see that except the dimension Uncertainty Avoidance, Sweden and China have a huge culture differences in many aspects, have very different values. Since the Long-term Orientation dimension comes from the Chinese Confucian values, it is very easy to understand that Sweden has much lower score under this dimension than China. However, the other differences under dimensions like Power Distance, Individualism and Masculinity are noticeable.

2.4 The Relationship between Scrum Implementation and National Culture

This part will start with the discussion of how national culture impact the software development under the background of globalization. More specially, the software development methodology Agile will be discussed. Author tries to find the national cultures influence on the practice, or we say implementation of Agile. Since Scrum is one type method or one part of Agile, we predict that national cultures might have the relevant influence on Scrum implementation as well. In order to prove this prediction, in this part, an important part- the theoretical framework of the relationship between national culture and scrum practices will be presented.

2.4.1 Global Software Development and National Culture

With the deepening of globalization, the multi-cultural practice and values are becoming more and more significant in the business cooperation [59]. Therefore, the cross-cultural research is very useful for providing substance to modern management practice and techniques [52].

Culture factors have an impact on the success of software applications and developments [11]. The diversity of nations and societies make it is critical to understand how organizational and cultural factors influence IT applications [60]. When it comes to the software development, Nurur, Mahapatra and Mangalaraj [61] stated that culture exerts considerable influence on decision making processes, problem-solving strategies, innovative practices, information filtering, social negotiations, relationships, and planning and control mechanisms. Nicholson and Sahay [62] concluded that it was important to take national
culture issues seriously into the research framework when the process of software
development involves development stuffs from different nations. A larger software project to
have teams in more than one locations and often in more than one continent is very normal
now, therefore, there is clear visibility of connection between the software development
methodology and national level cultural related issues [11].

Similarly, Misra, Kumar and Kumar [63] pointed out that the development of software is
similar to other products that the culture of the society in which the organization operates is
important. In addition, they also stated that software development is highly influenced by the
regional or local culture because compared to the process and tools of software development,
individuals and the interactions between people have more influence on the software
development [64]. In other words, national culture has an influence on software development
through the function of who involved in the development.

2.4.2 Agile and National Culture

The significance of national culture’s influence on global software development has been
considered by many researchers, as one important software development methodology which
has kept popularity since the beginning of 21th century, the relationship between national
culture and Agile and its implementation, practice or team behaviors.

Misra, Kumar and Kumar [63] tried to find out the success factors in Agile software
development practice through large-scale survey. They pointed out 14 hypothesized factors
and in the end nine of them were proved by the findings. They include two cultural factors:
organizational culture and society culture. Accordingly, we understand the society culture as
national culture that is different from organizational culture. According to their research
result, they found that social culture is observed to have a significant relationship with the
success of Agile software development due to having people in society who are
communicative, dynamic, progressive in attitude and having team members with similar
cultures, take together [63].

In Palokangas’s [10] master thesis, he aimed to figure out how Agile values are interpreted
in national cultures. Based on the theoretical framework which are made up of Hofstede’s
national culture dimensions and Agile values, he made two case studies in the form of
interviews. In the end, he got the conclusion that: Agile values fits the individualism and
masculine which have lower power distance and lower uncertainty avoidance. It means that
cultures have larger power distance and collectivism value take longer time and more effort
to accept Agile values. Moreover, the national culture dimensions power distance and
individualism which have been proved to have influence of acceptance of Agile values are
mainly showed in the aspects of for example hierarchy, management and discussion within
the group.

Still about the national culture dimensions, Veerla and Subrahmanyam [65] from the
perspective of behavior to discover national culture’s influence on Agile team member’s
behavioral characteristics. They got the conclusion that there is the influence of national
culture dimensions on Agile team member’s behavioral characteristics like shared leadership,
autonomy and redundancy in both positive and negative ways.

2.4.3 Scrum and National Culture

After all these literature review, in this part, the paper starts to discuss the probable
relationship between national culture and Scrum, or we can say, how the national culture
affects the implementation of Scrum. As the theoretical base for interview guide and analysis,
this paper will present an analysis between the national culture dimensions’ values or detail
behaviors under the working place sense and Scrum practices, try to find out the potential influence between these two parts. Therefore, a theoretical framework belongs to this paper will build in this part.

2.4.3.1 National Culture and Scrum’s Values

In the literature part, the values and principles of Agile have been introduced. Since Scrum is one kind of Agile’s method or framework, Scrum in some terms also follows Agile values and principles. However, Nettleton [35] concluded five values that Scrum mainly based on and the related 8 principles come from the basic values.

According to Nettleton, Scrum’s values are as following:

- Respect- all participants are seen as valued, unique individuals with an important contribution to the Scrum process.

- Commitment- all members can fully decide themselves to the team for example to choose objectives before appointed by the team meanwhile team members also choose to make sacrifices for the greater good of the whole team.

- Trust- members need to perform the highest professional standards through the collaboration with each other and assume everyone acts with positive intent.

- Visibility- everything in Scrum includes action, decision, artifact, outcome, and conservation is available for everyone in the team to see and discuss.

- Courage- both members and team will display strength to find and concur the adversity

From the Scrum values, we can find the connections between them and the national culture dimensions. For example, in the respect value part, individuals are highly valued and treated uniquely which can be explained by the individualism culture dimensions; the commitment value is related to the power distance dimension because each team members have the right to choose what objectives they want to do; commitment value is also related to the long-term orientation dimension since the team members will sacrifice themselves for the good of team; the value trust is based on team member’s self-organizing which can be found in the individualism; everything is visible in the Scrum framework can also be explained by power distance and uncertainty avoidance because all members are equal in the team with the equal information about software development meanwhile the visibility will reduce the uncertainty of the whole project; the courage value that team and members try to solve problems actively can be explained by the masculinity which included the belief of active self-assertion and daring.

After the short analysis, we predict that the Scrum values are somehow connected to the national culture. In another word, national culture has an influence on Scrum values. As we know, the Scrum practices or Scrum implementations are structured according to the Scrum principles which root from Scrum values. Therefore, we predict the national culture can have an influence on Scrum implementation as well even though the action mechanism is not that obvious and direct.
2.4.3.2 National Culture and Scrum Practices

Based on all the literature reviews of Scrum and national cultures, the paper starts to build up its own theoretical framework since here. The principle of this part is to find the probable influence of national culture on Scrum practices.

Considering that Scrum is a kind of software development methodologies, it is actually the framework of how people work on the software development. Therefore, Scrum should be discussed under the scene of the workplace. Meanwhile, according to Hofstede, his five national culture dimensions have different detailed value expressions under different scenes and one of them is under the workplace scene. It perfectly fits Scrum implementation.

As a result, this paper decides to do a comparison analysis between these two parts and present the result it finds in the form of the cross table. In the table, the horizontal direction is Scrum practices which is related to Scrum implementation, and the vertical direction is the Hofstede’s national culture dimensions.

Table 2.3 Cross Analysis of Scrum Practices and National Culture Dimensions

<table>
<thead>
<tr>
<th>Scrum Practices</th>
<th>Power Distance</th>
<th>Individualism</th>
<th>Masculinity</th>
<th>Uncertainty Avoidance</th>
<th>Long-term Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrum Roles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Owner</td>
<td>Solely authorized for product backlog</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attend daily meeting</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Scrum Team</td>
<td>Team size</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No title</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No leader</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Full authorized</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Collective responsibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use burn down chart</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Daily meeting</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Authorized to terminate sprint</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Scrum Master</td>
<td>Leader assumes the role</td>
<td></td>
<td></td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsible for decision</td>
<td></td>
<td></td>
<td>✓ ✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only one or two teams</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manage burn down chart</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remove impediments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Facilitate meetings</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>The Kickoff</td>
<td>Time boxed</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprint</td>
<td>Authorized to decide work load</td>
<td></td>
<td>✓ ✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No interference</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Chance to be terminated</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Sprint Plan</td>
<td>Two parts planning meeting</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Meeting</td>
<td>Time-boxed meeting</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-16 hours</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The table above shows the result of the cross analysis. Through the analysis, this paper finds a lot of Scrum practices can be connected with the national culture dimensions. In other words, these aspects of Scrum practices might get affected by the national culture through the function of the teams located in the geographic location of cultural geographies. In this part, this paper will explain the theoretical deduction one by one.

- **Product owner, attend daily meeting— Power Distance**

  As product owner, he or she represents the interests of the whole task in the project and its resulting system. Product owner’s responsibility is to make sure the development reach the most valuable functionalities [12]. The Scrum practices, that Product Owner attend the daily meeting, is a way to monitor the progress of the project. According to Hofstede’s power distance dimension in the working environment scene, in a large power distance society, the manager will have more monitoring on the personnel and work compare to the small power distance society [58]. So whether the product owner attends daily meeting or not and what does product owner’s action at the daily meeting might be affected by the national cultures with different power distance degree.

- **Scrum team, team size— Masculinity**

  The ideal size of a Scrum team is between 5 and 9. Too small teams might decrease the team productivity meanwhile too big team will affect the empirical process due to the complexity [16]. According to Hofstede, Hofstede and Minkov [58], people in the feminism society prefer working a smaller groups but people live in masculinity prefer working in bigger organizations. So we infer that, Scrum teams in different nations might have a small difference on the team size according to their national cultures.

- **Scrum team, no title— Power Distance, Individualism**
In a Scrum team, there are no titles among members but only team members [16]. It means members have equal roles and take the task together. It fits Hofstede, Hofstede and Minkov’s [58] power distance dimension in the workplace. They stated that in a small power distance society, the hierarchy means equal roles as determined by practical reasons. At the same time, since there is no title in the Scrum team, which means each member has no fixed job description so it also fits Hofstede’s individualism values- people in organization have more job mobility. Get influenced by national culture, we predict that even there is no formal title in the Scrum team, there might be some informal job division in some countries with large power distance and collectivism cultures.

- Scrum team, no leader— Power Distance

The Scrum team is supposed to have no team leader, so Scrum team is a highly self-organized, state-less and ego-less team that follows product backlog. They are capable of finding tasks to conduct and find problems and solve by themselves [16]. It means Scrum team is a small power distance organization. Hofstede’s dimension in the workplace states that the organization in small power distance culture has a smaller distance between leaders and subordinates. At the same time, subordinates are also highly self-organized, they expected to get consulted when they need but not like in the large power distance culture that subordinates expect the leader to appoint tasks to them. In this case, we assume that Scrum team in the country has large power distance might have an inviable or we say informal team leader to lead the team.

- Scrum team, use burn down chart— Uncertainty Avoidance

In the Scrum team, members use burn down chart to remind the progress of the project [35]. It means the time control for the Scrum practices is very important. Values under Hofstede’s uncertainty avoidance in the workplace can be connected to the using of burn down chart. Strong uncertainty avoidance society has higher stress and subjective feeling of anxiety [49]. Meanwhile, people in that kind of society have desire more precision and formalization [58]. This paper infers that whether the Scrum team uses the burn down chart and how they use it can be affected by the uncertainty avoidance which represent how people’s attitudes to time and formalization.

- Scrum team, daily meeting— Uncertainty Avoidance

The Scrum team meeting is supposed to have every day to synchronize the process and report the impediments [35]. Similar as the using of burn down chart, daily meeting can also be affect by the people’s attitudes to time and formalization under the dimension uncertainty avoidance because Scrum team in different national cultures might implement this Scrum practices differently in the aspects for example who holds the meeting, whether it is a daily scheduled meeting and in what forms they have the meeting.

- Scrum master, responsible for decision— Uncertainty Avoidance, Masculinity

When it is necessary to make a decision, Scrum Master is responsible for making decision immediately even though has insufficient information [16]. According to Hofstede, Hofstede and Minskov [58], in the weak uncertainty avoidance society, when it comes to the decision making in workplace, making decision itself is more important than the decision contents. Moreover, in a masculinity society, managers
are expected to be decisive and assertive when it comes to decision-making. Therefore, the national culture might affect Scrum master’s decision-making decisiveness.

- **Scrum master, manage burn down chart— Power Distance**

  Scrum master is responsible for creating and managing the burn down chart [35]. It also means Scrum master’s responsibility also includes monitoring the project progress. Similar to product manager attend the daily meeting, this Scrum practice can be connected to power distance. One of the differences between large and small power distance societies is superiors’ monitoring on the subordinates so whether and how Scrum master managers manage the burn down chart might can reflect the national culture difference.

- **Scrum master, facilitate meetings— Power Distance**

  Scrum master is supposed to hold meetings like daily meeting, sprint meeting and sprint review meeting to facilitate the project progress and remove the obstacles [35]. In Hofstede’s [49] power distance dimension, the values in small power distance societies, differences between people at the top and bottom of the organization is small. On another hand, the ideal manager is expected to be a resourceful democrat. So whether the Scrum master’s position or function obvious in the meetings, the managing style Scrum master uses to help teams to facilitate project might be various due to the different national cultures.

- **The kickoff— Long-term Orientation**

  The kickoff gives out the whole picture of the project includes all the business requirements and technique demands [33]. It results to a product backlog which includes all activities need to be developed during the project. The principle behinds the kickoff meeting matches Hofstede’s long-term orientation which emphasizes the synthetic thinking.

- **Sprint, time-boxed— Uncertainty Avoidance**

  According to the time boxed practice of sprint, the sprint is only supposed to last from one to four weeks but no longer than four weeks otherwise the sprint will be marked as fail [35]. This practice can be explained by Hofstede’s dimension uncertainty avoidance. As we presented above, people in the strong uncertainty avoidance society, people see money as money and chase for precision and formalization so they prefer following the rules. Scrum teams’ attitude to sprint’s time limitation and how they manage time in the Sprint might get affected by their various uncertainty avoidance values.

- **Sprint, authorized to decide workload — Uncertainty Avoidance, Long-term Orientation**

  Scrum team has fully right to decide how many hours they want to work every day [35]. It reflects the team’s efforts they put in the work and also how they see the relationship between leisure and working. This can be explained by Hofstede’s uncertainty avoidance dimension. In the strong uncertainty avoidance society, people have inner driver to work hard compare to weak uncertainty avoidance society.
Under the long-term orientation dimension, there are values in the workplace which can be explained that people have the willingness to sacrifice themselves for the interests of the group, people think leisure is not as important as work. Therefore, the workload in different scrum teams might get affected by their uncertainty avoidance and long-term orientation cultures since team members have different attitudes for the balance between leisure and work, the balance between personal interest and group interest. This difference will get reflected when team members might need to work harder than they supposed to reach the team’s goals.

- **Sprint, no interference— Power Distance**

Sprint is not allowed to get interfered by anyone from outside the Scrum team [13]. However, in small power distance society, privileges, and status symbols are frowned upon in the group. So the problem is that in the reality, Scrum team’s sprint might get affected by someone outside the team for example product owner due to the large power distance culture that the team has.

- **Sprint plan meeting, time-boxed meeting— Uncertainty Avoidance**

According to the Scrum practice, the time-boxed meeting is no longer than 4 hours [12]. In practice, the implementation of this practice by different teams might be different, for example, some teams might have longer meeting which does not follow the practice rule strictly. This difference can be explained by the people’s attitudes to time and formalization due to different cultures. These values can be estimated by the dimension uncertainty avoidance.

- **Sprint plan meeting, 4-16 hours task—Uncertainty Avoidance**

On the sprint meeting the Scrum team will generate a list of task, and each task should be finished within 4 to 16 hours [16]. In this way, the Scrum team divides the whole work of projects into detailed tasks which can turn the product backlog into working software. It makes the whole development project and process more organized. As many other practices, the 4-16 hour task can also be connected with the culture dimension uncertainty avoidance because people’s tolerance to ambiguity and chaos are different due to the culture difference.

- **Sprint daily meeting, 15 minutes time-boxed— Uncertainty Avoidance**

The sprint daily meeting is limited to 15 minutes [12]. Exactly like the sprint plan meeting which is limited to 4 hours, we still use the culture dimension uncertainty avoidance to explain the probable differences behind it.

- **Sprint daily meeting, attendees— Uncertainty Avoidance and Power Distance**

According to the Scrum practice, sprint daily meeting is open to managers so they can see what is going on within the project and how it can reach success [16]. The different implementations in this can part reflect the uncertainty avoidance culture of different team. Hofstede [58] mentioned that in a strong uncertainty avoidance society, top managers work with daily operations in order to take more control to avoid the uncertainty. Since it is open, whether the top managers for the project attend the meeting can reflect the uncertainty avoidance of the team. Meanwhile, as we discussed in the no interference practice, the team in a society with strong power distance, they might get affected by higher manager during the meetings.
Sprint retrospective meeting, conservation between team members—Long-term Orientation

During the retrospective meeting, the whole development process, practice, scrum process and framework are supposed to be revised in order to make the next sprint more efficient [12]. It somehow contains the Long-term orientation that emphasizes the future development.

Until now the theoretical framework and also the related work part is finished. This paper combined the two theories part - Scrum and national culture dimensions together. Based on that, this paper assumes the probable relationships between them. In other words, how national culture affect the implementation of Scrum is predicted and explained. After the empirical finding part, an analysis will be presented based on these assumptions and the empirics.
3 RESEARCH METHODOLOGY AND DESIGN

3.1 Research Approach

There are two basic research approaches that are usually used in academic research: inductive approach and deductive approach. Inductive research approach usually begins with the empirical data collection and then analysis. The findings can be used to compare with theories that are already existed in the former researches therefore it can bring to the formation of new theories [66, 67]. Compare to inductive research approach, deductive research approach is more often used in academic research. The principle of it is to use the existed theories to explain certain phenomenon [68]. Therefore, deductive research approach represents the relationship between theories and empirical observations but in a more common way [69]. Hypothesis is usually presented and waited to be deduced in this research approach.

In this thesis, the deductive research approach is used. According to Bryman and Bell [69], at the beginning of the deductive research approach, it is very important to build up a broad and solid literature review at the beginning of deductive research approach. An overview and full understanding of theoretical considerations related to specific research topic will be brought out through this approach. Follow this strategy, this thesis starts with literature reviews in both Scrum implementation field and national culture field. After reviewing abundant previous research of Scrum, author realized that Scrum is a framework which is under the Agile methodology and follows Agile’s values and principles. However, the implementation of Scrum could have small differences from Agile and its other frameworks. Therefore, it is important to conclude all Scrum practices during its implementation based on the literature review. In the end, a framework of Scrum practices in the implementation is built up. Culture is a very wide research area; this thesis starts from the definitions of culture and national cultures to get a brief understanding of it. When it comes to the national culture difference comparison, Hofstede’s national culture dimensions are mostly cited in academic research. This thesis then explained each Hofstede’s dimension and its values. At the end of the related work, the most important step is to build the theoretical framework of this thesis and the related hypothesis. Based on the reviews of these two parts, this thesis analyzed the probable connection between Scrum implementation and national culture. In other words, the thesis gives out several hypothesis about whether national culture differences have an influence on Scrum implementation and how national culture differences affect the implementation of Scrum.

The next step is to collect the empirical data based on all the literature reviews and theoretical framework in the qualitative interview. The design of the interview questions is tightly connected to Scrum practices and its probable relationship to national culture differences which increases the validity of this thesis. The original data are reorganized according to the Scrum practices and then it is used to compare with the theoretical framework (theoretical hypothesis). Finally, through the analysis, this thesis tested all these probable relationship between Scrum implementation and national culture differences. During this process, these are also something which is not included in the hypothesis got found. It leads to the conclusion and the further research in this area at the end.

3.2 Research Strategy

According to Bryman and Bell [69], choosing the right research strategy is essential because it can directly affect the research result and whether the research questions can be
answered or not. There are two research approaches that are usually used in academic research, quantitative approach, and qualitative approach. Saunders, Lewis and Thornhill [67] stated the differences between these two research strategies: in quantitative research strategy, measurable data that can be undergone statistical analysis is collected and analyzed; differently, qualitative research strategy mainly through methods like observations and interviews to gain the data. Therefore, qualitative research strategy is more flexible than quantitative research strategy since researchers can change their research questions, the designs of the studies, data collections and analysis during the qualitative research [66].

Qualitative research method will be conducted in this paper because through this approach we can conduct a deeper study on the social phenomenon and gain a better understanding of particular subjects [69]. Moreover, qualitative research strategy is wildly used in history, anthropology and political sciences [70]. The qualitative research strategy is based on ground theory which emphasize the inductive process, from the abundant phenomenon to generalized theories. However, it can also corporate with deductive process through the use of constant comparison. According to Rubin and Babbie, the constant comparison can be described as: researchers firstly detect patterns in their research, develop concepts and work on the theoretical hypothesis; after that, researches search more cases, conduct more observations or interviews to compare those empirical findings with the concepts and hypothesis that developed from earlier observation which can be understood as the observation on former theoretical work; at the end, through the comparison, new insights or theories might be developed [71]. Due to the lack of theories that directly discuss the relationship between national culture differences and Scrum implementation, after abundant literature reviews in these two research fields, this thesis built up a theoretical framework which is also a group of theoretical hypothesis that predict the probable relationship between the national culture differences and the Scrum implementations. From this point, this thesis chooses to gather data through interviews and design interview questions which relate to the theoretical framework.

Qualitative research provides individual’s own accounts of their attitudes, motivations and behaviors. Qualitative data are when it comes to defining feelings and attitudes [72]. Under the qualitative research strategy, in order to get individuals’ opinion and behaviors, qualitative data collection method such as observations, interviews, and focus groups can be used. In addition, the purpose of qualitative data collection and analysis is to identify and explore the antecedents and factors, that are related to the phenomenon researchers, want to investigate [73]. The way, to collect data this study used, was interview. It fits the characteristic of qualitative research strategy which mainly uses interviews and observations. Moreover, this study aims to see how people in different culture environment conduct Scrum implementation, which means the focus will be individuals’ behaviors and attitudes in the empirical discovery. Therefore, the interview method that can identify and capture individuals’ behaviors, opinions and attitudes are used in this study.

All in all, through the qualitative analysis based on both theories and empirics, this thesis aims to test the theoretical framework and then complete and enrich the theoretical research in this specific field. This research process fits Bryman and Bell’s [69] theory that qualitative research is aimed to generate or develop new theories, but not just using empirical data to test the existed theories. Therefore, taking qualitative approach will help to find out the hidden and unsuspected relationship between national culture and Scrum implementations. Furthermore, the research is not planned to provide a statistic validation or universal generalization, but to provide a better understanding of the subject under investigation [70]. The qualitative research should be most suitable for the project.
3.3 Research Design

According to Kothari, research design is the arrangement for data collection and data analysis in the manner that tries to combine relevance to research purpose with economy in procedure [74]. In other words, research design is the conceptual structure of what to study and how to conduct the research, as well as the blueprint for data collection, measurement, and analysis. Therefore, the research design describes from what research will write about the hypothesis to how to operate the research implications, data collection analysis and research results [74].

In the research strategy part above, the principles of how this study conducts the research purpose, literature review, and theoretical hypothesis have been introduced. Therefore, in the research design, this study puts focus on introducing how the study should be carried out, how the empirical study be designed, where to find and how to get the data as well as how the data should be analyzed and so on.

3.3.1 Data Collection

3.3.1.1 Data Source

There are several different sources of information that can be used in qualitative research [75]. According to Lethbridge et al. [76], there are three levels of data collection techniques, first degree, second degree and the third degree. The first degree is the direct methods that the researchers use in direct contact with the subjects and collect the data in real time. The second degree is to use indirect methods where the researcher directly collects raw data without actually interacting with the subjects during the data collection. The third degree is the independent analysis of work artifacts which are already available and compiled data is used.

Similar, Yin [77] defined them as primary data collection and secondary data collection. It is easier to divide the data source compare to Lethbridge et al.’s [76] categories. Primary data collection means the first-hand data from primary sources that is accumulated by the research self and can be obtained from, for example, by doing observations, surveys and interviews. The secondary data collection represents all the available information, such as statistical reports from government and other agencies, books, articles and many others [78].

The qualitative research in this thesis mainly uses the primary data collection through several interviews and also a bit secondary data collection. Author decides to find a company which involved in the software development. The author followed two principles when he started to search appropriate interviewed company. Firstly, the company should be an international company that might have multinational software development team or even have teams locate in different countries with different national cultures. Secondly, this company should have implemented Scrum for a while so that they have kind of mature Scrum framework in practice and also might involve the implementation adjustment when it comes to different culture environments. In the end, the author found a company that matches the company profile.

The secondary data collection is used when the thesis is introducing the background of the interviewed company in order to give out a brief picture it. The source of the other empirics used in the thesis is primary data. It is all gathered by interviews. The advantage of the first-
hand data is that the researcher can control what data is collected, how it is collected in what form data is collected to a large extent [75]. In other words, the data collection is more flexible, and also researchers have more control on it.

3.3.1.2 Interviews

- Why Interview

Interview is taken as main research method for this project. In qualitative research, interview is described as ‘gold standard’ because it involves in-depth exchange between interviewer and interviewee [77]. Interview provides the opportunities for interviewer to repeat questions. It reduces the possibility of misunderstanding between each other. Furthermore, through interview, researcher can get more information from what and how he answers to the questions. In qualitative research, interview is an important way for data collection [75].

Interview can be conducted by face-to-face, via phone or via other live video software. Face to face interview should be best for communication because it will greatly reduce the possibility that losing information during the interview. But in this research, the interviewees are located in different cities and countries. Due to time constraint and budget, face-to-face interview is not doable for this project. Live video interview doesn’t require for physical presence, but it needs camera and reliable, high-speed internet access. Taking all of these into consideration, phone interview is finally selected as our choice. The author recorded all the contents of interviews.

- Sampling Strategies and Interviewees

In this research, inclusion and exclusion criteria are used to define our target population [79]. We aim to explore the relationship between national culture and Scrum implementations. So it is better that we choose interview samples from different national culture environments. As we discussed in the introduction, due to author’s culture background and personal experiences, it is a good choice to choose Sweden and China as the two cultures that are going to be compared. From another perspective, since the thesis focuses on Scrum implementation which should be implemented by the whole group with rich daily practical experiences. Therefore, other stakeholders for example Scrum Coach is not excluded from the samples because even though they have good knowledge they do not attend the Scrum implementation practically.

Organizational culture is known to have influence on Agile implementations which can also affect Scrum implementation. Considering that different departments in the same company might have various organizational culture, this research decides to choose the interview subjects from the same department even though the Scrum software development method is used in several departments in our interviewed company.

Bases on all the considerations above, this study chooses the R&D department which implements Scrum for the reasons as following:

1) The interviewed company is a big international company who has R&D department locate in both Sweden and China

2) Their R&D department has used Scrum method for many years

3) In order to apply Scrum better in a different environment, the R&D department of the company always adjusts their Scrum implementation to get better performance so that their Scrum implementations are different from one team to another
Regarding to sample size, this research puts more emphasize on quality and depth of interpretations, instead of amount of interviews, 3 Scrum teams in each county and 6 Scrum teams in total are chosen for this research according to the triangulation validation. Triangulation means to take different angles towards the studied objects and to provide a broader picture [75]. More specifically, when the study is mainly relying on qualitative data, it is good to have border and richer data sources but not less precise than quantitative data [75]. Stake[80] defined four types of triangulation can be applied in studies: data (source) triangulation, observer triangulation, methodological triangulation and theory triangulation. The data (source) triangulation which means using more than one data sources or collecting same data at different occasions. Triangulation is important to increase the precision of empirical research. Therefore, this sample size is considered as the best choice for this study.

In this study, the interviewees are six team members from the 6 scrum teams that have been chosen which means each team is represented by only one team members. The reason can be explained like this: firstly, the interview questions’ design is based on the framework of Scrum implementation which means the interview questions about how they use Scrum method are quite objective so that no matter who from the team answers the questions, we might get the same answer. Secondly, as all team members are supposed to have no labor division (job title) and practice Scrum implementations every day, therefore a team member is assumed to have full knowledge of Scrum implementations of the team. Thereby, the interviewee of each team is a normal team member, and they represent their teams.

Non probabilistic convenience sampling method is chosen for this research. Convenience sampling involves people who are available and willing to take part [79]. Due to the target population is very specific and very limited available, interviewees are reached by email first, inquiring about their interests on this research. This research does not select interviewees according to their role in the team.

In the end, we got contacts with totally six teams belong to the interviewed company and locate in both Sweden and China. The selection of the team was random. Five of the teams were found through author’s personal contacts and only one through the professional social media “LinkedIn”. The interviewees are verified that they are from different teams. All teams belong to interviewed company’s R&D department and have used Scrum method more than one year. The profile of teams is shown in Table 3.1.

<table>
<thead>
<tr>
<th>Team</th>
<th>ST1</th>
<th>ST2</th>
<th>ST3</th>
<th>CT1</th>
<th>CT2</th>
<th>CT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Sweden</td>
<td>Sweden</td>
<td>Sweden</td>
<td>China</td>
<td>China</td>
<td>China</td>
</tr>
<tr>
<td>Interviewee</td>
<td>Team member</td>
<td>Team member</td>
<td>Team member</td>
<td>Scrum Master/tester</td>
<td>Scrum Master/Designer</td>
<td>Team member/Developer</td>
</tr>
</tbody>
</table>

In the table, ST1 means the Swedish Team No.1, ST2 means the Swedish Team No.2, ST3 means the Swedish Team No.3, CT1 means the Chinese Team No.1, CT2 means the Chinese Team No.2, CT3 means the Chinese Team No.3. From the table, we also notice that, all the interviewees found in Swedish teams are real team members without any titles meanwhile in the Chinese teams’ members have different roles for example Scrum master, tester or designer, developer. All of these three interviewees from three Chinese teams have two roles in the team except team member.
3.3.2 Interview Design Interview Session

3.3.2.1 Interview Design

In the interview-based data collection, researchers ask a series of questions according to the subjects that related to the interests in the study and these questions are based on the formulate research questions [75]. The interview design can be divided into three types: unstructured interview, semi-structured interview, and fully structured interview. In the unstructured interview, questions are formulated as general concerns and interests from the researcher. The fully structured interview is characteristic of questions that are planned in advance and asked in the same order so that this kind of interview is like a questionnaire-based survey.

Semi-structured interviews are the most common in qualitative interviews. Semi-interview guide provides more flexibility for interviewer to add more new questions and allow the interviewee to further explain their answers during the interview [69]. It is due to semi-structured interview’s character. In the semi-structured interview, the interview questions are planned but not necessarily asked in the order as they are supposed to be. Along with the development of the conservation, researcher can decide the questions orders, the improvisation and exploration of interview subject are also allowed in the semi-structured interview [75].

In this research, the semi-structure interview is used. Based on the Scrum implementation and national culture theories, many questions are organized in the interview questions list. A lot of half-open questions like “How” questions and “What” questions are asked in the interview which give interviewees more flexibility to give their answers. In addition, follow the development of the interview conservation, questions did not follow the question list. The reasons are: some questions were skipped in the real interview process due to for example interviewees have no clear ideas of some Scrum implementation practice; interviewees gave interesting answers to some questions which aroused author’s interest to dig deeper.

3.3.2.2 Interview Session

An interview session can be described into several phases. Firstly the objective of the interview should be introduced; how to use the data from the interview is also included; later several introductory questions should be asked and at the end comes the main interview questions [75]. This is more or less like an interview guide.

In this study, the interview objective is to find whether the national culture differences have influences on Scrum implementation though the comparison between interviewed teams from Sweden and China but belong to the same company. The data gathered from the interview was analyzed according to the theoretical framework that is built in order to figure out the probable relationship between national culture and Scrum implementation. In other words, the data was used to test the theoretical hypothesizes.

The interview was conducted in two rounds and two questions lists were asked. In the first round interview, the author made a question list which included a few very open questions about the Scrum implementations, for example, the Scrum roles, process and so on. The collected data are then analyzed, and a few implementations are obtained. Based on the very wide answers, author got a brief overview of how these teams conduct Scrum method. Later, combine with the theoretical framework of this study, the author developed more detailed questions as the main interview questions with the purpose to confirming the found
implementations and exploring more implementations. Later the second round interviews started meanwhile the interviewees were still the same. The conservation between author and the interviewees were guided by these main interview questions. According to Runeson and Höst [75], interview sessions can be structured to three general principles as funnel model, pyramid model, and time-glass. The funnel model starts with open questions and then develops to more specific ones. Therefore, the way, this study used to conduct the interview session, is reasonable.

3.3.3 Data Analysis

Qualitative data analysis methods are usually used in qualitative research due to the flexible research method [81]. Deriving conclusions from the data and keeping a clear chain of evidence are the basic objectives of the analysis. The chain of evidence means that a reader easily can follow the derivation of results and conclusions from the collected data [82]. In order to reach that, researchers should provide sufficient to represent each step of the study and every single decision they make [75].

In this research, the data analysis was conducted in this process: after the first interview, author firstly listened to the interview record and documented all the keywords and phrases to find important information regarding to Scrum implementations the whole process can be seen as coding; later author grouped all the implementation practices according to the Scrum implementation framework; based on that, author designed a main interview questions list and gathering the data again; then author used the same coding process as the first time to find interviewees’ answers to the these more specific questions and wrote them down; according to Runeson and Höst [75], tabulation is an useful technique to analyze the data so author put all the interviewees’ answers into a table which is structured regarding to Scrum implementation framework so that to get an overview of data and compare the data from different interviewees.

The two different parts of qualitative data analysis can be divided into hypothesis generating techniques and hypothesis confirmation techniques [81]. Hypothesis confirmation technique is the techniques are used to confirm whether a hypothesis is true. In addition, hypothesis confirmation techniques are usually used for explanatory studies [81]. This study used the hypothesis confirmation techniques. A theoretical framework generated at the end of related work part focuses on discussing the probable relationship between national culture dimensions and the Scrum implementation practices from a theoretical perspective. We can see this theoretical framework as a group of hypotheses. The purpose of the interviews is to test whether these hypotheses are true through the comparison analysis between the empirical data and the hypotheses. This part is represented in the analysis part under Chapter 4.

3.4 Research Validity

The validity of a study is about the trustworthiness of the results, which is to what extent the results are true and not biased by the researchers’ personal subjective point of view Runeson and Höst [75]. There are many aspects to classify research validity in literature. Based on Yin’s [82] research, Runeson and Höst [75] take Yin’s classification scheme for validity regarding to the flexible design studies. The scheme can be divided into four aspects: construct validity, internal validity, external validity, and reliability.
3.4.1 Construct Validity

Construct validity of research reflects what extent the studied operational measures represent what is in research’s mind and what has been founded according to the interview questions [75].

In this research, the whole structure is logical, and each step has been taken is to reach the research purpose. In the related work, all the literature reviews of Scrum implementation and national culture dimensions are for building up a theoretical framework for the research subject which is to find out whether and how national culture differences affect Scrum implementation. Based on these, the next step is to do the interviews and compare the empirical findings with the theoretical hypotheses to see whether they can be proved or not. The comparison analysis actually answers the research questions.

In the qualitative interviews, the author took two steps’ verification to make sure what have been done in the research are really relevant to the research subject. Firstly, the research questions were clarified and broken down to sub-questions. All the research questions and sub-questions were well documented. This makes the study has a clear and visible guide to follow. In addition, all the interview questions have related theoretical base thereby the results of these interview questions are related to the research subject and help to answer the research questions.

This research takes Hofstede’s culture dimension theory to analyze the national culture differences. However, this theory is not impeccable. The flaws of Hofstede’s culture dimension theory may create a threat to our research result. For instance, according to McSweeney, it is problematic to take nation as the unit to study culture [83]. People who are from difference regions or speak different languages might have different cultures even in the same nation. It is true, according to Hofstede’s reply [84]. Nevertheless, they are usually the only kind of units that are available to make the comparison. [84, 85]. Taking nation as the culture unit is an interim option. It is much easier to collect data based on nation than the region or language [85].

3.4.2 Internal Validity

Internal validity is concerned when there is causal relations are examined. If the research is trying to investigate the influence one factor on another, then the risk might be that there is a third factor actually also affects the investigated factor. If the researcher does not know to what extent the third factor has an influence on the investigated factor then, the research can be seen as lack internal validity [75].

The national culture is always seen to be carried by individuals in this research. At the same time, all the Scrum implementations are also conducted by individuals. Therefore, it is obvious that if there is a third factor affect the Scrum implementation, it must through human or individuals as well. There are several levels of cultures, and national culture is just one of them. It means that same individuals can be grouped by national culture but also some other culture divisions. In this study, all the team members have their national culture. However, as employees working in interviewed company, how they think and how they behavior also got affected by the organizational culture. In order to reduce this third factor’s influence, this research chooses the interview teams from the same company and same department. It is reasonable to believe that these teams share same company culture or even department culture. Since the third factor is limited among the samples, this research tries to find out whether national culture difference is the only reason results in their different Scrum implementations.
3.4.3 External Validity

External validity concerns to what extent it is possible to generalize the research results and to what research results are of interest to other people outside the study. It means that research is trying to find out whether the results can be generalized and be used in other cases [75].

In order to generalize the research result, it is important to have sufficient responses and a large sample size. Due to the size of the sample of this research, in addition to the nature of the study, generalization our research results is not recommended. The external validity of this research is that: Even though the Scrum implementation framework is very objective and supposed to be conducted in the same way no matter in which environment, the finding of this research proves that the detailed implementations still got affected by national culture difference. It will arouse software developers’ awareness of why Scrum implementations show differences under the various culture backgrounds and also increase their consideration about how to adjust Scrum implementation to match the development team’s national culture background.

3.4.4 Reliability Validity

Reliability validity concerns to what extent the data and analysis depend on the specific researchers. In other words, whether the research result will be same if there is another researcher conducts the study. The reason, that arouses the threat of reliability validity, could be that the interview questions are not clear or the inappropriate way to collect and code data [75].

In order to keep the reliability validity, all the research questions were designed according to the theoretical framework and well documented. Moreover, all interview questions were sent to interviewees before the interview in order to let interviewees get familiar with the questions and prepare for the answers. During the interview, we re-explained each question with examples. The interview contents were recorded and dictated into written contexts before put into the tables which follow the structure of Scrum implementation. So this study is well organized and has strong reliability validity.
4 FINDINGS AND ANALYSIS

In this part, the empirical findings will be reorganized and presented according to the structure of Scrum practice framework. In each part, how three Swedish teams and three Chinese teams conduct the Scrum practices will be stated.

4.1 Scrum Implementations and Analysis

4.1.1 Scrum Team

Practice: Team size, No title, No leader, Full authorized, Use burn down chart, Daily meeting, Authorized to terminate the Sprint

ST1 has seven team members, including 6 developers and 1 Scrum Master. When the interviewee was asked about whether they defined themselves as testers or designers, the interviewee said no. The team avoids having someone only working on testing or designing. They aim to build a team in which anyone can do anything about the product. As this team is composed with new developers who are young and freshman to the company, there is no leader in the team. Everyone is equal to each other. Product Owner is not one of the team member. When we asked about whether the team is fully authorized to make any decision regarding the product, the interviewee said it depended. For some decisions, they need to discuss with Product Owner because he has more experience and skills. When the interviewee was asked about whether they used the burn down chart, he answered yes. But normally no one used it, he added.

ST2 has a dynamic team, and the size is from 6 to 8. For vary reasons, some team members left and some joined in. At the moment we made the interview, the team size was 8. The team composition is complex. There are 1 Product Owner, one design leader, 2 developers, 1 system engineer and 2 technique writers. Obviously there are titles in the team, but designers and testers are not defined. People, who write the codes, are responsible for testing them. Both Design Leader and Product Owner work as a leader in team. They are opinion leaders. However, the interviewee emphasized that it was because they had more experience. There was nothing about hierarchy. About the decision-making, as the Product Owner is one of the team members, most of the decisions can be made within the team. While, there is some decision need to be discussed with managers. The interviewee answered “no” when we asked whether they used Sprint burn down chart.

ST3 has dynamic team size, from 6 to 7. There were seven team members when we conducted an interview. All the team members are developers. There are no titles among designers and testers. However, the interviewee also mentioned that some team members had strong knowledge in designing or testing. The Product Owner is not a team member. When we asked about team leader, he said no. They are equal in the team. For the full authorization to make decisions, he told us that it always depended. Things like changing time plan need to be discussed with Product Owner. ST3 uses Sprint burn down chart. When we asked about who controlled it, he answered no specific role was in charge of that.

For Scrum Teams in China, CT1 has dynamic team size, from 5-7. At the moment we made the interview, the team had five members, including 3 designers and 2 testers. The Scrum Master is one of the testers and Product Owner does not belong to this team. When the interviewee was asked about whether there was a team leader in the team, the interviewee said no. But he mentioned that the experienced designer actually was an invisible team leader. He can represent the team when all of the team members are not be on board. For the
full authorization to make a decision, he said the tasks, which were listed on the white board, could be decided by the team. Other decisions need to be discussed with Product Owner. CT1 uses Sprint burn down chart to show the progress. The person who holds the daily meeting is in charge of updating the chart every day.

There are seven team members in CT2. The interviewee told us that it was recommended to have seven team members in the team. It implies that all the Scrum Teams, which are working together with CT2, have seven team members. This Scrum Team is composed of 6 designers and one tester. One of the designers also takes the role of Scrum Master. This kind of team composition is also recommended. Product Owner is not one of the team member, and there is no leader in the team. When he was asked about whether the team had full authorization to make decisions, he said yes. The team has full authorization to make decisions on the user stories which are taken from the product backlog. CT2 uses the Sprint burn down chart and Scrum Master is always in charge of updating it every day.

CT3 has seven team members, and interviewee described that this was demanded by company. When the interviewee was asked about whether there were titles in the team, he said no. However, he added that there were titles in their minds. Because before they composed the team, they had titles. They are one system designer, 2 testers, and 4 developers. Even they didn’t say the title in the team, they still preferred taking tasks related to their old titles. When he was asked about whether there was leader in the team, he answered no again. There was no hierarchy. But he also said there was an invisible leader in the team. Product Owner is not one the team member. There are multiple teams sharing the same Product Owner. CT3 also uses Sprint burn down chart. Scrum Master takes the responsibility to update it every day.

4.1.2 Scrum Master

Practice: Leader/Manager assumes the role, Responsible for decision, Only for one or two teams, Manage burn down chart, Remove impediments, Facilitate Meeting.

For teams in Sweden, Scrum Master in ST1, doesn’t take any tasks of coding or testing. He is a full-time Scrum Master for two teams. Each team takes half of his job. The interviewee told us that the Scrum Master was a developer before. Then he preferred to take full-time job of Scrum Master. When the interviewee was asked about the Scrum Master’s responsibilities in the team, he answered that Scrum Master worked more like a coach or an assistant. Scrum Master books the meeting room, sets the meeting time, makes Power Point for presentation, helps to make decisions, etc. Scrum Master attends the Scrum Meeting every day. When someone reports an impediment on the Daily Meeting, he normally writes it down on the white board and makes sure it will be resolved as soon as possible.

When we asked about the Scrum Master in ST2, the interviewee told us that they didn’t agree on who was Scrum Master in their team. Even though they know they are using the Scrum method, no one is called Scrum Master in the team. However, he added that, the Product Owner worked as a Scrum Master since he helped to conduct meeting, remind time plan and prepare for meetings, etc. The assumed Scrum Master, who is actually the Product Owner, attends Scrum Daily Meeting every day, except that he has other meetings to attend. He didn’t write many codes, only wrote core part of some products.

When we asked about the Scrum Master in ST3, the interviewee thought for a while and answered the line manager might be the Scrum Master. Because he also takes the responsibilities of coaching the team, reminding the work process and discussing the block that the team reported. The line manager is in charge of many Scrum teams. Interviewee
stated that there was not a role called Scrum Master in the team, and they didn’t have a need for that. The assumed Scrum Master attends 90% of the Scrum Daily Meeting.

For teams in China, one of the testers in CT1 takes the role of Scrum Master. His responsibilities include representing the team to communicate with managers, helping to build more mature team, improving team productivity, making the daily meeting more effective, helping the team to make decisions, etc.

One of the designers in CT2 takes the role of Scrum Master. He spends half of his time on developing and another half on the job of Scrum Master. He stressed the responsibilities of Scrum Master on ‘supporting’ and ‘facilitating’. On daily meeting, Scrum Master helps to make some decisions and update the burn down chart. Besides, the Scrum Master also represents the team to communicate with other teams and Product Owner.

The Scrum Master of CT3 is one of the team member. When the interviewee was asked about the responsibilities of Scrum Master, he described them as booking the room, setting time for meeting, coordinating the meeting, helping to make decisions, managing burn down chart, representing team to communicate with Product Owner, etc. Scrum Master attends the Scrum Daily Meeting every day.

4.1.3 Sprint

Practice: Time boxed, Authorized to decide work load, No interference, Chance to be terminated

For teams in Sweden, ST1 set 2 weeks as the Sprint duration. The interviewee said he had no experience of overwork for the past year. They follow Swedish laws of workload and use flexible work time, which means they have a choice to start to work early and leave early or start late and leave late. Regarding the interference of the Sprint, the interviewee said he could remember twice that some leader/manager resigned tasks to the team during the Sprint. When we asked about whether the team had the right to terminate the Sprint, he answered that he didn’t know about this. It never happened to his team. If the Sprint goal is found unable to be accomplished, the team won’t take extra actions. They won’t mark this Sprint as failure as it is supposed to be.

ST2 sets three week's duration for a Sprint. They seldom have overwork during Sprint. He can remember only two times of overwork experience for the past year. Their workload follows Swedish laws. They also use flexible working time, and they are allowed to start working earlier and leave earlier. Regarding the interference of the Sprint, interviewee said he had no relevant experience for the recent year. When we asked about the whether the team had right to terminate the Sprint, he answered that he didn't have this kind of experience, so he was not sure. The interviewee described that his team reached the Sprint goal all the time. He has no experience of Sprint failure as well.

ST3 has dynamic duration for a Sprint. It is from 2 to 4 weeks. The duration of Sprint depends on the size of the user story. The overwork is not usual for this team. They follow legal workload and use flexible work time. Regarding the interference experience, the interviewee said it did not often happen in his memory. The team has the right to terminate of Sprint, but he has never experienced this. When we asked about what they would do if the goal was found unable to be accomplished, he said that the team would spread this out on daily meeting and discuss with product owner. But they don’t have the definition of Sprint failure.
For teams in China, CT1 has dynamic duration for Sprint, from 2 to 4 weeks. It depends on previous experience to change the duration. At the moment when the interview was conducted, they used three weeks for a Sprint. The interviewee mentioned that the whole company uses flexible work time as it is in Sweden. Their workloads follow China laws. It is also seldom to have overwork in his team. Let’s say among 10 Sprints, there are only 2 or 3 Sprints need some team members to have a few days overwork at night. When we asked whether he had experienced about some leader resigned new tasks during a Sprint, he answered yes and it was always unavoidable. The interviewee said his team theoretically had the right to terminate the Sprint, but they never used it. Regarding to the situation that Sprint goal is found unable to be accomplished, the team will do as much as they can and mark this Sprint as failure.

CT2 use three weeks for a Sprint, and it is also recommended by the company. The workloads of this team are fixed. They seldom have overwork. His personal experience showed that he had one-day overwork in two months. They also use flexible work time, but team members normally start to work at the same time and leave the company together. Regarding the interference, this team only get user stories from Product Owners. If a user story is very emergency, the Product Owner will replace some user stories in the Sprint with the emergent one. The interviewee has never experienced the termination of a Sprint. When we asked what they would do if they found the Sprint goal was unable to be finished, he said they would mark this Sprint failed. However, this situation seldom happened in his team.

CT3 uses three weeks for a Sprint, and it is demanded by the company. The workload of this team is fixed, and they rarely take overwork. When we asked the interviewee about the interference, he told us that the leader sometimes resigned tasks to some team member, but not to the whole team. He has no experience about the termination of a Sprint. If the Sprint goal is found unable to be finished, they will work as normal to continue and mark it as a failure. However, he added, the more important thing was that the team could get experience from the failure.

4.1.4 Sprint Plan Meeting

Practice: Two parts planning meeting, Time boxed meeting

For teams in Sweden, ST1 takes Sprint Plan Meeting in two parts. It takes almost two hours in total. The first Sprint plan meeting is held within three teams and 2 Product Owners, who are working on the same feature. The second meeting is held within the team and Product Owner. On the second meeting, the Product Owner clarifies the requirements and the team members discuss about the efforts estimation. The interviewee described that they used playing cards to estimate efforts of each task, but after a period of time they found it took too much time to estimate. They chose to negotiate and made quite estimations instead. For the estimation unit, they use real day (in contract to ideal day) per person to estimate the efforts.

ST2 tasks only one Sprint Plan Meeting. It is 4-hour time-boxed. During the plan meeting, Product Owner clarifies the requirements at first. Then the team members sit together to estimate the efforts of each task. They discuss each of the tasks and write the estimations on a paper. The estimation unit is effective hours per person.

ST3 has the planning meeting in two parts. It takes from a few hours to a few days differently. The first meeting is held to identify which tasks will be taken into this Sprint. Then all the team members go back to their own desks and do some research about each task. After the research, all team members sit together to estimate the efforts of each task. They have a document recording the estimation; they edit the document after the negotiation.
For teams in China, CT1 takes the planning meeting in one part and within 2 hours. During this meeting, Product Owner uses PowerPoint to clarify the requirements and the user stories. It is an interactive process. If the some team members are not clear about the requirements, they ask. Afterward, all team members sit together to estimate the efforts. They use playing cards to estimate the efforts of each task. Every team member chooses poker which can represent his estimation. All the team members show their pokers at the same time. By then, they discuss and decide the final estimation. The estimation unit in this team is function point.

CT2 has the plan meeting in two parts. The first meeting is an informally prepared meeting for the Sprint. The team, Product Owner and system technician sit together to discuss about what can be finished in this Sprint. The formal plan meeting is held afterward. It takes about 1 hour. The Product Owner clarifies user story and the team estimates the efforts of each task. The team uses playing cards for efforts estimation at first, after a period of time they changed to have an informal discussion to do the estimation. Their estimation unit is function point.

CT3 has one plan meeting. It takes approximately 2 hours. During this meeting, Product Owner presents the requirements firstly. Afterward, the team members sit together and make each task into small tasks. The interviewee told us that previously, they used playing cards to estimate efforts. However, it was found to be very time-consuming and was deprecated. They discussed each task and made efforts estimation instead then. The estimation unit is real hour per person.

4.1.5 Scrum Daily Meeting

Practice: 15 minutes time-boxed, Attendees, Stand up Meeting, Write Impediments on white board, Short conversation, Three questions.

For teams in Sweden, ST1 takes the Scrum Daily Meeting every day at 10:00 am. It is set into 15 minutes and normally they can finish it within the limited time. Every day at 10:00 am, the Scrum Master reminds all team members to start the meeting. Team members stand in a circle, in front of the whiteboard. The Scrum Master plays an important role in the meeting. He recommends someone in the team to start the meeting and other members talk one by one. Sometimes the Scrum Master will inquiry some questions regarding tools and time management. If someone reports an impediment, he will write it on the whiteboard. On the meeting, team members answer the three questions and simple questions are allowed to be discussed during the meeting. Except the team members, Product Owner, and line manager attend the meeting from time to time. The interviewee said Product Owners attended three times a week, and line manager attended one time a week approximately. Team members come to the company before the meeting starts, so no one is late for the meeting normally.

ST2 takes Scrum Daily Meeting at 9:45 every day. It is 15-minute time-boxed. 15 minutes before meeting starts, the email system will remind all team members about the daily meeting. Team members stand as a half circle, in front of a white board. The one, who stands at the edge, starts to talk on the meeting, and then people talk from one side to the other. Sometimes, the Scrum Master (he is also Product Owner) will point someone to start the meeting. Discussion is not allowed during the meeting. The meeting is focused on progress reporting. The Scrum Master informs the team about the progress of the whole project and some decisions that he gets from meetings he attended yesterday. They don’t report the impediments on the daily meeting. Expect team members and Product Owner, line manager attends the meeting but not often. Program manager attends the meeting only when the tasks are important.
ST3 takes Scrum Daily Meeting at 9:00 every day. It is also 15-minute time-boxed. All team members start to have meeting spontaneously in the morning. They stand in a circle, and the one, who stands on a specific place, starts to talk. People talk by clockwise order. Each team member answers the three questions. Short discussions, like yes or no questions, are allowed in the meeting. Scrum Master (line manager) listens to team members’ talking mostly. He informs team the whole project process if it is necessary. Except team members and line manager, whether system manager attends the meeting depends on cases.

For teams in China, CT1 starts the daily meeting at 9:45. It is also 15-minute time-boxed. There is a ball which is passed from one team member to another. The one, who takes the ball, is responsible for reminding the team to start meeting before 9:45. Team members stand in a circle, in front of the white board. The ball keeper is the first one to talk on the meeting. Then people take turns to talk. The three questions will be answered by each team member. Short discussions are allowed during the meeting. Scrum Master doesn’t need to organize the team. He doesn’t talk much except his role of a tester. Scrum Master shares the project information with team if he attends some meetings the day before. The impediments, which are reported by team members, will be taken action immediately by Scrum Master after daily meeting. Scrum Master doesn’t need to write them on the whiteboard. Except the team members, PO is recommended to attend daily meeting every day, but in practice, he attends 2 or 3 times a week. Project manager attends the daily meeting depends on different projects. The ball is passed to another team member at the end of the day.

CT2 starts Scrum meeting at 9:45 every day. It is also 15-minute time-boxed. The email system will remind the team 15 minutes before meeting starts. At 9:45, team members go to meeting the place spontaneously. There is no need for Scrum Master to coordinate the meeting. Team members go through all the tasks on the whiteboard together, from highest prioritization to lower. The one who wants to take the first task talks at first. All team members need to answer these three questions. Scrum Master shares project information, meeting information on daily meeting. People, who report the impediments, will write them done on the whiteboard. Scrum Master will keep the impediments in mind until it is solved. Except the team, Product Owner, line manager and project manager attend meeting occasionally.

CT3 has daily meeting from 9:30 to 9:45 in the morning. It is 15-minute time-boxed. They seldom exceed 15 minutes. The team uses email system to remind them start meeting, and the Scrum Master will also remind all team members to go to meeting place at 9:30. They stand in a semi-circle, in front of a white board. As the team has been established for a long time, team members have their preferable place when they stand together. There is one team member always talking at first. Then other team members talk in anti-clockwise order. All team members answer these three questions on the meeting. Scrum Master shares the information that he got from other meetings. Some short discussions are allowed in this meeting. If someone reports an impediment in the meeting, he will write it down on the white board. Team members discuss and try to solve it directly. When we asked about who else attended the daily meeting, he said the line manager attended once in three months, and the Product Owner attended 2 or 3 times a week approximately.

4.1.6 Sprint Review Meeting

Practice: Informal meeting

For teams in Sweden, ST1 shows the Sprint result by Scrum Master. He makes the Power Point and presents it to Product Owner and anyone who attends the meeting. Team members also help Scrum Master to present the result. Team members only show the parts which they developed.
ST2 also uses PowerPoint to show the Sprint result. The interviewee described that, it was supposed to be presented by whom were involved in the product development, but the Scrum Master (he is also the Product Owner) took most parts of the job.

When the interviewee in ST3 was asked about who and how to show the Sprint result, he answered it always depended. There is no one especially responsible for presenting the result. PowerPoint is used if it is necessary.

For teams in China, one tester in CT1 shows the result to Product Owner. They don’t use PowerPoint.

Interviewee in CT2 told us that, tester in the team normally took the job of doing presentation to show the result. However, it is not demanded, anyone who would like to can do this job also. They don’t user PowerPoint neither.

The tester in CT3 takes the job of showing the result to Product Owner. They don’t use PowerPoint as well. The interviewee mentioned that Product Owner preferred the team to run test cases to show that they have finished all the tasks.

4.1.7 Sprint Retrospective Meeting

Practice: Conversation between team members

For teams in Sweden, ST1 holds retrospective meeting at the end of each Sprint. Product Owner and the whole team will attend this meeting. It is held very informal. Team members discuss together to find out how time is wasted in the Sprint and figure out how to improve the process for the next Sprint. It normally takes 40 to 60 minutes.

ST2 has the retrospective meeting at the end of each Sprint. It takes about 1 hour. During this meeting, the team members who has done a good job will be praised. Besides, they discussed about what can be improved in the next Sprint.

ST3 doesn’t take retrospective meeting in each Sprint. It depends on the project, if the project is finished with three Sprints, the retrospective meeting is held at the end of the third Sprint. Scrum Master (he is also line manager) is also invited. The purpose of taking retrospective meeting is to find out the problems in the past Sprints and find ways to make the next Sprint better. It takes only 15 to 30 minutes.

For teams in China, CT1 has the retrospective meeting at the beginning of the Sprint. Only team members attend this meeting. They sit together and discuss the way to improve for the next Sprint. It normally takes 1.5 hours.

CT2 has the retrospective meeting at the end of each Sprint. Product Owner sometimes attends this meeting. During the retrospective meeting, team members collect problems that they have met and discuss the ways to make the next Sprint better. It takes about 1 to 1.5 hours.

Retrospective meeting is held at the end of each Sprint in CT3. Only team members attend this meeting. Team members spend 1 to 2 hours to discuss about the problems they have met for the past Sprint and search the way to improve the process.

4.1.8 Burn Down Chart

Practice: Updated every day
For teams in Sweden, when the interviewee in ST1 was asked about whether they used the burn down chart, he answered yes. “But normally no one uses it,” he added.

The interviewee in ST2 answered no when we asked whether they used Sprint burn down chart.

ST3 uses Sprint burn down chart. When we asked about who controlled it, he answered no specific role is in charge of that.

For teams in China, CT1 uses Sprint burn down chart to show the progress. The ball keeper is in charge of updating the chart every day.

CT2 uses the Sprint burn down chart and Scrum Master is always in charge of updating it every day.

CT3 also uses Sprint burn down chart. Scrum Master takes the responsibility to update it every day.

4.2 Analysis

Based on the theoretical framework this study has built at the end of related work part and the reorganized empirical findings, in this part, this paper focused on analyzing. The purpose of the analysis here is to find out whether national culture affects the Scrum implementation through analyzing how these Swedish and Chinese teams conduct their Scrum practices. In other words, this part is trying to test the theoretical hypothesis about in which aspects national culture might affect Scrum implementation through the empirical findings.

Each paragraph will start with a table to show the empirical differences between Swedish and Chinese teams. After that, the analysis, which combines theories and empirical findings, will be presented one by one. In the end, it is a summary of the whole analysis part.

- Scrum team, team size—Masculinity

<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>Team size is 7.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>Team size is from 6 to 8.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>Team size is from 6 to 7.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>Team size is from 5 to 7.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>Team size is 7.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>Team size is 7.</td>
</tr>
</tbody>
</table>
As we discussed in the theoretical part, the size of the team can reflect the culture difference in the dimension of Masculinity. The team locates in masculinity might prefer bigger team meanwhile team locates in the feminism society might prefer smaller team size to keep the empirical process. The ideal team size according to Scrum implementation should be around between 5 and 9, seven will be the perfect size. From the empirical findings, we can see that almost all the teams no matter locate in Sweden or China have the size within that range (ST1 has 7 team members, ST2 flexibly has 6 to 8, ST3 has 6 to 7, CT1 has 5 to 7 members, CT2 has 5 to 7 and CT3 has 7). Therefore, we can say that, the team size practice is not affected by the national culture difference but exactly follow the Scrum implementation rules. And CT3 team size seven members is even decided by the company.

- Scrum team, no title— Power Distance, Individualism

<p>| Table 4.2 Implementations of No Title |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>There are no titles in the team.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>There are 2 developers, 1 Product Owner, 1 design leader, 1 system engineer and 2 technique writers.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>There are no titles in the team.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>There are 3 designers and 2 testers.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>There are 6 designers and 1 tester.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>There are 4 developers, 2 testers, and 1 system engineer.</td>
</tr>
</tbody>
</table>

Based upon our related work, titles or roles in the team reflect the culture dimension of Power Distance and Individualism. According to Hofstede’s theories, the small power distance and individualism societies prefer equal roles in the organization and also higher job mobility in working the environment. Differently, large power distance and collectivism societies show the characteristics of a clear division of labors. The empirical findings show that all teams in China have titles in Scrum, which is on the opposite of Scrum recognized practice. This kind of high consistency might reveal the influence from national culture in large power distance dimension and collectivism dimension. Meanwhile, two teams in Sweden have no titles and one has. It demonstrates the tendency of teams in Sweden, which has no titles in teams. In general, the opposite tendencies between two sides reflected that national culture in power distance dimension and individualism dimension have influences on no title practice.

- Scrum team, no leader— Power Distance

<p>| Table 4.3 Implementations of No Leader |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
</table>
From related work, we have predicted that the national culture in power distance dimension might have influence on team leader practice. Teams in large power distance country might have an invisible leader in Scrum team as they expect the leader to assign tasks. While teams in small power distance country might don’t need a leader. However, the empirical findings don’t support our speculations. There is one team in each country (ST2 and CT1) having team leaders while other teams have no leaders. No difference is found between two sides. Hence, no leader implementation is not influenced by national culture difference.

- Scrum team, use burn down chart— Uncertainty Avoidance

<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>Burn down chart is seldom in user.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>Burn down chart is not used.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>Burn down chart is updated every day.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>Burn down chart is updated every day.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>Burn down chart is updated every day.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>Burn down chart is updated every day.</td>
</tr>
</tbody>
</table>

As we inferred in the theoretical part, whether the team use burn down chart and how they use it can be affected by culture dimension of uncertainty avoidance due to societies’ different desires for time precision and formalization. The team, which locates in high uncertainty avoidance country, might follow Scrum’s rules and forms more stringently because of the fear of uncertainty. As a tool to control the project progress, burn down chart is a good way for teams to know which stage they are, how much time
left and so on, so that to accelerate or adjust their project. From the empirical finding, we notice that most of team use burn down chart. However, the difference is that, all the Chinese teams (CT1, CT2, and CT3) use burn down chart and update it every day. They show high consistency in this practice. Meanwhile, in Sweden side, only one team (ST3) use burn down chart as they supposed to but other two teams have kind of negative attitudes to it or even totally don’t use it. From here, we can see the culture difference on uncertainty avoidance dimension through their attitudes to time precision and formalization. Even though the consistency of Swedish team is not as strong as Chinese teams, we can say the culture influence does exist but the only difference between two sides are the influence degree. Chinese teams show a stronger desire on precision and formalization than Swedish teams.

- Scrum master, manage burn down chart— Power Distance

<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>No one uses it.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>They don’t use burn down chart.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>Different team member updates the burn down chart every day.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>Ball keeper is responsible for updating the burn down chart.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>Scrum Master is responsible for updating the burn down chart every day.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>Scrum Master is responsible for updating the burn down chart every day.</td>
</tr>
</tbody>
</table>

In previous theoretical part, this study stated that in large power distance society the superior prefers monitoring subordinates to control the work progress. Therefore, this study predicts that whether Scrum masters manage and how they manage the Burn down chart can somehow reflect the culture difference in power distance aspect. From our interview findings, Scrum Masters in all three teams in Sweden don’t manage burn down chart, which shows a consistency. Meanwhile, for teams in China, two Scrum Masters manage burn down chart every day. It shows a tendency which is opposite to the implementations in Sweden. Therefore, the different implementations between two sides reflect that the national culture in power distance dimension might have influence on manage burn down chart practice.

- Sprint, time-boxed— Uncertainty Avoidance

<p>| Table 4.5 Implementations of Manage Burn Down Chart |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>No one uses it.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>They don’t use burn down chart.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>Different team member updates the burn down chart every day.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>Ball keeper is responsible for updating the burn down chart.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>Scrum Master is responsible for updating the burn down chart every day.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>Scrum Master is responsible for updating the burn down chart every day.</td>
</tr>
</tbody>
</table>

Table 4.6 Implementations of Time Boxed
<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>Not accomplishing Sprint goal is normal. There is no definition of Sprint failure.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>All Sprint goals are accomplished.</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>There is no definition of Sprint failure.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>There is the definition of Sprint failure.</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>There is the definition of Sprint failure.</td>
</tr>
<tr>
<td></td>
<td>CT3</td>
<td>There is the definition of Sprint failure.</td>
</tr>
</tbody>
</table>

As we discussed in related work, teams in strong uncertainty avoidance country prefer precision and formulation. Hence, they may treat Sprint time limitation more seriously than teams in weak uncertainty avoidance country. From empirical findings, all teams in China mark Sprint as failed if they cannot reach Sprint goal. Failure implies the team is not competent for the task. None of the team members would like to see the failure of Sprint. So they carefully manage time plan and work hard to keep all tasks accomplished before Sprint ends. Their attitude towards time limitation of Sprint is very serious. On the contrary, two teams in Sweden don’t have the definition of Sprint failure. One of the interviewees from the two teams said they wouldn’t do anything special, even if the Sprint goal was found unable to be finished within a limited time. From his words, we can see, they have a high tolerance to exceed the time limit. In general, their different implementations on Sprint time boxed practice reflects their different attitude towards tolerance of exceeding time limitation, which is affected by national culture in uncertainty avoidance dimension. On the other hand, national culture in uncertainty avoidance dimension has an impact on implementations of Sprint time boxed practice.

- **Sprint, authorized to decide workload — Uncertainty Avoidance, Long-term Orientation**

  From related work, it has been known that, how the Scrum team sets workload might be related to the national culture in uncertainty avoidance dimension and long-term orientation dimension. People in strong uncertainty avoidance country might have more overwork as they see the work is more important than leisure. And people in long-term orientation country can have more overwork since they accept sacrificing personal interests to collective goals. From our empirical findings, all six teams didn’t show many differences from each other. Teams all set workload maximum according to law, use flexible work time and seldom have overwork. Therefore, we can see national culture in uncertainty avoidance dimension, and long-term orientation dimension don’t affect the implementations of authorized to decide workload practice.

- **Sprint, no interference — Power Distance**

  Table 4.7 Implementations of No Interference
The Sprint is supposed to be uninterrupted after it starts. However, due to our discussion in the theoretical part, the implementations of no interference practice might be different. Scrum teams in large power distance country might be interfered since the privileges in the culture is accepted. Even though both team and managers have the knowledge of Sprint, the new tasks from manager which are resigned during Sprint are still accepted. Differently, in small power distance country, managers and teams are equal. Resigning new tasks to team during Sprint might not be accepted. From empirical findings, three teams in China have experience of being interfered, which shows high influence from large power distance culture. For teams in Sweden, one team has experience of being interference. However, two teams (ST2 and ST3) in Sweden have never experienced this as they supposed to, which shows the tendency to avoiding interference. In general, the implementations of no interference practice are different in both sides. National culture in power distance dimension shows its influence on the implementations of no interference practice.

- Sprint plan meeting, time-boxed meeting—Uncertainty Avoidance

**Table 4.8 Implementations of Time Boxed Meeting**

<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>2 hours.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>4 hours</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>It depends. It took from a few hours to two days</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>2 hours</td>
</tr>
<tr>
<td></td>
<td>CT2</td>
<td>1 hour</td>
</tr>
</tbody>
</table>
According to our discussion in the theoretical part, time-boxed practice might be affected by peoples’ attitude towards time and formulization, which is revealed in uncertainty avoidance. Teams locate in strong uncertainty avoidance country might set time limitation before meeting starts while teams in weak uncertainty avoidance country might show more tolerance about meeting duration. Findings from our interviews show that most of the teams have time limitation of Sprint planning meeting, except one team (ST3) in Sweden. Therefore, uncertainty avoidance dimension didn’t show much influence on time-boxed meeting practice.

- **Sprint daily meeting, 15 minutes time-boxed— Uncertainty Avoidance**

As we discussed earlier on time-boxed practice in Sprint planning meeting, we infer that 15 minutes time-boxed daily meeting might be affected by uncertainty avoidance dimension as well. From our empirical findings, all team restrict daily meeting to 15 minutes and all of them can keep the meeting finished within 15 minutes. Hence, the uncertainty avoidance is found have no influence on implementations of 15-minute time-boxed practice.

- **Sprint daily meeting, attendees— Uncertainty Avoidance and Power Distance**

<table>
<thead>
<tr>
<th>Location</th>
<th>Team</th>
<th>Implementations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>ST1</td>
<td>Product Owner attends meeting about 3 times a week.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Line manager attends meeting once a month.</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>Line manager sometimes comes to meeting, but not often.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Program managers, who control high level design, comes to meeting when tasks are important. Otherwise, not so often.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Owner attends meeting</td>
</tr>
<tr>
<td></td>
<td>ST3</td>
<td>System manager attends daily meeting very seldom. It depends on cases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Owner comes to daily meeting often.</td>
</tr>
<tr>
<td>China</td>
<td>CT1</td>
<td>Product Owner is recommended to attend the daily meeting every day, but actually, 2-3 times for a week.</td>
</tr>
</tbody>
</table>
|          |      | For PM, if the project is hard, he comes 2-3 time weekly, while if the project is not hard, he comes once weekly.
From related work, we inferred that whether and how the top managers attend daily meeting might get influenced by different national culture in uncertainty avoidance dimension. Managers in strong uncertainty avoidance culture may attend daily meeting more frequently than them in low uncertainty avoidance culture, in order to control the deviation or monitor the process. From empirical findings, there are no implementations grouped by locations are found to be different in how the managers attend daily meeting. Product Owner and managers attend daily meeting dynamically depend on cases. Therefore, no evidence is found that national culture has influence on implementations of attendees practice.

### 4.3 Summary

To summarize our analysis, we create a table to show the implementations which are found influenced by national culture.

- The implementations of Scrum, no title practice are found influenced by national culture in power distance dimension and individualism dimension.

- The implementations of Scrum team use burn down chart practice are found influenced by national culture in uncertainty avoidance practice.

- The implementations of Scrum Master manage burn down chart are found influenced by national culture in power distance dimension.

- The implementations of Sprint time boxed practice are found influenced by national culture in uncertainty avoidance.

- The implementations of Sprint no interference practice are found influenced by national culture in uncertainty avoidance.

<p>| Table 4.10 Summary of Analysis |</p>
<table>
<thead>
<tr>
<th>Scrum Practices</th>
<th>Power Distance</th>
<th>Individualism</th>
<th>Masculinity</th>
<th>Uncertainty Avoidance</th>
<th>Long-term Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No title</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td>Team</td>
<td>Use burn down chart</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>---------------------</td>
<td>---</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>Scrum Master</td>
<td>Manage burn down chart</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrum Process</td>
<td>Sprint</td>
<td>Time boxed</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>No interference</td>
<td></td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

From the table, we can see, national culture’s differences mainly through power distance this dimension to affect Scrum practices. Totally, Power distance affects three practices. The uncertain avoidance degree is the second reason that results in the Scrum implementation differences in two countries. Individualism degree affects only one practice.
5 DISCUSSION

5.1 Why fewer differences are found?

In this study, we built the theoretical framework to predict the possible relationships between national culture and Scrum implementations. Some of the Scrum practices are found might be affected by national culture differences. However, after the analysis of the interview data, only a few of these hypotheses are supported by our empirical findings. Most of the Scrum implementation practices in two cultural environments don’t show differences which means they are not affected by national cultures.

Why there are fewer differences as we predicted? One of the reasons might lie in the theoretical framework. The framework is based on Hofstede’s cultural dimensions theory. This theory was created 40 years ago, and some data were collected in the 1970s and 1980s. As culture is dynamic and constantly changing [86], this theory might be obsolete. Some detailed value expressions, which Hofstede described in workplace scene, might have changed in practice due to the on-going globalization process. Thus, the predicted relationships between national culture and Scrum implementations might be out of date relatively. This may lead to most failures of our predictions.

Another reason could be the continuity of software development methodology and managerial approach within the organization. Regarding to the company which we had interviews with, they used to apply traditional waterfall software development method for many years before they transferred to Scrum. In traditional methods, software development processes and implementations are pre-defined [87]. During the data collection, interviewees mentioned that some implementations were defined by company. It might imply that the management of the company is still affected by previous traditional methods. The continuity of management may limit Scrum teams to tailor Scrum implementations according to their situations, which leads the result that national culture differences are not shown to have a significant influence on Scrum implementations. In fact, there is research showing that altering attitudes and activities are problematic, especially for companies with a high level of Capability Maturity Model Integration (CMMI) [88].

5.2 How to use the results?

Despite fewer hypotheses are verified, this research is built on a solid foundation, which is the theoretical framework, and validated from industry which is the six teams from a global company. The results of this research confirm the national culture differences do have an impact on Scrum implementations and provides empirical evidences.

For the project manager and Scrum coach, this research provides reference when they manage a project in another nation or cross-national. The research results work somewhat like a guideline to help the manager or coach to implement Scrum practices when they take national culture differences into consideration. For instance, in those countries where monitoring is not welcome, the burn down chart should be less used.

For software engineers, who work abroad in a different country, this research arouses their awareness of the different Scrum implementations derived from a different culture. For instance, if he were in a country which prefers formalization and rigor, he should try best to finish his task as the planned.
For academy, this research combines the culture and Agile implementations. There are not many published studies that focus on the relationship between implementation level of Agile and culture. This research brings empirical evidences on how Agile is implemented under different national cultures. Thus, the research findings will benefit software engineering researchers working in the field of software methodology and culture.
6 CONCLUSION AND FUTURE WORK

6.1 Conclusion

In this paper, the author studied the relationship between national culture and Scrum implementations. A literature review was firstly conducted to build a theoretical framework. This framework included the potential relationships between national culture and Scrum practices, which can be seen as our hypotheses. Afterward, interviews were conducted in a company which has Scrum teams in both Sweden and China. Their implementations of Scrum practices were interviewed and analyzed based on our hypotheses. From our analysis, some Scrum practices were found to be influenced by different dimensions of national culture.

In response to RQ1, we conclude that the national culture has influence on Scrum implementations. From the literature review we can see, the impacts of national culture on global software development, Agile values and Agile team’s behaviors were found. It gave us reasons to predict that the national culture might have influence on implementations of Scrum. Hypotheses were built between national culture dimensions and Scrum practices. In the end, findings from interviews confirmed five of our hypotheses. Therefore, the answer for RQ1 is yes.

In response to RQ2, we conclude that the national culture has influence on Scrum implementations of Scrum team, Scrum Master, and Sprint. During analysis, we compared the implementations grouped by country locations. Our hypotheses on the relationship of national culture and Scrum practices were verified and confirmed from the interview data. In summary, for the implementations of Scrum team practice, we found national culture has an influence on whether there are titles in teams and how they use burn down chart. For the implementations of Scrum Master, we find that the culture has influence on whether and how they manage burn down chart. For the implementations of Sprint practice, we found national culture has influence on how they treat time limitation and whether Sprint can be interrupted.

In response to RQ3, we conclude that different Scrum implementations are affected by national culture in different dimensions. After comparing different national culture models, we chose Hofstede’s national culture dimension theory to analyze different implementations. Five hypotheses presented the predicted relationship of national culture dimension and Scrum practices are proved. After our analysis of interview data, we found that national culture through power distance dimension has the most impact on implementations of no title practice, manage burn down chart practice and no interference practice. National culture differences in the aspect of individualism dimension also affect the practice like no title in teams. Uncertainty avoidance degree in different nations also has the most impact on Scrum implementation such as using burn down chart practice and time-boxed dimensions.

After our analysis, we got one more conclusion beyond our hypotheses. Three teams in China show stronger consistency on Scrum implementations than teams in Sweden. In other words, the Scrum implementations in China are more similar while Scrum implementations in Sweden are very dynamic. For instance, all three Chinese teams have titles; meanwhile two Swedish teams have title and one without. Another example is that all three teams in China use burn down chart, but in Sweden two teams of three don’t use it. For the five practices which we have found affected by national culture dimensions, four of them (no title, use burn down chart, time-boxed and no interference) were found implemented similar in teams located in China, but implemented differently in Sweden. So another conclusion, we
made, is that the influence from national culture in China makes the Scrum implementations more consistency than the influence from national culture in Sweden.

Another interesting thing that we find is that national culture in uncertainty avoidance dimension has an impact on the Scrum implementations between teams in Sweden and China. Our empirical findings reveal that whether the Scrum teams use burn down chart and how the teams treat Sprint time limitations are different between two countries. This kind of different implementations are influenced by the national culture difference in uncertainty avoidance dimensions, which is deducted from Hofstede’s value expression under workplace scene. However, from our related work we can see, Sweden and China get very close scores in uncertainty avoidance dimension according to Hofstede’s research. This means theoretically people’s behaviors regarding to uncertainty avoidance dimension should be similar between Sweden and China. We can’t say that our finding is directly against Hofstede’s national culture scores. However, we conclude that culture difference in a specific context (like in the Scrum implementation) could be different from the general sense.

6.2 Future Work

National culture’s impact on software development has been studied by many researchers. Due to the growing corporation of global software development and Agile as a popular method, the topics around national culture and Agile implementations will still be a hot topic for a long time. This paper creates a new perspective to discover the relationship between national culture and Scrum implementations. Given the empirical findings and analysis during this thesis, there are several opportunities for future work.

1. The same study can be conducted in different country context and a new aspect of national culture might be found has impact on Scrum implementations.

2. Other data collection method such as survey can be used to give a quantitative empirical evidence to validate our findings.
REFERENCES


S. Tan, "How to increase your IT Project success rate " *Gartner*, 2011.


[79] A. Irons, "Agile Methods Silver Bullet or Red Herring," *Northumbria University. UK. An online document that can be found at [http://www.newcastle.bcs.org/BCS%20Agile%20methods.ppt](http://www.newcastle.bcs.org/BCS%20Agile%20methods.ppt) (Last accessed: July 2006)*[The year 2006 mentioned in this reference corresponds to the year of last access of this online document. The year of publication of this document is unknown]*, 2006.


Appendix: Question List

**Table Appendix: First Question List for Interview**

<table>
<thead>
<tr>
<th>No.</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is your team composition?</td>
</tr>
<tr>
<td>2</td>
<td>How does your team use Scrum?</td>
</tr>
<tr>
<td>3</td>
<td>How does your team take daily meeting?</td>
</tr>
<tr>
<td>4</td>
<td>What activities do you have in a Sprint?</td>
</tr>
</tbody>
</table>

**Table Appendix: Second Question List for Interview**

<table>
<thead>
<tr>
<th>Scrum Practices</th>
<th>Interview Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrum Team</td>
<td>How many people are there in the team?</td>
</tr>
<tr>
<td></td>
<td>What is the composition of the team?</td>
</tr>
<tr>
<td></td>
<td>Are there titles in the team?</td>
</tr>
<tr>
<td></td>
<td>How many hours does team member work every week?</td>
</tr>
<tr>
<td></td>
<td>Are there special roles for architect, designer and code engineer? Has anyone ever refused to code?</td>
</tr>
<tr>
<td>Scrum Master</td>
<td>Who takes the role of Scrum Master? Is PO role assigned him/she?</td>
</tr>
<tr>
<td></td>
<td>What are the Scrum Master’s responsibilities? Does the Scrum Master have a mandate to coordinate work, assign tasks, or manage any</td>
</tr>
<tr>
<td><strong>Sprint</strong></td>
<td>other activities?</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------</td>
</tr>
<tr>
<td>How long is the Sprint?</td>
<td></td>
</tr>
<tr>
<td>Have you ever experienced that some leader come and resign new tasks to them? Is this allowed? Who has the mandate to change the Sprint scope or duration?</td>
<td></td>
</tr>
<tr>
<td>Have you ever experienced termination of the Sprint? How often?</td>
<td></td>
</tr>
<tr>
<td><strong>Sprint Plan Meeting</strong></td>
<td>How is it held?</td>
</tr>
<tr>
<td>How long does this meeting take?</td>
<td></td>
</tr>
<tr>
<td>Who attends this meeting?</td>
<td></td>
</tr>
<tr>
<td><strong>Scrum Daily Meeting</strong></td>
<td>How is this meeting held?</td>
</tr>
<tr>
<td>How long does this meeting take?</td>
<td></td>
</tr>
<tr>
<td>When and where is the meeting held?</td>
<td></td>
</tr>
<tr>
<td>Is there anyone except the team members attending the meeting?</td>
<td></td>
</tr>
<tr>
<td>Are discussions allowed during the meeting?</td>
<td></td>
</tr>
<tr>
<td><strong>Sprint Review Meeting</strong></td>
<td>What will the Scrum Master do if a team member propose an impediment? Will he/she write it down on the white board?</td>
</tr>
<tr>
<td>How does your team prepare this meeting?</td>
<td></td>
</tr>
<tr>
<td>How long does this meeting take?</td>
<td></td>
</tr>
<tr>
<td>How is it held?</td>
<td></td>
</tr>
<tr>
<td><strong>Sprint Retrospective Meeting</strong></td>
<td>Who attends this meeting?</td>
</tr>
<tr>
<td>How does your team prepare this meeting?</td>
<td></td>
</tr>
<tr>
<td>How long does this meeting take?</td>
<td></td>
</tr>
<tr>
<td>Who attends this meeting?</td>
<td></td>
</tr>
<tr>
<td><strong>Burn Down Chart</strong></td>
<td>Does your team use burn down chart?</td>
</tr>
<tr>
<td>How does your team use it?</td>
<td></td>
</tr>
</tbody>
</table>