



# Multi-agent System Applied in the Analysis of Servitization Difficulty in Chinese MNE Greenfield Subsidiaries

AN EXPLORATORY CASE STUDY

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# Multi-agent System Applied in the Analysis of Servitization Difficulty in Chinese MNE Greenfield Subsidiaries: An Exploratory Case Study

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# Executive summary

Over the last 20 years, the Chinese corporations have accumulated essential technological competencies such as those in the consumer goods manufacturing and information technologies. Therefore, Chinese multinational enterprises (MNEs) have high global ambitions to expand their reach into the foreign markets as an important role in contributing to the rising economic power of China. They are establishing greenfield subsidiaries from the ground up to penetrate into foreign markets. On the other hand, service offerings and service solutions are becoming the popular options for the consumption of our daily life. It has a huge potential for company to increase the customer engagement and “lock in” the customers. The term “servitization” is going viral nowadays which refers to an organizational transformation of companies from being a product-centered organization to being a service provider for customers. However, given the more and more integrated world economy, the servitization difficulties that are faced by companies, especially Chinese MNEs, are even more complex due to the changing environment and the involvement of different stakeholders in a global environment. This problem of servitization, especially for the greenfield subsidiaries of the Chinese MNEs, gets even difficult to be handled.

In response to the problem, the research objective of this research is set as “to explain the causes of servitization difficulty in the greenfield subsidiaries of Chinese multinational enterprises (MNEs)” with the research question of “what are the causes of the servitization difficulty in the greenfield subsidiaries of Chinese MNE”. In order to achieve the research objective and answer the research question, an exploratory single case study is adopted to study the organization of Chinese greenfield subsidiary with the application of an agent-based model that is able to simulate the case-study organization. The agent-based model *Opera* as an agent organization modelling tool can integrate the perspective of both organization and individual into one model. It is applied in this research to simulate the selected greenfield organization of a Chinese MNE. In-depth interviews were conducted to collect the data and information in the selected organization for the *Opera* model construction. Based on the analysis of the *Opera* model that enables the simulation in the selected organization, the causes of the servitization difficulty in the greenfield subsidiary of the Chinese MNE are developed.

The research outcomes showed that geographical distance between the parent corporation, R&D facilities and overseas subsidiaries is one of the major factors that impede the servitization because the Chinese MNEs tend to design and manufacture the service and product in China, which causes the limitations of the inclusiveness in the service design. And this affects the user experience of

the services. The cultural factors also make an enormous impact to the servitization in the greenfield subsidiaries. Especially the poor communication between the local staff and the Chinese staff causes incoherence in the project. In addition, the collaboration with local service partners is also affected by the cultural incoherence. These situations affect the customer satisfaction. The structural factors, such as the global-scale sales control, overlook the local circumstances of the subsidiaries by setting up a fixed sales goal for all the greenfield subsidiaries of different countries. This measure of the control is destructive for the service sales and servitization in nature, since a service solution project needs considerable pre-investments. The period of profitability for the service project is longer than the time that the subsidiary could endure if the subsidiary is fully devoted to achieving the sales goal. Therefore, the service sale is undermined by such conditions.

This research explains the reasons of why the Chinese MNE greenfield subsidiaries are facing many obstacles. By looking into the characteristics of the organization, this research suggested that the performance of the servitization is correlated to the organizational features. Using agent-based model *OperA* to study the servitization in the organization is served as an exploration of a new approach to study the servitization. The insights that are explored from this approach is able to assist the future studies of other research problems regarding the servitization. On the other hand, people in the industries of different countries could be aware of the challenges of the globalization of Chinese MNEs, as well as the issues that they are facing. Understanding their problems will be helpful to establish better business cooperation and networking connections with the Chinese MNEs.



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# Chapter 1 Introduction

The “belt and road forum for international cooperation” was held on 14th May in Beijing, China. Twenty-nine foreign leaders of the state and government representatives from more than a hundred countries were presented in this political and economic event that was held by the Chinese government. It is said that it would create a worldwide largest platform to accelerate the economic cooperation and development. It is not only intended for more efficient and open international economic cooperation, but also to establish a close and vigorous partnership network with the countries (Jinchen, 2017; Phillips, 2017). With the help of increasing cooperation with other countries, the world is witnessing the overseas expansion of Chinese multinational enterprises (MNEs). However, it is never easy for Chinese MNEs to survive in developed economies. Like other countries’ corporations, Chinese MNEs are seeking ways to live up to the demands of consumers, and to ensure that they will not be driven out of the global market.

On the other hand, service offerings and service solutions are becoming the popular options for the consumption of our daily life. Even a smartphone not merely has the function as a phone but is also integrated with unlimited service options. It enlightens people that they may not need a product for which they are required to read through all the instruction manuals and to take all the responsibilities as the owner of the product, but incline to be provided with services that can help solve the problems and fulfill their demands with taking limited owner responsibilities for the product. The change of the consumer behavior in our life is in connection with a transformation that is undertaken in many big corporations, including the Chinese MNEs. It is referred to as “**servitization**”.

In this chapter, I will first present the introduction and the background of the research items in **Section 1.1**. Then, I will explain my research problem by specifying the issues and problems at stake. Next, the research objective and research questions are introduced in **Section 1.3**. At the end of this chapter, at **Section 1.4**, I will specify the structure of this thesis report.

## 1.1 Background

### *The Chinese Globalization*

It has been proved that over the last decade, the center of the world economy is shifting from the “west” to the “east”. Emerging markets such as China have caught the attention of the world by generating new opportunities to reactivate the growth of the global economy (Prahalad & Hammond, 2002). Notably, Chinese corporations have come under the spotlight, as their roles are switching from the world’s major recipients of global inward foreign direct investment (FDI) to the high-profile internationalizing corporations (Wu, 2015). China’s internationalization ambitions have expanded dramatically in the last five years. The “belt and road” event has demonstrated the Chinese government’s ambitions and determinations to internationalize the Chinese corporations. In order to introduce the “Chinese design” and Chinese products to more countries and markets, Chinese corporations have been making greenfield investments in many countries (Cooke, 2012; Richet, 2014). The “greenfield investment” is a form of investment where a company establishes its operation in a foreign country from the ground up (Kogut & Singh, 1988; Hennart & Park, 1993). Accordingly, the “greenfield subsidiary” means the subsidiary that is built through greenfield investment. Increasingly, the Chinese MNEs have established more and more subsidiaries through greenfield investments, which shows that the Chinese globalization is in an ‘active’ mode. This phenomenal trend of Chinese globalization will continue in the foreseeable future.

The Chinese corporations are expanding their businesses on a global scale via greenfield investments thanks to the maturity of many underlined conditions. These conditions, such as the corporations’ competitive innovation, specialization in the protected market, desire for foreign markets, and sound financial relationship with monopoly banks, support the Chinese corporations in promoting their products and innovations to the overseas markets (Richet, 2014). Over the last 20 years, the Chinese corporations have accumulated essential technological competencies such as those in the consumer goods manufacturing and information technologies. Huge overseas markets are the targets for the Chinese corporations which intend to internationalize the Chinese products. Besides, since the economic growth of China has boosted the labor cost of the Chinese labor market, the product cost rises significantly, and it propels the Chinese corporations to search for solutions in the overseas labor market. To further expand the scale of the business, the corporations need to have accesses to more resources. The resources that are required include those related to the overseas technology outsourcing as well as the natural resources. These advantages abroad are pushing the Chinese corporation to go global.

## Servitization

On the other hand, along with continuous technological development and economic growth on a global scale, an increasing number of corporations across the globe are adding new values to their offerings to the customers because they have been facing increasing competitive pressure years by years. Services as the essential element of the fuller market package that contain combinations of product, support, and knowledge, have become a new source of return for the companies. This trend of upgrading their offerings is customer-driven, and it allows the corporations to be equipped with new competitive edges (Baines, Lightfoot, & Kay, 2009). Small and Medium enterprises are following the large corporations and have also launched their service offerings, in addition to sales of products. This transition is called “**servitization**”.

**Servitization** is defined by *Baines* in his research as the evolution of product identity based on material content to a position where the material component is inseparable from the service system (Baines et al., 2007). Namely, it requires an organization transformation of companies from being a product-centered organization to being a service provider for customers.

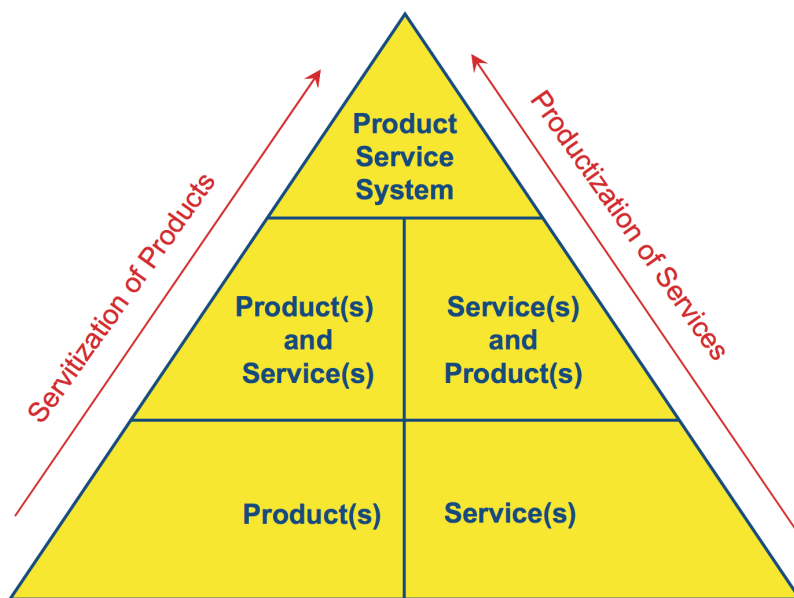


Figure 1: Definition of Servitization (Baines et al., 2007)

Over the last twenty years, servitization has captured the attention in various industries because of its intimacy with the customers. Corporation's move to servitization is happening on a global scale. The sharing economy business that is trending in the US and China has demonstrated that there is an enormous market potential for service-oriented businesses, instead of for product-oriented

businesses. The success of Uber, a car-hailing service company, indicates that the services that provide car-sharing systems are much more in need than the car itself (Kang & Wimmer, 2008).

Back in the history, the origin of servitization was not customer-oriented. Over a hundred years ago, innovation of the supply chains that combined the service and goods led us to servitization of nowadays. It was a phenomenon in supply chain management in the late 1800s when the bundled service and goods appeared (Schmenner, 2009). The bundle of services and goods were aimed to create “lock-in” situation and to obtain the competitive advantages against the other competitors of supply chain management. This point still holds true in the present in respect of supply chain management. As developed, the servitization is further considered as an approach to achieve forward integration of service and goods towards customers (Schmenner, 2009).

There is a paucity of literature on the evolution of servitization. But it was mentioned and developed in the management-related literature back in the early 90s (Baines, Lightfoot, Benedettini, & Kay, 2009). It is argued that the reason why manufacturing is turning into service-oriented business is that the distinctions of goods and service are becoming vague regarding the company offerings. Later, discussions on servitization have frequently appeared in the managerial and business practitioner literature, which are mainly related to the business management, marketing, and corporate operations (Baines, Lightfoot, Benedettini, & Kay, 2009)

### *Summary*

All in all, the ambitions, motivations, and preconditions for global expansion of Chinese MNEs and the phenomenal trend of servitization have been discussed in this section. The world is marching towards a stage with another major player, i.e., China. It is inevitable that dramatic changes will take place across the world due to the Chinese business “invasion”, while the servitization of the industries will keep affecting the consumer behaviors of people. Therefore, it is wise and reasonable to study and research these new changes.

## 1.2 Motivations

### 1.2.1 Research Problem and its Significance

It is acknowledged that servitization brings benefits to the companies so that they could gain competitive advantages of services (Baines, Lightfoot, & Kay, 2009; Annarelli, Battistella, & Nonino, 2016). However, launching servitization in the organization comes with challenges and problems, which are faced by many corporations and companies. Many studies were carried out to explore the causes of servitization difficulty in various fields (Martinez, Bastl, Kingston, & Evans, 2010; Baines, Lightfoot, Benedettini, & Kay, 2009). The causes of servitization difficulty have been identified in different aspects such as the lack of good service design, and the organizational resistance for servitization (Annarelli, Battistella, & Nonino, 2016). The trend of servitization in the industries can also be found in the Chinese companies, and they are also suffering from the challenges and the difficulty of the servitization (Neely, 2007).

Nowadays, given the more and more integrated world economy, the servitization difficulty that is faced by the Chinese MNEs is even more complex due to the changing environment and the involvement of different stakeholders in a global environment. Besides, compared to other MNEs, Chinese MNEs have high global ambitions to expand their reach into the foreign markets as an important role in contributing to the rising economic power of China. They are establishing greenfield subsidiaries from the ground up to penetrate into foreign markets. The same old problem of servitization, especially for the greenfield subsidiaries of the Chinese MNEs, gets even difficult to be handled.

This research is intended to respond to the problem with a new perspective. As follows, I will discuss the practical and theoretical significance of the proposed research.

Talking about the **practical significance** of the proposed research, servitization is one of the focuses of the corporate strategies in many product-oriented Chinese MNEs that aim to develop new market and deliver new value to their customers. However, in the global dynamic business environment, companies in the process of the servitization are facing a complicated situation. The Chinese MNEs need to understand what problem of the servitization that they are facing is, and how could the servitization be affected by the unknown factors in the global environment. On the other hand, people in the industries of different countries should be aware of the influence of the globalization of Chinese MNEs, as well as the issues that they are facing. Understanding their problems will be helpful to establish better business cooperation and networking connection with the Chinese MNEs.



Talking about the **theoretical significance** of the proposed research, as mentioned, the more integrated world economy and the more engaged international business have made the servitization face more complicated environment. Most previous researches only studied the single-factor effects on the servitization. However, the results have become obsolete since the complex environment involves multiple factors that may exert impacts on the servitization (Buschmeyer, Schuh, & Wentzel, 2016; Bustinza, Bigdeli, Baines, & Elliot, 2015). The focus of the research ought to be put in the collective effects of the complex environment on the servitization instead of the consequences affected by individual factor. On the other hand, despite the fact that, as a rising power of the world business, more and more attention has been paid to the Chinese MNEs as the subject of academic researches, only few studies focus on the servitization of the Chinese MNEs. Also, currently there is still a limited number of the Chinese corporations that have largely internationalized. Given our general expectation that there will be more and more Chinese MNEs that may impose significant influence on the global economy, studying the organization transition of the Chinese MNEs will add more values to the future studies of the Chinese companies, in particular to the studies of their business culture.

### 1.2.2 Multi-agent System and Agent-based Modelling

In response to the practical and theoretical significance of the mentioned research problem, I suggest that a more integrated world economy and a more dynamic international business environment need a new perspective to analyze the issues. **Multi-agent system** is a mindset to analyze a system with a set of agents that interact with each other to coordinate their behaviors (Ferber, Gutknecht, & Michel, 2003). The multi-agent system is useful to analyze a system with multiple factors which work collectively, especially in a changing environment (Bonabeau, 2002). If we consider the servitization is being undertaken in a multi-agent system, we could look at the interactions of the agents, i.e., the stakeholders in the system, which is helpful to study the collective effects of the factors. It is also a suitable research approach to study phenomena the dynamic and changing environment (see Section 2.3 for the detailed explanation).

Agent-based modelling is used to reflect the mindset of the multi-agent system, which is a powerful modeling technique that has been used for modeling a multi-agent system (Niazi & Hussain, 2011). And it consists of autonomous decision-making entities which are called agents in the modelling. Those agents are the stakeholders that can make decisions in the system based on a set of rules. Therefore, with the help of the agent-based model, in this research, I intend to explore the causes of the servitization difficulty of Chinese MNEs from a perspective of a multi-agent system.

## 1.3 Research Objective & Questions

### 1.3.1 Research Objective

In this section, I would lay down the research objectives of my research project. The research objectives presented below is derived from of the research problem. The research objective is given below.

*This research is intended to explain the cause of servitization difficulty in the greenfield subsidiaries of Chinese multinational enterprises (MNEs)*

In order to achieve the research objective, a case study will be adopted as the research method. However, due to the time limits, in this research, only a single case study can be conducted. It is acknowledged that a single case study could not make reliable generalization of the theory. But it is valuable in the exploratory stage of the research and provides potential hypotheses for the succeeding researches, which may be able to test the theory of my research with more cases (Abercrombie et al. 1984). A Chinese MNE greenfield subsidiary that is facing the servitization difficulty will be studied through a case study. An agent-based model will also be implemented in this organization for the analysis of the causes of servitization difficulty. This part will be discussed with a thorough explanation in the Chapter 3.

As we could see from the research objective, the focus of the research is on the greenfield subsidiaries of the Chinese MNE. The rationale is that the **greenfield** subsidiary has the implementation of the parent organization's own management staff and practices from the outset (Child & Rodrigues, 2005). However, the other two types of the subsidiaries, which are acquisitions and joint ventures, do not have the consistency of the management style and practice with its parent organization, which shows very few value for the in-depth research of servitization. Therefore, the subsidiaries of acquisition and joint venture are excluded in this research. This part will be further explained in the literature review (see Chapter 2).

### 1.3.2 Research Question

The research questions motivated by the research objective are presented as follows. The research will concentrate on explaining the main research question.

*Main research question:*

*“What are the causes of the servitization difficulty in the greenfield subsidiaries of Chinese MNE?”*

In order to have a better explanation of the main research question, six sub questions are proposed.

***Sub questions:***

1. *“What is servitization and how does it contribute to organizations?”*

This question is proposed to understand the servitization as an organization transition. The definition of the servitization will be found to answer this question. The drivers of the servitization of the company will also be developed. This question will be answered by the method of literature review.

2. *“What are the causes of the servitization difficulty encountered by the companies according to the existing studies?”*
3. *“What are the characteristics of those organizations of which there are studies of the causes of the servitization difficulty?”*
4. *“What are the differences between those studied organizations and the greenfield subsidiaries of the Chinese MNE?”*

The question 2-4 are proposed to review the existing studies of the cause of the servitization difficulty. By answering these questions, I could provide the arguments that the cause of servitization difficulty in Chinese MNE subsidiaries is very likely to be different from the causes in other organizations by pointing out the differences between the studied organizations and the greenfield subsidiaries of the Chinese MNE.

5. *“What kind of adaptations must be done to implement in order to evaluate the servitization for the Chinese MNE greenfield subsidiary?”*
6. *“How should those adaptations be implemented in order to evaluate the servitization for the Chinese MNE greenfield subsidiary?”*

The question 4 and 5 are proposed to develop a particular approach to achieve the research objective. The approach will be find an adaptation to be implemented in discovering the cause of the servitization difficulty as well as how to implement such adaptations. In this cases study, agent-

based modelling is the adaptation that is used to evaluate the servitization in the Chinese MNE greenfield subsidiary.

## 1.4 Structure of the Thesis

This thesis report is structured as follows. In the beginning, **Chapter 1** introduced the research problem with the explanation of the background of my research field and the research problem. Then, the research objective and questions are formed according to the research problem. Next, literature review regarding the topics of the servitization, the causes of servitization difficulty, and the agent-based models will be presented in **Chapter 2**. All the topic-related theories and frameworks will be discussed in this chapter. Then, **Chapter 3** discusses the research approach and methodology, as well as the data collection methods. And we also argued the reasons why I chose such method to conduct this research topic. Next, **Chapter 4** specifies the process of the construction of the selected agent-based model *OperA*, as well as how I analyze the simulation of the model and draw the critical conclusions from the analysis. In **Chapter 5**, I will summarize the findings from the simulation of the model. Also, we will talk about some implications from the findings and explain some thoughts that I derived from this research. At the end of Chapter 5, I will also address the limitation of this research and point out the future direction for this research project.

## Chapter 2 Literature Review

In the previous chapter, I made an introduction to my research, including the background, the research problem illustration, the research objective, and the research questions. For the next step, this chapter will cover the studies of relevant literature for my research. Therefore, three general sections will be presented.

**Section 2.1** is about **servitization and the drivers of servitization**. This section aims to answer following questions.

- 1. What is servitization? How to define servitization?*
- 2. What are the drivers of the servitization?*

Answering the first question allows me to have a thorough understanding of the servitization as a corporate strategy and organization transition. To respond to the second question allows me to understand why companies want to be "servitized". The answer to the second question is critical for analyzing the behaviors of the organization in response to the servitization difficulty.

The second **section 2.2** is about the **cause of servitization difficulty in different organizations**. This section aims to answer following questions.

- 1. What are the causes of the servitization difficulty of the companies according to the existing studies?*
- 2. What are the characteristics of those studied organizations?*
- 3. What is the greenfield subsidiary of Chinese MNE? What are the characteristics of the greenfield subsidiary of Chinese MNE?*
- 4. What are the differences between greenfield subsidiary of Chinese MNE and the organizations of which there are studies of the causes of the servitization difficulty?*

The first question aims to review the status quo of the studies that discover the causes of the servitization difficulty. Next, by reviewing these studies, I could also identify the characteristics of the case-study organizations in which the studies were conducted. On the other hand, I also need to find out the characteristics of the greenfield subsidiary of the Chinese MNE. Through a comparison of these studied organizations and the Chinese MNE greenfield subsidiary, I will have arguments for that the causes of servitization difficulty in the Chinese MNE subsidiary are different from those of other organizations. Answering these questions will provide the guidance

and arguments in the formation of my research approach and the analysis of the model simulation (see Chapter 3 methodology).

The third **section 2.3** is about **Multi-agent system (MAS) and agent-based models**. This section aims to answer following questions.

- 1. What are multi-agent system and agent-based models? What are the benefits of the agent-based modelling?*
- 2. Which agent-based model should be selected for the simulation of the Chinese MNE subsidiaries to find the cause of servitization difficulty?*
- 3. What can this model do? Are there any alternatives?*

In the case study of the Chinese greenfield subsidiary, an agent-based model will be implemented to evaluate the servitization difficulty. The first question allows me to understand what the multi-agent system could achieve with the help of agent-based models, and why this new perspective is suitable for the analysis of the servitization. Then I will review some agent-based models that have been widely applied in the academic field, and I eventually choose an appropriate model for my research.

## 2.1 Servitization and its Drivers

The literature review begins with understanding the servitization. First, the definitions of servitization are discussed. Secondly, we will develop the drivers of servitization that push companies to implement servitization strategy from literature. Revealing the benefits of servitization also let us understand the benefits and rationale of launching servitization for the companies. This part will serve as the theoretical foundation for the research design that will be addressed in chapter 3. Based on the definitions found in this section, the strategy to explore the causes of servitization difficulty could be formed.

### *Defining Servitization*

A clear definition is the basis of a research. There are many other definitions of the servitization that are defined by many researchers. The term ‘servitization’ was first introduced in Vandermerwe & Rada (1988, p.2)’s research as “the increased offering of fuller market packages or ‘bundles’ of customer-focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings.” However, this definition is lack of the concept that servitization is a kind of corporate transition. White and Stoughton (1999, p.5) in Tellus Institute defined that servitization is “the emergence of product-based services which blur the distinction between manufacturing and traditional service sector activities” by focusing on the product-based perspectives. Lewis, Portioli Staudacher, & Slack (2004, p.8) defined servitization as “any strategy that seeks to change the way in which a product functionality is delivered to its markets” by focusing on the perspective of corporate marketing strategy. These definitions indicate that servitization can be looked at from different perspectives.

In Chapter 1, I mentioned Baines (2007, p.9)’s definition of servitization as “*evolution of product identity based on material content to a position where the material component is inseparable from the service system*”. It is the definition that is adopted in this thesis project (see Figure 1). The reason is that it accurately defines the servitization is an ‘evolution’ from product-only offerings to the services that product is integrated inside, which fits the idea of my research problem as well as the case study that I have conducted in the organization. (it will be discussed in chapter 3).

The servitization difficulty in this research refers to the situation that the company has obstacles in transforming into a service-oriented company. Therefore, the cause of servitization difficulty can be considered as the challenges and barriers of the servitization in this research, because in the other researches and studies, the challenges and barriers of the servitization are defined similarly as the reasons for why the companies are facing servitization difficulty.



## *Drivers of Servitization*

It is important to discover and understand the drivers of servitization. It is critical for analyzing the behaviors of the organization in response to the servitization difficulty because the behaviors of the organization are affected by the drivers of servitization. Many studies and researchers have discovered the drivers and benefits of the servitization. They could be summarized into several aspects in terms of the variety of benefits. Mont (2002) classified the benefits of servitization in respect of various beneficial parties, which are the **manufacturing companies**, the **government/society**, the **consumers/customers**, and the **environment**. The following reviews are conducted according to the classification of these drivers that is constructed by Mont (2002).

By looking into the manufacturing company's aspect, servitization could not only increase the customer engagement, but also lock in customers with services (Annarelli, Battistella, & Nonino, 2016). The reason is that service delivery enhanced the intimacy of consumers and service providers by increasing the contact and flow of the information that contains the preference data of the customers. It creates a loop with positive feedback that could make a huge improvement to the service-product bundled offerings. Eventually, it benefits both customers and the service companies. On the other hand, service can improve the total value that is delivered to the customers because of the varieties of service offerings that enable the existing products to gain extended values. Therefore, by sufficiently making a full use of the existing manufactured products, sustainability could be achieved through servitization of the organization, which gives rise to numerous new business models and strategies (Mont, 2002).

By looking into the government/society side, understanding servitization could contribute to the formulation of policies which nurture the sustainable patterns of consumption and economy. The servitization has the potential to provide a better approach for understanding and affecting the stakeholders' interactions as well as the development of governmental policies. On the other hand, the new generated service offerings that contain the alternative usage of products are possibly able to create new jobs for the society. The growing and strengthening sustainable patterns that are created by the servitization of industries will affect the traditional mass production and disposable economy. However, the sufficient and sustainable economy that are encouraged by servitization could reduce the unnecessary employment by gaining extra values from the existing manufactured items instead of manufacturing new items (Mont, 2002).

By looking into the customer side, diversity of the consuming options for customers is the most perceived change as one of the influences of servitization. The service provider could utilize the

flexibility of service by nature to offer services with different schemes of combinations of the products and other capabilities. It is capable of quick responses to the changes of demands, needs, and environment. As a result, the customer receives more customized services with good quality. Besides, since service does not require customers to purchase a physical product on some occasions, customers are relieved from the ownership responsibilities of the physical product, as these responsibilities are under the service provider, which is more convenient for the customers (Helo, Gunasekaran, & Rymaszewska, 2017).

By looking into the environmental aspect, sustainable service design can reduce the waste of products' life and environmental impact, while increasing the utilization efficiency of the product. Namely, the manufactured products could be reused in a sufficient way through services and reduce the unwanted extensive mass production products. (Armstrong, Niinimäki, Kujala, Karell, & Lang, 2015; Cook, Bhamra, & Lemon, 2006).

Regarding the drawback of the servitization, it can be seen as the fact that the servitization costs enormous resources of the company, and it is possible that company fails to be "servitized". The servitization is a result of the company's pursuit of different business model through transformation. This transition is customer-driven and initiated by the commander in the organization. When company wants to be "servitized", it must spend resources and struggle with the difficulties of servitization that are faced. Namely, the drawback of the servitization is that the company must pay tolls during the journey towards being "servitized". Despite the risk of successful servitization, the company still wants to seize the opportunity that is brought by the servitization and driven by the benefits of servitization mentioned above.

## 2.2 Causes of Servitization Difficulty in Different Organizations

This section discusses the causes of the servitization difficulty in different organizations. In the first subsection, I will first make an overall introduction to the existing studies of the causes of servitization difficulty. I have selected four articles that summarized the found causes of the servitization difficulty in categories, which provide a general understanding of the servitization difficulty. Next, in the second subsection, I am going to explore the characteristics of the “servitizing” organizations of which there are studies of the cause of the servitization. I selected 13 studies that researched this topic or gave the implication of the causes of the servitization difficulty. Based on these existing studies, I could identify the characteristics of these organizations in which the studies were conducted. On the other hand, in the third subsection, I found out the characteristics of the greenfield subsidiary of the Chinese MNE. Through a comparison of characteristics of these organizations and the Chinese MNE greenfield subsidiaries, I am able to identify the research gap for this study in the Chinese MNE greenfield subsidiary.

### 2.2.1 Causes of Servitization Difficulty

In this subsection, I will discover the causes of servitization difficulty according to the existing studies and researches. In order to give a comprehensive understanding of the causes of servitization difficulty. I selected four research articles that adopted the method of the systematic literature review to summarize the causes of servitization difficulty into categories (Annarelli, Battistella, & Nonino, 2016; Baines, Lightfoot, Benedettini, & Kay, 2009; Kuo, Ma, Huang, Hu, & Huang, 2010; Mont, 2002). As follows, I will make a brief introduction of their findings.

Annarelli (2016) created a comprehensive conceptual framework of the servitization. He reviewed 37 papers that have implicated the cause of the servitization difficulty and categorized them into 12 types of causes. Among these types of causes of servitization difficulty, he found out the most popular causes of the servitization difficulty from the literature, which are the “acceptance from the customers” and the “company’s resistance to change”. Kuo (2010) also provided a framework of the causes of the servitization difficulty through literature review. Through the interpretive structural model, they managed to partition those causes into a hierarchical structure. The findings suggest that there are three root causes of servitization difficulty: the lack of support from laws and regulations, the lack of awareness of servitization and the burden of increasing maintenance for service system. It is suggested that these three causes of the servitization difficulty will lead to the other causes which are situated in the other levels of this hierarchical model. Baines (2009) broadly categorized the causes of servitization difficulty into three aspects: service design, organizational strategy, and organizational transformation. They emphasize respectively on the three phases of the servitization: design phases, planning phase, and the implementation phase. It

is suggested that the three phases are affected by various facts or factors, so that the servitization encounters various obstacles. Mont (2002) also provided a list of conceivable and potential causes of the servitization difficulty, which hinders the development, application and the betterment of the servitization. The findings of Mont are based on the literature as well as her own research findings.

The **Table 1** lists the findings of four articles that specified and summarized the causes of servitization difficulty. In order to have a better understanding of these causes, I divided them into internal causes and the externals causes. The reason why to divide them is that the internal causes reflect the characteristic of the “servitizing” organizations. And it provides some clues to find out the characteristics of the organizations that were studied by other researchers in terms of the causes of servitization difficulty.

*Table 1 : List of summarized causes of servitization difficulty in literature*

<b><i>Author</i></b>	<b><i>External causes</i></b>	<b><i>Internal causes</i></b>
<i>(Annarelli, Battistella, &amp; Nonino, 2016)</i>	<ul style="list-style-type: none"> <li>• <i>Acceptance from customers</i></li> <li>• <i>Acceptance from stakeholders</i></li> <li>• <i>Lack of profitability</i></li> <li>• <i>Financial risk</i></li> <li>• <i>Legitimacy of servitization</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Lack of technological know-how</i></li> <li>• <i>Lack of experience in service design</i></li> <li>• <i>Lack of skilled personnel</i></li> <li>• <i>Higher costs</i></li> <li>• <i>Company's resistance to change</i></li> <li>• <i>Rebound effect</i></li> </ul>
<i>(Kuo, Ma, Huang, Hu, &amp; Huang, 2010)</i>	<ul style="list-style-type: none"> <li>• <i>Lack of support from relevant laws and regulations</i></li> <li>• <i>Lack of market acceptance</i></li> <li>• <i>Difficulty controlling and managing materials</i></li> <li>• <i>Lack of reverse logistics</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Rejection of change by internal personnel</i></li> <li>• <i>Lack of an ideal management information system</i></li> <li>• <i>Lack of training and education</i></li> <li>• <i>Lack of technical personnel and support</i></li> <li>• <i>Lack of support from senior management</i></li> <li>• <i>Lack of awareness related to servitization</i></li> <li>• <i>Lack of strategic planning</i></li> <li>• <i>Different recycling time and quantity as well as product quality</i></li> </ul>
<i>(Baines, Lightfoot, Benedettini, &amp; Kay, 2009)</i>	<ul style="list-style-type: none"> <li>• <i>Market competition</i></li> <li>• <i>Risk of profitability</i></li> <li>• <i>Customer acceptance</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Lack of service design</i></li> <li>• <i>Lack of service culture and mindset</i></li> <li>• <i>Incompatible organization structure</i></li> </ul>
<i>(Mont, 2002)</i>	<ul style="list-style-type: none"> <li>• <i>Difficulties in identifying the existing social system</i></li> <li>• <i>Need for suppliers</i></li> <li>• <i>Challenge of environmental impact</i></li> <li>• <i>Challenges in tracing the shift of industry</i></li> <li>• <i>Risk of customer acceptance</i></li> <li>• <i>Growing complexity of customer demands</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Challenge of changing the existing system</i></li> <li>• <i>The inherent resistance of companies</i></li> </ul>

## 2.2.2 Characteristics of the studied Organizations

To find out the characteristics of the organizations that were studied in terms of the servitization difficulty, I selected 14 articles that specified the causes of the servitization difficulty in their researches (Ahamed, Inohara, & Kamoshida, 2013; Ahamed, Kamoshida, & Inohara, 2013; Baines, Lightfoot, & Kay, 2009; Brax, 2005; Buschmeyer, Schuh, & Wentzel, 2016; Bustinza, Bigdeli, Baines, & Elliot, 2015; Gao, Yao, Zhu, Sun, & Lin, 2011; Liu & Granados, 2015; Martinez, Bastl, Kingston, & Evans, 2010; Mont, Singhal, & Fadeeva, 2008; Sakao, Öhrwall Rönnbäck, & Ölundh Sandström, 2013; Turunen & Neely, 2012; Xia & Xue, 2010; Xing, Liu, Tarba, & Cooper, 2017). By evaluating their works, I found out that, in general, these studies tend not to fully identify the specialty of the studied organizations. And there are very few lines in their works to discuss the relevance between the specialty of the studied organization and the causes of the servitization difficulty. The reason is that these researchers aimed to study the servitization in general instead of the servitization in a specific type of organization. The findings of these studies did not point out the relevance to its organizational features. In the below, Table 2 lists the studies of the causes of the servitization difficulty, and specifies the research approach and characteristics of the studied organization.

Table 2 : List of specifications of the studies that revealed the causes of servitization difficulty

<i>Author</i>	<i>Research approach</i>	<i>Causes of the servitization difficulty</i>	<i>Organizations</i>	<i>Characteristics</i>
<i>(Xing, Liu, Tarba, &amp; Cooper, 2017)</i>	<i>Case Study</i>	<ul style="list-style-type: none"> <li>• Limited absorptive capacity of acquirer (Chinese company)</li> <li>• Incompatible philosophy of design</li> <li>• Determination of the degree of the autonomy</li> </ul>	<i>4 German companies</i>	<ul style="list-style-type: none"> <li>• Acquired by Chinese company</li> <li>• Manufacturing industry</li> <li>• Integrating their product/service to their parent company's product/service.</li> </ul>
<i>(Gao, Yao, Zhu, Sun, &amp; Lin, 2011)</i>	<i>Case Study</i>	<ul style="list-style-type: none"> <li>• Product maintenance</li> <li>• Difficulties to dispose product</li> <li>• High transaction cost</li> <li>• Organization culture and structure</li> </ul>	<i>A Chinese Company</i>	<ul style="list-style-type: none"> <li>• Domestic business</li> <li>• Local manufacturing company</li> </ul>
<i>(Liu &amp; Granados, 2015)</i>	<i>Comparative Case Study</i>	<ul style="list-style-type: none"> <li>• Poor understanding the concept of sustainability</li> <li>• Lack of policy support</li> <li>• Barriers to shift the attitudes of manufacture</li> </ul>	<i>9 Chinese companies</i>	<ul style="list-style-type: none"> <li>• 4 state-owned company, 3 private company, 2 multinational firms from different industries such as electricity, automobile.</li> </ul>
<i>(Brax, 2005)</i>	<i>Case Study</i>	<ul style="list-style-type: none"> <li>• Poor understanding of the services in the organization</li> <li>• Long adaptation phase to service</li> <li>• Corporate culture differences</li> </ul>	<i>A company based in Europe</i>	<ul style="list-style-type: none"> <li>• Operating global market</li> <li>• Supplier in different continents</li> </ul>

		<ul style="list-style-type: none"> <li>• Different Philosophy of design</li> <li>• Changed communication and relationships with customers</li> </ul>		<ul style="list-style-type: none"> <li>• Manufacturing industry</li> </ul>
(Turunen & Neely, 2012)	Case Study	<ul style="list-style-type: none"> <li>• Resource coordination and planning</li> <li>• Geographical issues for task</li> <li>• Difficulties in communication</li> </ul>	A Finnish Company	<ul style="list-style-type: none"> <li>• Manufacturing company</li> <li>• One subsidiary in Denmark</li> <li>• Own business in Denmark and Finland</li> </ul>
(Bustinza, Bigdeli, Baines, & Elliot, 2015)	Survey	<ul style="list-style-type: none"> <li>• The poor management of the behavior changes of the employees</li> </ul>	Germany manufacturing industries	<ul style="list-style-type: none"> <li>• Not specified</li> </ul>
(Ahamed, Inohara, & Kamoshida, 2013a)	Case Study	<ul style="list-style-type: none"> <li>• Employee's resistance to change</li> <li>• Lack of organization resources</li> </ul>	US-based multinational firm (IBM)	<ul style="list-style-type: none"> <li>• ICT Industries</li> <li>• Global-scale business</li> <li>• Multiple subsidiaries worldwide</li> </ul>
(Ahamed, Kamoshida, & Inohara, 2013b)	Case Study	<ul style="list-style-type: none"> <li>• Lack of leadership, vision of the management team</li> <li>• Lack of good marketing strategy</li> </ul>	3 Japanese multinational firms	<ul style="list-style-type: none"> <li>• ICT multinational firms based in Japan</li> <li>• Expertise in technology and manufacturing,</li> </ul>
(Sakao, Öhrwall Rönnbäck, & Ölundh Sandström, 2013)	Case Study	<ul style="list-style-type: none"> <li>• Fail in customer acceptance</li> <li>• Fail in Provider commitment</li> <li>• Immature Product and service design</li> </ul>	A Swedish joint venture of different companies	<ul style="list-style-type: none"> <li>• All based in Sweden</li> <li>• Business based a new technology for a new market</li> </ul>
(Martinez, Bastl, Kingston, & Evans, 2010)	Case Study	<ul style="list-style-type: none"> <li>• Embedded product-service culture</li> <li>• Delivery of integrated offering</li> <li>• Internal processes and capabilities strategic alignment</li> <li>• Supplier relationships.</li> </ul>	A UK company	<ul style="list-style-type: none"> <li>• UK-based original equipment manufacturer (OEM) that design and manufactures high-value capital equipment.</li> </ul>
(Baines, Lightfoot, & Kay, 2009)	Case Study	<ul style="list-style-type: none"> <li>• Lack of knowledge of Service design</li> <li>• Value dimension are biased towards relationship rather than transaction</li> <li>• People's resistance to change (Supplier, customer and service provider)</li> </ul>	A UK company	<ul style="list-style-type: none"> <li>• UK-based original equipment manufacturer (OEM) that design and manufactures high-value capital equipment.</li> </ul>
(Bustinza, Bigdeli, Baines, & Elliot, 2015)	Survey	<ul style="list-style-type: none"> <li>• Poor management of customer Satisfaction</li> <li>• Incompatible organization structure</li> </ul>	370 global manufacturers	<ul style="list-style-type: none"> <li>• Not specified</li> </ul>
(Xia & Xue, 2010)	Not Specified	<ul style="list-style-type: none"> <li>• Poor management of modularized service design</li> <li>• Nature of service that is incompatible with global management</li> <li>• Lack of experiences</li> </ul>	Multinational Firms	<ul style="list-style-type: none"> <li>• Not specified</li> </ul>

(Mont, Singhal, & Fadeeva, 2008)	Interview	<ul style="list-style-type: none"> <li>•Lack of understanding of the new services</li> <li>•Lack of customer acceptance</li> <li>•Lack of trained employees</li> <li>•Lack of financial support</li> </ul>	Swedish companies and European companies	<ul style="list-style-type: none"> <li>• Chemical management service providers</li> </ul>
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The research articles tend to have very few lines to describe each studied organization. However, some clues and implications of the relevance between the studied organizations and the causes of servitization difficulty could be found from the articles.

Generally speaking, despite the specialties of each studied organization that was specified in each article, the studied organizations are basically all manufacturing or technological companies. They are based in Europe, the US, and China. The influences of the nationality of the company to the servitization have been barely discussed in these studies. None of the studies suggested that there are the correlations between the nationality or region to the causes of servitization difficulty.

However, it is suggested that the causes of servitization difficulty are correlated to the specific characteristics and strategies of an organization. In some studies, the findings imply that the servitization difficulty is possibly caused by some of the characteristics of the organization. For example, Xia (2010) and Ahamed (2013a) conducted studies of the multinational firms. Their findings pointed out some features of the multinational firms such as the management of the cultural issues, and the modularized service offering. It is suggested that the servitization in the MNEs is usually concerned about the global management strategies of the multinational firms. Similarly, in Xing (2017)'s case studies of the Chinese-owned manufacturing companies in Germany, the causes of the servitization difficulty indicate a high level of relevance to the organizational features. The case studies of Xing (2017) were conducted in the German manufacturing firms that were acquired by the Chinese corporations, and the firms are in different stages of the servitization process. The research found out that the servitization difficulty is directly related to the nature of acquisition. The incompatible philosophy of design, management style, and absorptive capacity between the parent Chinese corporation and the German subsidiaries are found to be the causes of the servitization difficulty.

### 2.2.3 Characteristics of Chinese MNE greenfield subsidiary

Many case studies have unveiled the internationalization strategy of Chinese multinational enterprises (MNEs). The center of the discussion is over the two primary entry modes of multinational enterprises: *greenfield investment* and *acquisition*. A greenfield investment means that the company establishes its operation in another country from the ground up (Kogut & Singh, 1988; Hennart & Park, 1993). While the acquisition is the other way around, which means that a

company buys the full ownership of another company. The research of McAllister & Sauvant (2013) suggested that the MNEs from the emerging market tend to take the entry mode of a greenfield investment, while the developed country MNEs tend to adopt mergers and acquisitions as entry mode to a foreign market. Furthermore, studies have also been carried out for the internationalization strategy of the Chinese multinational enterprises, especially its options of entry modes. Child & Rodrigues (2005) summarized three routes that the Chinese MNE has been taken on for internationalization and elaborated on the greenfield establishment of the Chinese MNE subsidiaries. They suggest that the greenfield subsidiaries facilitate the organic international expansion of the Chinese corporations with the advantages of enabling the implementation of their own management staff and practices from the outset, which significantly reduces the heterogeneity.

As mentioned in the explanation of the research objective, the focus of the research is on the greenfield subsidiaries of the Chinese MNE instead of other types of subsidiaries. It is mentioned that the **greenfield** subsidiary has the implementation of their own management staff and practices of its parent corporation from the outset (Child & Rodrigues, 2005). However, the other two types of the subsidiaries, which are acquisition and joint venture, do not have the consistency of the management style and practice with its parent organization, which shows very few value for the in-depth research of servitization.

### *Characteristics of the Greenfield Subsidiary of Chinese MNE*

The literature has also discussed the characteristics of the greenfield subsidiaries of Chinese MNEs. Three features have been identified through literature. **First**, Chinese greenfield investment allows great controls of the parent organization over the strategy of subsidiaries. This characteristic is by the nature of greenfield investment because of full ownership of subsidiaries by the MNEs. It is also a good approach to transfer their organizational and technical expertise as well as corporate culture to the greenfield subsidiaries (Hennart & Park, 1993; Wang, Salazar, & Ben-Ur, 2013). These consistent organizational features are achieved by the centralized structure of the Chinese MNEs (Edström & Galbraith, 1977). **Second**, Chinese MNEs have extensive R&D in China, and they took the advantages of the increased productivity and cheap labor rate in China to enhance their competitive advantages (de Pablos & Lytras, 2009; Richet, 2014). It results in a competitive price of the Chinese product in the global market, associated with the introduction of Chinese design to the world. **Third**, regarding the human resource management, Chinese MNE's greenfield establishments tend to have a high usage of the Chinese expatriates in the subsidiaries (Shen, 2006). The main reason for the transferring and staffing of the Chinese expatriates is to maintain the control (Edström & Galbraith, 1977). It is critical for the Chinese greenfield subsidiaries to



maintain cultural control and hegemony over the changing environment. And the usage of Chinese expatriates is the key to maintain such control.

In summary, three characteristics of the Chinese MNE greenfield subsidiary are identified, which are the centralized control of the parent organization, the Chinese local R&D and manufacturing, and the preference of ethnical group for employees. Each of them represents a different aspect of the organization. The centralized control represents the **structural** aspect of the Chinese MNE, because the centralized structure is the source of the control over subsidiaries. The local R&D represents the **geographical** aspect, since the R&D facilities and factories are located in China, as well as the headquarter. The preference for the employment of the Chinese employee represents the **cultural** aspect, because the numerous employments of the Chinese employee give rise to a situation that the Chinese community which is relatively a huge community is culturally divided with the international community and the local community.

### *What are the effects of these characteristics to the MNE organization?*

As previously mentioned, the characteristics of the Chinese MNEs greenfield subsidiary have three aspects, which are those of the culture, geography and the structure of the organization. And these aspects do exert impacts on the organization. In the section, I reviewed the theories that have demonstrated that the factors of structure, culture, and geography would affect the operation of the multinational firms.

#### **Structural Effects**

**Centralized control** of the greenfield subsidiary is one of the essential characteristics of the Chinese MNE. Given that I have found in the literature that the Chinese greenfield subsidiaries are wholly-owned by their parent corporations. It shows that there is a high degree of control of the greenfield subsidiary. In the following listed literature, some literature could be found to explain how the centralized control would affect the company and why MNEs tend to enhance their centralization and control.

Many factors are involved in the correlation between cultural influences and centralization of subsidiaries. For example, the subsidiary's experience, expatriate human resources, parent company ownership level, and market risk should all be taken into account when the MNE wants to determine their level of control over the subsidiaries (Root, 1994). They suggest that cultural issues should be addressed with absolute hierarchical control. More recent research of Wilkinson, Peng (2008) found that by collecting the data from the Japanese MNEs, the degree of control is

depending on the measurement of the cultural distance. It suggests that the centralized control over the subsidiary may be able to reduce the uncertainty that is brought by the cultural issues.

In respect of the decision making, Birkinshaw & Morrison (1995) argued that the MNEs with differentiated structures also have differentiated strategy to gain competitive advantages. The article believes that the degree of autonomy or centralization of the MNE aligns with the core strategies that the corporation is implementing. According to Young (1985), financial asset, marketing decision, and R&D are the most controlled aspects in the MNEs foreign subsidiaries. However, Edwards (2002) concluded that when the subsidiaries have superior local information, they tend to have greater autonomy over the decisions, particularly in the operational areas including approving finance for minor projects, setting wage rates, and domestic marketing.

In summary, the centralized control of the greenfield subsidiary reduces the uncertainty that is caused by the cultural distances, and exerts influences on the decision-making process of the organization for the purpose to ensure good performances.

### Geographical Effects

**Location** of the subsidiaries is one of the most critical factors of the MNEs. Given that I have found the facts in the literature that the Chinese MNEs tend to produce and develop their products and services in China. It suggests that the greenfield subsidiary of Chinese MNE depends greatly on the Chinese designed and manufactured product and services in China. In the following literature, some findings could be found to explain how the geographical factor would affect the company.

Anand (1997) studied the Japanese MNEs in the late 20th century when there was a similar situation that the large corporations of another Asian country Japan were internationalizing aggressively. Their theoretical and empirical analysis argued that under the condition that location-specific resources can only be developed by local experience, the hierarchical and centralized structure for controlling the subsidiaries are not preferred. Namely, when the subsidiaries are located in a different country with distinctive ethnical culture, the centralized structure works poorly. Anand (1997) specified three entry mode of the Japanese MNEs to establish a business in a new country, greenfield, joint venture and acquisition. For the greenfield subsidiaries, they have demonstrated by data that the Japanese MNEs tend not to establish greenfield subsidiary when the foreign parent's resources and capabilities are not able to be transferred to the target country due to the different locations (Anand & Delios, 1997).

The research of Anand (1997) offers me a different approach to look at Chinese MNEs because the situation of Chinese MNEs is similar to the one in Japanese MNEs. He found that the local resources could not be well utilized by the greenfield subsidiaries, and, on the contrary, the capabilities of the home country might not be transferred to the host country, which implies that there might be potential geographical effects on the Chinese greenfield subsidiary in different countries.

### Cultural Effects

**The culture** of the subsidiaries is one of the most critical factors of the MNEs. Given that I have found the facts in the literature that the Chinese MNEs tend to have a high degree of the employment of the Chinese expatriates in the subsidiaries (Shen, 2006). It suggests that the greenfield subsidiaries of Chinese MNE have significant concerns about the cultural diversity in the organization. In the following literature, some implications could be found to explain what this would affect the multinational firms.

To understand “culture”, it is defined by Hofstede (1984, p.21) as the "collective programming of the mind". Based on the dimension derived from his analysis of the surveys of more than 100,000 international employees of IBM, Hofstede categorized the states and nations into different cultural clusters. He pointed out the significance of the national culture's effect on the organization and provided theoretical basis for the corporate management in managing cultural issues within the organization. So did the “GLOBE” model, which is a long-term programmatic research effort devoted to finding out the complicated influence of culture on leadership, organizational effectiveness, economic, and competitiveness of societies (Shi & Wang, 2011). These studies allow people to realize the nature of culture and the significance of cultural issues.

In respect of the cultural influences on the overseas subsidiary, Gomez-Mejia (1997) suggested that the cultural heterogeneity significantly affects the effectiveness and efficiency of the human resources management (HRM). The HRM becomes complex and sophisticated to be implemented due to the heterogeneity. The reasons are that, first, the substantial costs of HRM development, implementation, coordination, monitoring, and periodic adjustment are increasing. Second, the consistent HR mechanism that allows HRM practices to work better under different cultural conditions is almost non-existent due to the cultural heterogeneity. The risks of making poor performances in the HRM are very likely to be increased.

## 2.2.4 Comparing Chinese Greenfield Subsidiary to the “studied” organizations

We have discussed the characteristics of the organizations that were studied in terms of the causes of the servitization difficulty as well as the characteristics of the greenfield subsidiary of Chinese MNEs. To compare these characteristics in a systematic way, the three aspects of the characteristics of the Chinese greenfield subsidiary are adopted to structure the comparison in the table of comparison below.

Table 3 : Table of comparison (Chinese greenfield subsidiary with "studied" organizations)

	<i><b>Overseas Greenfield subsidiary of Chinese MNE</b></i>	<i><b>"Studied" organizations</b></i>
<i><b>Structure (Control and autonomy)</b></i>	<ul style="list-style-type: none"> <li>• Wholly-owned greenfield subsidiary by parent company in China</li> <li>• Limited degree of autonomy in terms of the corporate strategy, management</li> </ul>	<ul style="list-style-type: none"> <li>• Mergers &amp; acquisitions (M&amp;A) in developed countries</li> <li>• Owned by Chinese corporations</li> <li>• Limited degree of autonomy in terms of the corporate strategy and management style (Xing, Liu, Tarba, &amp; Cooper, 2017)</li> </ul>
<i><b>Geography</b></i>	<ul style="list-style-type: none"> <li>• The greenfield subsidiaries are over the world, while R&amp;D facilities and production plants are mostly located in China</li> </ul>	<ul style="list-style-type: none"> <li>• Chinese local companies (private and state-owned); or (Gao, Yao, Zhu, Sun, &amp; Lin, 2011; Liu &amp; Granados, 2015)</li> <li>• Multinational firms (headquarters in China, Japan, and US); or (Xia &amp; Xue, 2010; Ahamed, Kamoshida, &amp; Inohara, 2013a; Ahamed, Kamoshida, &amp; Inohara, 2013b)</li> <li>• Based in Germany; or (Xing, Liu, Tarba, &amp; Cooper, 2017; Bustinza, Bigdeli, Baines, &amp; Elliot, 2015)</li> <li>• Based in UK; or (Martinez, Bastl, Kingston, &amp; Evans, 2010; Baines, Lightfoot, &amp; Kay, 2009)</li> <li>• Based Nordic Europe (Finland, Sweden, and Denmark) (Mont, Singhal, &amp; Fadeeva, 2008; Sakao, Öhrwall Rönnbäck, &amp; Ölundh Sandström, 2013; Turunen &amp; Neely, 2012)</li> </ul>
<i><b>Culture (Human Resource)</b></i>	<ul style="list-style-type: none"> <li>• Chinese ethnicity has a dominate position in the organization.</li> <li>• Culture diversity: Chinese, internationals, and locals.</li> </ul>	Not specified in terms of human resources and ethnicity.

In summary, in the previous studies of the causes of the servitization difficulty, there is a great lack of the information and description of the studied organizations. One of the reasons is that in many cases, the information of the organization is confidential and unavailable to be published. Therefore, I selected the findings in these studies that are able to reveal some clues of the characteristics of these organizations to make a contrast with the greenfield subsidiary of Chinese MNE that I am conducting a research in.

**Table 3** shows that, in terms of the structure of the organization, Xing (2017) provided some information of the case-study organizations. He studied the other type of subsidiary other than the

greenfield establishment, which is the mergers or acquisitions. In this case study, the conflicts between the subsidiaries and the parent company are discussed. Similar to the greenfield subsidiary, the dilemma of control and autonomy is also worrisome for the servitization in these organizations. However, the acquired subsidiary has more autonomy than the greenfield subsidiary (Child & Rodrigues, 2005). Therefore, my research will figure out how the servitization will be affected when there is a higher degree of control of the subsidiary in a MNE.

In terms of the geography, the studied organizations can be found in many European countries, as well as states like China, the US, and Japan. Local manufacturing companies that were studied can be found in UK, Germany, and Nordic countries. The multinational firms that were studied have been found in China, US, and Japan. However, I could not find any description regarding the location of subsidiaries and the specifications of the functions of each subsidiary in the multinational firms. Therefore, my research will attempt to solve the question that what the different locations of the multinational firms will affect the servitization.

In terms of the culture of the organization regarding human resource, none of the studies mentioned the human resources in the organizations and its effects to the servitization. However, on the other hand, the influences of the human resources and cultural distance of the employees will be addressed in my research.

## 2.3 Multi-agent system and agent-based model

In the third section of chapter 2 literature review, I will discuss **multi-agent system (MAS)**, **agent-based model** and ***OperA* model**. Multi-agent system and agent-based model are applied in the analysis and evaluation of the servitization difficulty in the greenfield subsidiary of Chinese MNEs. I reviewed the literature on the multi-agent system and agent-based models and provided arguments of the motivation to use the agent-based model. In this section, I will present two subsections, which are respectively the introduction of multi-agent systems (MAS) and the agent-based model *OperA*.

The first subsection explains what the adoption of the multi-agent system could achieve with the help of the agent-based models. And, the benefits of applying the agent-based model to study organization transition will also be explained. It will answer the question of why this new perspective is suitable for the analysis of the servitization difficulty.

The second subsection discusses the selection of the agent-based model for my research. I select ***OperA* model** as the one to be applied in the case study of exploring the causes of the servitization difficulty. In the second subsection, a more informative introduction will be given for *OperA* model. As well, the alternative agent-based models will be discussed in this subsection. The introduction of *OperA* model will serve as the theoretical basis for the research design and research approach that are addressed in the Chapter 3.

### 2.3.1 Introduction of Multi-Agent System and Agent-based Model

#### *Multi-agent Systems (MAS)*

The multi-agent system (MAS) is considered as "societies of agents", which is a set of agents that interact with each other to coordinate their behaviors, in the meantime, they cooperate to achieve couples of collective goals (Ferber, Gutknecht, & Michel, 2003). As we could see from the definition, MAS consists of the concepts of the agent and society, which are two important focuses of the MAS. The collective influence that the agents exerted on the organization results from the behaviors of the individual agents and the interactions amongst themselves. The MAS enlarge the single-agent architecture with the introduction to the interaction and communication among the agents (Dignum, 2004). When the MAS is used to illustrate the organization, an agent-based model as a modeling technique is used to represent the social organization of the MAS or the organizations inside the MAS (Coutinho, Sichman, Boissier, & others, 2005).

## Agent-based Model

Agent-based modeling is a powerful modeling technique that has been used for modeling the multi-agent systems (Niazi & Hussain, 2011). It is a type of the models that consists of a collection of autonomous decision-making entities which are called “agents”. They can make decisions in the system based on a set of rules. And it reflects the mindset of the multi-agent system. Agent-based models such as MOISE, UML, and Brahms have been broadly applied in different field and have come with different preferences in solving the systematic problems (Hubner, Sichman, & Boissier, 2007; Sierhuis, 2001; Eshuis, 2002).

Bonabeau (2002) suggested that there are three **benefits** of using agent-based models to analyze organizations. First, *the agent-based model can capture the emergent phenomena*. He argued that the phenomena result from the interactions of all the individual entities in a system. The agent-based model provides such advantages to study the interactions of all the agents and develop the explanation of the phenomena. Second, *the agent-based model offers a natural description of a system*. When studying an organization, merely looking at single agent or interactions of two agents will fail to understand the systemic behavior of the organization. The nature of the agent-based model could have a better simulation of the complex system such as organization activities. Third, *the agent-based model is of good flexibility*. In the simulation of agent-based models, it is easy to add extra agent or delete in accord to the changing environment. On the other hand, it also allows the change of rules, behaviors of agents as well as the other conditions in the model, which could be used as a powerful tool to study organization changes and transitions.

### 2.3.2 OperA Model

In this subsection, I will make a brief introduction of the agent-based model *OperA* (Organization per Agent), which is designed by Dignum (2004) and it has been chosen to be used as a theoretical tool for developing my research outcome. In the end, since many terminologies that have been defined in the *OperA* model will be used in the chapter of methodology, a list of definitions of terms in *OperA* will be presented.

## OperA Model

*The OperA* model is an agent-based model that provides a mean to define open organizations with various concepts of the organizational aims and the individual objectives that act in the organization (Dignum, 2004). To understand *OperA* model, we must know that *OperA* as a

framework is comprised of three interrelated models, which are respectively the organization model (OM), social model (SM), and interaction model (IM).

The correlations of the OM, SM, and IM are the features that make *OperA* different from other MAS organizational model. First of all, Organization Model (OM) represents the observation and analysis of the organization, and explains the desired interactions and activities of the organization. The OM is determined by the stakeholders in terms of their roles, norms, interactions, and objectives. As for the Social Model (SM), it is constructed in an inherently different technique by mapping the organizational roles to agents, which describes the agreement regarding the role enactment and other terms in the social contracts. The construction of Interaction Model (IM) is also based on agents, and it specifies the interaction agreements between REAs (role enacting agents) as well as the interaction contracts (Dignum, 2004). The cooperation and interrelation of OM, SM, and IM at the same organization level compose the *OperA* model and enable *OperA* to represent institutional requirements, in the meanwhile, provide flexibility to accommodate heterogeneous components (Aldewereld & Dignum, 2010).

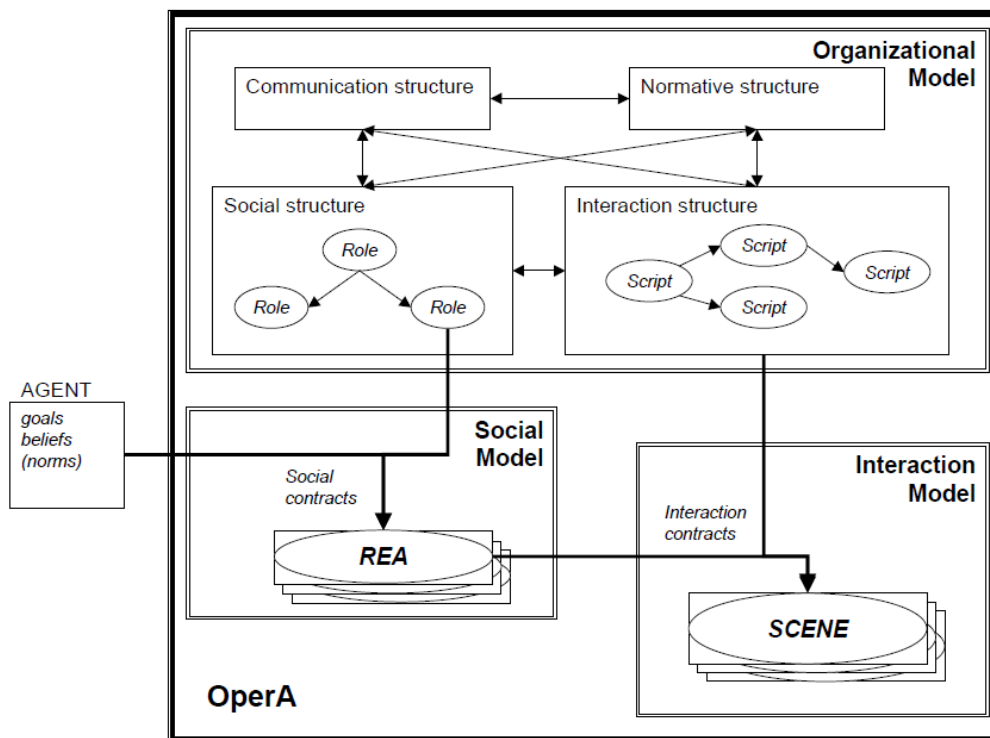


Figure 2 : Architecture of OperA (Dignum, 2004)

## Terminology List of OperA



To improve the understanding of the following chapters that relate to the application of *OperA*, terminologies that have distinct or dissimilar definitions compared to our common understandings will be explained and presented as follows according to (Dignum, 2004). The words that are used in following chapters and related to the concepts or explanations of *OperA* model should be understood in accordance to the explanations as listed in **Table 4**.

Table 4 : List of explanation of terminologies used from *OperA* model (Dignum, 2004)

<b>Terminologies</b>	<b>Explanations</b>
<b>Organization Model (OM):</b>	
<i>Role</i>	“A <b>role</b> is the abstract representation of a policy, service or function.”
<i>Role Script</i>	“A <b>role script</b> describes the role in terms of objectives, norms and rights.”
<i>Scene</i>	“Interactions of roles and agents are articulated through <b>scenes</b> that follow pre-defined abstract scene scripts.”
<i>Scene Script</i>	“An interaction <b>scene script</b> describes a scenario of activity, that is, how roles can interact and evolve in the context of a scene.”
<i>Landmarks</i>	“The <b>landmark</b> indicates the pattern of interaction (on a high level of abstraction) to achieve the scene.”
<i>Social Structure</i>	“The <b>social structure (SS)</b> specifies objectives of the society, its roles and what kind of model governs coordination.”
<i>Interaction Structure</i>	“The <b>interaction structure (IS)</b> describes interaction moments, as scene scripts, representing a society task that requires the coordinated action of several roles, and gives a partial ordering of scene scripts, which specify the intended interactions between roles.”
<i>Normative Structure</i>	“Society norms and regulations are specified in the <b>normative structure (NS)</b> , expressed in terms of role and interaction norms.”
<i>Communication Structure</i>	“The <b>communicative structure (CS)</b> specifies the ontologies for description of domain concepts and communication illocutions.”
<b>Social Model (SM):</b>	
<i>Agent</i>	“ <b>Agent</b> is an autonomous, socio-cognitive entity capable of individual social behavior and represents the perspective and objectives of the individuals themselves.”
<i>Social Contract</i>	“A <b>social contract</b> describes the conditions and rules applying to an agent enacting role(s) in the agent society.”
<i>REA (role-enacting agent)</i>	“The <b>role-enacting agent</b> $rea(a, r, s)$ is defined, indicating that agent $a$ enacts role $r$ in scene $s$ .”
<i>Contract Clauses</i>	“A <b>contract clause</b> is a deontic expression that describes conditions and deadlines for a specific obligation, prohibition or permission on the activity of the agent as enactor of the role.”
<b>Interaction Model (IM):</b>	

<i>Interaction Contract</i>	<i>“An <b>interaction contract</b> describes the conditions and rules applying to interaction between agents in the agent society.”</i>
<i>Interaction Protocol</i>	<i>“<b>Interaction protocols</b> are the concrete representation of the refinement of scene script landmarks with the particularities imposed by the participants to the specific communicative capabilities of those participants.”</i>

### *The Alternative Agent-based Models*

In this subsection, I will introduce three agent-based models that are alternatives to the *OperA* model. The alternatives are *Brahms*, *MOISE+*, and *JaCaMo*. With a brief introduction, we would know the basics of these alternatives. In the Chapter 3, I will further explain the reasons why I use *OperA* instead of these alternative models.

#### *Brahms*

*Brahms* is an agent-based model that is developed for an approach to model and simulate agents within a social world. *Brahms* language is built to model and simulate work processes. Beliefs and behaviors from the groups are inherited by each agent. The subsumption of the architecture offers flexible perceptual scoping, redirection of attention, and the resumption of the interrupted activities for modelling (Clancey, Sierhuis, Kaskiris, & Van Hoof, 2003; Sierhuis, 2001). The *Brahms* model has three types of the agents in the system, which are the personal agent, communication agent and the proxy agent. They work differently from each other with different formalities and serve various functions in the MAS.

There are many advantages of *Brahms* as a MAS agent-based model in modeling the real-life cases. First of all, the language enables seamlessly modeling of the interactions of agents. Second, the *Brahms* model introduced geographical dimensions to the modeling, which allows the agents to be located in different locations so that it can model the physical activities of the agents. Third, it has the capability to convert a simulation into an implementation. Fourth, it has multiple sub-systems that could be "talking" to each other through proxy agents. Fifth, when the model is running, it is available to remove or add new components for the model. And in the end, the group inheritance of the behaviors and beliefs is good for the representation of multiple instances of the agent (Clancey, Sierhuis, Kaskiris, & Van Hoof, 2003).

#### *MOISE+*

*MOISE* (Model of Organization for multi-agent SystEms) is an organization model which is developed to includes three aspects for interpreting an organization (Hübner, Sichman, & Boissier,

2002). The structure, function, and deontics are the three elements of MOISE+. The structural aspect refers to the interrelations of the agents through different notions. The functional aspect explains how the agents achieve goals with interactions and coordinations. The deontic aspect refers to the norms that agents hold regarding the permissions and obligations for missions of agents.

In the research of Coutinho, Sichman, & Boissier (2005), MOISE+ was compared to many other organization models such as AGR, ISLANDER, ODML and so on. The outcome turns out that comparing to other organization models, MOISE+ has advantages of modeling structural and functional aspects of a MAS.

### JACAMO

Agent-based modelling tool JaCaMo is created on the basis of three existing agent-based modelling platforms of programming, the *Jason* for programming agents, the *MOISE* for programming organizations, and the CArtaGo for programming the environment (Boissier, Bordini, Hübner, Ricci, & Santi, 2013). JaCaMo integrates important findings and technologies in the area of agent-oriented, organization-oriented, and environment-oriented programming. It is considered as a multi-agent oriented programming, which refers to as the full potential programming paradigm of MAS.

To further explain the composition of JaCaMo, *Jason* is a platform that is designed for the development of the MAS with agent-oriented programming language, *AgentSpeak*. Bordini, Hübner, & Wooldridge (2007) expand the original idea of the *AgentSpeak* language and make it available for practical use. The MOISE model is an agent-organization model that has been discussed in the previous paragraph. At last, CArtaGo is an environment programming framework for the MAS. In practice, the software environment of CArtaGo could be made as a dynamic set of computational entities named *artifacts*, which could be collected in the workspaces and distributed between different nodes of the network. Therefore, all in all, the MAS of JaCaMo has a three-layer architecture of the model with three models integrated into one model. It also means that the advantages and the capabilities of three dimensions of a system are integrated with an extended application to form a more complicated system (Boissier, Bordini, Hübner, Ricci, & Santi, 2013).

## Chapter 3 Methodology

**Chapter 1** introduced the research problem and the background of this problem. And **Chapter 2** specified the literature review that provides theoretical fundamentals to the research problem and the research approach. In this chapter, the methodology of the research is explained. It specified how to conduct this research with theoretical foundations and research approach to achieve the research objective. With the scientific explanation and justification of the methodology, we are able to conduct the research and obtain the research outcome. And the research implementation will be discussed in **Chapter 4**.

The Section of **3.1** talks about the determination of the research method. An inductive single case study is adopted in this research project. The arguments of why to use the single case study are given in this section. Next, how to implement the agent-based model *OperA* is also discussed, as well as the arguments for why *OperA* is a preferred tool for conducting this single case study.

The second Section of **3.2** explains the developed research design. This section aims to explain the research approach that is determined for this research project. First, how the theoretical research concepts link to the concrete research items in the case study of Chinese greenfield subsidiary is discussed. Next, the research approach is formed. The subsection respectively talks about how all the sections in the thesis report are connected.

The third Section of **3.3** specifically discusses the matters of data collection, which is one of the critical processes in the research approach, as it concerns the credibility of the research outcome. With the detailed explanation of the semi-structured interviews as the data collection instrument, the description of model construction in Chapter 4 could have a well-argued basis in terms of the collected data and the information of the Chinese greenfield subsidiary. In the end, the external tools that are used in the research processes are briefly introduced.

The fourth section of **3.4** specified the limitation and constraints of the research methods.

## 3.1 Research Method

In this subsection, I will describe the research methods that I adopted for my research project and the research organization for the case study. I conducted an inductive qualitative analysis with an exploratory single case study of a Chinese greenfield subsidiary. The greenfield subsidiary for which I conduct the case study is ServCo B.V in the Netherlands. It is a greenfield subsidiary of ServCo Corporation in China. As follows, I will provide the arguments for why it is appropriate to use such method in achieving my research objective.

### 3.1.1 An Exploratory Case Study

In order to *explain the cause of servitization difficulty in the organization*, an **inductive qualitative research** analysis was adopted to this research. As there are insufficient parameters to measure servitization, it is still constrained to conduct a quantitative research for servitization related topics. The approach of inductive study aims to develop new theories (King, Cassell, & Symon, 1994). This research is also designed to develop new theories about the cause of the servitization difficulty in the Chinese MNE subsidiaries. Therefore, inductive qualitative study is a good option to study my research topic.

Apart from the qualitative analysis, in order to find the cause of servitization difficulty of Chinese MNE greenfield subsidiaries, an **exploratory single case study** is adopted to study the organization of Chinese greenfield subsidiary with the application of an **agent-based model** that is able to simulate the case-study organization. The reasons for the adoption of a single case study are presented as follows.

First, the case study has been defined by Yin (2013) as an empirical inquiry that investigates a contemporary phenomenon in-depth and within its real-life contexts, especially when the boundaries between phenomenon and context are not clearly evident. Cunningham (1997) also suggested that an extensive case study is carried out for the purpose of developing theories from the exploration. This exploratory research also aims to explore the explanation of a phenomenon that requires in-depth analysis of the organization, which matches to what the case study could achieve.

Second, given the fact that the techniques of a multi-agent system are taken to investigate this organizational transition, the agent-based model is applied. The modelling of a single organization system achieves a high depth of the research into the chosen subject. In the meantime, it also takes a relatively long time to conduct a single case study. In order to manage the research duration in a reasonable time, a single case study is preferred, and could be executed within 5 months. Single

case study indeed could not make a reliable generalization of the theory, but it is valuable in the exploratory stages of the research subject and can provide potential hypotheses for the future researches. And these future researches may be able to test the theory of my research with more case studies (Abercrombie et al. 1984).

Third, there are many reasons of why to use an agent-based model for exploring the causes of the servitization difficulty. Apart from the benefits of the agent-based modelling that are discussed in the literature, using agent-based model could also increase the credibility of the research by diminishing the errors that are made by human's opinions. Namely, the model could simulate the organizational activities instead of highly depending on people's perceptions and opinions in the case study.

### 3.1.2 The Case of ServCo B.V, a subsidiary of ServCo Corporation

*(Confidential)*

*"SerCo" is an alias of the case-study Chinese corporation. SerCo B.V is a greenfield subsidiary of the ServCo Corporation in China.*

### 3.1.3 Implementation of Agent-based Model (OperA)

As what has been explained in **Chapter 2 Section 2.3**, the agent-based models and multi-agent systems (MAS) provide a useful approach to describe and study a complex system. As follows, I will explain the reasons why agent-based model is suitable for this case and why *OperA* is the appropriate model to be implemented in this research, as well as why the other alternative models are not as suitable as *OperA*.

#### *Why agent-based model*

The approach of agent-based modelling is recognized as a good tool to simulate a social system of an organization. Carley (2002) made a demonstration of the special capability of agent-based modelling. She used the agent-based modelling to examine how the internal policies and procedures affect the performance of a company. And she successfully reproduced the realistic performance of the actual organizations, which serves as a good example of the application of agent-based modelling and multi-scenario simulation of the organization. The case of analysing servitization difficulty has many similarities with the case of Carley (2002). The servitization difficulty is also a result of the interactions of the agents in an organization according to the given policies and procedures inside the organization. Therefore, agent-based modelling can also be an approach to study the cause of servitization difficulty.

The approach of the agent-based modelling is able to simulate the organization's systematic behaviors in different scenarios and connect the behaviors of the individuals to the patterns of organizational behaviors. It is attributed to one of the benefits of implementing agent-based modelling which is that the agent-based modelling offers a natural description of a multi-agent system. It is useful to analyze a system with multiple factors which collectively affect the system, especially in a changing environment (Bonabeau, 2002). If we consider the servitization is undertaken in a multi-agent system, we could look at the interactions of the internal agents in the organization, which is helpful to explore the collective effects of the factors to the organization which could be possibly the cause of the servitization difficulty. It is also a suitable research approach to study phenomena in a dynamic and changing environment, such as the transition of servitization.

### *Why OperA*

The *OperA* model as an agent organization modelling tool can integrate the perspective of both organization and individual into one model. This ability enables the model to adapt the changing environments and organizations (Dignum, 2004). Some features of *OperA* model enable the *OperA* to have advantages over the other agent-based models in terms of the organization modelling.

First of all, *OperA* established a novel architecture that enables the conceptual separation between the organizational and individual perspective (Mensonides, Huisman, & Dignum, 2008). Once the connections between the systematic behaviours of an organization and the individual behaviors of an agent are found, the exploration of the root causes of organizational phenomena, such as the servitization difficulty, could be significantly facilitated since organizational phenomena is one of the systematic behaviour of the organization. The causes of servitization difficulty could be the facts or factors at the individual level, which needs analysis of individual agents, in particular of their roles, norms, behaviors, and objectives. The separation of organizational perspective and individual perspective makes the diagnosis of problems possible. The other alternative models were not able to investigate the matter from the individual perspective. And they are unable to find the relation between two perspectives.

Secondly, *OperA* clearly distinguishes the concept of roles and agents (Mensonides, Huisman, & Dignum, 2008). This innovative setting of the model provides another possible approach that could explain the malfunction of the organization processes. The separation between the abstract level of the organization and the concrete level could be made through such setting, as the roles represent the abstract level of the organization while the agents represent the concrete level. By looking at

the differences between the desired situation which the OM represents, and the reality which the SM and IM represent, the root causes of the servitization difficulty may be identified. On the other hand, the nature of this feature is suitable in studying the agents and organizational behaviors in a single organization rather than in complex systems with multiple subsystems. My project which is an exploratory single case study makes a better match with the *OperA* model than other alternative agent-based models.

In the study of Mensonides, Huisman, & Dignum (2008), a practical application of *OperA* as an organizational modeling tool has been conducted in the strategy development of NedTrain, a rolling stock maintenance provider in the Holland. This research showed that the agent-based scenario modelling as a specification tool could facilitate the discussion, validation, and the acceptance of the strategic changes in an organization. The outcome implies that the organizational model *OperA* has been proved to be useful in simulating the complex organizational interactions, and provide important guideline for the strategic decision-making process of the company. The exploratory case studies such as the study of Mensonides (2008) are broadening the application of agent-based models in various disciplines.

The similarities of case studies can be found between the case of ServCo subsidiary and the case of NedTrain. First, they both aim to study a single organization with complex organizational interactions, while both of them are also in need of the analysis from both the individual perspective and the organizational perspective. Besides, both studies are aiming to provide identification of the unexpected complexity in the organization, which can be further used for the strategy planning of the organization. Therefore, it is worthwhile to make use of the *OperA* model to conduct a multi-agent analysis for the study of servitization process in the organization of ServCo greenfield subsidiary.



## 3.2 Research Design

In this subsection, I will explain the overall design of my research project and illustrate the connections of all the processes in this research. This allows people to understand the rationale of my research project. **Section 3.2.1** is about how to build the links between the theoretical concepts and the research object in the case study. **Section 3.2.2** explains the research approach that contains discussions of each process of my research. Also, it will also act as the pre-explanation of the model implementation that is going to be discussed in **Chapter 4**.

### 3.2.1 Linking Theory to Case Study

In achieving the research objective, I need to link the theoretical concepts to the concrete object in the case study. According to the **Research Objective** and **Main Research Question**, this research aims to find the causes of servitization difficulty that impede the servitization transition by implementing an agent-based model. Servitization is an abstract concept for describing a transition in the organization. It needs to be instantiated in the case study of ServCo greenfield subsidiary so that I can conduct research in this organization.

Firstly, the "servitization transition" needs a concrete concept to be represented in this case. The definition of servitization given in Chapter 2 is "*an organization transformation of the company that provides consumer offerings from 'product-centered' to 'servitized' for customers*". Therefore, in the case study of ServCo subsidiary, the transformation towards being 'servitized' could be interpreted as the transition from the domination of product sales to the position that service solution or service sale is the major sales activities, which means the company is able to increase its sales of service offerings. And the *servitization difficulty* in this case study refers to the difficulty of replacing product sales with service sales.

However, merely looking at the data of service sale does not explain the reasons accounted for the insufficient service sale. Thus, the research will focus on the **service-related activities in the ServCo greenfield subsidiary**. The service-related activities generally are defined as the activities of **service sale**, **service development** and **service delivery** in the Chinese subsidiary. And these three essential activities greatly affect the sales of service offerings in the Chinese subsidiary, which also have strong linkage to the servitization. In this thesis report, **service sale process** is also used to interpret the service-related activities. Because the service sale process contains all the service-related activities, which are service development, sale, and delivery. Therefore, the *service sale* is not equivalent to the *service sale process*, but as a part of the *service sale processes* (see Figure 3).

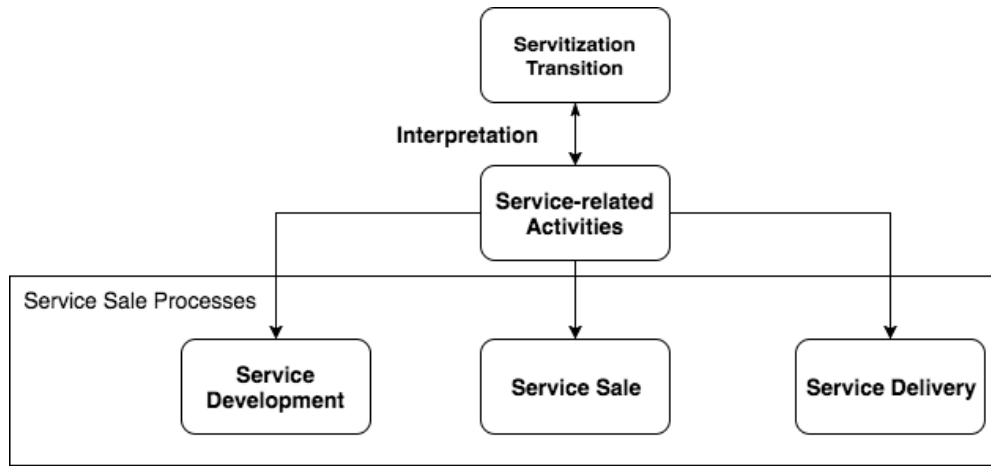


Figure 3 : Conceptualization of servitization in the case study

Secondly, based on the definition that the servitization is an organizational transition that takes place within the organization, I applied the agent-based model to the internal organizational system. The agent-based model *OperA* will be constructed based on the internal organizational interactions of the agents in ServCo corporation. It means that the case study focuses on investigating the interactions and behaviors of the agents within the organization of ServCo corporation. And by the use of the advantages of *OperA* model, I could identify the cause of the servitization difficulty of the organization.

All in all, based on the explanations that are presented above, a research approach is formed and discussed in the next section.

### 3.2.2 Research Approach

Taking a look at **Figure 4**, it illustrates my research approach with a diagram. As we can see from this diagram, there are two critical phases of the research approach, which are the **Phase 1 literature review** and **Phase 2 model implementation**. The research problem has been already specified in the **Chapter 1**, and the conclusion and discussion of this research are stated in **Chapter 5**. As below, the explanations of two phases for conducting the case study are presented. They are in-depth literature review and model implementation of *OperA*.

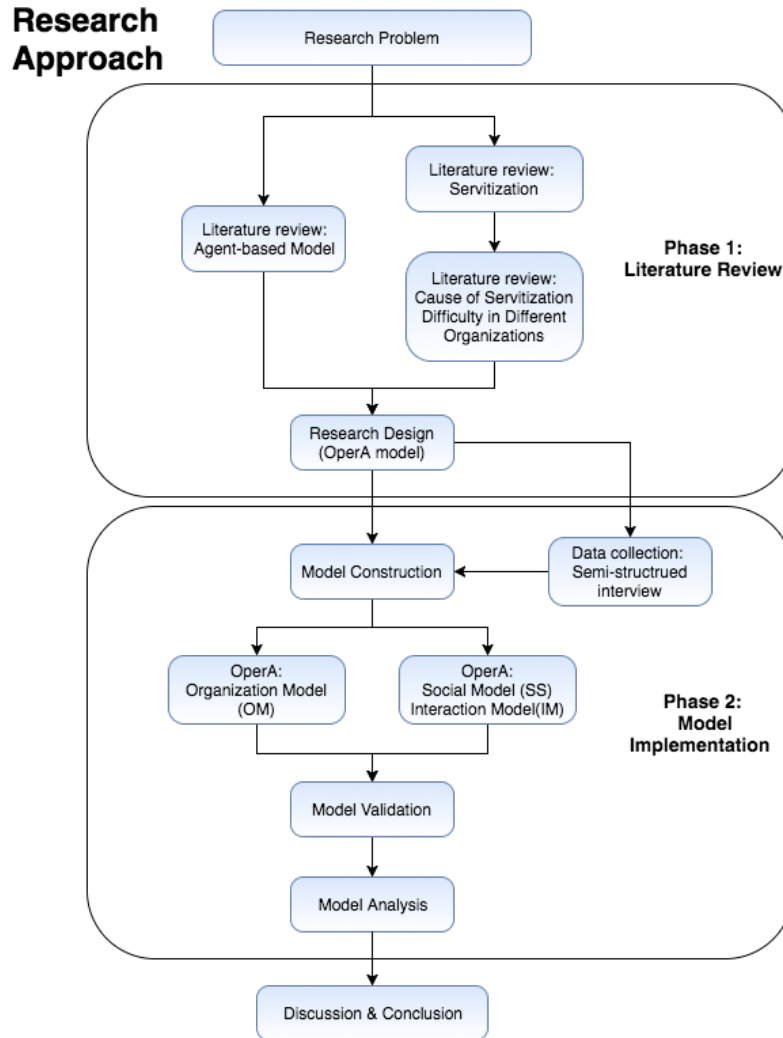


Figure 4 : Research approach processes

### Phase 1: Literature Review

As for this phase, it consists of two processes, the systematic literature review and the research design. For the literature review, it is vital to study the relevant theories to form a research strategy. Therefore, in **Chapter 2**, the literature review specified three general fields. The first one is the definition of servitization and the companies' drivers to be "servitized". The second one is the causes of servitization difficulty in different organizations. It discusses the differences between the organizations that were studied in terms of the servitization difficulty and the Chinese MNE greenfield subsidiary. The third one is the agent-based model and *OperA* model that were used to as the approach to study the Chinese MNE greenfield subsidiary. Agent-based model is served as the adaptation to evaluate the servitization in the Chinese subsidiary.

Through literature review, the sub research question 1-4 are answered. The reason why to study these topics is because these will help me construct the research method, research design, and the method of the model analysis. For the research design, it is laid down in this section, which answers the sub research question 5 & 6. This section requires a thorough understanding of the content that has been studied through the literature review, such as the agent-based model and the servitization.

## Phase 2: Model Implementation

According to the diagram of research approach, Phase 2 is comprised of three research processes, which are model construction, model analysis, and data collection. Apart from the data collection that will be explained in **Section 3.3.1**, the explanations of **model construction**, **model validation**, and **model analysis** are presented as follows. Figure 5 outlines how model implementation could facilitate the exploration of the causes of servitization difficulty. The implementation processes of applying *OperA* model to the ServCo subsidiary will be further illustrated in **Chapter 4**.

### ***Model Construction***

In this phase, the agents and the roles, which are critical in the servitization of ServCo, need to be identified firstly. For example, each of the ServCo account management team, service management team, and project delivery team has independent functions in the servitization. Secondly, the values, objectives, and norms of each role shall be discovered, which serves the basis to form the organization model (OM) of *OperA*. The scenarios that include all the service-related activities shall also be discovered beforehand for the OM interaction structure. On the other hand, the social interactions and the obligations of the agents should be identified for the purpose of the construction of social model (SM) and interaction model (IM).

### ***Model Validation***

Apart from the measures to assure the validity of the data collection, the validation of the *OperA* model is implemented too. This phase involves a complete evaluation of the organization model (OM), social model (SM) and interaction model (IM). In order to validate the OM, SM and IM, I planned to simulate the service-related scenarios of the historical cases in ServCo subsidiary to test the model. First, I shall collect the data of the initial conditions of the historical scenarios that include the service-related activities in the ServCo subsidiary. Second, by enabling each agent in the organization to enact its role in the system according to the roles' objective and norms, interactions, and the initial conditions of a specific scenario, we could achieve a result of possible outcomes of the specific scenario. In the end, I am able to compare the simulated possible outcomes to the actual outcome of the historical scenarios and then to check if there is a match. Based on

this measure, I am able to validate the OM, SM and IM or I can further calibrate them based on the comparison of the simulated outcomes and the actual outcome.

### ***Model Analysis***

This phase is designed to analyze and compare the OM with SM and IM for exploring the cause of the servitization difficulty. The OM is formed based on the designed roles with specific functions in the organization and the desired structure of the organization, while SM and IM are established based on the actual activities of the agents that have real positions in the ServCo subsidiary, which have social features and behaviors. It means SM and IM are related to the objective reality of the organization. The contrast between OM with SM and IM will lead to the identification of the problems within the system. On the other hand, the problems found in the comparison could give some insights of the causes of servitization difficulties. The results that is drew from the contrast would also enhance the understanding of the complex organizational interaction, so it would enable us to find out the conflicts arising from the agents' interactions and the systematic problems of ServCo as an “servitizing” organization.

My design is to compare OM to SM and IM in the unit of **scenes** (see **Figure 5**). And within one scene, I will compare the two models in terms of **their composition, interactions, and norms of agents and roles**. With the help of that, I am able to provide explanations for the differences and to consider their impact on the service-related activities. The reasons of why I chose this approach are as follows: Since the construction of OM and SM, IM is built upon different foundations, I need to find the link, at least one, that could enable a parallel comparison of two models. To further explain, OM is formed based on the expectation, in which the roles conduct desired interactions by the organization design. SM and IM are established based on actual activities of agents in which they have real-life interactions. Therefore, even the interactions are fundamentally heterogeneous, they all take place in the same selected scenes. By looking into the scenes, the heterogeneous interactions of both models are expected to cause different results in the same scene due to the influence of the possible external factors or social features of the agents. In the meantime, the exploration of those potential external factors or social features, etc., would lead us to the discovery of the causes of the barriers to the service-related activities. More explanations for the implementation of the model are discussed in **Section 4.3.1**.

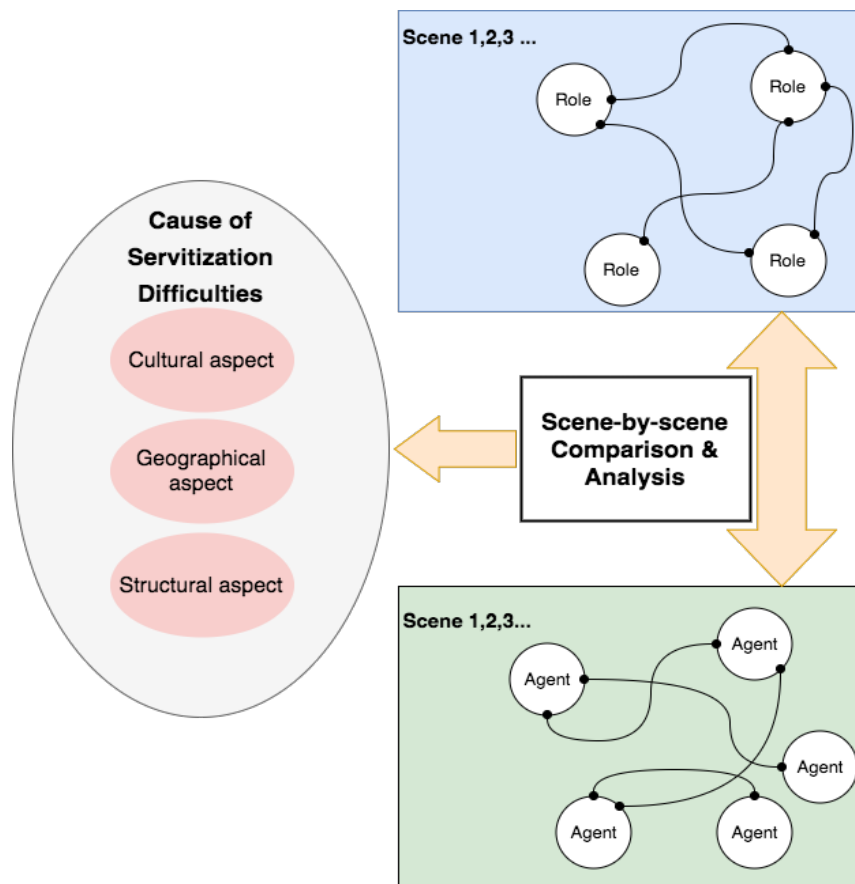


Figure 5 : Model Analysis of Research Design

### 3.3 Data Collection & Tools

In this subsection, I will talk about the data collection and the tools that are used for the research. Data collection is one of the critical processes in the research. Since it is crucially responsible for the validity and reliability of the research, it is explained in detail as an independent section. I will explain the arguments for using semi-structured interview and will describe how to undertake interviews in the ServCo subsidiary. The validity and reliability of the qualitative data will be discussed as well. Secondly, the introduction of tools that were used for the research will also be presented in section 3.2.2.

#### 3.3.1 Data Collection

In the model construction phase, data and information in the organization are collected for building the *OperA* model. The data in need for *OperA* model construction is the description of the facts regarding the specification of the organization and the agents, as well as the activities and interactions that are undergoing in the organization. For example, the data such as the structure, agents and interactions of the ServCo subsidiary is needed for the *OperA* model. Therefore, the collected data does not reflect the people's understanding and opinions towards certain things. The *OperA* model that is built upon the collected data is used for the analysis of the servitization in the ServCo subsidiary. Therefore, as long as the collected data is able to fulfill all the information that is required by the *OperA* model, the data collection is considered as sufficient for the model simulation and the analysis, as well as the research.

#### *Semi-structured Interview*

In the journal article of Eisenhardt & Graebner (2007, p.28), it is suggested that “interview is a very efficient way to gather rich, empirical data, especially when the phenomenon of interest is greatly episodic and infrequent.” Therefore, I conducted the **semi-structured interviews** in the organization. Semi-structured interview is a suitable data collection instrument which gives rich data regarding the situation and operation of the current organization, if the research has a clear focus and addresses specific issues (Eisenhardt & Graebner, 2007). It allows an interactive way to communicate with the participants. At the same time, it contains richer information than the structured interview since the participants can have more rooms for expression during the interview, allowing participants to tell as many as possible information in the selected topics (Fylan, 2005; Wengraf, 2001).

This method was used as a tool to collect data that contains information of ServCo's practice. The structure, actors and interactions of the *OperA* model are all based on the data that is collected

through interviews. The reason why I chose semi-structured interview as the data collection instrument for my research is because the model construction requires certain amount of data of the facts in the organization, especially the descriptions of the interactions and processes in the organization. Given the fact that there is a limitation of the number of people I could reach for valid interview data in the organization and this short-term master thesis project does not allow me to interview people with a huge number, semi-structured interview could provide the richness of the data with a limited number of interviews and meet the requirements that I need for the data collection instruments in this research. Therefore, the unstructured and over-structured form of the interview are not preferred in this case. On the other hand, I have attempted to use surveys as an assisting method to collect data. However, in reality, given the fact that there is an extremely low proportion of surveys have been collected back from the participants, I abandoned this plan to use the survey.

It is important that, beforehand the interview, it was needed to develop an interview guide that outlined the specific subjects that will be discussed in the semi-structured interview (Appendix E). This helps the researcher to stay focused on the topics during the interviews (Bryman & Bell, 2015). **Table 2** reveals the general topics that I designed beforehand for the semi-structured interviews. Besides, I also made a list of potential interviewees within the organization in the preparation phase.

*Table 5 : List of topic discussed in the semi-structured interviews*

<i>Roles/Agents in the organization</i>	<i>Organization structures</i>
<i>Objectives/Norms of different roles</i>	<i>Behaviors of agents and external stakeholders</i>
<i>Perceptions of servitization difficulty</i>	<i>Interactions with Customer</i>
<i>Scenarios of service sale, development, coordination</i>	

### ***Implementation of the Semi-Structured Interview***

Given that I am undertaking an internship in the Service Department of ServCo B.V. in the Netherlands, working inside of the organization provides me with abundant resources for conducting the research and ensuring the validation of the data source. I was able to reach various departments with different functions in the organization for extracting information and data. To ensure the credibility and reliability of the data, several means are deployed for my research and they are explained as follows.

Firstly, since the collected information is the “open information” that is available to all the people inside the organization, there is no absolute need to interview participants with a huge number.



Everyone who is involved in the service-related activities knows about the basic information for the model construction. However, to ensure the reliability of the data, I interviewed multiple participants with the same topics and questions. Thus, if the data extracted from different participants matches each other, this means the collected data is of high validity and credibility, so that by this mean I filtered the unwanted data and false data to enhance the reliability.

Secondly, an iterative verifying process of the data collection is included. First, the collected data and the summaries of the data were sent back to the interview participants after the interview for verification purposes (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008). This process was repetitive. In my research, the interview participants have validated the data and summaries of the information. Second, if there is any missing data for the model construction. I would contact the interview participants again for more information. These processes were continuous until the model construction was complete.

Thirdly, the transcription of the interviews was executed right after the termination of the interviewees in order to accurately reproduce the words and avoid any misunderstandings.

In summary, a total number of seven interviews were carried out according to the interview guide with 7 managers and associates that work in different positions and departments in ServCo. The collected data were enough to reach the requirements for the *Opera* model construction. The interviewees are working collaboratively as colleagues in the service-related activities. All of them are responsible for at least one of the processes in the service-related activities in ServCo subsidiary. The interviews had a duration of 30-40 mins and they were semi-structured in order to gain broader and more insights of the organizational data. There are two interviews were conducted through video conferences due to the distant locations of the participants. This is because service-related activities require both the function teams in the China and the teams in the Dutch subsidiary to collaborate. There are extensive communications between the subsidiaries and the function teams in the headquarter in China. It is necessary to interview employees from both the Netherlands and China.

Table 6 : List of interview details

<b><i>Interviewees:</i></b>	<b><i>Numbers:</i></b>	<b><i>Function/Department:</i></b>	<b><i>Means:</i></b>	<b><i>Duration:</i></b>
<b><i>Service Managers/ Specialist</i></b>	<b><i>3</i></b>	<b><i>Service Department (Netherlands)</i></b>	<b><i>Face-to-face</i></b>	<b><i>30-35 mins</i></b>
<b><i>Product Manager</i></b>	<b><i>1</i></b>	<b><i>Product Team (Netherlands)</i></b>	<b><i>Face-to-face</i></b>	<b><i>Approx. 30 mins</i></b>
<b><i>Account Manager /Channel Manager</i></b>	<b><i>1</i></b>	<b><i>Account Management Team (Netherlands)</i></b>	<b><i>Face-to-face</i></b>	<b><i>Approx. 35 mins</i></b>

<b>Project Manager/Specialist</b>	2	Technical Support/R&D (Headquarter, China)	Video conference	Approx. 40 mins
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### *Confidentiality*

This thesis project is conducted internally with the ServCo B.V. service department. In order to protect the privacy of the interview participants in ServCo and allow them to express their experiences freely, details of the information such as the names of interview participants, and their personal job responsibilities, etc., will not be presented in the public version of the master thesis report, and the transcriptions of the interviews are confidential, which will not be presented. Very limited personal information of the interviewees will be revealed. This aims to protect the company's privacy that contains sensitive organizational information. Furthermore, according to the regulations of the ServCo B.V, it is forbidden to take photos and record voices and videos inside the company. All the data and information that are generated in the company are considered as the properties of the company, which are not allowed to be shared or transferred. Any actions that transfer the data from the company's working computer to the other place would also be considered as the violation of the company's privacy. Therefore, interviews are not recorded according to the regulations.

## 3.3.2 Tools, Platform and Software used for research

### *Operetta*

The tool of visualizing organization model (OM) of *Opera* is used. ***Operetta*** development environment enables the visualization of the social structure and interaction structure of the OM of *Opera* (Aldewereld & Dignum, 2010). Now, *Operetta* is developed as a plug-in feature of Eclipse. To run *Operetta*, it requires an installation of Eclipse of version 3.5.

In the *Operetta* environment, **Partial State Descriptions (PSD)** is adopted. It is defined as the logical formulas that are representations of (parts of) the state of affairs in terms of the properties of the state (e.g., goods are sold, thermostat is on, room is cold, etc.) that holds at a certain point in time. It will be used in Chapter 4 for the model construction.

### *Petri Net*

Petri Net is a graphical and mathematical modelling tool. It is a versatile tool for describing the information processing systems that are characterized of being concurrent, asynchronous,

distributed, parallel, nondeterministic, and stochastic (Murata, 1989). In addition, Petri Net could also be used as a visual aid that is functionally closed to flow charts, block diagrams, and networks (Murata, 1989). In this thesis, Petri Net is used to interpret the **interaction protocol** for the interaction model (IM) as a visual aid. The Figures with Petri Net can be found in Chapter 4 and Appendix C for illustrations.

### 3.4 Limitation and Constraints of Research Method

The research method and the research approach that I used for this research project also have limitations and constraints.

First, the exploratory single case study has weaknesses in the generalizability. Even though I have identified the specialties of the greenfield subsidiaries of Chinese MNEs in order to make the outcomes could be applied in other organizations with the similar specialties, still the single case study of one of the ServCo foreign subsidiaries has other underlined specific conditions that undermine the generalizability of the theory, such as the degree of the development of the local market and economy. Therefore, the insufficient amount of cases has many constraints on the generalizability of the research outcomes. Therefore, this research does not aim to generalize its findings.

Second, ideally, in the data collection phase, the interviews should be performed with a large number of employees and staffs within the ServCo subsidiaries of numbers of countries, including the headquarter in China. However, a total number of seven interviews were conducted. This problem is mainly due to that there is a limitation of the number of people I could reach for valid interview data in the organization. And this short-term master thesis project does not allow me to interview people with a huge number. These situations might undermine the result's reliability.

## Chapter 4 Implementation of *OperA* Model

In this chapter, we applied the agent-based model ***OperA* (Organization per Agents) model** to the ServCo greenfield subsidiary in the Netherlands. In the previous chapter, we have illustrated that by constructing the **Organization Model (OM)** that represents the designed organizational interactions, and **Social Model (SM)** with **Interaction Model (IM)** that represent the realistic organizational interactions, I could compare these three models and identify the differences in the operational aspect. According to my research approach, it leads to the exploration of the cause of the servitization difficulty. Thus, the research processes are implemented and described in this chapter. At the end of this chapter, the causes of the servitization difficulty are explored, and the answers for the research questions are developed.

This chapter involves many terminologies of *OperA* Model. In order to read this chapter with a good theoretical foundation, it is recommended first to read the **Section 2.3.2** beforehand, which contains a brief introduction and necessary definitions of the *OperA* model.

The chapter is organized as follows. **Section 4.1** provides the explanation of the construction of Organization Model (OM). **Section 4.2** provides the explanation of the construction of Social Model (SM) and Interaction Model (IM). **Section 4.3** discusses the validation process of the constructed model. **Section 4.4** provides the comparison of three models (OM, SM, and IM) with analysis.

## 4.1 Construction of OperA: Organization Model (OM)

In this section, the **Organization Model (OM)** of *OperA* model is constructed. It consists of four structures to complete, **Social Structure (SS)**, **Interaction Structure (IS)**, **Normative Structure** and **Communication Structure**. These four subsections of Section 4.1 are respectively explaining the construction of the four structures of the OM model. As explained in the Chapter 3, the OM is built upon the roles instead of agents. And it does not include social features and behaviors of the humans as well as other external limitations that is applied to the organization. It is a desired and designed system based on company's regulations, rules and policies.

The tool of building *OperA* model is used in this phase of research. As mentioned in the Section 3.3.2, *Operetta* development environment is adopted (Aldewereld & Dignum, 2010). It enables the visualization of the social structure and interaction structure of the OM.

In the end of this section, the OM is completed. It is able to generate the **role scripts** of and **scene scripts** of all the roles and scenes. Role scripts include the description of the objectives, rights and norms of each roles. Scene scripts include the description of the roles, results, patterns and norms of each scenes. The interactions of the organization are described and depicted through these scripts.

### 4.1.1 OM Social Structure

In order to build OM, I start from constructing **Social Structure**, which is one of the four components of the OM. Given the situation that it is a very complex system for an organization that is comprised of a variety of **roles** with multiple **objectives** and **norms**, we need to simplify the system by selecting relevant roles and objectives for the social structure in order to focus on servitization related context.

In order to find the “relevant” roles in the organization, techniques are applied to ensure the relevance of roles. First, based on the information extracted from the semi-structured interviews (see **Section 3.3.1** for details), we could found out what processes and activities are **service-related**, which means that those processes and activities have relevance to the development, sales and delivery. Next, starting from looking at service-related activities, we identified the roles who were responsible for the activities. Hence, the relevancies of roles to the servitization are identified. Same process applies dependencies of roles for finding out that if the dependencies are service-related. Eventually, I left out dependencies and roles which are irrelevant to the servitization of organization. (Dependencies are the objectives of roles that have visually showed as arrows in the

Figure 6.) **Table 7** lists the selected roles, objectives and norms. **The objectives and norms define the existence of the roles in the organization.**

*Table 7 : List of relevant roles and their objectives and norms*

<i>Roles</i>	<i>Objectives</i>	<i>Norms</i>
<b><i>Sales Control (SC)</i></b>	<ul style="list-style-type: none"> <li>• Set sales goal for product sale, service sale and country total sale</li> <li>• Propel Account Management and Sales to achieve goals and assure income.</li> </ul>	<ul style="list-style-type: none"> <li>• If the sales goal is not fulfilled, Sales Control is obliged to propel all the sales team to achieve the goals.</li> <li>• If CM is not positive about the proposal, SC is obliged to propel other roles to reach an agreement.</li> </ul>
<b><i>Account Management (AMT)</i></b>	<ul style="list-style-type: none"> <li>• Bidding/Proposing project (to customer)</li> <li>• Achieve country total sales goal</li> <li>• Contracting (Make income)</li> <li>• Coordinate with sales</li> <li>• Maintaining customer relationships</li> </ul>	<ul style="list-style-type: none"> <li>• If TSD and Sales agree, the AMT is permitted to reduce price in the bidding of Service projects.</li> </ul>
<b><i>Sales (SL)</i></b>	<ul style="list-style-type: none"> <li>• Achieve sale goal product</li> <li>• Achieve sale goal service</li> <li>• Request for technical services solution</li> <li>• Negotiate with customer</li> <li>• Coordinate with account management</li> </ul>	<ul style="list-style-type: none"> <li>• If the Service Realization fails, Sales is permitted to facilitate the product sale (according to company's rules).</li> </ul>
<b><i>Technical Solution Development (TSD)</i></b>	<ul style="list-style-type: none"> <li>• Service Solution Realization</li> <li>• Facilitate Local service deliver</li> <li>• Communication with Customer</li> </ul>	<ul style="list-style-type: none"> <li>• If the Solution Request sent to TSD, TSD is obliged to develop the solution by the deadline specified in the contract.</li> <li>• If the TSD does not approve the proposal, AM and SL are prohibited to send the proposal to CM.</li> </ul>
<b><i>Service Delivery (SD)</i></b>	<ul style="list-style-type: none"> <li>• Service Solution delivery</li> <li>• Coordinate with Local Partner</li> </ul>	
<b><i>Local Service Deliver (LSD)</i></b>	<ul style="list-style-type: none"> <li>• Deliver Service Solution with Chinese Company</li> <li>• Obey Local Rules</li> <li>• Coordinate with Service Delivery</li> </ul>	<ul style="list-style-type: none"> <li>• If the Chinese company's interests are in conflict with the local law or regulations, LSP is obliged to obey local law and regulations.</li> </ul>
<b><i>Customer</i></b>	<ul style="list-style-type: none"> <li>• Assure Project Success</li> <li>• Evaluate Proposals</li> <li>• Contracting/Deal</li> <li>• Provides feedback</li> </ul>	

After identified all the relevant roles, objectives and norms, the social structure is ready to be established. Thanks to the utilization of *Operetta* development environment, I am able to make a graphical indication of the constructed social structure of OM. In **Figure 6**, we have the visualization of the social structure of the ServCo organization. We could see from this picture that the customer is interacting with most of the roles, which indicates it is a very customer-intimate design. The customer and local service deliver are the only two external roles in the structure.

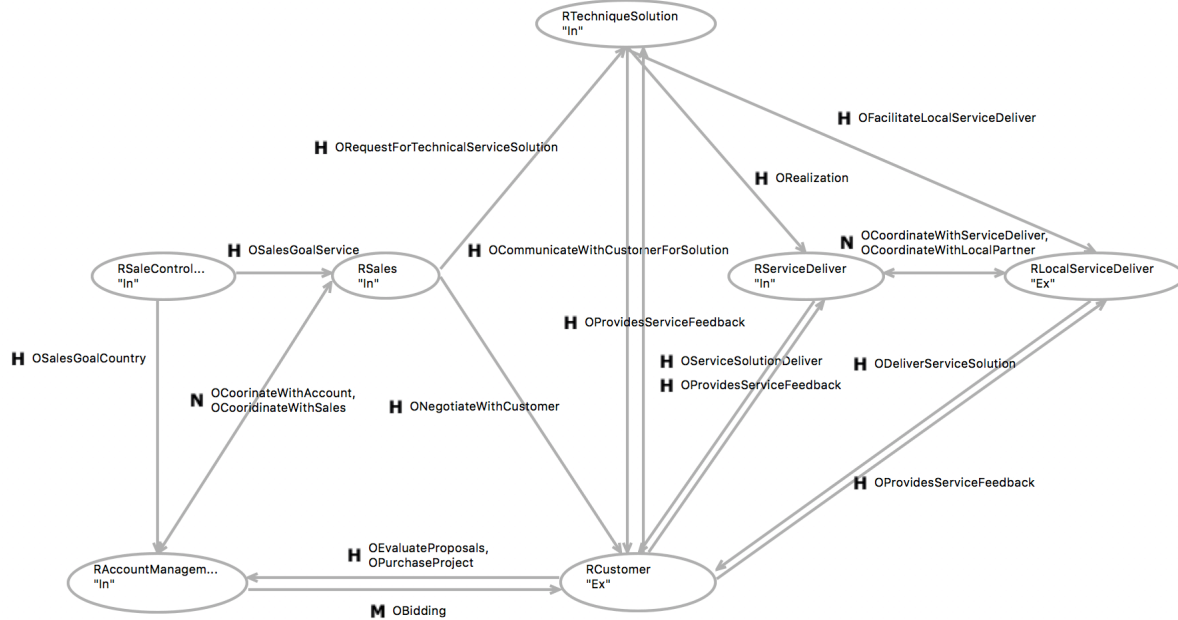


Figure 6 : Graphical OM social structure of the Chinese organization in Operetta environment

### 4.1.2 OM Interaction Structure

Following the establishment of the OM social structure, I built the **interaction structure** of the OM. In order to build the interaction structure, I need to first refer one of the interview topics that was discussed over the semi-structured interviews, which is the perceptions of servitization difficulty of people inside the organization. This would lead to the establishment of interaction structure.

In reality, there are many scenarios and cases that could be interpreted in the interaction structure according to the interview data, but only one of them will be chosen for the interpretation. The selection of the scenarios is a crucial process. Therefore, I come up with some designed criteria to select the most appropriate scenario for the interaction structure. By applying these criteria, I selected a very representative scenario, and interpreted it in the interaction structure. **Table 8** is a list of criteria that I came up with to select the proper scenario.



The final selected scenario includes both activities of **product sale processes** and the **service sale processes**, which allows for the contrast of different models with distinctive natures. The selected scenario is interpreted into the interaction structure with four elements, **scene**, **players (roles)**, **landmarks**, and **transitions**. Transitions are the logic symbols in Figure 7, representing the mode of flows. Scenes are the white blocks in Figure 7. Roles and landmarks are the integrated information in the scenes. It means that the specific players are interacting within one of the specific scenes. Landmarks represent the status or intermediate results of interactions in a scene. **Table 9** and **10** list all the scenes in **Figure 7** and indicate the roles and landmarks in the scenes with full specifications of all the scenes in the selected scenario.

Table 8 : A list of criteria of the scenario selection for the OM interaction structure

<i>Criteria</i>	<i>Explanations/Reasons</i>
<b>Must include ‘servitization’ related interactions</b>	<i>It means including all the service-related activities which reflect the connections to servitization. (Please see <b>Section 3.2.1</b> for definition)</i>
<b>Must include all the selected roles</b>	<i>Reflect that the servitization is performing in a complex system that involves the behaviors of all the roles who are inter-affected by each other.</i>
<b>Must include the communications with local external roles</b>	<i>The research question defines that the servitization takes place in the overseas subsidiaries of Chinese organization. Therefore, the interactions must involve the local actors and stakeholders,</i>

Table 9 : Specifications of the scenes 1

<i>Scenes</i>	<i>Description of the Scenes</i>
<b>Project Bidding/Proposing</b>	<i>In the first scene of the selected scenario, the AMT gets in touch with the customer and negotiates over the feasibility of the project. This process will involve the discussion with TSD, SL and SC. If customer agrees, they will determine the clauses of the contract together. If customer is not satisfied, measures like reducing the price or providing extra services would be applied according to the SL’s requirements. If customer declines the proposal, then the scene ends without next scene following.</i>
<b>Service Technical Realization</b>	<i>This scene follows the <b>Project Bidding/Proposing</b> if all the roles reach an agreement on the contract. In order to fulfill the contract’s obligations, TSD will receive the request of service development, and communicate with SL, SD and LSD for the development of customized service solution. If the development of customized service fails, then the next scene will be <b>Product-only Deliver</b>. If the it succeeds, the next scene will be <b>Service Solution Deliver</b>.</i>
<b>Service Solution Deliver</b>	<i>This scene follows the <b>Service Technical Realization</b>. In this phase, the SD will coordinate with LSD and deliver the service solution to the</i>

	<i>customer together. The next scene following is <b>Feedback &amp; Improvement</b>.</i>
<b>Product-only Deliver</b>	<i>This scene follows <b>Service Technical Realization</b> when the service solution development fails. A renegotiation will be conducted to maintain the income the company with only selling product, to which this is required by the SC. Then later the products are delivered. This is the end of this scene flow.</i>
<b>Feedback &amp; Improvement</b>	<i>This scene follows the <b>Service Solution Deliver</b>. The feedback generated in the service delivery is delivered to SL, SC, TSD, AM and LSD. This is a continuous and iterative process. And it will facilitate the next service delivery.</i>

Table 10 : Specifications of the Scenes 2

<b>Scenes</b>	<b>Players (Roles) in the Scenes</b>	<b>Landmarks in the Scenes</b>
<b>Project Bidding/Proposing</b>	Account Management Sales Technical Solution Development Customer Sales Control	Propose Solutions Negotiation Deal/Contract Fail to Reach Agreement
<b>Service Technical Realization</b>	Technical Solution Development Service Deliver Local Service Deliver Sales	Send Technical Requirement R&D/Realization Success Failure
<b>Service Solution Deliver</b>	Service Deliver Local Service Deliver Customer	Coordination with Local Partner Deliver Service Together
<b>Product-only Deliver</b>	Sales Customer Sales Control	Renegotiation Major-Product Deal Product Delivery
<b>Feedback &amp; Improvement</b>	Service Deliver Local Service Partner Customer Sales Account management Technical Solution Development	Send Feedback

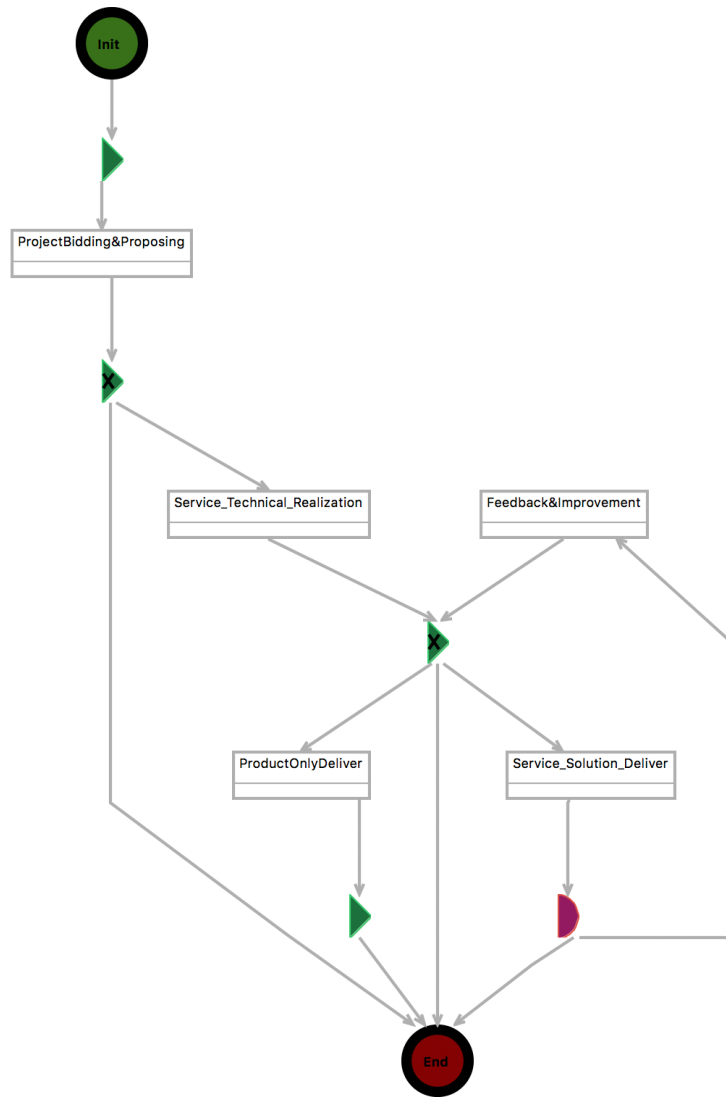


Figure 7 : Interaction Structure (IS) with the selected scenario

### 4.1.3 OM Normative & Communication Structure

#### Normative Structure

The normative structure of the OM consists of three types of **norms**, which are **role norms**, **scene norms** and **transition norms**. All norms are indexed within a role, but they are reflected in three different situations of the OM, which makes the three types of the norms (Dignum, 2004). The establishment of the normative structure is based on the interview data (see **Section 3.3.1** for details). In the *Operetta* development environment, norms are represented by PSD (partial state description). This is also a very important part of the OM, since it depicts the behaviors of a role.

In the following paragraphs, examples of role script and scene script that are showed will reveal what position the norms are playing in the system of the OM.

## Communication Structure

The communication structure represents the communications among the interacting roles. It is also interpreted by PSD (partial state description) in the *Operetta* environment by using the code to represent communications. PSDs are used in the landmarks in scenes, as well as the objectives and norms in the description of the roles, so that the details are able to be seen in the model. **Table 11** is a list of all the constants and variables created in the communication structure. The establishment of communication structure is also based on the interview data (see **Section 3.3.1** for details).

Table 11 : List of constants and variables in the communication structure

<i><b>Constants:</b></i>	<i><b>Variables:</b></i>
<i>Service</i>	<i>Proposal</i>
<i>Product</i>	<i>Price</i>
<i>Payment</i>	<i>Feedback</i>
<i>Deadline</i>	
<i>Customer Satisfaction</i>	
<i>Customer Qualified</i>	

## Scripts

The completion of the communication structure means the organization model (OM) is fully constructed. There are some different ways to look at this model. **Roles script** and **scene script** are two of the ways to understand the interactions in the organization. **Table 12** is an example of role script of the Account Management (AM). **Table 13** is an example of the scene scripts that gives detailed information of the scene of Project Bidding/Proposing.

Table 12 : Example of role script: role account management

<i><b>Role Script:</b></i> <i><b>Account Management (AM)</b></i>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• <i>Representing the company, maintaining good relationships with the customer.</i></li> <li>• <i>Responsible for the interactions with customers, such as proposing businesses, making contract with customers.</i></li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• <i>Bidding/Proposing projects to the customer</i></li> <li>• <i>Achieve country sales goal set by the board of company</i></li> </ul>

	<ul style="list-style-type: none"> <li>• Sign Contracts with customers representing the company</li> <li>• Coordinate with sales to determine the contract</li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• Decide the customer preference</li> <li>• Decide the preference of projects and business</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If Technical Solution Development and Sales agree, the Account Management is permitted to reduce the price in the bidding in order to gain advantages over other competitors.</li> </ul>

Table 13 : Example of scene script: scene of project bidding/proposing

Scene Script: <b>Project Bidding/Proposing</b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• Account Management (AM)</li> <li>• Sales (SL)</li> <li>• Technical Solution Development (TSD)</li> <li>• Customer (CM)</li> <li>• Sales Control (SC)</li> </ul>
<i>Results</i>	<ul style="list-style-type: none"> <li>• An agreement or disagreement between customers and company representatives over a project. The agreement should be in the form of a contract or purchase order.</li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• AM is in touch with CM <b>and</b></li> <li>• AM with SL, TSD proposed solutions <b>and</b></li> <li>• CM received the reviewed the proposal <b>and</b></li> <li>• SC pushes the AM, SL to negotiate with CM <b>and</b></li> <li>• Both parties reach agreements <b>or</b></li> <li>• Fail to reach agreement</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If CM is not positive about the proposal, SC is obliged to propel other roles to reach agreement.</li> <li>• If CM is not positive about the proposal. AM and SL are permitted to reduce the price in order to raise the chance of making deal.</li> <li>• If the TSD does not approve the proposal, AM and SL are prohibited to send the proposal to CM.</li> </ul>

## 4.2 Construction of *OperA*: Social Model (SM) and Interaction Model (IM)

In this section, **Social Model (SM)** and **Interaction Model (IM)** are constructed. The ultimate purpose of establishing the SM and IM in this research is to compare the OM with SM and IM, and the research questions will be answered by looking into the contrast of two essentially different models.

As explained, the essential difference of SM, IM to OM is that the SM and IM are based on **agents** instead of the roles. They are fundamentally differently defined in the *OperA* model. **Agents are the real existing characters and positions in the organization with social features and behaviors.** It could be responsible for either multiple roles or only one part of a role. Thus, the first subsection of Section 4.3 is to clarify the relations of roles and agents.

The second subsection is about the construction of Social Model. It is comprised of **social contract** and **role enacting agents (REA)**. The third subsection comes to describe the Interaction Model. To establish an interaction model, a number of sets of **interaction contracts** are the crucial elements to make up an interaction model. The establishment of the SM and IM are all based on the interview data (see **Section 3.3.1** for details). In the end of this section, social model and interaction model are well-established. And the explanation of the outcomes will be presented in the following sections.

### 4.2.1 Relations of Roles & Agents

Before a social model (SM) is constructed, we first need to identify the agents and its relations with the roles. According to data and information extracted from interviews (see **Section 3.1.1** for details), I could identify the agents and clarify the relations between the roles and agents. **Table 14** lists the agents in the Chinese organization that play the selected “roles” of the roles. Meanwhile, the relations of roles and agents are revealed in the table.

Table 14 reveals that the control and management of this Chinese organization is very centralized, and the location of the power is in China. The local subsidiaries do not have R&D or production facilities. It means the product offerings in all kind are designed and manufactured in China. In terms of the role responsibilities, it is very interesting that the sales is taken by three positions (agents). The service and product sales is separated for the service managers and the product managers to manage.

*Table 14 : Relations and explanations of roles and agents*

<b><i>Roles:</i></b>	<b><i>Agents:</i></b>	<b><i>Explanation:</i></b>
<i>Sales Control</i>	<b><i>Headquarter in China</i></b>	<i>*The Sales Control is operating in a global scale, and it is run by the headquarter located in China.</i>
<i>Account Management</i>	<b><i>Account Manager</i></b>	<i>*Account Manager and Service Manager both act in the role of Sales. On the other hand, they also serve as the roles of Account Management and Service Deliver.</i>
<i>Sales</i>	<b><i>Product Manager</i></b>	
<i>Service Deliver</i>	<b><i>Service Manager</i></b>	
<i>Technical Solution Development</i>	<b><i>R&amp;D in China</i></b>	<i>*There are no R&amp;D and production facilities in Europe in this case. They are all based in China.</i>
<i>Local Service Deliver</i>	<b><i>Local Service Partner</i></b>	<i>*Local Service Partner are local-based companies running similar business.</i>
<i>Customer</i>	<b><i>Customer</i></b>	<i>*Normally local customers.</i>

## 4.2.2 Social Model (SM) with REA (Role Enacting Agents) & Social Contract

Social model has an architecture that consists a set of **role enacting agents** with the description of their **social contracts**. Social contract is a description consisting of three elements, which are the agents, the role and the contract clauses. It specifies what the agents' behaviors are when the agents are acting according to the role. By sorting out the data that is collected, a set of social contracts that describes the REA is formed. **Table 15** lists the social contracts of all the agents.

## 4.2.3 Interaction Model (IM) with Interaction Contract

Interaction model specifies the activities of the REAs in the scenes which are specified in the OM. In the Section 4.2.3, the scene scripts extracted from the OM describes the desired interactions by the organization designers. However, when agents, as an instantiation of the roles, enact one of the roles in a specific scene, the real-life situation is different from the designed situation of the desired interactions. In this phase, the interaction model is used to interpreted the real-life interactions of the organization.

An interaction contract is comprised of a **scene**, a set of **agents** acting in the scene, a set of **contract clauses** for the scene, and a **protocol** of the scene. To explain, the scene in the SM is derived from the scene that is defined in the construction phase of interaction structure of the OM. **Table 15** specifies the contract clauses of an agent when interacting in a specific scene. For protocols, **Petri Net** will be adopted to visualize the protocols of the interaction contract. **Figure 8** is an example

of the protocols of a scene with the representation of Petri Net, where landmarks of scenes could be “places” and the REA is represented by special “places” with a token inside (Murata, 1989). In the end, with all elements gathered, the interactions of the agents in the organization are all integrated in this model.

Table 15 : A list of social contract agents

<b>Agents:</b>	<b>Roles enacting:</b>	<b>CC (Contract Clauses):</b>
<b>Headquarter in China (HQ)</b>	<i>Sales Control (SC)</i>	<ul style="list-style-type: none"> <li>• Forcing Sales to achieve sales goals using employee performance assessment system.</li> <li>• Setting up fixed sales goals based on last year's accomplishments.</li> </ul>
<b>Account Manager (AM)</b>	<i>Account Management (AMT)</i>	<ul style="list-style-type: none"> <li>• Maintain Customer relationship.</li> <li>• Introduce products and service solutions to customer.</li> <li>• Sign contract with customer.</li> <li>• Make income.</li> </ul>
<b>Account Manager</b>	<i>Sales (SL)</i>	<ul style="list-style-type: none"> <li>• Determine the content of contract, including the responsibilities of both sides.</li> <li>• Mostly local citizens (non-Chinese), have language barrier with Chinese employees</li> </ul>
<b>Product Manager (PM)</b>	<i>Sales</i>	<ul style="list-style-type: none"> <li>• Determine the content of contract related to product.</li> <li>• Deliver Product: delivery management</li> </ul>
<b>Service Manager (SM)</b>	<i>Sales</i>	<ul style="list-style-type: none"> <li>• Determine the content of contract in terms of service.</li> </ul>
<b>Service Manager</b>	<i>Service Deliver (SD)</i>	<ul style="list-style-type: none"> <li>• Deliver Service. Coordinate with local partner</li> </ul>
<b>R&amp;D in China (RD)</b>	<i>Technical Solution Development (TSD)</i>	<ul style="list-style-type: none"> <li>• Realize the technical service solution</li> </ul>
<b>Local Service Partner (LSP)</b>	<i>Local Service Deliver (LSD)</i>	<ul style="list-style-type: none"> <li>• Locally deliver the services together with the Chinese organization</li> </ul>
<b>Customer</b>	<i>Customer</i>	<ul style="list-style-type: none"> <li>• Negotiate with the account manager.</li> <li>• Provide feedback to the product and service management as well as local service partner.</li> </ul>

Table 16 : List of interactions contract (Exclude protocols)

<b>Scenes:</b>	<b>REAs:</b>	<b>CC (Contract Clause):</b>
<b>Project Bidding/Proposing</b>	<i>Account Manager Headquarter in China Customer</i>	<ul style="list-style-type: none"> <li>• Headquarter in China has ultimate controls over the global subsidiaries. Local subsidiaries have very limited power over the headquarter in the decision making.</li> <li>• Account managers are mostly locals because of the cultural affinity to local customers.</li> </ul>



<b>Service Technical Realization</b>	R&D in China Service Manager	<ul style="list-style-type: none"> <li>Limited communication between R&amp;D in China and Service Manager in Europe.</li> </ul>
<b>Service Solution Deliver</b>	Service Manager Local Service Partner Customer	<ul style="list-style-type: none"> <li>Local service partner tends to obey local rules rather than maintain partnership with Chinese company.</li> </ul>
<b>Product-only Deliver</b>	Product Manager Customer Service Manager Headquarter in China	<ul style="list-style-type: none"> <li>Service manager is willing to facilitate product sale, since 10% of product sale is counted as service sale in the employee performance assessment system according to the company rules.</li> </ul>
<b>Feedback &amp; Improvement</b>	Customer Service Manager Local Service Partner	

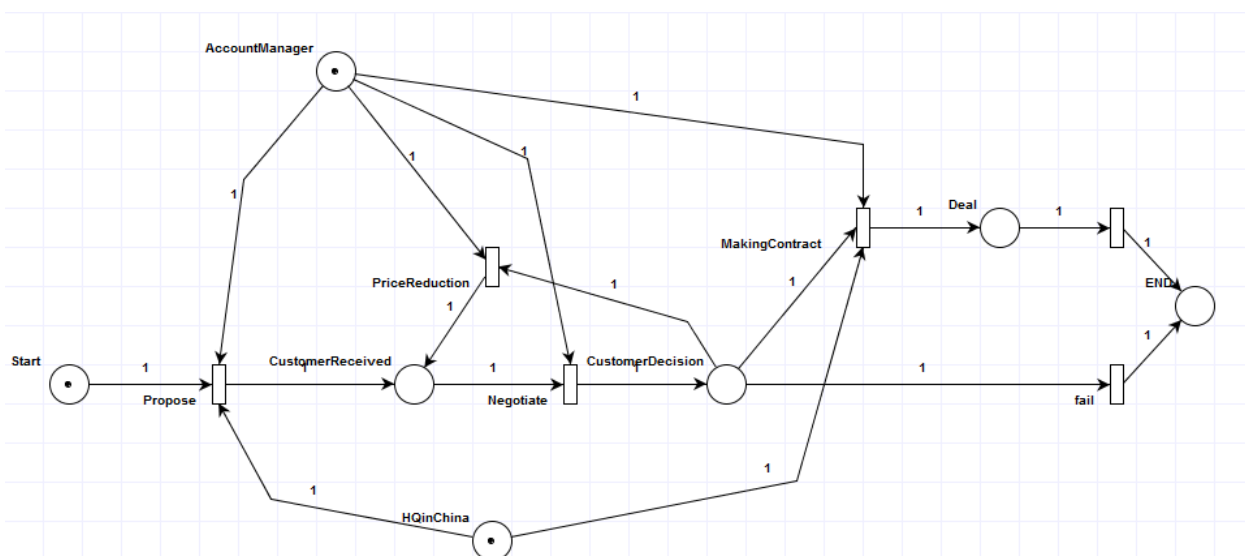


Figure 8 : Example of a protocol in the scene of Project Bidding/Proposing, using Petri Net

## 4.3 Model Validation

Apart from the measures to assure the validity of the data collection, the validation of the *OperA* model is implemented too. This phase involves a complete evaluation of the organization model (OM), social model (SM) and interaction model (IM). In order to validate the OM, SM and IM, I referred some empirical validation methods for the agent-based model (Moss, 2008; Windrum, Fagiolo, & Moneta, 2007; Dosi, Fagiolo, & Roventini, 2006; Werker & Brenner, 2004). I made a customized approach for the *OperA* model validation of the ServCo case. This approach plans to simulate the service-related scenarios of the historical cases in the ServCo subsidiary to test the model. The processes are as follows.

### Step 1

In order to simulate the scenarios that have previously taken place in the ServCo subsidiary, it is needed to first collect the data of the initial conditions of the historical scenarios that contain the service-related activities. The historical scenarios of service-related activities are collected through interviews. There is no need to include all the service-related activities for a specific scenario as what has been done in the selection of the scenario for the interaction structure during the construction of the OM, because the validation does not need a thorough analysis of the scenario for the servitization.

### Step 2

Second, by enabling each agent in the organization to enact its role in the multi-agent system according to the role's objective, norms, and interactions as well as the initial conditions of the specific scenario, it is able to achieve a result with possible outcomes of a specific scenario. The more scenarios are implemented for validation, the better calibration and validity can be achieved.

### Step 3

For the final step, I compare the simulated possible outcomes to the actual outcome of the historical scenarios. If they have a good match or a high degree of similarity, then the model is valid. Based on this measure, I am able to validate the OM, SM and IM or I can further calibrate them based on the comparison of actual outcome.

Due to the time limits of the master thesis project, I am not able to complete the entire processes of the model validation. However, in order to assure that the constructed model does not have major errors and defects, I reached the service managers to verify the information that is carried in this model. And the service managers confirmed the accuracy of this model. The validation of the model can be implemented in the future and further improve this model.

## 4.4 Model Analysis

In this phase of the research, we have constructed the complete *Opera* model, including the organization model (OM) representing the desired structure and interactions of the organization design, and social model (SM), interaction model (IM), representing the existing behaviors and interactions in the reality of the organization. Therefore, as explained in Chapter 3, in order to answer the main research question, we need to find the differences of the interactions between OM and SM, IM. And it will lead us to the influences on the organization caused by such differences. Eventually, I can find how the influences are imposed on the service-related activities as well as the servitization of the ServCo subsidiary.

Firstly, I compared the OM to SM and IM on a **scene-by-scene** basis. Within one scene, I could compare the two kinds of the models in terms of the **composition**, **interactions** and **norms of agents and roles**. The explanation and reason has discussed in **Section 3.2.2**. For the next step, I developed the explanation of the differences that are found in the comparison, and addressed their impacts to the service-related activities.

### 4.4.1 Comparison Within Scenes (OM to SM, IM)

#### *SCENE: PROJECT BIDDING/PROPOSING*

##### *Composition of Roles and Agents*

By looking at the composition of the roles and REAs acting in the same scene in **Table 17**, we could see that the roles of technical solution development (TSD) and part of the sales (SL) is absent in the duties of all REAs in this scene (service manager and product manager are not involved). It means TSD and partial SL are not involved in the proposing/bidding phase.

##### *Interactions/Norms*

In the IM, account manager, under the pressure of the fixed sales goal coming from headquarter, has the right to negotiate with customer and determine the contents of contract without the involvement of service manager (SVM), product manager (PM) and TSD. However, in the OM, this phase requires all the project stakeholders' involvement, which are the TSD, SVM and PM, in order to assure the feasibility of the proposed service solution. To further explore the causes of the unmatched situation, I find out four important facts:

- *The account managers (AM) are taking up two roles which are the sales and the account management.*
- *The account managers (AM) are almost all local language speakers (non-Chinese speakers).*

- *The Technical Solution Development (TSD) is physically staying in China.*
- *The role of Sales Control (SC) is taken by headquarter (agent) in China. And it is a global-scale control with ultimate authority in the organization. It focuses on the performance of the sales.*

The listed four facts explain the mismatch of the situation in two models. The AMs are taking up two roles so that they could skip the process of attaining consents from the SVMs and PMs. However, the AMs are mostly non-chinese speakers. The AMs normally do not communicate with TSD in China or the communications are based on Chinese SVMs and PMs as messengers, so that the communication is very limited.

On the other hand, the SC is a global-scale control. It means there are very limited local-issue concerns are taken into the considerations of the SC. It focuses merely on whether the subsidiaries/offices of each country achieve the sales goal each year. In order to achieve the sales goal, it is very likely to reduce the profit margin significantly by the AMs in the overseas subsidiaries.

*Table 17 : List of REAs and roles acting in the specific scenes*

<b>Scenes</b>	<b>REAs</b>	<b>Roles</b>
<b><i>Project Bidding/Proposing</i></b>	<i>Account Manager (AM) Headquarter in China (HQ) Customer</i>	<i>Account Management(AMT) Sales * Technical Solution Development (TSD) * Customer Sales Control (SC)</i>
<b><i>Service Technical Realization</i></b>	<i>R&amp;D in China (RD) Service Manager (SVM)</i>	<i>Technical Solution Development (TSD) Service Deliver (SD) Local Service Deliver (LSD) * Sales (SL)</i>
<b><i>Service Solution Deliver</i></b>	<i>Service Manager (SVM) Local Service Partner (LSP) Customer</i>	<i>Service Deliver (SD) Local Service Deliver (LSD) Customer</i>
<b><i>Product-only Deliver</i></b>	<i>Product Manager (PM) Customer Service Manager (SVM) Headquarter in China (HQ)</i>	<i>Sales (SL) Customer Sales Control (SC)</i>

<b>Feedback &amp; Improvement</b>	<i>Customer</i> <i>Service Manager (SVM)</i> <i>Local Service Partner (LSP)</i>	<i>Service Deliver (SD)</i> <i>Local Service Partner (LSP)</i> <i>Customer</i> <i>Sales (SL)</i> <i>Account management(AMT) *</i> <i>Technical Solution Development (TSD) *</i>
<b>‘*’ at the end of roles: it means that role is absent in the duties of all agents in the same scene.</b>		

### SCENE: SERVICE TECHNICAL REALIZATION

#### Compositions of Roles and Agents

We could find from **Table 17** that the LSD is not included in the duties of all agents playing in the scene of service technical realization. It means during the service solution design phase, opinions and feedback from the locals are not concerned in the design, which is deviating from the designed process of the OM.

#### Interactions/Norms

By looking at the interactions, SVM has very limited communication with TSD. It is a one-way communication instead of an inclusive discussion with the stakeholders. This is due to the geographical constraints that the TSD is located in China. It is unfamiliar for the TSD to design and realize the customized overseas projects which need to involve many cultural considerations. Thus, it could cause failure of providing satisfied service solutions for customer.

### SCENE: SERVICE SOLUTION DELIVER

#### Interactions/Norms

In this scene, there is no significant issue for the compositions of roles and agents. For interactions, it is also well-arranged in normal cases. However, in some cases, when the HQ (headquarter) gives orders to the LSP which may offend the local rules or regulations, the LSP tends to obey local rules and regulations. It happens sometimes when the HQ is not familiar with local rules, however gives orders to all the global partners. It affects the collaboration of the overseas subsidiaries and the local partners.

### SCENE: PRODUCT-ONLY DELIVER

#### Interactions/Norms

This scene follows when the service solution fails to be delivered or realized in the last scene. The Chinese organization decides to sell product instead of selling services + products for the purpose to maintain revenue. It is a less complicated and less repetitive process but a one-time job. However,

it is interesting that the SVM facilitates this process for the PM. The reason is that according to the company's rules, 10% of the product sale is counted as the service sale in the company's system.

### **SCENE: FEEDBACK & IMPROVEMENT**

#### **Compositions of Roles and Agents**

We could find from **Table 17** that the AMT and TSD are absent in the duties of all agents in the same scene of Feedback & Improvement. It means that the feedbacks from customers do not manage to be sent to the AM and RD.

#### **Interactions/Norms**

By looking into the interactions and norms in this scene, the reason why the customer's feedback could not reach RD is because of the distant location of RD, as well as the language barrier between employees. There is no formal channel in the organization for two agents to communicate. As for the customer's feedback to AMT, the AMT is merely taking the roles of the SL and AM. Service delivery and project delivery are not AMT's responsibilities.

## **4.4.2 Analysis Conclusion**

In this subsection, I summarized the facts and factors that were found in the scene-by-scene comparison of the OM and SM, IM in the last section. Next, I further developed and explained the connections of all the facts and factors as well as how they affect the service sale processes and the servitization in the Chinese organization.

*Table 18 : List of summarized facts and factors that impede the service-related activities of all scenes*

<b>Scenes</b>	<b>Facts and factors that hinder the service sale process</b>
<b>Project Bidding/Proposing</b>	<ul style="list-style-type: none"> <li>• The account managers (AM) are taking up two roles which are the sales and the account management.</li> <li>• The account managers (AM) are almost all local language speakers who are also non-Chinese speakers.</li> <li>• The Sales Control (SC) is taken by the headquarter (agent) in China. It is a global-scale control with ultimate power which focuses on the performance of the sales.</li> </ul>
<b>Service Technical Realization</b>	<ul style="list-style-type: none"> <li>• The Technical Solution Development (TSD) and R&amp;D (RD) are located in China.</li> </ul>
<b>Service Solution Deliver</b>	<ul style="list-style-type: none"> <li>• When the collaborative work requires Local Service Partner (LSD) to disobey local rules or regulations, LSD tends to refuse to do it.</li> </ul>
<b>Product-only Deliver</b>	<ul style="list-style-type: none"> <li>• Sales (SL) would like to facilitate the product-only sale if they fail to sell service solution + product, since according to the company's rules, 10% of the product sale is counted as service sale in the company's performance assessment system.</li> </ul>

<b>Feedback &amp; Improvement</b>	<ul style="list-style-type: none"> <li>• <i>There is no formal channel in the organization for R&amp;D and Account manager to communicate. As for the customer's feedback to AM, AM is merely taking roles of the SL and AMT, which means he/she will not be involved in the following phases after signed the contract.</i></li> </ul>
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**Table 18** summarizes the findings for the scenes-by-scene comparison of OM and SM, IM. According to the literature review that specified the servitization in the Chinese MNE greenfield subsidiary in **Chapter 2**, three general aspects are paid attention to analyze these facts and factors that impede the service-related activities, which are respectively the **geographical, cultural and structural effects**. The analysis as follows will discover the reason why the service sale is undermined, and further discover the causes of the servitization difficulty of ServCo subsidiary.

### *Geographical effects*

**Location** plays a crucial role in the service sale processes. Due to the centralized control and the distant locations of R&D facilities, two elements of the service-related activities are significantly affected.

The first one is the **inclusiveness of the service design**. In principle, the service and service solution designing are proceeded and accomplished in the R&D facilities in China. It is very likely to exclude the opinions, values, and feedbacks of various foreign markets in the service offerings. Therefore, in some occasions, the service offerings have to be adjusted to become local-customized. However, this could be a failure to be realized, or take an extra-long time to be achieved. It greatly hurts the customer satisfaction that was accumulated in the previous projects.

The second important element is the **global-scale sales control**. This is highly connected to the centralization of the MNE structure. Thus, the influences of this element will be explained in the following subsection.

### *Cultural effects*

**Cultural issues** between the greenfield establishment countries and China are crucial problems to be tackled. In the service-related activities, the influences of the cultural differences within the organization are reflected in the **communications with the locals and stakeholders**, which is concerned about two aspects in the selected scenario, respectively the **partnership with the local service partner (LSP)**, and the **intimacy with customers**. As for the partnership with LSP, in terms of the management style of executing orders, the Chinese subsidiaries tend to be obedient

rather than follow local customs in this case. However, LSP is the other way around, who follows the local customs, rules, and protocols. This may cause chaos during the service delivery.

In terms of intimacy with customers, it is reflected in the compositions of the Account Managers. Mostly, account managers are local language speaker and local citizens since they are capable of increasing the local-customer intimacy. However, they do not have the advantages as Chinese employees who are more intimate with the Chinese supervision team and R&D team in the headquarter. It causes the cultural disconnection in the organization. For instance, in the communications with the Chinese subsidiary, the customers are dealing with two culturally different groups of people in a continuous project with the same company. It may affect the customer satisfaction of the service delivery. Comparing to the product sale, it is relatively more efficient. Once the customer understands the standard parameters of the product, there are no further cultural issues for making the purchase order.

### *Structural effects*

In this section, the effects of the two types of structures are discussed, which are the **global parent-subsidiary structure** which refers the structural connection between the parent company and its overseas subsidiaries, and the **arrangement of the roles in the organization** that specifies the agents' duties of taking up roles in the organization.

In case the ServCo subsidiary, the **global-scale sales control** is implemented and uses the performance of sales as an indicator to horizontally compare all the overseas subsidiaries' performance globally. And it distributes the resources, such as financial support, based on the sales performance of each subsidiary. Therefore, sales become extremely crucial for all the subsidiaries. In order to achieve the sales goal, overseas subsidiaries focus on maintaining enough sales for each season, which is a short-sighted strategy sometimes, because it left fewer rooms for spending resources and time to develop the market while dedicating to increase sales. On the other hand, it may significantly affect the customer satisfaction because the company pursues the speedy project delivery to ensure the revenue. The quality of the project sometimes may be undermined because of the speedy project delivery. This undermines the customer satisfaction.

However, on the other hand, the product sale is very efficient for maintaining the revenue and sales. As mentioned, there are no cultural and geographical issues for product sale activities. Therefore, product sale turns out to be suitable for the sales-oriented global structure.



Concerning the **arrangement of roles** in the organization, some arrangements are making negative impacts to the service-related activities. First, the account manager (AM) is taking up the roles of both account management and sales. This arrangement increases the efficiency of assuring revenue, however on the other hand, causes very serious problems for the service development and delivery, since it allows service manager to determine the obligations in the contract while skipping the processes that involve the opinions from service manager, local service partner and R&D team. The possibility of successful service delivery could be significantly reduced so as to undermine the customer satisfaction.

## Chapter 5 Conclusion and Discussion

This thesis is devoted to exploring the causes of servitization difficulty of the Chinese multinational enterprise (MNE) greenfield subsidiaries with the adoption of an agent-based model, *OperA*. In this thesis, an exploratory single-case study of a greenfield subsidiary of Chinese MNE is conducted. Causes of the servitization difficulty regarding geography, culture, and structure of the organization are found in the case of ServCo B.V in the Netherlands.

The thesis report consists five chapters. The **first chapter** introduced the motivation, purpose of the research, as well as the description of the research problem, objectives and questions. The **second chapter** reviewed the literature that studied the relevant academic subject and defined the research items. Meantime it provided the fundamental and theoretical basis of my research problem, research design, and research approach. It also reviewed the introduction of the multi-agent system and agent-based models, and the options of other agent-based models that could be adopted to my research. The **third chapter** described the research method, research design and research approach with explanations and arguments. It also explained the reason of why to use *OperA* model for the case study with the explanation. The **fourth chapter** illustrated the process of the construction of the *OperA* model and showed the findings of the case study with systematic analysis.

In this chapter, I will link the findings that are found in the previous chapters to the research questions that are proposed in Chapter 1. Then I will discuss the findings and talk about what the findings imply to the topic. The academic and practical contribution are discussed as well. In the end, the limitations and constraints of this research are addressed. In the meantime, the recommendation for the future research is proposed in response to the limitations of this research.

## 5.1 Findings

In summary, this research was carried out for achieving the following research objective:

*To explain the causes of servitization difficulty in the greenfield subsidiaries of Chinese multinational enterprises (MNEs)*

This research uses an exploratory single-case study approach that is based on the agent-based organization modelling. The agent-based model *OperA* is adopted for modelling the case of a Chinese MNE greenfield subsidiary: ServCo subsidiary in the Netherlands. The qualitative and inductive research analysis is used for the model analysis.

The research outcomes showed that geographical distance between the parent corporation, R&D facilities and overseas subsidiaries is one of the major factors that impede the servitization because the Chinese MNEs tend to design and manufacture the service and product in China, which causes the limitations of the inclusiveness in the service design. And this affects the user experience of the services.

The cultural factors also make an enormous impact to the servitization. Especially the poor communication between the local staff and the Chinese staff causes incoherence in the project. In addition, the collaboration with local service partners is also affected by the cultural incoherence. These situations affect the customer satisfaction.

The structural factors, such as the global-scale sales control, overlook the local circumstances of the subsidiaries by setting up a fixed sales goal for all the greenfield subsidiaries of different countries. This measure of the control is destructive for the service sales and servitization in nature, since a service solution project needs considerable pre-investments. The period of profitability for the service project is longer than the time that the subsidiary could endure if the subsidiary is fully devoted to achieving the sales goal. Therefore, the service sale is undermined.

### 5.1.1 Answer for Research Questions

*Answers for the sub research questions:*

1. *“What is servitization and how does it contribute to organizations?”*

In Section 2.1, I mentioned that the servitization can be looked at from different perspectives. Therefore, there are different definitions of servitization with different focuses. For this research,

Baines (2007, p.9)'s definition of servitization as *“evolution of product identity based on material content to a position where the material component is inseparable from the service system”* is adopted as the definition of the “servitization” appears in the thesis report.

Talking about the contribution of the servitization, the servitization is able to increase the customer engagement and intimacy by offering services. The increasing varieties of the service offering dramatically boosted the consumption of the customers as well as the customer satisfaction. It also contributes to the sustainable patterns of the consumption and economy, which is beneficial for the formulation of the policies in the society. Moreover, it can further benefit the environments by reducing the waste of product's life. (For the details see Section 2.1.)

2. *“What are the causes of the servitization difficulty encountered by the companies according to the existing studies?”*

As what has been listed in Table 1 of Section 2.2.1, there are two major categories of the causes of servitization difficulty has been found according to the review articles that summarized the existing studies. They are external causes and the internal causes. External causes mainly concern about the customer acceptance of the services and the markets conditions. The legislation and policies are also included as the external causes. As for the internal causes, the lack of many capabilities in the company is one of major causes of servitization difficulty, such as the lack of service design, good service marketing strategies, the training of staffs, and technology know-hows. The employees' resistance to change is also a major internal cause as well. (For the details see Section 2.2.)

3. *“What are the characteristics of these organizations for which there are studies of the causes of the servitization difficulty?”*

There are various organizations that were studied in terms of the servitization difficulty. As what has been showed in Table 2, each research studied one or multiple different organizations. The characteristics of the studied organizations are indicated in Table 2. The first thing to mention is that the research tends not to expose too much information of their studied organization since the internal information of the companies is confidential. Second, only a few characteristics can be summarized from these studies. For instance, the organizations are mostly manufacturing and technological companies. And they are based in Europe, US, Japan and China. None of the studies suggested that there are the correlations between the nationalities or regions of the company to the causes of servitization difficulty in the company. And implications could be found that the causes

of servitization difficulty are correlated to the specific characteristics and strategies of the organization. (For the details see Section 2.2.)

4. “What are the differences between these studied organizations and the greenfield subsidiaries of the Chinese MNE?”

Three characteristics of the Chinese MNE greenfield subsidiary are identified, which are the centralized control of the parent organization, Chinese local R&D and production, and the preference of Chinese expatriates for employment. Comparing to the studied organizations, there are very few cases that specified the nature of a subsidiary, or greenfield subsidiary of the studied organization in the existing studies. And none of these studies specified the human resources and the culture of the organization. Even some research specifically studied the multinational firms, however, they did not indicate how the relations among its subsidiaries affect the servitization of the MNE. (For the details see Section 2.2.)

5. *“What kind of adaptations must be done to implement in order to evaluate the servitization for the Chinese MNE greenfield subsidiary?”*

Agent-based model *OperA* is adopted to study the servitization difficulty in the Chinese MNE greenfield subsidiary. Agent-based modelling provides a different approach to study the organization transition. It is able to connect the organizational behaviors to the individual behaviors in the organization, and simulate organization’s interactions in different scenarios so that we could find out the causes of the organizational behaviors at micro level. *OperA* model as an agent-based model with novel architecture, is able to make the abstraction of the actual agents in the organization and create a system with two levels of the models. One is the desired situation of the organization, and the other one is the actual situation of the organization. With the help of this special design of the *OperA*, it is able to find out the causes of the problems in the organization. (For the details see Section 2.3 and Section 3.1.)

6. “How should those adaptations be implemented in order to evaluate the servitization for the Chinese MNE greenfield subsidiary?”

In Section 3.1, I have argued that why I chose the *OperA* model as the agent-based model to be applied in the Chinese greenfield subsidiary in this case study. And I explained that the research would be conducted through an exploratory case study of the ServCo subsidiary in the Netherlands.

In terms of how to apply the *OperA* model to the ServCo subsidiary in the Netherlands, I considered the internal organization of the ServCo as a multi-agent system. Based on this, I specified the agents and their norms, values, behaviors and interactions, as well as the scenarios in the organization from the collected data. With the information and data that are collected from the employees in the organization, I formed the organization model (OM), social model (SM) and interaction model(IM) that compose the *OperA* model according to the techniques of the *OperA*. Since the OM represents the desired situation of the organization, while SM and IM represent the actual situation of the organization. By comparing these models, I am able to identify the causes of servitization difficulty. (For the detail see Section 3.2 and 4.1, 4.2.)

### ***Answer for the main research questions:***

*“What are the causes of the servitization difficulty in the greenfield subsidiaries of Chinese MNE?”*

In summary, the three causes of the servitization difficulty of Chinese greenfield subsidiary that are found in the case study are respectively the distant Chinese-only R&D facilities, the cultural barriers of the employees, and the centralized control of the parent corporation. The causes are explained as follows.

*Table 19 : Explanation of the causes of servitization difficulty in Chinese MNE greenfield subsidiary*

<b><i>Causes of Servitization Difficulty</i></b>	<b><i>Explanation</i></b>
<i>Distant location of the Chinese-only R&amp;D facilities</i>	<i>The geographical distance between the parent corporation, R&amp;D facilities and overseas subsidiaries is one of the major factors that impede the servitization, because the Chinese MNEs tend to design and manufacture the services and products in China, which causes the limitations of the inclusiveness in the service design. And this affects the user experience of the services.</i>
<i>Cultural barriers of the employees</i>	<i>Cultural factors make an enormous impact to the servitization. Especially the poor communication between the local staff and the Chinese staff in the subsidiary causes incoherence in the project. In addition, the collaboration with the local service partners is also affected by the cultural incoherence. These situations affect the customer satisfaction significantly.</i>
<i>Centralized control of the parent corporation</i>	

	<p><i>The structural factors, such as the global-scale sales control, overlook the local circumstances of subsidiaries by setting up a fixed sales goal for all the greenfield subsidiaries in different countries. This measure of controlling is destructive for the service sales and servitization in nature, since the service solution project needs considerable pre-investments. The period of profitability for the service project is longer than the time that the subsidiary could endure if the subsidiary is fully devoted to achieving the sales goal. Therefore, the service sale is undermined by this type of structure.</i></p>
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## 5.2 Contribution and Implication

### 5.2.1 Implication

We have developed the causes of the servitization difficulty in the Chinese multinational firms. The conclusion makes me inevitable to think about the nature of service offering and product in terms of the sale. This is also very important for the company to consider if the servitization is the appropriate strategy for them. Because of the inherent difference of the product sale and the service sale, the servitization encounters different obstacles in different organizations. It is discovered from the analysis in the research that the **service solution** and **service offerings** need long-term spending for the company to develop the market before gaining profitability from the service. On other hand, it also needs the long-term partnership with the stakeholders including customers to earn trust from the customers.

To further explain, service solution and service offering requires customization for each customer, especially in the big projects of B2B field. As found in this research, the service project costs tremendous resources to build before it can assure the profitability. For instance, the project aims to provide a cutting-edge ICT system for a big corporation which includes data center construction and digital migration that require a high degree of customization of the service and service solution. In respect to this type of the project, it is very similar to the infrastructure construction. Pre-investment will be applied and the company will profit from the following years of the service subscription. This is considered as a sustainable source for the company's development. Besides, as what the managers of the interview participates mentioned, in order to win the bid for these type of project, it needs a good reputation to prove the company's service capabilities to the customers since service solution by nature is a very complicated system that could be vital to the customer company. Mistakes or errors may cause huge loss to the customer company. However, to build such good reputation, it also needs more investments to develop the reputations, images, and trust from the customers. During this period of building reputations, the profitability is also relatively low since reducing price would be the best weapon to win the bid before the company has a good reputation, especially for the companies from China. Inevitably, this process will further undermine the company's determination to be "servitized". In this research, we find that the center research facilities of ServCo are mostly located in China and fixed sales goals are set for each overseas subsidiary. These reflect the company's indetermination to the servitization and the compromise that has been made for assuring profits.

On the other hand, the **product** is the other way around in some ways. In the research, we found out that selling product is a very efficient approach to assure good sales record and the revenue for the overseas subsidiaries. The reason is that the performance and the specifications of a specific



product can be tested beforehand, which does not require the customers to take enormous risks of making the purchase. Comparing to the service capabilities, the performance of a specific product is easy to be tested and less complicated to demonstrate the product capabilities. Even when there are malfunctions of the installed bases happened, it could be solved by the warranty that enables speedy replacement of the faulty products. The reputation is easier to be built than service capabilities because there are less risks. It does not need a long period for the company to earn trust from the customers. In this research, the researched organization is very suitable for the product sale in many aspects, such as hiring many local account managers to attract potential customers. However, it results in that the price becomes the most crucial factor for sales. By giving discounts to customers, the long-term profit margin for product sale is relatively lower to the service sale. Namely, products are less profitable than services in a long run. Therefore, we could consider selling products as a **short-term strategy** to ensure the profit in a certain period. And the servitization is a **long-term strategy** to profit with a huge potential to achieve huge and sustainable profitability.

## 5.2.2 Academic Contribution

Talking about the **academic contribution**, this research explains the reasons of why the Chinese MNE greenfield subsidiaries are facing many obstacles. By looking into the characteristics of the organization, this research suggested that the performance of the servitization is correlated to the organizational features. It also provides insights of the organization of the Chinese Multinational firms. On the other hand, using agent-based model *Opera* to study the servitization in the organization is served as an exploration of a new approach to study the servitization. The insights that are explored from this approach is able to assist the future studies of other research problems regarding the servitization.

The status quo of the studies of servitization difficult has put numerous efforts on studying the features of servitization. Case studies were carried out in various organizations. However, they tend not to specify the relations between the performance of the servitization and the characteristics of the organization (See section 2.2.2). Servitization as an ambiguous concept is highly depended on the situation and conditions of the company. This results in a limited value of the findings for these studies to give implications to the studies of other organizations. In response to this problem, this research establishes the connections between some features of organization to the servitization difficulty, which enables the understanding of the root causes of servitization difficulty in a specific type of organizations. Even through the single case study of ServCo is not able to make a generalizable conclusion, it still specified the connections between some organizational features and the servitization, which is able to give academic insights for the similar studies.

On the other hand, despite the fact that, as a rising power of the world business, more and more attention has been paid to the Chinese MNEs as the subject of the academic research. Only very few studies focus on the servitization of the Chinese MNEs. Also, currently there is still a limited number of the Chinese corporations that have largely internationalized. In the future, there will be more and more Chinese MNEs that may impose significant influence on the global economy. This research takes up the role as a pioneer to study the organizations of Chinese MNE subsidiary. It specified the characteristics of the greenfield subsidiary of which there are very few studies that covered this topic. Therefore, the research provides some insights for the Chinese corporation studies.

In respect to the research approach, since the more integrated world economy and the more engaged international businesses have made the servitization face even more complicated environment, the traditional research approach, it seems, is becoming unfit to analyze the complex organizational interactions of the stakeholders of servitization. On the other hand, many previous researches only studied the single-factor effects on the servitization. However, the results have become obsolete since the complex environment involves multiple factors that may exert impacts on the servitization (Buschmeyer, Schuh, & Wentzel, 2016; Bustinza, Bigdeli, Baines, & Elliot, 2015). The focus of the research ought to be put in the collective effects of the complex environment on the servitization instead of the effects of an individual factor. This research uses the agent-based model *Opera* to study the servitization in the organization. It is served as an exploration of a new approach to study the servitization. The agent-based model connects the macro-level organizational behaviors to the micro-level individual behaviors, which enables the understanding of the phenomena in the organization. It is good at the analysis within a multi-agent system or in a system with changing environment. The insights that are explored from this approach are able to assist the studies of other research problems regarding the servitization.

### 5.2.3 Practical Contribution

Talking about the **practical contribution** of this research, servitization is a crucial corporate strategy in many product-oriented Chinese MNEs that aim to develop new market and deliver new values to their customers. In the global dynamic business environment, companies in the process of the servitization are facing a complicated situation. This research enables the Chinese MNEs to understand what problems of the servitization they are facing and how could the servitization be affected by the unknown factors in the global environment. On the other hand, people in the industries of different countries could be aware of the challenges of the globalization of Chinese

MNEs, as well as the issues that they are facing. Understanding their problems will be helpful to establish better business cooperation and networking connections with the Chinese MNEs.

### *Contribution for the ServCo Subsidiary*

*(Confidential)*

### *Contribution to Management of Technology*

The servitization research has contributed for the management-of-technology domain. First, the servitization often takes place in technology firms. It is a corporate strategy to improve the performance and the profitability of the company's technology capabilities. One of the contribution of servitization is to help the company to promote its technology competence and gain advantages. The competitiveness, productivity, customer satisfaction, and profitability of the company can be significantly increased by servitization (Mont, 2002). Therefore, servitization study could contribute to the better management of its technologies in the company.

On the other hand, the techniques of agent-based modelling are adopted in this research, which is another contribution to the management-of-technology domain. This research adopts the agent-based modelling to study an organization transition. It is an example of using the technology to analyze the company's problems and further provide insights for the improvement of the corporate strategy. The agent-based modelling simulates the operations in the company and helps the company managers to understand the problems in the corporate management. With the agent-based modelling, the managers can improve the management of the company based on the analysis of modelling outcomes. This is also a demonstration of the contribution to the management-of-technology domain by this research.

## 5.3 Research Limitations & Advice for Further Research

### 5.3.1 Research Limitations

The research is built upon the literature and empirical findings. The limitations of this research can be identified as follows.

First, the exploratory single case study has weaknesses in the generalizability. Even though I have identified the specialties of the greenfield subsidiaries of Chinese MNEs in order to make the outcomes could be applied in other organizations with the similar specialties, still the single case study of one of the ServCo foreign subsidiaries has other underlined specific conditions that undermine the generalizability of the theory, such as the degree of the development of the local market and economy. The insufficient amount of cases has many constraints on the generalizability of the research outcome. Therefore, in order to maintain the depth of this single-case study, this research does not aim to generalize the findings.

Second, ideally, in the data collection phase, the interviews should be performed with a large number of employees and staffs within the ServCo subsidiaries of numbers of countries, including the headquarter in China. However, a total number of seven interviews were conducted. This problem is mainly due to that there is a limitation of the number of people I could reach for valid interview data in the organization. Since the research organization is a multinational organization, there are some expected interview participants who are based in China. The geographical limitation does not allow me to interview the participants in China as many as who I could reach in the Netherlands. Another situation is that for a short-term master thesis project, I could only process limited number of interview data. It does not allow me to interview people with a huge number. All in all, these might undermine the result's reliability.

Third, this study is limited to find the internal causes of the servitization difficulty. The research does not cover the external effects from the stakeholders, which results in a limitation in analyzing the behaviors of the organization transition. Some collected data has suggested that there are evidences for the stakeholders' influences on the servitization. However, there is no proper argument could be drawn from this model simulation to support those data. Therefore, if I put the scope on the external influences on the "servitizing" organization, such as the influences of policies, legislations and business environment, the insights would provide additional depth to the research.

### 5.3.2 Future Research Recommendations

In response to the research limitations that are explained above, there are many optional directions could be adopted for further research of this topic. Firstly, the future research could be further implemented upon the current research by expanding the quantity of case studies. The cases could be in different industries or locations of countries to enhance the generalizability.

Another approach is to explore the cause of servitization difficulty from an external point of view. Instead of studying the internal interactions of the organization, the future research can explore the interactions among multiple organizations or other stakeholders, and see if these interactions impede the servitization in the organization.

Moreover, I suggest a comparative case study that contrasts different cases of the servitization in other Chinese MNE greenfield subsidiaries. This approach could find out what similarities of the servitization in the different Chinese MNE greenfield subsidiaries are, as well as what the distinctions are. This approach could further help my research in terms of the generalizability.

A longitudinal study of the ServCo subsidiary could also be an option for the future research. More details of the organizational transition could be found through longitudinal study. It could provide more evidence to the theory of this research. And possibly, more additional scenarios of the servitization could be found in such study.

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## Appendix A: Organization Model (OM) Role Specification

<i><b>Roles</b></i>	<i><b>Objectives</b></i>	<i><b>Norms</b></i>
<i><b>Sales Control (SC)</b></i>	<ul style="list-style-type: none"> <li>• Set fixed sales goal for product sale, service sale and country total sale</li> <li>• Propel Account Management and Sales to achieve goals and assure income.</li> </ul>	<ul style="list-style-type: none"> <li>• If the sales goal is not fulfilled, Sales Control is <b>obliged</b> to propel all sales team to achieve goals.</li> <li>• If CM is not positive about the proposal, SC is <b>obliged</b> to propel other roles to reach agreement.</li> </ul>
<i><b>Account Management (AMT)</b></i>	<ul style="list-style-type: none"> <li>• Bidding/Proposing project (to customer)</li> <li>• Achieve country total sales goal</li> <li>• Contracting (Make income)</li> <li>• Coordinate with sales</li> <li>• Maintaining customer relationships</li> </ul>	<ul style="list-style-type: none"> <li>• If Technical Solution Development and Sales agree, the Account management is <b>permitted</b> to reduce price in the bidding in order to gain advantages over other competitors.</li> </ul>
<i><b>Sales (SL)</b></i>	<ul style="list-style-type: none"> <li>• Achieve sale goal product</li> <li>• Achieve sale goal service</li> <li>• Request for technical services solution</li> <li>• Negotiate with customer</li> <li>• Coordinate with account management</li> </ul>	<ul style="list-style-type: none"> <li>• If the Service Realization fails, Sales is <b>permitted</b> to facilitate the product sale in order to maintaining sales income (company rules).</li> <li>• If the local “rules” are in collision with the SC’s interest, the SL is <b>obliged</b> to follow the SC’s instruction.</li> </ul>
<i><b>Technical Solution Development (TSD)</b></i>	<ul style="list-style-type: none"> <li>• Service Solution Realization</li> <li>• Facilitate Local service deliver</li> <li>• Communication with Customer</li> </ul>	<ul style="list-style-type: none"> <li>• If the Solution Request sent to TSD, TSD is <b>obliged</b> to develop the solution by the deadline in contract.</li> <li>• If the TSD does not approve the proposal, AM and SL is <b>prohibited</b> to send proposal to customer.</li> </ul>
<i><b>Service Delivery (SD)</b></i>	<ul style="list-style-type: none"> <li>• Service Solution delivery to the customer.</li> <li>• Coordinate with Local Partner.</li> <li>• Take feedback from customer.</li> </ul>	<ul style="list-style-type: none"> <li>• If the local “rules” are in collision with the SC’s interest, the SL is <b>obliged</b> to follow the SC’s instruction.</li> </ul>

<b><i>Local Service Delivery (LSD)</i></b>	<ul style="list-style-type: none"> <li>• <i>Deliver Service Solution with Chinese Company</i></li> <li>• <i>Obey Local Rules</i></li> <li>• <i>Coordinate with Service Delivery</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>If the Chinese subsidiary's interests are in collision with the local law or regulation, LSP is <b>obliged</b> to obey local rules.</i></li> </ul>
<b><i>Customer</i></b>	<ul style="list-style-type: none"> <li>• <i>State the requirements of the project.</i></li> <li>• <i>Negotiate with the service supplier.</i></li> <li>• <i>Make deal with the service supplier. Send purchased order.</i></li> <li>• <i>Evaluate the received Proposals and make priority.</i></li> <li>• <i>Provides feedback.</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>If the purchase order is sent, the customer is <b>prohibited</b> to withdraw the payment for the project.</i></li> </ul>

## Role scripts:

<i>Role Script:</i> <b><i>Sales Control (SC)</i></b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• <i>To ensure the global total sales volume of the Chinese MNE organization.</i></li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• <i>Set fixed sales goal for product sale, service sale and country total sale</i></li> <li>• <i>Propel Account Management and Sales to achieve goals and assure income.</i></li> <li>• <i>To issue strategic order for achieving better sales performance</i></li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• <i>Have ultimate control over the subsidiaries' decision, strategy and finance management.</i></li> <li>• <i>Decide how much discount could be offered.</i></li> <li>• <i>Determine the fixed sales goal each year for each subsidiary.</i></li> <li>• <i>Ultimate determination of the big contract.</i></li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• <i>If the sales goal is not fulfilled, Sales Control is <b>obliged</b> to propel all sales team to achieve the goals.</i></li> <li>• <i>If Customer is not positive about the proposal, SC is <b>obliged</b> to propel other roles to reach agreement.</i></li> </ul>

<i>Role Script:</i> <b>Account Management (AMT)</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• Representing the company, maintain good relationship with customers.</li> <li>• Responsible for interactions with customer, such as proposing business, make contract with customer.</li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• Bidding/Proposing projects to the customer</li> <li>• Achieve country sales goal set by the board of company</li> <li>• Sign Contracts with customers representing the company</li> <li>• Coordinate with sales to determine the contract</li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• Decide the customer preference</li> <li>• Decide the preference of projects and business</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If Technical Solution Development and Sales agree, the Account management is <b>permitted</b> to reduce price in the bidding in order to gain advantages over other competitors.</li> </ul>

<i>Role Script:</i> <b>Sales (SL)</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• Responsible for the communication with customer and to push the process of reaching agreement with customer.</li> <li>• To ensure the fixed sales goal of the subsidiary company is achieved each year.</li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• Achieve sale goal product</li> <li>• Achieve sale goal service</li> <li>• Request for technical services solution</li> <li>• Negotiate with customer over the contract obligations</li> <li>• Coordinate with AMT on determination of the contract</li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• Approve the obligations of the contracts</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If the Service Realization fails, Sales is <b>permitted</b> to facilitate the product sale in order to maintaining sales income (company rules).</li> <li>• If the local “rules” are in collision with the SC’s interest, the SL is <b>obliged</b> to follow the SC’s instruction.</li> </ul>



<i>Role Script:</i> <b>Technical Solution Development (TSD)</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• The assure the proposed service solution can be realized on-site for the project.</li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• Realize the proposed service solutions in the obligations of contract</li> <li>• Facilitate LSD to deliver service to customer</li> <li>• Communication with Customer</li> <li>• Taking feedbacks in order to improve the current service and the future project.</li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• TSD is authorized to determine technically if the service solution can be realized or not.</li> <li>• TSD is authorized to determine technically if the proposed service solution is feasible or not.</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If the Solution Request sent to TSD, TSD is <b>obliged</b> to develop the solution by the deadline in contract.</li> <li>• If the TSD does not approve the proposal, AM and SL is <b>prohibited</b> to send proposal to customer.</li> </ul>

<i>Role Script:</i> <b>Service Delivery (SD)</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• To ensure the realized service solution could be delivered to the customer smoothly and functionally.</li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• Service Solution delivery to the customer.</li> <li>• Coordinate with Local Partner.</li> <li>• Take feedback from customer.</li> </ul>
<i>Rights</i>	
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If the local “rules” are in collision with the SC’s interest, the SL is <b>obliged</b> to follow the SC’s instruction.</li> </ul>

<i>Role Script:</i> <b>Local Service Delivery (LSD)</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• To facilitate the service delivery of the Chinese MNE subsidiary.</li> <li>• To obey the local rules, law and regulations.</li> </ul>
<i>Sub-Objectives</i>	
<i>Rights</i>	<ul style="list-style-type: none"> <li>• Deliver Service Solution with Chinese Company</li> <li>• Obey Local Rules</li> <li>• Coordinate with Service Delivery</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If the Chinese subsidiary's interests are in collision with the local law or regulation, LSP is <b>obliged</b> to obey local rules.</li> </ul>

<i>Role Script:</i> <b>Customer</b>	
<i>Objective</i>	<ul style="list-style-type: none"> <li>• To assure the requirements are met in terms of the completion of the project.</li> <li>• Make sure the cost and duration of the project is less enough to meet the requirement.</li> </ul>
<i>Sub-Objectives</i>	<ul style="list-style-type: none"> <li>• State the requirements of the project.</li> <li>• Negotiate with the service supplier.</li> <li>• Make deal with the service supplier. Send purchased order.</li> <li>• Evaluate the received Proposals and make priority.</li> <li>• Provides feedback.</li> </ul>
<i>Rights</i>	<ul style="list-style-type: none"> <li>• Customer has the right to determine the contract obligations of the all the party in the contract.</li> <li>• Customer has the right to determine the cost of the project.</li> <li>• Customer has the right to decide if the proposal is taken.</li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• If the purchase order is sent, the customer is <b>prohibited</b> to withdraw the payment for the project.</li> </ul>

## Appendix B: Organization Model (OM) Scene Specifications

<i>Scenes</i>	<i>Description of the Scenes</i>
<b><i>Project Bidding/Proposing</i></b>	<i>In the first scene of the selected scenario, the AMT gets in touch with the customer and negotiates over the feasibility of the project. This process will involve the discussion with TSD, SL and SC. If customer agreed, they will determine the clauses of the contract together. If customer is not satisfied, measures like reduce price or provide extra services would be applied according to SL's requirements. If customer declined the proposal, then the scene end with no next scene follows.</i>
<b><i>Service Technical Realization</i></b>	<i>This scene follows the <b>Project Bidding/Proposing</b> if all the roles reach agreement on the contract. In order to fulfil the contract obligations, TSD will receive the request of service development and communicate with SL, SD and LSD for the development of customized service solution. If the development of customized service fails, then the next scene will be <b>Product-only deliver</b>. If the it succeeds, the next scene will be <b>Service Solution Deliver</b>.</i>
<b><i>Service Solution Deliver</i></b>	<i>This scene follows the <b>Service Technical Realization</b>. In this phase, the SD will coordinate with LSD and deliver the service solution to the customer together. The next scene following is <b>Feedback &amp; Improvement</b>.</i>
<b><i>Product-only Deliver</i></b>	<i>This scene follows <b>Service Technical Realization</b> when the service solution development fails. A renegotiation will be conducted to maintain income with selling product only, which is also required by the SC. Then later the products are delivered. This is the end of this scene flow.</i>
<b><i>Feedback &amp; Improvement</i></b>	<i>This scene follows the <b>service solution deliver</b>. The feedback generated in the service delivery is a continuous process. The feedback is delivered to SL, SC, TSD, AM and LSD. And it will facilitate the next service delivery.</i>

<b><i>Scenes</i></b>	<b><i>Players (Roles) in the Scenes</i></b>	<b><i>Landmarks in the Scenes</i></b>
<b><i>Project Bidding/Proposing</i></b>	Account Management Sales Technical Solution Development Customer Sales Control	Propose Solutions Negotiation Deal/Contract Fail to Reach Agreement
<b><i>Service Technical Realization</i></b>	Technical Solution Development Service Delivery Local Service Delivery Sales	Send Technical Requirement R&D/Realization Success Failure
<b><i>Service Solution Delivery</i></b>	Service Delivery Local Service Delivery Customer	Coordination with Local Partner Deliver Service Together
<b><i>Product-only Delivery</i></b>	Sales Customer Sales Control	Renegotiation Major-Product Deal Product Delivery
<b><i>Feedback &amp; Improvement</i></b>	Service Delivery Local Service Delivery Customer Sales Account management Technical Solution Development	Send Feedback

## Scene scripts:

<i>Scene Script:</i> <b><i>Project Bidding/Proposing</i></b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• <i>Account Management (AM)</i></li> <li>• <i>Sales (SL)</i></li> <li>• <i>Technical Solution Development (TSD)</i></li> <li>• <i>Customer (CM)</i></li> <li>• <i>Sales Control (SC)</i></li> </ul>
<i>Results</i>	<ul style="list-style-type: none"> <li>• <i>An agreement or disagreement between customer and company representatives over a project. The agreement should be in the form of a contract or purchase order.</i></li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• <i>AM is in touch with CM <b>and</b></i></li> <li>• <i>AM with SL, TSD proposed solutions <b>and</b></i></li> <li>• <i>CM received the reviews proposal and</i></li> <li>• <i>SC pushes &amp; AM, SL negotiate with CM <b>and</b></i></li> <li>• <i>Both parties reach agreement <b>or</b></i></li> <li>• <i>Fail to reach agreement</i></li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• <i>If CM is not positive about the proposal, SC is <b>obliged</b> to propel other roles to reach agreement.</i></li> <li>• <i>If CM does not show positive signal about the proposal. AM and SL is <b>permitted</b> to reduce the price in order to raise the chance of deal.</i></li> <li>• <i>If the TSD does not approve the proposal, AM and SL is <b>prohibited</b> to send proposal to CM.</i></li> </ul>

<i>Scene Script:</i> <b><i>Service Technical Realization</i></b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• <i>Technical Solution Development (TSD)</i></li> <li>• <i>Service Delivery (SD)</i></li> <li>• <i>Local Service Delivery (LSD)</i></li> <li>• <i>Sales (SL)</i></li> </ul>
<i>Results</i>	<p><i>In the end of this scene, there will be two possible results.</i></p> <ul style="list-style-type: none"> <li>• <i>The first one is the TSD failed to technically realize the service solution that has written as obligations to be realized in the contract.</i></li> <li>• <i>The second is the TSD succeeded to technically realize the service solution proposal.</i></li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• <i>SL send the request of the technical realization requirements <b>and</b></i></li> <li>• <i>TSD works on the service solution project <b>and</b></i></li> <li>• <i>The realization fails <b>or</b></i></li> <li>• <i>The realization succeeds</i></li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• <i>If the Solution Request sent to TSD, TSD is <b>obliged</b> to develop the solution by the deadline in contract.</i></li> <li>• <i>If the Service solution could not be realized as expected, the TSD is <b>permitted</b> to shut down the project in order to limit the loss.</i></li> </ul>

<i>Scene Script:</i> <b><i>Service Solution Delivery</i></b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• <i>Service Delivery (SD)</i></li> <li>• <i>Local Service Delivery (LSD)</i></li> <li>• <i>Customer</i></li> </ul>
<i>Results</i>	<ul style="list-style-type: none"> <li>• <i>The service solution is delivered to the customer, and it works as expected in the proposal.</i></li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• <i>SD receives the realized solution plan <b>and</b></i></li> <li>• <i>SD coordinated with the LSD to launch delivery plan <b>and</b></i></li> <li>• <i>LSD and SD deliver the service solution together</i></li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• <i>If the Chinese subsidiary's interests are in collision with the local law or regulation, LSP is <b>obliged</b> to obey local rules.</i></li> <li>• <i>If the local "rules" are in collision with the SC's interest, the SL is <b>obliged</b> to follow the SC's instruction.</i></li> </ul>

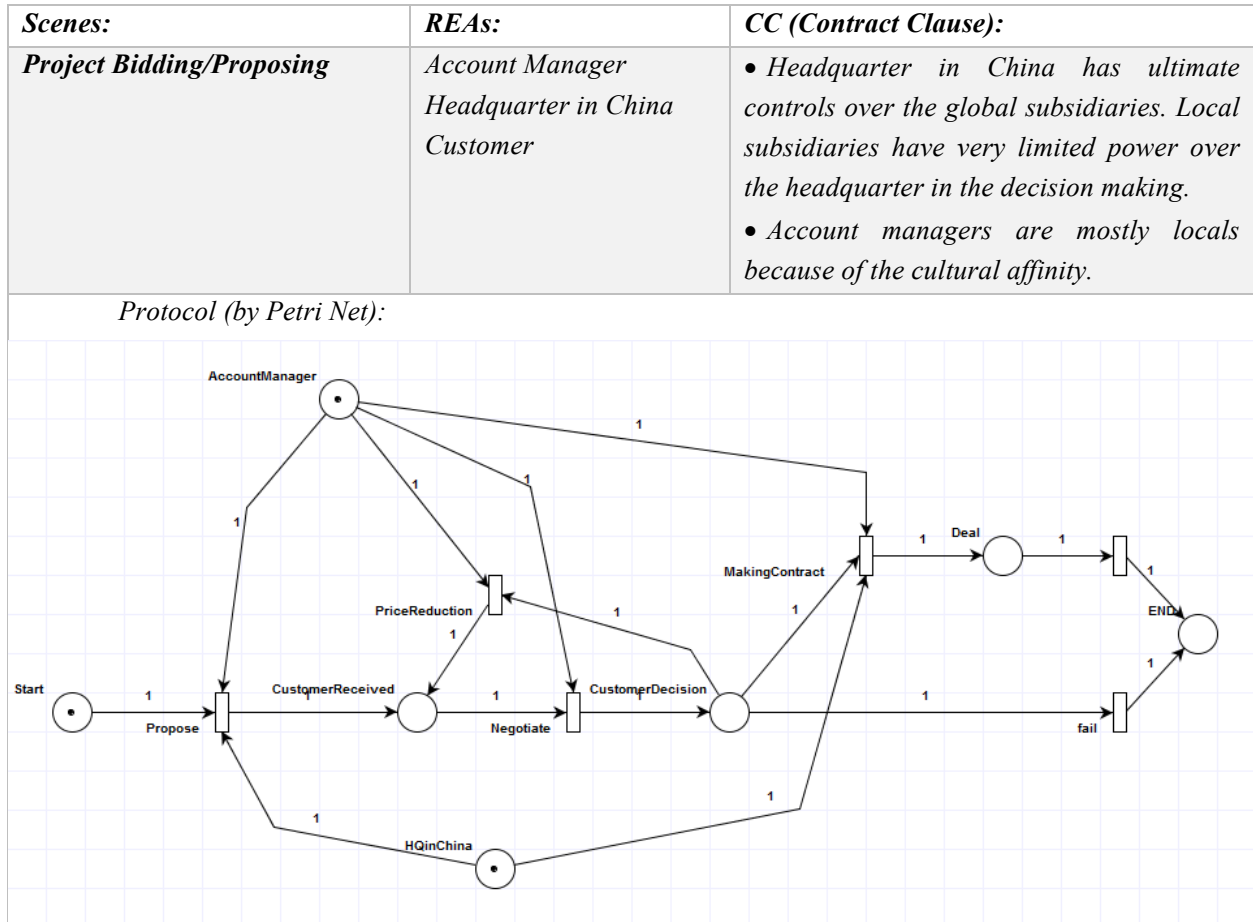
<i>Scene Script:</i> <b><i>Feedback &amp; Improvement</i></b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• <i>Service Delivery (SD)</i></li> <li>• <i>Local Service Delivery (LSD)</i></li> <li>• <i>Customer, Sales (SL)</i></li> <li>• <i>Account management (AMT)</i></li> <li>• <i>Technical Solution Development (TSD)</i></li> </ul>
<i>Results</i>	<ul style="list-style-type: none"> <li>• <i>The feedback of service delivery from the customers is sent to the SD, LSD, SL, AMT and TSD.</i></li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• <i>Customer generates feedback from service delivery coming from the SD and LSD <b>and</b></i></li> <li>• <i>Customer send feedback to the SD and LSD <b>and</b></i></li> <li>• <i>SD shares the feedback with SL, TSD and AMT.</i></li> </ul>
<i>Norms</i>	

<i>Scene Script:</i> <b><i>Product-only Delivery</i></b>	
<i>Roles</i>	<ul style="list-style-type: none"> <li>• <i>Sales (SL)</i></li> <li>• <i>Customer</i></li> <li>• <i>Sales Control (SC)</i></li> </ul>
<i>Results</i>	<p><i>This scene has two results</i></p> <ul style="list-style-type: none"> <li>• <i>First result: Instead of service solution, new agreement is reached between customer and the company. the delivery only contains product.</i></li> <li>• <i>Second result: The renegotiation with customer failed. The contract is violated by the Chinese subsidiaries.</i></li> </ul>
<i>Patterns</i>	<ul style="list-style-type: none"> <li>• <i>SC urges SL to control the loss as much as possible because of the failure to technically realize the designed service solution <b>and</b></i></li> <li>• <i>SL starts to renegotiate with the customer over the contract <b>and</b></i></li> <li>• <i>They reach the agreement with product-only order <b>or</b></i></li> <li>• <i>They fail to reach agreement</i></li> </ul>
<i>Norms</i>	<ul style="list-style-type: none"> <li>• <i>If the Service Realization fails, Sales is <b>permitted</b> to facilitate the product sale in order to maintaining sales income (company rules).</i></li> <li>• <i>The SL is <b>permitted</b> to reduce the price for product order, if the SC requires minimize the loss of fail to deliver services as expected.</i></li> </ul>



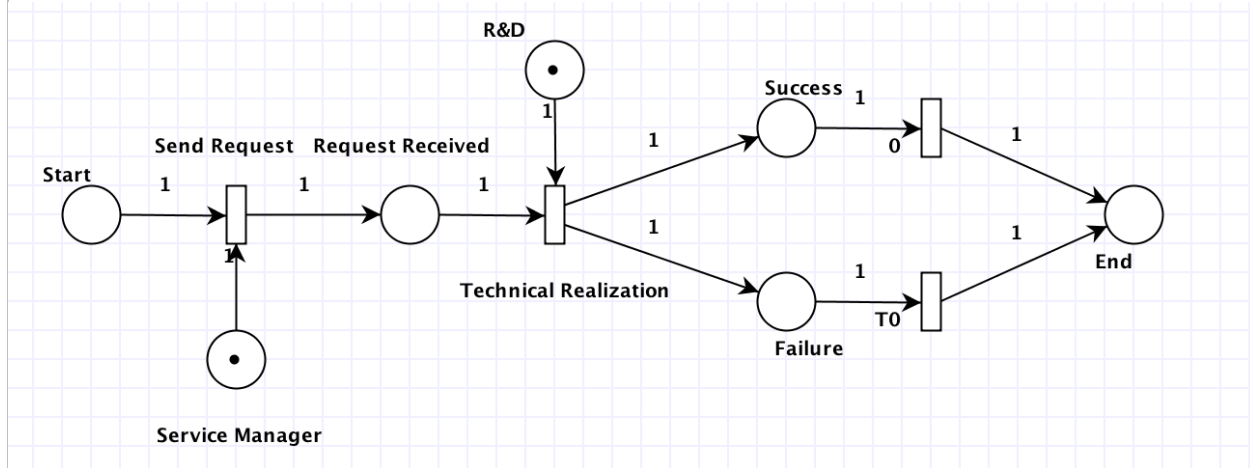
## Appendix C: Interaction Model (IM) Interaction Contract Specifications

List of interactions contract (with Protocols):



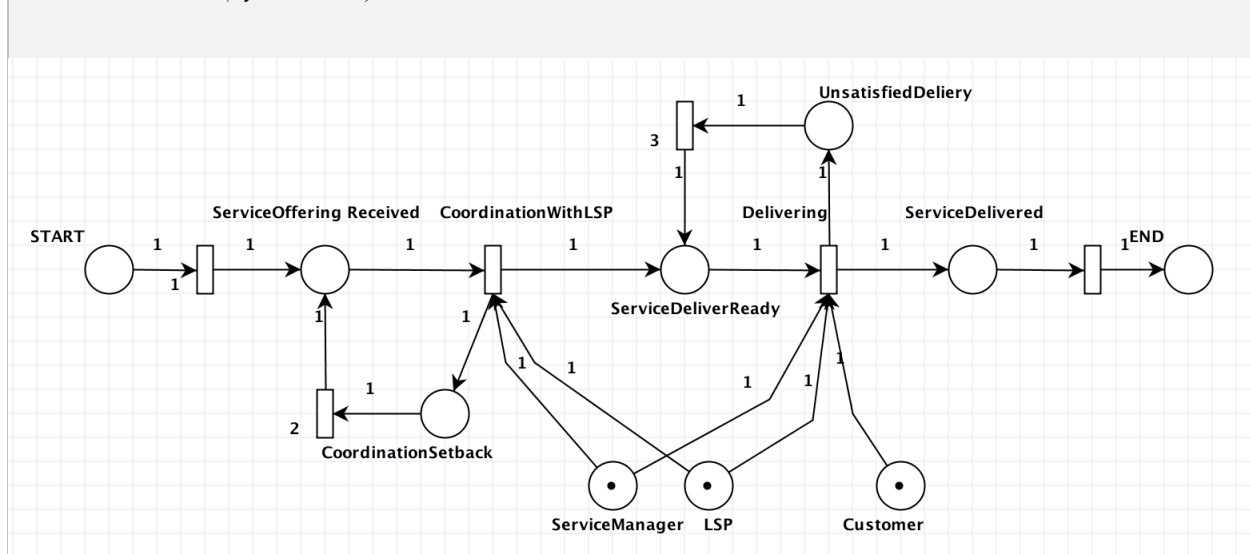
<i>Scenes:</i>	<i>REAs:</i>	<i>CC (Contract Clause):</i>
<b><i>Service Technical Realization</i></b>	<i>R&amp;D in China</i> <i>Service Manager</i>	<ul style="list-style-type: none"> <li><i>Limited communication between R&amp;D in China and Service Manager in Europe.</i></li> </ul>

*Protocol (by Petri Net):*



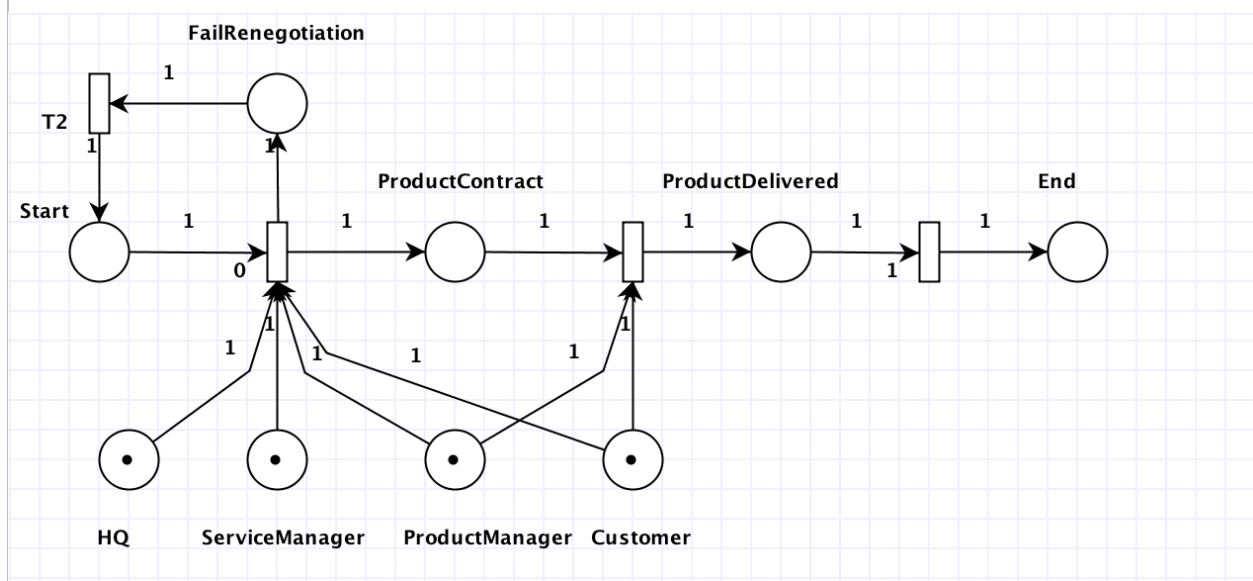
<b><i>Service Solution Deliver</i></b>	<i>Service Manager</i> <i>Local Service Partner</i> <i>Customer</i>	<ul style="list-style-type: none"> <li><i>Local service partner tends to obey local rules rather than maintain partnership with Chinese company.</i></li> </ul>
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*Protocol (by Petri Net):*



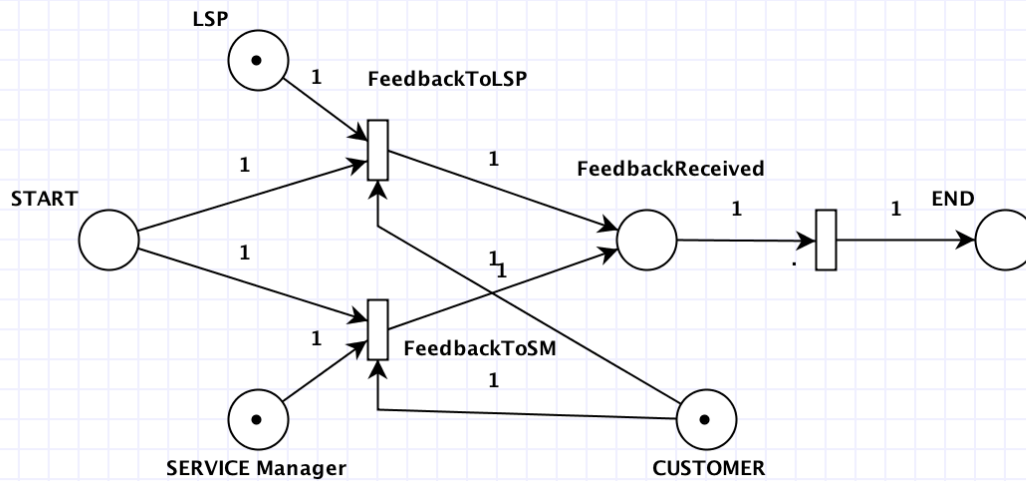
<b>Scenes:</b>	<b>REAs:</b>	<b>CC (Contract Clause):</b>
<b>Product-only Deliver</b>	Product Manager Customer Service Manager Headquarter in China	<ul style="list-style-type: none"> <li>Service manager is willing to facilitate product sale, since 10% of product sale is counted as service sale in the employee performance assessment system by company rules.</li> </ul>

*Protocol (by Petri Net):*



<b>Scenes:</b>	<b>REAs:</b>	<b>CC (Contract Clause):</b>
<b>Feedback &amp; Improvement</b>	Customer Service Manager Local Service Partner	

*Protocol (by Petri Net):*



## Appendix D: Interview Information

“\*”: The sensitive information in this form will not appear in the public version of the thesis report.

<i><b>Interviewees</b></i>	<i><b>Title/Role</b></i>	<i><b>Function/Department</b></i>	<i><b>Means</b></i>	<i><b>Format</b></i>	<i><b>Location</b></i>	<i><b>Durations</b></i>	<i><b>Date/Time</b></i>	<i><b>Language</b></i>	<i><b>Company</b></i>
*	Service Manager	Service Department (Netherlands)	Face-to-Face	Semi-structured	*	32 mins	19 <sup>th</sup> June	Chinese	ServCo B.V.
*	Product Manager	Product Team (Netherlands)	Face-to-face	Semi-structured	*	Approx. 30 mins	21 <sup>st</sup> June	Chinese	ServCo B.V.
*	Account Manager/ Channel Manager	Account Management Team (Netherlands)	Face-to-face	Semi-structured	*	Approx. 35 mins	21 <sup>st</sup> June	Chinese	ServCo B.V.
*	Service Specialist	Service Department (Netherlands)	Face-to-face	Semi-structured	*	35 mins	22 <sup>nd</sup> June	Chinese	ServCo B.V.
*	Project Specialist	Technical Support/R&D (Headquarte, China)	Video conference (internal online communication)	Semi-structured	N/A	38 mins	23 <sup>rd</sup> June	Chinese	ServCo Corporation
*	Service Manager	Service Department (Netherlands)	Face-to-face	Semi-structured	*	Approx. 35 mins	27 <sup>th</sup> June	English	ServCo B.V.
*	Project Manager	Technical Support/R&D (Headquarter, China)	Video conference (internal online communication)	Semi-structured	N/A	41 mins	27 <sup>th</sup> June	Chinese	ServCo Corporation

## Introduction of the position of the interviewees in ServCo:

<b>Interviewee</b>	<b>Introduction</b>
<b><i>Service Managers</i></b>	Service manager is responsible for the service sale and delivery of the service solution project, including negotiate with customers and regularly collect feedback from the customer.
<b><i>Service Specialist</i></b>	Same working responsibility with Service manager. It has less rights than the manager.
<b><i>Account Manager/ Channel Manager</i></b>	Account manager is in charge of maintaining the customer relationship, dealing with the contract issues and explore potential customers. They are also sometimes referred as channel partner because their close relationship with the channel partners.
<b><i>Product Manager</i></b>	Product manager is responsible for the product sale and product delivery including negotiate with customers and regularly collect feedback from the customer. The product delivery means manage the logistics in this case.
<b><i>Project Manager/ Project Specialist</i></b>	Project manager/specialist is responsible for the project management, especially on-site projects. The jobs responsibilities include technical project management and communication. Since the project requires the technical specialties of ICT technologies, the project managers are also ICT engineers.

## Appendix E: Interview Guide

### Interviewer: **Shen Yang**

Master student of Delft University of Technology, Faculty of TPM.

Interviewee: \_\_\_\_\_

#### *Introduction of the interview:*

This interview is a semi-structured interview which will take approximately 35 mins. It will cover 7 general topics, and consist of 5 parts. Each part of the interview will take about 7 mins. The interview will not be recorded according to the company's regulation. Transcription will be applied by hand. The **purpose** of this interview is for accomplishing the master thesis project of the interviewer in the Delft University of Technology. The information that is collected in the interview will **only** be used for this purpose. The personal information of the interview participants will not be published. The company will be also anonymous in the thesis report.

This interview will collect the organizational information of the interviewee's company for the construction of the organizational model *Opera*. The information is expected to be the "open information" in the interviewee's company, which will be expected to not include any sensitive information. The collected information is expected to not include any personal opinions of the participants but only asking for the facts of the organization.

#### *Topics Covered*

<i>Roles/Agents in the organization</i>	<i>Organization structures</i>
<i>Objectives/Norms of different roles</i>	<i>Behaviors of agents and external stakeholders</i>
<i>Perceptions of servitization difficulty</i>	<i>Interactions with Customer</i>
<i>Scenarios of service-related activities</i>	

#### *Guiding questions*

(The interview is semi-structured. These questions are used for guiding the interview. Some questions may not be covered in a specific interview if they were deemed unnecessary.)

<b>Part 1:</b>
<b>Personal information</b>
1. What is your name?
2. What is your position in the company?
3. What are your job responsibilities in the company?

4. How long have you been working in this position?
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<b>Part 2:</b>
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<b>Service-related activities/ Service sale process</b>
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|--|
| 1. What are the activities that are concerned with the service or service sale process?          |
| 2. What are the specific jobs of these activities that contribute to the service sale processes? |
| 3. Which activities are you involved and how are you involved?                                   |
| 4. What is the process of these activities?  |
| 5. How are these activities organized in the system?   |
| 6. How do these activities affect each other?  |

<b>Part 3:</b>
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<b>Actors, roles, and agents in the organization</b>
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- |   |
|---|
| 1. Who are the agents acting in the service-related activities? (Both internal and external agents) |
| 2. What are their specific responsibilities in those activities?                                    |
| 3. What are the objectives, rights and norms of the agents? Or anything particular?                 |
| 4. Why do these agents have such objectives, rights, and norms?                                     |
| 5. Are there any relations between those to the job responsibilities of the agents?                 |
| 6. What is your position and responsibility in the organization?                                    |

<b>Part 4:</b>
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<b>Structure of the Organization</b>
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|--|
| 1. How is the multinational organization structured? (Relations among subsidiaries)        |
| 2. What are the locations of the subsidiaries of the subsidiaries and parent organization? |
| 3. How do the different subsidiaries connect and coordinate to each other?                 |

<b>Part 5:</b>
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<b>Scenarios / perception of servitization difficulty</b>
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- |   |
|---|
| 1. How do you perceive the impedance of servitization?                        |
| 2. What are the scenarios that could indicate the impedance of servitization? |
| 3. What are the processes and outcomes of these scenarios?                    |



**Part 6:****Interaction pattern of the scenarios**

1. How do the agents interact in those scenarios?
2. What are the interactions with external agents, such as customer?
3. How do these interactions of the agents reflect the roles that the agents play in the organization?
4. What are the results/outcome of these scenarios?