



A Framework of Supply Chain Management for Cross-border Reproductive Care (CBRC) in Thailand: Case study Chinese Patients

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Abstract

Cross-border reproductive care (CBRC) is a growing international phenomenon since the Chinese government introduced a universal two-child policy in 2016 to encourage fertility. Consequently, the number of patients who looking for international reproductive assistant increases rapidly, especially in Thailand. The purpose of this research is to explore supply chain management, identify problems, and design an efficient supply chain by restructuring the supply chain for CBRC in Thailand using the case study of Chinese patients. This work also examines the patients' experience for a better understanding of the diverse processes involved in reproductive travel. The treatment-experienced, motivation and satisfaction of Chinese patients have been evaluated using an online questionnaire with a sample of Chinese patients who used to treat in Thailand. The results show that participants are more motivated to seek non-medical services provided by a professional agency that gives a high success rate, good medical technology, and services. Sex, trait selection, and the long treatment waiting list in own country are also the key reasons for CBRC. In addition, privacy is one of the primary motivations for international treatment due to the fact that the patients avoid others knowing about treatment. Moreover, Thailand's treatment experience meets patients' treatment requirements and expectations.

Keywords: *Cross-border reproductive care, reproductive travel, reproductive care, assisted reproductive travel.*

1. Introduction

With the development of globalization in healthcare, medical tourism is a rising global phenomenon in the 21st century (Hoz-correa and Mu 2018). In the search for cheaper, better quality medical services and shorter waiting lists, many people travel abroad to obtain medical care. According to Allied Market Research (Sanjivan Gill & Onkar Sumant 2019), the value of global medical tourism market in 2017 was \$53,768 million, what is more, the market trend is rising in the next few years, which registering a CAGR of 12.9% from 2018 to 2025 and is estimated to reach at \$143,461 million by 2025. While, the most active region in the Asia-Pacific region, where would exhibit the highest CAGR of 14.4% during 2018-2025. The development of medical tourism in the Asia-Pacific benefits from good quality care but less cost than in North America. Especially, Thailand is considered the highest contributor to the Asia-Pacific medical tourism market.

One category of cross-border medical tourism, cross-border reproductive care (CBRC), colloquially known as reproductive tourism or fertility tourism, has been developed rapidly. At the moment, cross-border medical tourism becomes a worldwide phenomenon (Culley et al, 2011; Rodino et al, 2014). Although, there is evidence of CBRC occurring in many countries worldwide, there are a few reliable data on the incidence (Culley et al, 2011; Salama et al, 2018). Scilicet, CBRC lacks regulatory, it is difficult to obtain the data on the number of patients who cross-border looking for assisted reproduction care. However, according to the World Health Organization (WHO), infertility will be the third most serious disease worldwide in the 21st century (Qiao and Feng 2014), approximately 9% of couples worldwide are suffering from infertility, and currently, the most effective fertility treatment is assisted reproduction technology (ART). In recent years, CBRC has been debated, which has significant growth. Moreover, many researches have been investigated for CBRC that consists of exploring patient motivations (Bennett 2017; Culley et al, 2011; Hudson and Culley 2011; Rodino et al, 2014), religious restrictions (Zanini, 2011), Laws and regulations (Gu, 2011; Hoof and Pennings, 2011; Storrow, 2011), and many more. All this research evidence shows mounting interest in this phenomenon.

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China's 40 years of reform and opening-up have brought about great changes in China's economy, China's economy is developing at a high speed, people's living standards have improved. But the population problem is getting sharper and sharper. Since the Chinese government has implemented family planning in the 1970s, China has well-controlled the population. However, China's low birth rate, insufficient labor supply, gender imbalance, and an aging population have affected economic development. To solve the mentioned population problem, the Chinese government introduced a universal two-child policy in 2016. Based on the two-child policy, the birth rate of China has increased lately. There is a marked increase in the number of people over the age of 35 who have fertility needs. But people over the age of 35 must rely on medical means because of the decline in ovarian function and the decline in sperm quality, resulting in a significant decline in the ability to naturally conceive. In China, exposure to radiation, pesticides and other environmental pollutants, work-related stress and unhealthy lifestyles are contributing to increase the incidence rate of infertility. A recent study concluded that 15%-20% of the reproductive age women in china suffer from infertility, which translates into 40-50 million women (Qiao and Feng 2014). After more than 40 years of development, Chinese ART has no inferior to other countries in the world. In terms of ART facilities, according to the National Health Commission of the People's Republic of China, there are 451 medical institutions approved for assisted reproductive technology treatment by the end of 2016, covering 31 provinces, autonomous regions, and municipalities throughout mainland China. In terms of ART services, China is dedicated to providing their patients with all of the procedures that fall under the ART umbrella, which including artificial uterus insemination (IUI), in vitro maturation (IVM) of oocytes, oocytes cryopreservation, elective single embryo transfer (eSET), and blastocyst embryo transfer (bET), vitrification, preimplantation genetic diagnosis (PGD)/screening (PGS) (Qiao and Feng 2014). However, according to the National Health Commission of the People's Republic of China (NHCPRC), China's assisted reproductive institutions can annually complete 700,000 assisted fertility surgeries average, which demonstrates that China's assisted reproductive market is in short supply. Therefore, a lot of Chinese patients go abroad looking for assisted reproductive treatment recently.

Thailand's soft and hard conditions laid the foundation for the rapid development of medical tourism. Thailand's geographical location in Asia is unique, convenient transport, beautiful view, and unique customs. The mentioned reasons have attracted thousands of tourists from all over the world every year. In addition, Thai medical services are world-renowned, because of its outstanding medical foundation that includes premium medical services, qualified healthcare specialists and various internationally accredited medical facilities. Furthermore, the Thai government has launched a ten-year policy, which is executed from 2016-2025, aim to help the country achieve the goal of "Thailand, a Hub of Wellness and Medical Services". Currently, Thailand's 53 JCI accredited hospitals and 4 receiving advanced HA are among the first to receive accreditation in Asia. Wherefore, foreign patients like to come to Thailand for treatment and recuperation, foreign patients coming trend every year is on the rise. There are media reports reveal that 70-80% of patients in the big IVF clinic or hospital are Chinese patients, however, there has been no related research in this area so far.

Therefore, the purpose of this research is to study CBRC of Chinese patients in Thailand from the supply chain management perspective. First, to explore the present CBRC supply chain of Chinese patients in Thailand. Second, to identify the problem for CBRC supply chain management of Chinese patients in Thailand. Third, to design an efficient supply chain in order to improve the present supply chain. Rodino et al, (2014) consider that in the area of CBRC, motivations are of particular psychosocial relevance, because these promote the activities of CBRC, and may have a profound long-term impact for those involved in the process. Therefore, the Chinese patients' CBRC experience, satisfaction, and motivations in Thailand will be the first to study.



2. Objectives

The objectives of this study are:

- 1). To explore the present CBRC supply chain of Chinese patients in Thailand
- 2). To identify the problem for CBRC supply chain management of Chinese patients in Thailand.
- 3). To design an efficient supply chain in order to improve the present supply chain.

3. Literature Review

3.1 The Definitions and Incidence of CBRC

Cross-border reproductive care (CBRC), procreative tourism, reproductive tourism, fertility tourism, or reproductive exile is the terminology used to describe the activities of infertility patients seeking assisted reproduction technologies treatment across borders. Current researches have different definitions of CBRC, Salama et al, (2018) defined CBRC as the phenomenon of people travels internationally to obtain fertility treatments. Hoof, Pennings, & Sutter (2015) defined CBRC as across border movement for law evasion, aim to make use of ARTs forbidden in the home country, or certain categories of patients are forbidden access to. Reproductive tourism was defined as infertile individuals and couples, in order to receive medical advice, ART treatments, travel across national and international borders (Inhorn and Patrizio 2009). In addition, reproductive tourism has been defined as candidate service receivers travel from one institution, jurisdiction or country that they can't obtain treatments to another institution, jurisdiction or country that they can obtain the treatments of assisted reproduction they want (Inhorn and Shrivastav 2010). There is no stationary definition of CBRC, researchers can define CBRC based on research needs. In this research, the author defines CBRC as infertility patients pursue ART treatments by traveling from home country to destination country.

Since the introduction of IVF in 1978, many other ARTs have also been invented and developed. Among them, the use of In vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI) is the most widely used and legally allowed in almost all countries worldwide (Salama et al, 2018). In addition, the commonly used ARTs have third party reproduction (such as sperm, egg, and embryo donation), preimplantation genetic diagnosis and sex selection, fertility preservation (such as cryopreservation of sperm, eggs, embryos, as well as ovarian and testicular tissue).

The reasons, factors, motivations, or causes of CBRC are multifactorial. In many countries, religions, legal, culture, and policy can be barriers accessing to ARTs service. Wherefore, restrictive regulation in the home country may be the most powerful factor (Hughes, Dejean, and Sc 2010). However, restrictive regulation may not be the only consideration. Inhorn & Patrizio (2009) had summarized 7 discrete but often interrelated factors underlying reproductive tourism: 1) home country prohibit a specific service for religious or ethical reasons; 2) lack of expertise, personnel, and equipment causes a specific service to be unavailable; 3) a service be unavailable due to consider dangerous and unknown risks; 4) certain categories of people on the basis of age, marital status, or sexual orientation can't receive a service; 5) services may be unavailable due to shortages and waiting lists, especially for donor gametes; 6) some people have privacy concerns; 7) treatments cost is cheaper in other countries. Points, Incidence, & Cbrc, (2016) think the reasons of CBRC can fall into four basic categories: 1) Access broader and higher quality care; 2) reduce the cost of fertility care; 3) circumvent ART law; 4) privacy and cultural comfort. Furthermore, Pennings et al, (2008) expressed that the different causes of CBRC can be divided into two groups: legal restrictions and availability of good quality care.

3.2 Related Works

Researches on CBRC is currently focused on Western countries, such as European, US, Canadian and Australian studies. As for the research content, it can be divided into two sections, one is patients experience for CBRC, one is discussions brought by CBRC.

The perspectives of patients' experience, Zanini (2011) had analyzed the experiences of Italians undertaking CBRC, by focusing on feelings that people develop in the face of restrictive legislation and on the meaning that CBRC acquires in their reproductive stories. Blyth & Ph (2010) identified the



availability of counseling services and other factors affecting patient experiences by studying the information of individuals who have either experienced CBRC or have considered doing so. Hudson & Culley (2011) think reproductive tourists have common characteristics, but also are differences, and we can be better understood the diverse processes involved in reproductive travel through a study of the personal landscapes of fertility travel. The study of (Hoof, Pennings, and Sutter 2015) and (Rodino et al, 2014) proved this view.

The perspectives of discussions brought by CBRC are focusing on the legal hazards of cross-border reproductive travel or challenges faced. Actually, the law interacts with CBRC. First, the law is a trigger of CBRC. Second, a country's laws may ban procedures of cross-border reproduction banned at home. Third, the law may deny legal recognition of children born abroad using techniques forbidden in the home country. Finally, the activities of physicians, attorneys, and brokers involved in CBRC cause civil sanctions (Hoof, Pennings, and Sutter 2016; Storrow 2011).

To conclude, current researches on CBRC are focusing on patients' experience and challenge, but there is no study on Chinese patients. There are many participants in the CBRC industry, but people seem to be focusing on patients, little research on other participants.

4. Materials and Methods

Although CBRC is a growing phenomenon, rare people are known about its actual magnitude and scope around the globe. The aim of this study is to conduct a supply chain for cross-border assisted reproductive care (CBRC) in Thailand by focusing on Chinese patients. Based on the aim of this research, the primary exploration of the Chinese patient's opinion has been examined by using the online questionnaire. Therefore, the results of primary exploration are presented in this paper to show the opinion of patients, which is the one role-player in the supply chain for CBRC. In order to achieve the results of the Chinese patient's opinion, the qualitative and descriptive, non-probability sample of Chinese residents who had been to go to Thailand for fertility treatment was accessed. Accidental sampling will be used to develop the sample size. And the respondents were all from mainland China, are men or women 20 years or older, because the legal marriage age in China is 20 years or older.

In this study, an online questionnaire was conducted on the wjx.cn. This popular website was created for supporting to sustain research in different academic fields, that can deliver to the participant, who participate in this survey voluntarily. The link to the online questionnaire has been distributed via WeChat, a social software with more than one billion users. The questionnaire is anonymous, and participants complete surveys voluntarily, the questionnaire took approximately 15 minutes to complete. The research was conducted during February 2020.

The content of the questionnaire focused on the following areas: (1) socio-demographic profile, (2) reproductive treatment experience in Thailand, (3) type of treatment and motivations for traveling to Thailand, (4) evaluation of clinical care service and satisfaction during treatment. Evaluation of clinical care service was rated on attitudinal Likert scales (e.g., 1 = strongly agree to 5 = strongly disagree).

5. Results and Discussion

Demographic profile

The sample size of this study has been a total of 51 participants, all of the samples are Chinese patients who had already completed their fertility treatment in Thailand, including 43 females and 8 males. Nearly 90% of them are married, and half of the participants already have children before treatment. The average age of the participants is 32.43 years, 84% are the first time to go abroad for assisted reproductive treatment. Their overall education level is not too high, mainly engaged in freelance and general administrative work. Specific demographics, like sample numbers and proportion, are given in Table 1.

**Table 1** Demographic profile of participants: Chinese patients

Characteristic	N	%
Gender		
Female	43	84.31
Male	8	15.69
Marital and nurture status		
Married and have children	31	60.78
Married and no children	14	27.45
Unmarried	6	11.77
Educational status		
Secondary level	28	54.90
Graduate	17	33.33
Post-graduate	6	11.77
Occupation		
Staff	11	21.57
Senior management	10	19.61
Civil servant	4	7.84
Entrepreneur	7	13.73
Student	2	3.92
Freelance	17	33.33
Average monthly income (Yuan)		
Within ten thousand	21	41.18
Ten thousand to Twenty thousand	14	27.45
Twenty thousand to Thirty thousand	8	15.69
Over thirty thousand	8	15.69

IUI, intrauterine insemination.

Reproductive travel experience in Thailand

For the experience of Chinese patients, the results show that patients who are participants in the online questionnaire will search for assisted reproductive treatment information from multiple sources when they suffer from infertility. On the one hand, most of the participants are willing to accept recommendations from an acquaintance (52.94%). However, the number of participants, who choose large authoritative hospitals for consultation is quite large (35.29%). In addition, 70% of participants will reserve one month for treatment. When on the journey for fertility travel, 58.8% of participants choose to find arranging service personnel, the services were provided by professional agencies that are very extensive and cover almost all activities of patients. The activities consist of the arrangement accommodation and food, ticket agent, visa agent, doctor appointment, medical records, translation service, pick-up service and drop off service. Moreover, 16.13% of participants choose to arrange their own itinerary, and 25.81% of participants are accompanied by family and friends to Thailand for treatment.

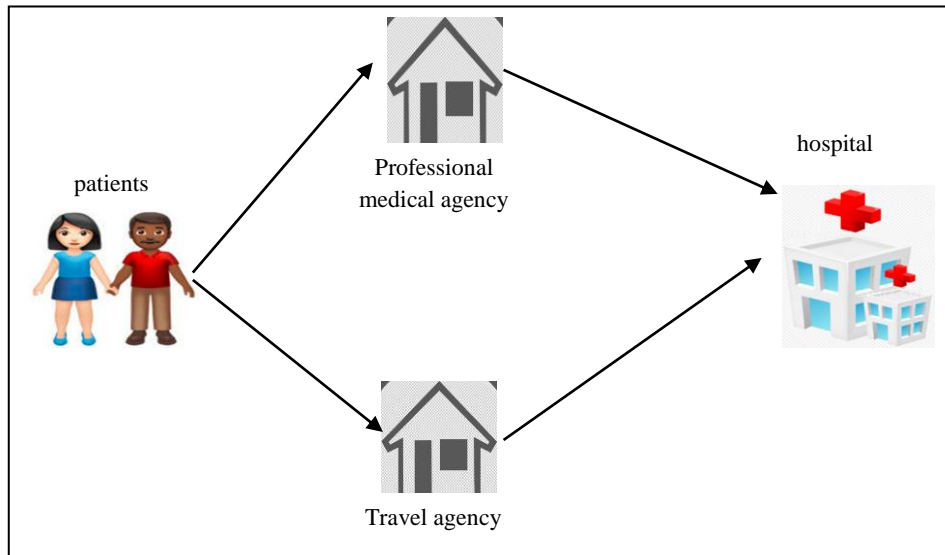


Figure 1 Chinese patients reproductive travel experience in Thailand

In terms of experienced treatment in Thailand, in this part was related to the kind of treatment was received, nearly 80% of participants indicate that they have accepted IVF treatment, which using their own gametes, other than that, Preimplantation genetic diagnosis (PGD/PDS) treatment also is a hot spot that attracted 29.03% of participants. The proportion of other treatments is fertility preservation (22.58%), intracytoplasmic sperm injection (ICSI) (12.90%), surrogacy 9.68%, IVF donor oocyte 6.45%, IVF/IUI donor sperm 3.23%. The graph in Figure 2 is shown the mentioned proportion for the kind of treatment that participants used to treat in Thailand.

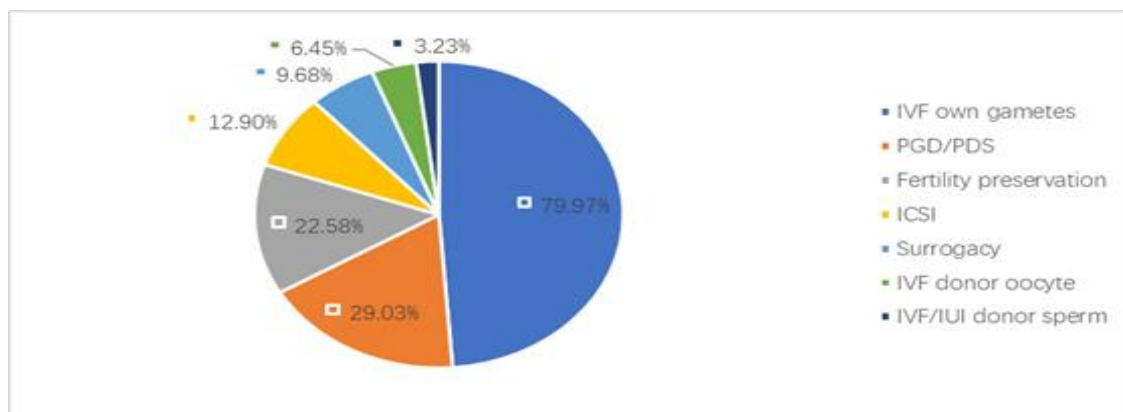


Figure 2 The types of treatment that Chinese patients looking for in Thailand.

Motivations for traveling Thailand

Motivations of Chinese patients are illustrated in Table 2. This table shows the motivation factors for making the decision of participants about fertility travel in Thailand. Based on the results that are shown in the table, primary motivating factors for participants comprise of higher success rate in Thailand, good medical technology and services in Thailand, sex or trait selection, the long treatment waiting list in own country, and privacy—not wanting others to know about treatment.

**Table 2** Motivations for Chinese patient pursue treatment in Thailand

Motivation item	n	%
Long treatment waiting list in own country	14	27.45
Treatment not permitted by law in own country	9	17.65
Gamete shortage in own country	2	3.92
Privacy—not wanting others to know about treatment	13	25.49
Thailand has a higher success rate	32	62.75
Treatment is cheaper in Thailand	7	13.73
Sex or trait selection	17	33.33
Good medical technology and services in Thailand	23	45.10

The satisfaction of clinical care service in Thailand

For the satisfaction of clinical care service in Thailand, the author mainly studies from the following aspects: preparation work of Thai clinic, the accurate information, easy access to treatment, the professionalism of the medical staff, achieving with patient treatment needs, achieving with expectations for treatment, would not hesitate to recommend this clinic to others. The satisfaction of clinical care service in Thailand are shown in Table 3, the average scores of participants are mainly distributed in strongly agree and agree.

Table 3 The satisfaction of clinical care service in Thailand

Item	Sample (n)	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Thailand clinic adequately prepared you for treatment	51	54.9	39.22	5.88	0	0
The information prepared by the Thailand clinic is consistent with your previous understanding	51	50.98	45.10	3.92	0	0
Easy to obtain treatment in Thailand	51	52.94	43.14	3.92	0	0
Thailand clinic had professional counseling services available during treatment	51	54.9	41.18	3.92	0	0
Thailand clinic satisfied your overall medical needs	51	52.94	43.14	1.96	1.96	0
Thailand clinic satisfied your overall expectations for treatment	51	54.9	41.18	1.96	1.96	0
You would not hesitate to recommend this clinic to others	51	56.86	35.19	7.84	0	0

The assisted reproductive travel, or fertility travel, reproductive travel, CBRC, as a part of a burgeoning globalized medical industry, had attracted attention from various fields. Rodino et al, (2014) believe that the decision to participate in fertility travel is an important life event, which can affect all participants involved in the process from the physical, emotional, social, and financial side. Previous studies demonstrated that patient will choose different destinations for treatment in different motivations (Culley et al, 2011). As reported in Table 2, the motivations for Chinese patient pursue treatment in Thailand are higher success rate, good medical technology and services, sex or trait selection, the long treatment waiting list in own country, and privacy—not wanting others to know about the treatment, which is quite different from Italian patients motivations (Zanini, 2011). Furthermore, judging from the individual financial strength of patients, 41.18% of participants were from financially general socioeconomic groups, also are different from the finding of (Rodino et al, 2014). However, the item of privacy—not wanting others to know about the treatment, was similar to the findings of (Bennett, 2017).



In western countries, the shortage of resources in third party reproduction will be the motivation for pursuing treatment overseas, the study of (Hoof, Pennings, and Sutter, 2015) provides evidence. For Chinese patients, third party reproduction is not popular, Figure 2 provides clear evidence. This may be influenced by traditional Chinese culture, Chinese people pay attention to blood heritage, so they are more inclined to have children by using their own gametes. Simultaneously, Chinese long for both sons and daughters, having a son and daughter is a blessing, they two will make a “hao” (good), therefore, participants in this study deliver a strong desire for sex or trait selection. What’s more, Bennett (2017) considered that economic considerations were always taken into account when determining a destination, this view is not reflected in our research.

For Chinese patients, they prefer to obtain information from an acquaintance and consultation from large authoritative hospitals. However, the internet was the main source of information for patients from western countries (Hudson et al, 2011). In terms of treatment arrangements, most of the patients in the study of Blyth and Ph (2010) make their own arrangements, which is a difference from our study. Most of the patients in our study prefer to find a professional agency to arrange all journey.

In the online questionnaire, the patients were asked about the evaluation of preparations for the pre-treatment, information output, easy to acquire treatment and professionalism of treatment in Thailand. The evaluation results show that each indicator has been highly recognized by patients, the patient's treatment needs are met, and the patient's overall treatment expectations are satisfied.

6. Conclusion and Future Works

Although, ART in China got rapid development lately. However, Chinese patients try to seek reproductive treatment overseas. This often makes headlines in mass media, and there is no research evidence. Therefore, the aim of this study is to study the Chinese patients assisted reproductive travel experience, treatment satisfaction, and motivation in Thailand. We can be better understood the diverse processes and the parameters involved in reproductive travel by examining the patients’ experience, where the results can help conducting the present supply chain for Chinese patients. Moreover, treatment satisfaction can help identifying the problem in supply chain management. Furthermore, the motivation of Chinese patients can provide a reference for restructuring the supply chain.

This study reveals that participants are more inclined to seek non-medical services provided by a professional agency, including the arrangement accommodation and food, ticket agent, visa agent, doctor appointment, medical records, translation service, pick-up service, and drop off service. Moreover, the types of treatments they pursue include IVF treatment by using their own gametes, and Preimplantation genetic diagnosis (PGD/PDS) treatment. In addition, the higher success rate, good medical technology and services, sex or trait selection, the long treatment waiting list in own country, and privacy are the primary motivation for them to look for reproductive treatment in Thailand. From the result of the evaluation of clinical care service in Thailand, most of the participants are very satisfied with the treatment in Thailand.

Based on the mentioned results of the online questionnaire that have been obtained from Chinese patients, this will be utilized in the next step of this study which is to conduct a supply chain structure for CBRC. Due to the role players in the structure of the supply chain, Chinese patients are role players that are important. Therefore, their opinion is quite important in terms of making the structure of the supply chain. Additionally, the other stakeholders who involve in the structure of the supply chain must be surveyed for analysis of current problems in supply chain management. Then restructuring the supply chain structure from the perspective of supply chain management, provide management advice for policymakers to strengthen international cooperation will be completed.



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