

Addressing issues and challenges in managing migratory tuna resources in the Western and Central Pacific Ocean

Tuna resources in the Western and Central Pacific Ocean are the world's largest and most valuable fisheries of their type and are vital to the economy and the sustainable development of the region. However, the region witnesses a rapid decline in tuna resources and the depletion of species such as bigeye and yellowfin tunas and overharvesting of the other species. This study investigated the collaborative management model used to manage migratory tuna resources. The study followed a case study design with a focus on the Western and Central Pacific Ocean Fisheries Commission. Forty interviews were conducted with key stakeholders. The findings indicated that six factors, namely, structure and size, self-interest, self-enforcement, leadership style, equality of power and culture, impacted significantly the outcomes of a collaborative management model. The findings also provide important insights on how the factors influenced the outcomes. The study contributes to a better understanding of international governance of common-pool resources (CPRs) and its challenges, and thus helps policy makers develop strategies for managing migratory fishing resources for the sake of the economic viability and sustainability in the region.

KEYWORDS: Migratory tuna resources; collaborative management; co-management; common-pool resources (CPRs); cooperative game theory; the Western and Central Pacific Ocean

1. Introduction

Tuna resources in the Western and Central Pacific Ocean (WCPO) are the world's largest and most valuable fisheries of their type and are vital to the economy and the sustainable development of the region. Compared to other ocean regions, the WCPO supplied more than 50 percent of the tuna resources to the global markets (World Bank, 2016) which are worth an estimated US\$5.3 billion each year (Seto & Hanich, 2018). However, tuna resources have been declining rapidly (e.g. Cyranoski, 2010; Costello et al. 2016; Hino et al., 2019). A combination of several factors has attributed to the decline. They include increased vessels' capacities, the high rate of illegally, unreported and unregulated (IUU) fishing activities and government fisheries subsidies (Havice, 2013; Sumaila, et al., 2014; WCPFC, 2016a). Additionally, fishing in closed areas, violations of fishing licence rules, illegal discards (dumping untargeted species overboard), and misreporting of catch have resulted in plundering of the fisheries and loss of revenue for the Pacific Island countriesⁱ (PICs), according to the Marine Resources Assessment Group's (MRAG) Report (MRAG 2016).

Governments, policy advocates, researchers, and other stakeholders have been searching for effective solutions to the problems associated with managing tuna resources (Havice & Campling, 2010; Mapuru & Naz, 2013; Wakamatsu & Managi, 2019; Pilling et al., 2020). In the WCPOⁱⁱ, the Western and Central Pacific Fisheries Commission (WCPFC) was established based on the principles of collaborative management (CM). The key principals include partnership, cooperation, participation, shared interests, collective responsibilities, mutual trust, social capital and consensus-based decisions (Doulman, 1993; Marttunen & Hämäläinen, 2008). The collaborative management and governance arrangement of the WCPFC involves 26 member states, cooperating non-members, participating territories and stakeholders such as non-government organizations (NGOs), fishing industries and distant water fishing nations (DWFNs), making it a complex management structure and institution. While collaborative management may work well with the management of some of traditional *coastal fisheries* in the Pacific Islands, known as community-based fisheries management (Cohen et al. 2015), the effectiveness of the model in managing highly *migratory tuna resources* involving regional and international actors remains unclear (Hanich & Tsamenyi 2014; Norris 2015).

Therefore, this research seeks to address the knowledge gap by investigating the use of CM as a tool to tackle issues surrounding the management of migratory tuna resources. The study was anchored on *cooperative game theory* to understand and explain the issues. In essence, the cooperative game theory describes players (actors) competing in grand coalitions rather than as individuals. The theory seeks to attain fairness and collective benefits (payoffs) for all players by way of regular communications in managing conflicting situations (Ostrom, 1990).

The research takes the Western and Central Pacific Fisheries Commission (WCPFC) as a case study for two reasons. First, the management of migratory tuna involves inter-country and different sovereign states. It also involves different actors with different level of powers (e.g. coastal states and DWFNs) that are subject to different sovereign laws and national interests. However, international governance of CPRs has been understudied, though fisheries are often used for CPR studies. Second, the WCPO region has the world's largest tuna resources. They are vital to the livelihood of small Pacific Island countries (PICs). However, research about issues of managing migratory tuna in the Pacific region has been underexplored, based on our literature review.

Specifically, this study aims to understand *what factors* and *how* the factors impact the collaborative management and governance arrangements of the WCPFC in managing migratory tuna resources. The findings of the study will help policy makers, in particular, in the WCPO region develop strategies to address issues and challenges identified in this study for the sake of the economic viability and sustainability in the region.

2. Literature review

As the study is on the collaborative management and governance arrangements of the Western and Central Pacific Fisheries Commission (WCPFC), this literature review centres around the management of common-pool resources (CPRs) to make it most relevant and manageable to this study. The primary criteria for our selection of the literature are that the publication outlets must be reputable, and the publications for the review have already generated academic impact judging by their impact factors (IFs). As a result, most of the articles reviewed were published in the mainstream *leading* scholarly journals between 2000-2015 and recorded a significant number of citations (20+ IFs) at the time of this review conducted between 2015 and 2016. However, other journal articles published three to five decades ago were also reviewed. These articles and authors were cited as references in many of the more recent articles on the topic areas, such as the works written by Ostrom, Axelrod, and Nash. The major database used to search the articles included Pro-Quest, EbscoHost, Emerald, AQORA and JSTOR. The key search words were selected based on their relevance and importance to this study, including *management of CPRs*, *collaborative management*, *co-management*, *collective action*, and *community-based fisheries management* (CBFM). The search and review was limited to *management and governance perspective*, and did not include articles that focused *primarily* on law, marine science, production and business strategy of fishing firms, technical aspects, etc. As a result, a total of 68 publications were selected for this review. **Table 1** presents a brief summary of the basic features of the publications.

Table 1. Summary of basic features of the articles (N=68) reviewed

Year & No. of publication	Type & No. of study	Methodology	Geographic area	CPR*
2000-2015 54	<i>Empirical</i> 46	<i>Quantitative</i> 9	North America 33	<i>Natural resources</i> 23
1990s 9	<i>Conceptual</i> 22	<i>Qualitative</i> 6	Central America 1	<i>Fisheries inshore</i> 11
1980s 2			South America 1	<i>Fisheries offshore</i> 6
1970s 1		<i>Ethnographic</i> 12	Europe 12	<i>Agriculture</i> 1
1960s 1		<i>Experimental</i> 8	Asia 11	<i>Unspecified</i> 27
1950s 1		<i>Conceptual</i> 22	Africa 6	
			Pacific 4	

***Note:** Common-pool resources (CPRs): *natural resources* refers to forests, wildlife, ponds, rivers, and minerals; *fisheries inshore* refers to coastal fisheries; *fisheries offshore* refers to fish in the deep ocean far from the coast (mostly pelagic, or migratory species); and *agriculture* refers to irrigation systems and pastures.

This endeavour reveals that the majority of the articles with a primary focus on governance and management of CPRs originated from North America (33), Europe (12) and Asia (11). Only four of the articles tackle the management and governance issues in the Pacific region. We argue that the context of studies plays an important role in commons management. Factors such as beliefs, attitude, socio-cultural, economics, and political environments can influence how societies (or communities) behave and interpret their situations (Podsakoff et al., 2012). In this regard, more research from the mainstream literature is needed on government and management issues with a focus on the Pacific region.

2.1. Collaborative management

Collaborative management (CM) is a loosely defined term. In a general sense, collaborative management is a working practice whereby individuals work together for a common goal (Ansell & Gash, 2007). Scholars such as Heikkila (2005) and Berkes et al. (2009) refer to it as ‘co-management’, which is defined as ‘a group of stakeholders, including resource users and government agencies working together to resolve shared dilemma’ (Berkes et al., 2009 p.583). Additionally, McGuire (2006), defined CM as a ‘concept that describes the process of facilitating and operating in multi-organizational arrangements for solving problems that cannot be achieved, or achieved easily, by single organizations’ (p.576). The principles of CM, based on Colebatch & Larmour’s (1993) definition are ‘common beliefs and values, affiliation and network’ (p.23), where members behave according to their group’s norms and take collective actions to achieve their goals.

The key concept of collaborative management (CM) was drawn largely from cooperative game theory. The theory argues that people tend to be controlled by group rationality when they can interact, communicate and work as a group (Nash, 1950). The group rationality prompts participants to be aware of other members’ goals, needs and challenges, therefore enabling them to cooperate among themselves (Ostrom, 1999). In the context of commons management, CM is sometimes referred to as ‘joint management’ which is an arrangement of power sharing between the State and local communities of CPRs (Carlsson & Berkes, 2005).

Most of the literature (42 out of 68 articles) that we reviewed has considered that CM is effective in improving the efficiency and equity in managing CPRs (e.g. Mutimukru 2010; Boateng, 2006). However, researchers such as Agrawal (2003), and Grafton et al. (2006) have reported negative outcomes in terms of cooperation towards the sustainability of CPRs. Despite the negative outcomes, most researchers are optimistic that the weaknesses can be addressed and have suggested ways for improvements.

Prior studies posit that CM has both perceived benefits (e.g. Heikkila & Gerlak 2005; Berkes 2009) and realized benefits (e.g. Cheng & Sturtevant 2012) in the management of CPRs. The key benefits for CM may include sharing common goals (Sa-Ngiamlak et al. 2011), social learning (Marttunen & Hämäläinen 2008; Richie et al. 2012), better relationships (Bruckmeier & Larsen 2008; Caldwell et al. 2009), and participatory decision making. Other benefits reported are: integrated management which enhances unity by bringing together different groups under a single framework (Olaru et al., 2014, Muñoz-Erickson et al., 2010), mutual respect (Richie et al., 2012) and collective benefits of all stakeholders (Espinoza-Tenorio et al., 2012).

2.2. Factors influencing collaborative management outcomes

Prior studies have identified many factors and conditions that are conducive to effective management of CPRs. These include: (i) equal power distribution among members (e.g. Gallardo et al. 2013), (ii) strong common interest (e.g. Acheson 2013), (iii) certain cultural orientations (predominantly communalism, femininity and long-term orientations) (e.g. Jentoft & Chuenpagdee, 2009), (iv) fair endowment (e.g. Ostrom, 1999), (v) high-level of cooperation (McGuire, 2006), (vi) strong leadership style (e.g. Cheng & Sturtevant 2012), (vii) low to moderate transaction costs (e.g. Dyer 1997), (viii) incentives (e.g. Hanich et al. 2015), (vix) clarity of rules (e.g. Xepapadeas, 2005), (x) small size groups (e.g. Olson 2009), and (xi) self-enforcement compounded with external enforcement (e.g. Reaves & Bauer, 2012). However, as Reynard et al. (2002) and Masomera (2002) argued that the effective management and governance structure and model of CPRs are context-based.

Among the 68 articles that we reviewed, only four of them (e.g. Chand et al., 2003; Havice & Campling, 2010; Bailey et al., 2013; Hanich & Tsamenyi, 2014) investigate migratory tuna

fisheries management in the WCPO. For example, the study by Havice and Campling (2010) argues from a political economy perspective that the combination of competitive capital accumulation strategies and inter-state power relations is the main factor in explaining the challenges in the WCPO tuna sector. The study by Bailey et al. (2013) addresses the overfishing issue in the WCPO through developing a bioeconomic game-theoretic equilibrium model. The model suggests that the elimination of fishing on floating objects could result in increased net benefits. But the potential economic gains require the formation of a cooperative sharing system. The limited research on the dynamics of international governance of CPRs makes this research important as it enhances the understanding of not only *what* factors but also *how* the factors influence collaborative management and governance in migratory tuna resources in the WCPO, a region of strategic importance for global tuna resources as well as Pacific Island countries.

3. Methods

3.1. Research design

A case study approach was chosen for this study because the method is useful when in-depth explanations of social behaviour are sought (Zainal, 2007) and when examination of data is conducted within the context of its use (Yin, 1994). The Western and Central Pacific Fisheries Commission (WCPFC) was selected as a case institution and a unit of analysis, because it took a collaborative governance model in managing CPRs at both regional and international levels. The data collection for the case study was conducted mainly through interviews complemented with documentary research of WCPFC official documents.

The WCPFC was founded to operate under a legally binding framework and the principles of collaborative governance that was based on collective responsibility and collective benefits (WCPFC, 2013). The mission of the WCPFC is the effective management and conservation of highly migratory stocks for sustainable use. Its member states include mostly the Pacific Islands Forum members (PIFs) including Australia, New Zealand and 14 Pacific Island countries (PICs), and distant water fishing nations (DWFNs) including Canada, USA, EU, China, Chinese Taipei, Republic of Korea and coastal states such as Indonesia and the Philippines.

3.2. Interviews

We conducted semi-structured interviews, which provided consistency of questioning across interviews while having the flexibility to explore areas of interest in greater depth. The interviews were completed over a four-month period between May and October 2015 in three locations – Nadi, Fiji; Pohnpei, the Federated States of Micronesia (FSM); and Honiara, the Solomon Islands. The time and places were chosen because the places hosted WCPFC committee meetings between May and October, which drew the targeted informants for this study. The main meetings were the Regular Scientific Committee meeting, Technical Compliance Committee meeting and the annual WCPFC member meeting.

Offshore tuna fisheries in the WCPFC is a sensitive issue, with government representatives from member states being hesitant to reveal information about their governments' position or their opinions. Research suggests that using face-to-face interviews offers the opportunity to break down the barrier, because on most occasions, discussions begin on the surface of the subject and then develop further into the core of the issue once trust is developed (Holbrook et al., 2003). Therefore, we considered that face-to-face interviews would be an optimal choice for this study. The interviews were intended to collect participants' insights into the CM practices in the WCPFC. The interviews looked at the *outcomes*, namely, compliance with

conservation and management measures (CMMs) and sustainable use of migratory tuna resources to achieve conservation goals, as well as the factors influencing the outcomes. Therefore, our interview questions revolved broadly around the following two key questions:

1. What is your view on the current collaborative management and governance arrangements of the WCPFC in terms of achieving the mission of the WCPFC?
2. What do you think are the most important factors influencing the outcomes of the collaborative management and governance of the WCPFC?

The key factors identified from our literature review (section 2.2 in this paper) were used to guide the interview discussion in relation to question 2. The interviews took between 30 minutes to 1 hour depending on the time availability of the participants. All the interviews were recorded after obtaining the consent from the participants. English was used in all the interviews.

3.3. Participants

We selected potential participants for our interviews following a purposive sampling technique, targeting key senior fishery officials from the 26 member states of the WCPFC. Most of them held important responsibilities in the fishing industry of their countries at the time of the interviews. They were representative of various stakeholders such as governments, resource users (fishing companies), monitoring, control and surveillance officers (see **Table 2** for detail). They were usually the gatekeepers holding most of the information about the management of tuna fisheries. To gain comprehensive insight into the WCPFC’s governance issues, we also recruited people who were marine scientists and university lecturers, and officials of NGOs for interviews. As a result, a total of 40 key informants participated in our interviews. **Table 2** presents a summary of the demographic data on the participants. Among them, 28 from PICs, 7 from DWFNs, 2 from NGOs, and 3 from RFMOs. The discrepancy in the number of members that we interviewed between the PICs and DWFNs was due to the unavailability of many of DWFNs who declined our interview, citing their tight schedules during and after the meetings of the WCPFC as the reason. All participants requested anonymity prior to the interviews. For confidentiality reasons, we are unable to provide further demographic data about the participants than those shown in **Table 2**.

Table 2 Summary of demographics of participants in interviews (N=40)

WCPFC Membership Type/Institution	No. of participant	Job Position
PICs	20	Senior Government Official of Offshore Fisheries
	6	Senior Monitoring, Control and Surveillance Officer
	2	University Academics (Fisheries Lecturer)
DWFNs	2	Tuna Scientist
	3	Tuna Industry Manager
	2	Senior Government Official of Fisheries
NGOs	2	Conservation Manager
RFMOs	1	Tuna Fishery Adviser
	2	Tuna Business Manager
TOTAL	40	

3.4. Data analysis

We used NVivo 11 software to help analyse our interview data by classifying, sorting and arranging information into their respective themes. It also helped us with concept mapping to examine the relationship between concepts. We chose content analysis (Neuendorf, 2016) to identify and categorise themes that centred around our two main interview questions, namely, what factors and *how* they influence the outcomes of the WCPFC. The following section presents the detail of the findings.

4. Findings and discussion

We found a general sentiment among the participants that the WCPFC management and governance model was not effective in curbing overharvesting and illegally unreported and unregulated (IUU) activities in the region. We sought to pinpoint the root causes of the problem and identify key issues in managing migratory tune resources in the region. In this regard, we engaged collaborative management (CM) discourse. As shown in our literature review section, prior studies have identified eleven factors that may influence the outcomes of CM, including equality of power, self-interest, cooperation, endowment, cultural diversity, leadership style, transaction costs, incentives, clarity of rules, size of the group, and enforcement. Our data analysis resulted in six of them that were seen by the participants as *most prominent* in influencing CM outcomes according to the number of participants who shared the same view. These included structure and size of the WCPFC, competing interests, difficulty with self-enforcement, leadership style, power inequality and different powers among WCPFC member states, and cultural differences. **Table 3** presents a summary of the responses from WCPFC's different type of member groups (see Table 2) to the six factors. The following sections discuss each of them briefly in the sequence of prominence viewed by the participants.

Table 3 Summary of responses to most prominent factors in influencing CM outcomes

Factors Membership	Structure & Size	Competing Interests	Self- enforcement	Leadership	Power	Culture
PIC	25	20	17	20	17	16
DWFN	3	5	6	2	3	2
NGO	2	2	2	2	2	1
RFMO	2	3	3	3	2	1
Total	32	30	28	27	24	20

4.1. Structure and size of the WCPFC

There was a clear consensus among our participants (32 out of 40) that the current structure and size of the WCPFC, a large and heterogeneous group representing various stakeholders in multi-jurisdictional regions, made it difficult for members to agree on critical issues such as conservation and management measures (CMMs), resulting in its inability to achieve WCPFC's conservation goals. For examples:

...as members get bigger, it gets complicated and the interests get wider, and some of these interests are finding their way to this WCPFC, the size as it is now making it more complicated than it was initially set-up.

Well in terms of group dynamics [in the WCPFC], bigger groups are very hard to manage because the bigger the group, possibly the more interests in it. The bigger the

group that would be hard to make decisions, the smaller possibly manageable would be good, we can identify who are the key stakeholders in the fisheries would be good because they play a major role in the fisheries.

Prior studies have different conclusions about structure factors such as composition and size of coalitions and their effects on institutional arrangements, and therefore, on the outcomes of CM. The study by Schlager (2004) suggests that heterogeneity and size of group do not have a significant impact on the likelihood of collective action. However, researchers such as Olson (2009) argues that size of group affects the outcomes of collective action and the larger the group, the less likely the common interests can be sustained. Studies suggest that CM is more likely to be effective in groups that are homogeneous and in the same geographic region, because members can more readily establish collective behaviours (group rationality). For example, the studies by Doulman (1993) and Johannes (2002) conclude that community fisheries management arrangements work effectively in most communities of the Pacific (e.g. Kiribati). Our findings contributed to the debate and shed further light on how the structure factors and size of group impacted on the decision-making process as well as the outcomes of CM.

4.2. Competing interests

In our interviews, a strong sentiment expressed by the participants (30 out of 40 participants) regardless of the type of their membership, was self-interest. We found that it was the precedence of self-interest over conservation goals that attributed to the failure of WCPFC in reaching agreements and delivering results, although all the member states appreciated the importance of common interest (i.e. conservation and sustainability of tuna fisheries). Two participants put it this way:

The work of the WCPFC is extremely difficult because of the divergent interests among the members. This makes negotiations very difficult.

Well, when conservation and management measures are not agreed or when there is no decision on the issues, this certainly means there is a difference in interest...I think from a DWFNs perspective, they will continue fishing, continue having their businesses alive, but from a coastal state's [i.e. PICs'] perspective it's a matter of sustaining that resource to ensure that there is a maximum economic return, so whether it be excess fees or what so ever value added. Therefore, I would say perhaps the common goal would be to have sustainable fishery, there would be differences on what would be the economic returns, what it means to those different perspectives.

Research shows that self-interest is a common issue in the management of CPRs because individual rationality often leads to a social dilemma situation (Ostrom, 1999; Salmi & Muje, 2001). In the case of the WCPFC, we found that DWFNs sought to maximize their financial benefits from the tuna resources, while PICs felt that they did not receive their fair share and were proposing an increase in the resource rent, which did not go down well with the DWFNs. One of the participants told us *'almost four billion dollars' worth of fish was harvested in Pacific waters in 2013, but not even a quarter of that value was returned to the region (the PICs)'*.

To our observation from interviews, DWFNs viewed the Conservation and Management Measure on Regulation of Transshipment (WCPFC, 2009) as a significant economic hardship to their long line fishing vessels. This was because they must go to PIC ports to offload their catch which incurred many fees, rather than transshipping their catch at their fishing ground. As a result, the profit margin of DWFNs was reduced significantly. In contrast, offloading on ports

of PICs generated economic spill-over benefits for PICs such as bunkering, taxes, port fees and other charges. Thus, the main hurdle to achieving CMMs was the competing interests and the unequal share of benefits received from the tuna resources among the WCPFC member states. This finding was consistent with the study of Aqorau (2018) and Hanich et al (2015) on the problems of conservation management of the tuna resources in the region.

The cooperative game theory suggests that collaborative management works when the benefits of a common approach for the good of the group (i.e. all countries in the WCPFC) is enough motivation for all to comply. However, this is not the case in the WCPFC with very different interests at stake, where the group rationality was overrun by the individual rationality of the member states. As a result of competing interests, the continued overharvesting of tuna fisheries left fishers, owners, and other stakeholders worse off.

4.3. Self-enforcement

Our interviews found that most participants (28 out of 40) believed based on their past experiences with the WCPFC that self-enforcement was not a viable mechanism to manage migratory tuna resources. Here are two comments made by the participants:

...it is and will be difficult for the DWFNs to participate co-productively in this approach [self-enforcement] because they have different interests. They are more interested in making money. So, we still need observers to oversee their activities and to increase the capacities of external monitoring and surveillance.

When we talk about offshore resources, we refer to migratory species that trans-boundaries, it is very difficult [to apply self-enforcement] because they are highly migratory. The key to managing such resources is monitoring and surveillance, if people feel that they own the resources or part of them.

Some of the extant research suggests that self-enforcement (where fishers are responsible to monitor their own behaviour) helps in the effective management of commons (Reaves & Bauer, 2012), when resource users have rights to commons (Oviedo & Burszty, 2016). However, due to the differences in the perception of the ownership of tuna resources, self-enforcement was proved to be difficult to implement in the WCPFC. This is because PICs have a strong interest in the long-term sustainability of tuna fisheries for their future generations, whereas DWFNs often have short-term licensed rights, which may not be guaranteed in the future. Therefore, long-term strategies are needed for self-enforcement to work for all in commercial fisheries and particularly in migratory tuna management, as well as in a heterogeneous coalition where members have divergent and competing interests. Some research suggests that self-enforcement must be compounded with external interventions such as regulations and monitoring by external authorities in order to achieve the desired results (Van Laerhoven & Barnes, 2014). Our finding may help explain further the challenges facing WCPFC's self-enforcement in managing highly migratory tuna resources that are multi-jurisdictional and cross-regional.

4.4. Leadership style

We found that most of the participants (27 out of 40) in our interviews were positive about the administrative leadership of the WCPFC and expressed their satisfaction when dealing with the incumbent senior officials/administrators of the WCPFC (e.g. Chairs, Directors and Secretary Generals). The key reason was that the leadership team treated all members equally, stayed neutral, and facilitated and encouraged cooperation among member states. Research

shows that sound leadership of CM encourages a participatory approach in matters such as decision-making, the enactment of laws, the development of policies, and encourages members to solve problems collectively (Carlsson & Berkes, 2005). One of the participants said:

The leaders appear to be neutral, and do not take side with their country. No complaint so far about them being biased etc. In addition, generally there is no complaint about WCPFC leaders being ineffective or biased.

We also found that these incumbents were mostly from the PICs and focused more on establishing the relationships with and between members than enforcing the rules agreed upon by members. One of the interviewees put it this way:

However, it [WCPFC] comes a long way to be where it is in terms of management framework and so I 'd say it's effective to begin with but needs to be reinforced. Have a look at the status of bigeye tuna for the last five years, it has been inching on over-fishing. There still has not been a solution...

The finding suggested that leadership style plays an important role. But we argue that the leadership style alone was unlikely to succeed in enforcing the rules of the WCPFC, in particular, those of CMMS which were seen as being crucial to curbing the sharp decline in tuna resources.

4.5. Power inequality and different powers

According to Article 20 of the Convention (The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean), decision-making by the WCPFC should be generally based on consensus among member states. However, to our observation in the interviews, power disparity between PICs and DWFNs who can leverage development aids in negotiations, made it difficult for decisions to be made on sustainable tuna management. An example was the submission made by Pacific Islands Forum Fisheries Agency (FFA) on the 4th November 2016 to close all fishing activities on the high seas pocket enclosing PIC's exclusive economic zone (EEZ). The DWFNs opposed the proposed measures (WCPFC, 2016b). The PIC members reacted by not granting fishing license to DWFNs to fish in PIC's waters according to our interviews.

The majority (24 out of 40) of the participants from all the four memberships of WCPFC that we interviewed indicated that different powers among the WCPFC members were a key barrier to reaching consensus on CMMS. A representative of a sub-regional country interviewed commented:

.... there is a big power inequality, but it cuts both ways. The smallest countries on earth are dealing with the most powerful, economic thugs, they use their markets, their aid and other instruments, they can intimidate PICs. However, another source of power is that these fish occur in the waters of developing countries, 90% of the catch is taken either in the waters of PICs or in Indonesia, Philippines or in the waters adjacent to those countries. That gives a very great power to the PICs. This WCPFC is about that balance of power on one hand, PICs with their power of ownership and right of the resources, and on the other hand the economic and political powers of the DWFNs. That's the game.

Prior research suggests that power imbalance and differential could be a significant force that affects negatively CM outcomes (Gallardo et al., 2013). It is a complex phenomenon from an interdisciplinary perspective (e.g. political, economic, resource affiliated, social, cultural, etc.). The power differential was structural in the case of the WCPFC. We found that the DWFNs had economic and political powers while PICs tended to take ownership of the tuna

fisheries. The study by Havice and Campling (2010) pointed out that the regionalization and internationalization of fisheries management was diminishing PICs' sovereignty and property rights and hindering their domestic capacity to regulate and control tuna fishing activities. DWFNs were using their economic power to exert pressure on fishing regulation at regional and national levels in the interest of their fleets. The power struggle and power relationship among different interest groups of WCPFC was eroding the potential benefit of the CM of WCPFC.

4.6. Cultural differences

From a culture perspective, the 26 member states of the WCPFC boasted a wide range of cultural backgrounds including the cultures of the West, the East and the South Pacific. The different membership groups – PIC, DWFN and REMO manifested different cultural orientations although intra-culture differences existed within each of the groups. We found that half of the participants (20 out of 40) held a view that different cultural values and norms among member states often negatively affected the outcomes of CM in the WCPFC. It was interesting to note that the cultural differences were less acknowledged by participants from DWFN and REMO than from the PIC group (see Table 3 for detail). Instead of capitalizing on the cultural diversity, the WCPFC was seen to be constantly struggling with it. One of the participants explained:

Cultural differences actually hinder a lot of things, impacting on how we manage this resource [tuna fisheries]. You take for example, Pacific Islanders, they have to listen to chiefs when it comes to talking in meetings, they can't talk even if they know the subject. However, there are other parties that do not possess the culture of being obedient; they make a lot of noise in the meetings when they talk. That sort of cultural thing has seeped into this management and has worked against us too.

This remark reflected the different attitudes towards power distance which is defined as the degree to which members of an organization or society expect and agree that power should be unequally shared (Hofstede, 2001). In the light of the cultural orientation theory of Hofstede (2001), countries that are high in power distance tend to be submissive. This was evident in the PICs that had high respect for chiefs, leaders and their early colonial powers (e.g. the USA, EU, and the UK). They viewed their leaders on the hierarchy end of society. Thus, they tended to keep quiet in decision-making process. In contrast, those members (e.g. Australians and New Zealanders) who came from a low power distance culture, freely debated issues that concerned them. Our interview findings also indicated another distinct cultural difference – individualism and collectivism (Hofstede, 2001) that may hinder the way that member states managed tuna resources and how the CM was enacted. For example, one of the participants told us:

We, in the Pacific, are more communal in our approach, we love our community-based management. The Western world looks at things differently, they do their own things and do not mind others' businesses. I think the perception that DWFNs have, will also affect the way we manage our resources collaboratively. They look at their own survivability, the economic viability, etc. I think our upbringings do have an impact on the way we manage our resources collaboratively.

This finding suggested that cultural differences and the inability of appreciation of the differences affected adversely the collaboration and outcomes of the WCPFC.

The overall findings of our research demonstrate that the management of migratory tuna resources in the WCPO is a far more complex process and should consider the contingency factors when implementing a CM governance model regarding commons governance of

migratory tuna resources. Based on our findings from this study and the extant literature, we posit that for collaborative management to be effective for the WCPFC, member states should work on the mechanisms surrounding: equal power sharing among members, reciprocity of benefits and common interests, intelligence in terms of cross-cultural communication and understanding, strong leadership and intervention of governing body of coalition group, self-enforcement compounded with external enforcement, and a balanced group structure and manageable size of coalition group. These factors are particularly important for the sustainable management of CPRs which involves multiple nations and cross-regional and international co-operations.

5. Contributions, Limitations and future research

This study contributes to the extant literature on commons management and governance in three ways. First, extant studies on the use of CM in the international governance of CPRs and research on issues of managing migratory tuna in the Pacific region are limited. This study addresses the knowledge gaps and provides empirical evidence to demonstrate *what* are the most prominent contingency factors that may influence the outcomes of CM governance model in managing migratory tuna in the WCPO region. By studying the WCPFC, this research identified six key factors in the management of CPRs in multiple geographical areas where inter-country and different sovereign states are involved, Second, there is a lack of understanding in the literature on *how* the factors affect the outcomes of CM. The study sheds important insights on *how* each of the six factors played out in the institutional arrangement and governance of migratory tuna resources, through the analysis of the motivations and conducts of international actors of a large heterogeneous coalition (i.e. WCPFC). Third, the contingent factors of CM identified through this empirical study could be used not only to extend the current research in CM of CPRs but also help policy makers develop effective strategies for managing migratory fishing resources to sustain the economic viability and sustainability in the region.

This study has taken every caution to ensure research rigorousness. However, a few limitations must be acknowledged. First, despite the merits of a case study, this method limits the generalisation of the findings given the single case design of this study. Multiple cases can be opted for more insightful results. Second, a quantitative study embracing more questions with a larger sample size should be employed to validate the findings from the qualitative approach. Third, more members from DWFNs and coastal states could have been recruited for our interviews because they may have raised different issues and provided different influencing factors. Future research should take these limitations into considerations to design a study that can identify an optimal model for more effective collaborative management in migratory tuna resources.

6. Conclusion

Collaborative management of CPRs has been suggested to be an effective governance model for commons managements in the literature (e.g. Vetemaa et al., 2001; Mutimukru, 2010; Hauzer et al., 2013; Aura et al., 2020). This study suggests that the effectiveness is contingent on many factors, which may vary in different contexts and thus need be considered cautiously when making institutional arrangements for commons management. The findings of our study are insightful and instrumental for commons management researchers and policy makers in developing models and strategies for collaborative management. The study is particularly useful for CM which involves multiple stakeholders, multi-governments, and multi-national organisations that are highly heterogeneous, especially those that involve international actors

(i.e. cross-country and cross-cultural). Their significant differences, competing interests, and different economical aspirations appear often to lead them to base their decisions at the expense of collective objectives and collaborative institutions.

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ⁱ Pacific island countries (PICs), commonly known as small islands developing states, have limited landmass (with the exception of Papua New Guinea), with few natural resources, but they control the largest ocean area in the world.

ⁱⁱ This is the region stretching from Indonesia and the Philippines in the west, to Hawaii, Kiribati and French Polynesia in the east, and from the southern oceans at 55 degrees south to the waters of the Arctic in the north.