Evaluating the effectiveness of citizen participation in public forest planning and management: results from surveys of public advisory committee members in Canada

by

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Abstract

Forest governance within Canada includes public engagement as an established component of forest resource development and regulation. Public engagement, often through local stakeholder advisory committees, can address conflicts in values and can facilitate decision making under conditions of scientific uncertainty. Such processes are also institutionalized through provincial regulation and third party certification, such as Forest Stewardship Council. Although forest governance institutions in Canada give centre stage to public engagement, research shows that such governance processes often fail to achieve claimed benefits, resulting in disillusionment among stakeholders. Moreover, empirical insights regarding these governance processes are often limited to regional, or case specific insights. In this thesis, I attempt to achieve two complementary goals. In chapter 2, I provide a theory-driven quantitative analysis of factors influencing the effectiveness of public advisory committee (PAC) participation in the Crown forest management in Canada. Drawing on a 2016 national survey of PAC members in Canada (n = 345), I examine committee member perspectives on procedural justice, distributive justice, and social learning are linked to self-reports of committee effectiveness and satisfaction. Controlling for other factors in binary logistic regression analysis, results indicate that procedural justice (fairness of the process) is the most significant factor in committee member expressions of effectiveness and satisfaction. These results lend support to theories of procedural justice as a foundation for enhancing forest governance in Canada.

In Chapter 3, given the evolving theory and practice of sustainable forest management (SFM), reflected in Canada through the criteria and indicators of SFM, the second goal of this thesis is examining potential differences between Indigenous and nonindigenous PAC participants regarding their opinions about the success of the PAC process in fulfilling their expectations and their perspectives about forest values. Under the second goal, I have had two district objectives. First, examining opinions of the two groups concerning the success of PAC processes in fulfilling their expectations. Second, statistically testing potential differences between Indigenous and nonindigenous public advisory committee (PAC) members

regarding their feelings about different forest values. I have attempted to address this goal by using the 2004 and 2016 national surveys data of PAC members in Canada. I used a Mann-Whitney U test to estimate if there is statistically significant difference between indigenous and nonindigenous PAC members regarding the two objectives (forest values and success of PAC process in fulfilling expectations). My findings from both the 2004 and 2016 surveys indicate that despite the application of PAC based public participation in Crown forest in Canada for almost two decades; there remain statistically significant differences between Indigenous and nonindigenous members regarding their perceptions about different forest values and successes of the PAC process. Compared with nonindigenous PAC members, Indigenous members are less likely to feel that the PAC process is fair, they are not confident in raising their concerns, and are less likely to agree that they are able to influence forest decision-making. Drawing on these findings, I suggest what future research may focus on in order to forward helpful policy implications for the success of PAC process as a dominant form of public participation in forest management in Canada.

Preface

This thesis is an original work by Alemu Sokora Nenko. The research project, of which this thesis is a part of, received research ethics approval from the University of Saskatchewan Research Ethics Board. (Project title: “The Role of Communities in Collaborative Forest Governance in Canada: Contributing to Theory and Practice through Comparative Study”, reference number: Beh 15-340, project operation period: December 7, 2015 to December 7, 2017).

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Chapter one: Introduction

Overview

Since the 1970s, public participation in natural resource planning and management has become crucial in both theory and practice (Sinclair & Diduck 2016; Rydin & Pennington 2011). To date, bodies of literature, which focus on public participation, shed light on two features of participatory public processes in natural resource management. First, the literature discusses many triggers for the evolution of participatory public processes, including public recognition of pluralistic ecosystem values, mounting scientific uncertainties in dealing with ecological problems, and growing attention to the quality of democratic discourses and practices (Parkins 2006). Second, the literature focuses on multiple approaches to evaluating participatory processes. There is no consensus on the best frameworks for achieving effective public participation outcomes (Appelstrand 2002). Rather, the state, civil society organizations, and the private sector often use public participation in different contexts and for various purposes; hence, the processes and outcomes of participation in resource management vary across the world (Rydin & Pennington 2011).

One contested feature of public participation in resource planning and management involves how to define and evaluate criteria for the effectiveness of these processes (Koontz & Thomas 2006; Reed 2008). In fact, to empirically evaluate public participation in resource management, the rationale behind seeking public involvement should be evident to all stakeholders (Buchy & Hoverman 2000). However, scholars argue that there are two broad and conflicting rationales for seeking public participation in resource planning and management (Parkins & Mitchell 2005; Rydin & Pennington 2011).

The first rationale focuses on public participation as a means of achieving an end, which is the improvement of specific social, economic, and environmental outcomes (Koontz & Thomas 2006). Most natural resource scholars and practitioners embrace this rationale and often face problems with public participation processes when tangible outcomes are not observed (Reed 2008). In this context, a primary goal for public participation largely depends on what public participants are expected to contribute to resource management outcomes.

In contrast, the second rationale views public participation as a process of opening up deliberative spaces whereby citizens have a chance of debating and discussing diverse values, interests, and knowledge and seek common ground regarding complex resource management issues (Parkins & Mitchell 2005). Proponents of the second rationale contend that given growing public value pluralism and scientific uncertainties, effective public participation enhances social learning, fairness, and inclusion, with less emphasis on conventional natural resource management and utilization (Sinclair & Diduck 2016; Smith & McDonough 2001).

Problem Statement

Within Canada, the forest industry has had an immense contribution to the socio-economic advancement of the country (Lantz 2008). As an industrialized nation, Canada's public forest management system had predominantly been following a "TechnoReg paradigm" where Techno refers to scientifically correct technical solutions to environmental problems, and Reg is the legal means through which the technical recommendations are institutionalized and regulated (Robson & Rosenthal 2014). The TechnoReg paradigm perceives forest as particular trees that should be extracted, protected, and renewed for mainly commercial purposes without considering biodiversity, social values of forest and wellbeing of Indigenous communities (Fedkiw and James 1999).

However, after the late 1960s, public concerns have been evolving on how public and private forest should be managed (Drushka 2003). Drivers of public concerns, among others, are failures to achieve the operational principle of sustainable yield in the 1970s and 1980s, the outbreak of some diseases,emerging alternative uses of forests, global warming and Indigenous rights (Harshaw, 2010; Lantz, 2008; Wyatt et al., 2011; Drushka, 2003).

In recent decades, governments have responded to these public concerns by opening up public engagement initiatives (Drushka, 2003). For example, initiatives such as criteria and indicators of sustainable forest management (C&I-SFM) processes, performance-based certification schemes, and impact assessment regulations often oblige forestry planners and decision makers to involve the public in forest management practices (Wyatt 2008; Tikina et al. 2010). These gradual shifts from the TechnoReg to a more participatory paradigm have challenged forest managers to "transform from objective technical analysts to facilitators of social learning in public participation" (Robson and Rosenthal 2014: 361). While so many collaborative and participatory approaches have been used in Canada's forest sector, public advisory committees (PACs) have become a principal part of public forest planning and management processes at the local level (Hunt 2015; Parkins et al. 2006). Scholars articulate that the PAC is in a better position to serve as deliberative public space that incorporates multiple values and interests of local forest users into forest planning and challenges experts to integrate local and scientific knowledge into addressing uncertainties (Parkins 2006; Hunt 2015).

The first goal of this thesis is to empirically assess the effectiveness of public participation in forestry from the eyes of stakeholders. The second goal is to evaluate the experience of Indigenous members of public advisory committees in comparison to nonindigenous members. To achieve these goals, I draw on insights from national surveys of public advisory committees (PAC) in Canada (n = 1424) conducted in 2004 and 2016.

The first report from the national survey of PACs shows that the process had limitations in three specific ways: all forest-related local interest groups were not represented in the committees, limited use of a diversity of information sources in deliberation, and flaws in consensus building & decision-making (Parkins et al. 2006). Reed (2010) articulates that the committees were dominated by resource extraction oriented elites, scientific based technical knowledge was used as the primary source of information, and groups with low socioeconomic status had no voice in the committees. Hunt (2015) also indicates how the lack of gender and age diversity in the committee members limited their ability to address pluralistic social values in Ontario forest management.

Research goals and objectives

In this thesis, I attempt to achieve two complementary goals: (1) analyze the factors influencing the effectiveness of public advisory committee (PAC) involvement in Crown forest planning and management in Canada from the eyes of committee members; and (2) examine the extent to which the application of criteria and indicators of sustainable forest management (C&I-SFM) in Crown forest planning and management enhanced PACs in terms of equally satisfying both Indigenous and nonindigenous Canadians.

The first goal is addressed in Chapter 2. My objective under goal one is to test if PAC members' claims about committee effectiveness and satisfaction are associated with procedural and distributive justice and social learning variables. In other words, I have tried to answer the following two questions in Chapter 2:

1) How do we quantify the effectiveness of PACs with a focus on variables related to procedural justice, distributive justice, and social learning?

2) How are self-reports of procedural justice, distributive justice, and social learning linked to self-reports of committee effectiveness and satisfaction?

The second goal is addressed in Chapter 3. I have tried to answer two questions under the second goal. First, given that C&I-SFM framework calls for inclusion of social values, to what extent is the Indigenous and nonindigenous PAC members' level of satisfaction regarding PAC processes similar or different? Second, to what extent has the implementation of C&I-SFM brought a shared understanding between Indigenous and nonindigenous PAC members regarding diverse forest values?

Project background

This thesis is part of a research project titled "The Role of Communities in Collaborative Forest Governance in Canada: Contributing to Theory and Practice through Comparative Study". A broader goal of the research project is to understand, theoretically and practically, how collaborative governance arrangements can foster learning and adaptive capacity of Canadian forest-based communities during times of environmental, social, and economic transition. Academically, the project builds on and contributes to theories of collaborative environmental governance, transformative and social learning, and adaptive capacity within resource-based communities. Practically, the project intends to share knowledge with local participants, researchers, policymakers, and other practitioners who are engaged in collaborative governance to co-generate recommendations for improving forestry practices.

While Professor Maureen Reed from the University of Saskatchewan led the investigation, the project is a joint effort between the research team (3 investigators and 2 collaborators) affiliated with the University of Manitoba and the University of Alberta, and natural resource governance institutions across Canada.

Methods

Data used in this thesis came from two national surveys of PAC members in Canada conducted in 2004 and 2016. The national survey in 2004 was a joint effort between all five members of the research team. The strength of the survey was that the research team was multidisciplinary, and each team member had broad experiences in social dimensions of participatory forest management. Further, each team member was from different geographic locations across Canada, and all members had personal experiences with public advisory committees.

Building on previous advisory committee surveys and experiences of each research team member, the survey questionnaires measured a wide range of factors associated with the success of public participation and "criteria for evaluating effective public participation processes" in forest management planning (Parkins et al. 2006: 2). The 2016 survey was conducted as a follow up to the 2004 survey. The 2016 survey was also conducted by four members of the research team, of which two members were contributors to the 2004 survey.

For this thesis, not all advisory committee members' survey data were used. Apart from demographic variables, only survey data that fit with my theoretical frameworks were used in both Chapter 2 and 3. For Chapter 2, which focuses on the effectiveness of PAC, I used survey data from 2016 that measured constructs related to procedural justice, distributive justice, and social learning theories. Since most advisory committees were established around 2000, I did not want to assess the effectiveness of PAC by using 2004 survey data. Chapter 3 seeks to compare perceptual differences between Indigenous and nonindigenous PAC members regarding different forest values and success of PAC process. Thus, for Chapter 3, I used both 2004 and 2016 survey data that measured forest values and PAC success constructs to get insights into the change trends in two groups of respondents' perceptions of forest values and PAC success.

Data collection

Both 2004 and 2016 survey data were collected from nine provinces, excluding territories. The 2004 data were gathered by distributing paper copies via postal address. A total of 1079 committee members responded, of which only 61 (5.7%) respondents self-identified as Indigenous community members. For the 2016 survey, an online questionnaire was sent to all chairpersons and many PAC members directly when the chairs provided email addresses of the committee. A total of 345 committee members responded from across the country, of which 30 (8.7%) respondents self-identified as Indigenous peoples.

In both 2004 and 2016 surveys, research administrators attempted to reach all PAC members in the nine provinces. However, since there is no central registry of PACs in Canada, the exact number of PAC members in the country is unknown (Bowie 2013; Parkins et al. 2006). In the 2004 survey, the total number of PAC members was estimated to be more than 1,000 where some provinces have less than 10 committees and the largest has more than 100 (Parkins et al. 2006). Further, the committees were established for diverse purposes and under different circumstances across counties and provinces. In Alberta, for example, PACs were associated with area-based tenure holders that participated in forest planning processes and were hosted by the forest industry (Parkins 2006). In Ontario, in contrast, the provincial government hosted the committees. Since 2004, however, some significant restructuring has taken place in provinces such as Quebec, where forest-sector has undergone significant change, including the abolishment in March 2016 of the regional government agency previously responsible for setting up and chairing PACs in the province.

Based on the above information, I cannot claim that the results of these surveys are an accurate reflection of the overall experience of committee members in Canada. Further, since survey administrators mailed paper copies (for the 2004 survey) and emailed (for the 2016 survey) all PAC

members whose contact information had been given to them, the randomness of samples cannot be claimed. Therefore, I am cautious about claims of generalizability, focusing the analysis in this study on the relationships between variables and the examination of theoretical assumptions.

Chapter two: Determinants of effective public participation in forest governance

Introduction

For the last four decades, public participation in environmental governance has become ubiquitous. The rationale behind the growing interest in public involvement in environmental decision-making is diverse, although there are two apparent and broad drivers (Rowe & Frewer 2000; Parkins 2006). The first driver involves multiple and often conflicting values and interests related to environmental management. Coupled with diverse values is the associated scientific uncertainties in managing complex and dynamic forest ecosystems for multiple values (Parkins 2006). Public participation is linked to a pragmatic recognition that addressing environmental problems through conventional expert and scientific knowledge alone has become ineffective, resulting in persistent conflicts with forest management agencies in the public and private sectors (Rowe & Frewer 2000; Chess & Purcell 1999; Parkins & Mitchell 2005). Indeed, since the 1970s and 1980s, the global recognition of multiple conflicting ecosystem values and mounting scientific uncertainties in dealing with the ecological challenges have raised public concerns and social movements across democratic nations including Canada (Ananda & Herath 2003; Booth & Halseth 2011). The second driver comes from democratic theory. From a normative perspective, public participation in environmental matters is part of a democratic right that calls for empowering citizens to demand a stronger voice in decisions that affect their livelihoods (Smith & McDonough 2001; Rowe & Frewer 2000; Chess & Purcell 1999).

Both pragmatic and normative perspectives show why and how different public participatory methods and philosophies are used to engage the public in environmental planning and policy decision-making processes (Parkins & Davidson 2008; Reed 2008). Both perspectives claim that

participatory approaches in environmental decision making have benefits (Reed 2008). However, the two views differ in what kinds of benefits are gained from public participation efforts (Reed, 2008). From a pragmatic perspective, public participation in natural resource governance is a means of achieving an end where its benefit is to enhance quality decision-making in environmental outcomes (Parkins & Mitchell 2005; Reed 2008). From a normative perspective, public participation is a process that leads to benefits of fairness, equity, trust, and social learning in environmental governance (Sinclair & Diduck 2016; Mitchell & Parkins 2005). In other words, while pragmatic scholars are focused on outcomes of public participation to improve the quality of environmental decision-making, democratic theorists are more concerned with the fairness in processes of public participation itself to foster collaboration among multi-stakeholders, and the impact of participation in the formation of personal values and preferences (Reed 2008; Parkins & Mitchell 2005). To this end, scholars supporting both perspectives have developed diverse criteria for effective public participation in environmental decision making based on different theories and stakeholders' views (Smith & McDonough 2001; Reed 2008).

Quantitative work supporting many of the benefits claimed by both pragmatic and normative perspectives remains somewhat limited (Parkins & Davidson 2008; Rowe & Frewer 2000). Notably, Reed's (2008) literature review shows that pragmatic public involvement efforts in environmental decision-making often fail to achieve the claimed environmental benefits, resulting in disillusionment among stakeholders, such as public participants, practitioners, and private agents. An extensive review of the literature by Koontz and Thomas (2006) shows that measuring the effects of the participatory public process on environmental outcomes is challenging due to multiple intervening factors, long-term environmental recovery, and difficulties in gathering data.

The proponents of the normative perspective contend that given growing public value pluralism and scientific knowledge, uncertainties are the main driver of the participatory public process effective public participation should be what enhances social learning, fairness, and inclusion (Sinclair & Diduck 2016; Smith & McDonough 2001). However, from an empirical standpoint, we have little knowledge of whether fairness and social learning perceptions in public participation determine evaluation of effectiveness and satisfaction of participatory public processes. Thus, efforts to gain empirical information about the claimed benefits of public participation by normative perspective theorists are paramount.

In this study, I contribute to this gap by conducting a theory-based quantitative analysis of factors influencing the effectiveness of public advisory committee (PAC) participation in the Crown forest management in Canada. I am particularly interested in how self-reports of procedural justice, distributive justice, and social learning issues are associated with self-reports of PAC effectiveness and satisfaction. By using a 2016 online national survey data of PAC members in Canada, I test these relationships by developing a theory-driven analytical framework and a series of related hypotheses. Our empirical findings confirm that personal perceptions of procedural justice, distributive justice, and social learning in committee participation determine individual judgment about effectiveness and satisfaction of the committee process and outcome. Further, although these independent variables, such as justice and learning, are conceptually different – the empirical results show that they are not mutually exclusive.

Conceptualization of public participation in resource management

Public participation is a process that gives individual citizens, communities, and groups of stakeholders an opportunity to influence public decisions (Parker 2003; Beckley et al. 2005). The concept of public participation originates from ideas of democratic theory that view citizen participation in public policy decisions as a basic right of citizenship within democratic societies (Parkins 2006; Smith & McDonough 2001). Specifically, for deliberative democratic scholars, public participation is, in a broader sense, "an opportunity for public debate, personal reflection and informed public opinion" (Parkins and Mitchell 2005: 532). This definition is in contrast with traditional natural resource management scholars and practitioners, who need participation to meet regulatory approvals and to potentially improve management outcomes such as reducing tensions and conflicts (Reed 2008; Booth & Halseth 2011). Given these objectives, natural resource managers often narrow participation to stakeholder involvement in which only those who are knowledgeable and who are directly affected by environmental decision-making should participate (Reed 2008). Parkins and Mitchell (2005) advance the argument that while deliberative democratic theorists urge the inclusion of a broader range of stakeholders; natural resource managers focus on the participation of limited stakeholders based on interest-based representation and/or who might otherwise pose a credible threat.

For the purpose of this study, I conceptualize public participation as an ideal form of stakeholder representation where PAC members "represent the voice and history of their constituencies on equal footing" (Parkins and Davidson 2008: 181) in public forest planning and decision-making. To this end, Smith and McDonough (2001) have empirically assessed public participation experiences in natural resource decision-making and concluded that public actors are vastly concerned with justice in decision processes and outcomes. Smith and McDonough (2001)

further argue that if natural resource scholars want to analyze the effectiveness of public participation, theories of procedural and distributive justice are the appropriate tools.

Further, in collaborative natural resources literature, social learning is a part of the participation process through which multiple stakeholders develop relationships and cooperation in the long term (Berkes 2009). For instance, scholars of human resource management articulate social learning theory as an interactive and collaborative process among a group of people and social organizations that create different levels of learning; it creates knowledge, reflection, and even initiates action based on the degree of learning (Kim 2014; Egunyu 2015). In this definition, participatory approaches are a central issue since individual or organizational learning cannot be shared without participation (Berkes 2009). Lave and Wenger (1991) defined "learning as a social participation by which people obtain shared knowledge and understanding of the world" (cited in Kim, 2014: 5). The next section further reviews ways of measuring effective public participation.

Measuring effectiveness of public participation

Measuring the effectiveness of public participation is not straightforward (Sale et al. 2005). In the public participation literature, instead of measuring the effectiveness of participation outcomes directly, a number of scholars theorize the components of a public participation process that are linked to effectiveness (Chess & Purcell 1999; Rowe & Frewer 2000). For example, some authors identify process criteria that affect decision-making: consideration of the diversity of views, impartiality of participation facilitators, equal opportunity for participation, identification and integration of concerns, adaptability, resiliency, and durability (Sale et al. 2005). Some scholars maintain that effectiveness of participation should be judged based on

participation outcomes (Chess & Purcell 1999). For instance, suggested outcome-based criteria are:

> decision acceptability, project efficiency, cost avoidance, mutual learning and respect, improved understanding, the amount of conflict resolution required, the degree of consensus achieved, influence on and participation in decision-making, or participant satisfaction with the results of the process (Sale et al. 2005: 12).

Other scholars support a middle ground, i.e., considering a "balance of outcome and process goals" (Chess & Purcell 1999: 2686). Further, some scholars contend that certain public participation methods and/or approaches are better than others (Ibid). For instance, it is argued that authorities or practitioners may simply use some public involvement methods, such as referenda and public hearings, as a legal formality of involving the public (Rowe & Frewer 2000; Chess & Purcell 1999). However, growing bodies of literature show that instead of claiming that some participation methods are better than others, it is better to select a method based on the intended level of engagement, project objectives, socio-cultural and environmental factors (Reed 2008).

Ideally, the effectiveness of public participation is about understanding "what results of a participation exercise constitute "good" outcomes and what processes contribute toward these (and are thus desirable)" (Rowe & Frewer, 2000: 10). However, practically, since public participation is about the consideration of multi-stakeholder values, perceptions, beliefs, aspirations, knowledge, and understanding, there is no one-size-fits-all criterion for effective public participation. An assessment of effective or satisfactory public participation is "complicated by a diversity of goals and expectations, differing processes and mechanisms,

relative and site or project specific needs and goals, and the inherent richness of context-dependent situations" (Sale et al. 2005: 12). As a result, there are limited comprehensive quantitative studies that measure the effectiveness of PAC in particular, and public participation approaches in resource management in general (Mauerhofer 2016; Irvin & Stansbury 2004). In one exceptional case, Chess and Purcell's (1999) reviews of quantitative reports on the PAC of the U.S. Department of Energy in the 1990s indicates that the effectiveness of the committee's participation in a process and outcome varied due to the difference in criteria used by researchers and the variation in local contexts (Chess & Purcell 1999).

Although the literature evaluating the effectiveness of public participation is mainly qualitative and case study oriented, there is limited quantitative empirical work that tested the claims of these theories discussed above. Thus, in this paper, I develop constructs and examine claims of some of these theories and empirical work about effectiveness of public participation. In doing so, the paper may initiate further empirical analyses that test theoretical and case studies claims of effective public participation. The next section elaborates on the theoretical background of selected independent variables and the corresponding hypotheses.

Theoretical framework and corresponding hypotheses of predictor variables

In this section, I provide a theoretical framework and corresponding hypotheses that explain how social learning, procedural justice, and distributive justice variables predict effectiveness and satisfaction of public participation.

Social learning variables

Qualitative case studies from social learning scholars show that successful public involvement in environmental governance enhances a variety of social learning outcomes (Berkes 2009; Sinclair

et al. 2011; Sinclair & Diduck 2001). If successful, public deliberation will result in collective learning and collective decision-making (Muro & Jeffrey 2006). Social learning involves what participants learned from the public deliberation process and outcomes, as an individual or a group. Social learning has different dimensions such as "moral dimension of civil virtues, the cognitive dimension of knowledge acquisition, the relational dimension and trust" (Romina 2014: 16). The moral dimension has relevance with Habermas' ideal conditions for rational debate (Rist et al. 2007). The theory of communicative action seeks deliberative forums for public cooperation, negotiation, collaboration, and shared understanding. The theory of communicative action involves an alternative to strategic action, which is based on conventional development planning that depends on technological interests, and calculations of self-interest and competition (Romina 2014; Rist et al. 2007). The cognitive dimension assesses to what extent a participant increased knowledge and skills about the issues under deliberation (Romina 2014). The relational dimension focuses on power relations and trust. Romina (2014) argues that if there is an imbalanced power relationship among participating actors and there is trust, public deliberation could transform the power imbalance and promote shared interests. Public deliberation may also increase interpersonal trust as a result of frequent interactions without necessarily improving institutional trust (Parkins 2010; Romina 2014). As a result, my hypothesis is:

> H1: Cognitive, moral and relational dimensions of social learning increase the likelihood that participation is satisfying, and the committee is deemed effective by the participants.

Procedural and distributive justices

Scholarship on procedural and distributive justice contends that, given mounting divergent values and interests in environmental management, criteria for effective public participation

should focus on what the participants perceive as fair processes and outcomes (Smith & McDonough 2001). Clayton (2000) argues that although what is meant as fair is contestable, "researchers have begun to find that perceived justice is a good predictor of environmental attitudes, often better than self-interest" (P. 460). The rationale behind the inclusion of both procedural and distributive justice criteria is that empirical case studies show that although following procedural justice by agencies could be requisite in public participation processes, getting public involvement processes right does not guarantee that an outcome would be effectively distributed (Chess & Purcell 1999). Studies show that warranting both the participation process and outcome effectiveness is often challenging since involved stakeholders (agencies and the public) could have different goals and intentions (Rowe & Frewer 2000; Chess & Purcell 1999). For example, agencies could be okay with fulfilling procedural justice and satisfying public participants in the process but implementing the recommendations of public deliberation may jeopardize the agencies' objectives (Rowe & Frewer 2000). As a result, the failure of agencies to include public inputs in their final decision-making could dissatisfy the public and impede social learning (Rowe & Frewer 2000). For instance, a survey based on staff and public perspectives on five U.S. Department of Energy (DOE) sites recommends that to grasp the full picture of the effectiveness of public participation in environmental governance, future environmental studies should use both outcome criteria "(e.g., key decisions are improved by public participation) and process criteria (e.g., 'The decision-making process allows a full and active stakeholder representation')" (Chess & Purcell 1999: 2686).

Procedural justice variable

Empirical work shows that procedural justice evaluates how the involved parties perceive fairness of authorities (groups, legal, managerial, and institutions) in the process of decision-

making (Tyler 1994). Scholars conclude that when parties of concern are given a chance to have a voice in decision-making authority, the likelihood of perceiving a procedure as fair is higher (ibid). Thus, it is argued that procedural justice is indicative of trust, respect, and neutrality in authorities (Lowe & Vodanovich 1995).

According to Smith and McDonough (2001), procedural justice measures to what extent the public participation process follows justice principles such as representation, voice, consideration, and logic. Representation is the inclusion of diverse interest groups in public deliberation and notifying and reaching out to citizens. Once an individual gains an opportunity to participate, gaining voice is about the capability of expressing concerns and providing inputs to the deliberation process. Consideration is whether a participant's voice is heard and considered. Logic is about the rationality of decision-making in deliberation. Public participants want to access enough information to know the reasons behind decisions they do not agree with. For the purpose of this study, I will use Smith and McDonough's account of procedural justice, which is similar to the process of the level effective public participation criteria mentioned by Sale et. al (2005). Accordingly, my hypothesis is:

> H2: Following justice principles (such as representation, consideration of diverse voices, and good decision-making principles) increases the likelihood that participation is satisfying, and the committee is deemed effective by participants

Distributive justice variable

Scholars of equity theory extensively study distributive justice as a principle of allocating decision outcomes (benefits and burdens) equally, equitably, and based on needs (Tornblom & Vermunt 2007; Tyler 1994). As Smith & McDonough (2001) have put it, "equity suggests

everyone should get rewards in proportion to their efforts or costs" while "equality requires that everyone benefits equally regardless of costs or efforts" (P. 240). In the environmental literature, distributive justice measures the favourability of public participation about outcomes or to what extent outcomes are desirable with respect to public needs, interests, and values (Smith & McDonough 2001). Further, issues of future generations and environmental sustainability are studied under distributive justice (Smith & McDonough 2001). Scholars also argue that procedural and distributive justices are correlated. For instance, the risk of a negative reaction against the unfair distribution of an outcome may be reduced if participants perceive fairness in a procedure (Smith & McDonough 2001). Thus, considering the correlation between the two justice principles is a critical issue for the valid measurement of effectiveness in public participation. I presume that:

> H3: A perception that outcomes are consistent with public needs, interests, and values, increases the likelihood that participation is satisfying, and the committee is deemed effective by participants

The next section addresses two interwoven issues, research methodology, and its appropriateness for empirical investigation of the theoretical framework.

Research method

Participants and Sampling procedure

This study used national survey data from PAC members in Canada, which was conducted during the summer of 2016. Public advisory committees are located throughout the country and are commonly associated with industrial forestry. In Alberta, for instance, public advisory committees are associated with area-based tenure holders and these committees participate in

forest planning processes sponsored by the forest company. In Ontario, in contrast, Local Citizen Committees are hosted by the provincial government. PACs are intended to represent a range of local interest groups in forest decision-making.

Based on the 2004 survey, the total number of committee members across Canada is estimated to be more than 1,000 (Parkins et al. 2006). However, since there is no central registry of advisory committees in Canada, and because these committees exist and function within a changing forest sector, it is not possible to achieve a complete census of committees nationally or in individual provinces. In 2016 survey, a total of 345 committee members responded from across the country. Survey administrators attempted to reach as many committees as possible in each jurisdiction: contacts were made with government and industry officials, as well as with other researchers working in the field of public participation. Survey administrator also conducted an exhaustive web-based search of forest management plans and forestry operators and tried to contact respective PACs.

Thus, the results of this survey may not be an accurate reflection of the overall experience of committee members in Canada. Therefore, I am cautious about claims of generalizability, focusing the analysis of this study on the relationships between variables and on testing theoretical assumptions.

Measurement of variables

The questionnaire for the national survey was first designed in 2004 "to identify the key factors contributing to successful public participation and to determine criteria for evaluating effective public participation processes" in forest management planning (Parkins et al. 2006: 2). The more current 2016 survey capitalized on the past survey and was updated by a multidisciplinary team

of researchers. For this study, I have used only the variables defined in the preceding section involving the theoretical framework plus a number of demographic variables. Table 1 below illustrates how these variables were measured in the survey.

Table 1: Lists of variables used in the analysis

Variables	Dimension of independent variables	Survey question and indicators
Dependent variables		
Effectiveness		"The process is effective" (1=agree 0=disagree)
Satisfaction		"In summary, we would like to know how satisfied or dissatisfied you are with the overall process in which you are involved" (1=satisfied 0=dissatisfied)
Independent variables		
Social Learning	*Cognitive dimension*	I have learned technical aspects of forest management as a result of participating on the committee (dummy: 1=agree, 0=disagree)
		I have gained new scientific knowledge as a result of participating on the committee (dummy: 1=agree, 0=disagree)
	Moral dimension	I have come to understand the need to incorporate many different perspectives into forest management processes (dummy: 1=agree, 0=disagree)
		I am more patient with people who do not share my point of view since serving on this committee (dummy: 1=agree, 0=disagree)
	Relational/Trust dimension	The general level of trust between forest stakeholders has improved since the committee was established (1=strongly disagree, 5=strongly agree)
		I trust the information presented to me about the impacts of forest management plans (1=strongly disagree, 5=strongly agree)
Procedural Justice	*Representativeness*	Deliberations accommodate the full spectrum of public interests (1= strongly disagree, 5=strongly disagree)
	Voice	I have been given adequate opportunity to voice my concerns within the committee (1= strongly disagree, 5=strongly disagree)
	Consideration	I believe that community forest management decision-makers consider all viewpoints (1=strongly disagree, 5=strongly agree)
	Logic in decision-making	I trust forest managers to make the right choices about forest (1= strongly disagree, 5=strongly agree)

Table 1:

Continued

Variables	Dimension of independent variables	Survey question and indictors
Distributive Justice	*Desired outcome*	Our recommendations have guided forest managers (1= strongly disagree, 5=strongly agree) I think forests are managed better because of the existence of the committee (1= strongly disagree, 5=strongly agree)
Forest Values	*Anthropocentric*	Forests should be managed to meet as many human needs as possible (1=totally disagree, 5= totally agree) Forests should exist mainly to serve human needs (1=totally disagree, 5= totally agree) Forests that are not used for the benefit of humans are a waste of our natural resources (1=totally disagree, 5= totally agree) The primary function of forests should be for products and services that are useful to humans (1=totally disagree, 5= totally agree)
	Ecocentric	Forests are sacred places (1=totally disagree, 5=totally agree) Forests should be left to grow, develop, and succumb to natural forces without being managed by humans (1=totally disagree, 5= totally agree) Wildlife, plants, and humans should have equal rights to live and develop (1=totally disagree, 5= totally agree)

The two dependent variables (effectiveness and satisfaction) were coded as dummy variables. The first dependent variable is measured by asking about an individual respondent's level of agreement or disagreement regarding the statement "the process is effective," which I recoded as a dummy variable (1 = agree, 0 = disagree). The second dependent variable is measured by using the statement "In summary, we would like to know how satisfied or dissatisfied you are with the overall process in which you are involved", which I recoded as a dummy variable (1 = satisfied, 0 = dissatisfied).

I divided independent (predictor) variables into four categories based on the theoretical framework. The first category is the procedural justice variable that measures how committee members feel about the fairness of the PAC process. Four questions measure the procedural justice variable: (1) representation "Deliberations accommodate the full spectrum of public interests"; (2) voice "I have been given adequate opportunity to voice my concerns within the committee"; (3) consideration of a raised voice "I believe that community forest management decision-makers consider all viewpoints"; and (4) logic of ultimate decision "I trust forest managers to make the right choices about forest". All four dimensions are measured by using a five-point Likert Scale (1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly disagree). Since the reliability of the four items was determined by a Cronbach's alpha of 0.802 and factor analysis suggested that all dimensions can be loaded on one factor, I used the mean of the four variables as a new scale variable of procedural justice.

The second independent variable is 'distributive justice' which measures the perception of the committee members about fairness or desirability of PAC outcomes. There are two statements: (1) "Our recommendations have guided forest managers" and (2) "I think forests are managed better because of the existence of the committee", which measure the respondents' observations

about fairness in PAC outcomes with a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly disagree). I used the mean of the two items to measure distributive justice.

The third predictor variable is ‘social learning,' which is a multidimensional construct. There are three dimensions of social learning that include cognitive, moral, and relational/trust concepts. I treat each of the three dimensions as distinct independent variables. Regarding cognitive dimension of social learning, the committee members were asked if they learned technical aspects of knowledge about forest management. The survey participants responded to two statements: “I have learned technical aspects of forest management as a result of participating in the committee” and “I have gained new scientific knowledge as a result of participating in the committee” (1 = agree, 0 = disagree). To measure the moral dimension of social learning, the committee members were asked if participation in the committee enabled them to develop a shared understanding of divergent views about forest values and interests, including recognizing the concerns of others. Three items measured the moral dimension: (1) “I have come to understand the need to incorporate many different perspectives into forest management processes”, (2) “I am more patient with people who do not share my point of view since serving on this committee”, and (3) “I have learned to work productively with people who think differently than I do” (1 = agree, 0 = disagree).

The relational or trust dimension is measured by asking the respondents about their general level of trust in forest stakeholders and their trust in the presented information about impacts of the PAC on forest management. The respondents were asked to indicate the level of agreement with two statements: (1) “The general level of trust in forest stakeholders has improved since the committee was established” and (2) “I trust the information presented to me about the impacts of

forest management plans" by using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly disagree).

The fourth category of independent variable involves forest values. Within the domain of forest values, two variables were the degree of anthropocentrism and ecocentrism. The two variables were measured by asking the respondent committee members to indicate their level of (dis)agreement about forest values by using a 5-point Likert scale (1 = totally disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = totally disagree) (Table 2).

The demographic variables included in the analysis are age (continuous), gender (Dummy; 1 = female, 0 = male), and education (five-point Likert scale: 1 = grade 9 or less, 2 = some high school or graduate, 3 = college graduate, 4 = some university or bachelor, 5 = some graduate studies or graduated).

Results

Descriptive and correlation analysis

Table 2 shows the results of descriptive statistics for all variables. Regarding outcome variables, 71% of respondent committee members agreed that the process of the public advisory committee is effective, while more than 82% were satisfied with the overall process. These results indicate that a number of committee members disagreed about the effectiveness of the process, but they were satisfied with the overall process.

Likewise, most respondents agreed or strongly agreed that from their PAC participation they experienced social learning and procedural justice. For procedural justice and distributive justice variables, on a five-point-scale (1 = strongly disagree, 5 = strongly agree), the mean is 3.71 and

3.76 respectively, indicating that most respondents felt that they either agreed or strongly agreed that the public forest advisory committee follows procedural and distributive justices. Concerning social learning variables, 92% of the respondent committee members agreed that due to their involvement in the committee they learned technical knowledge about forests (cognitive dimension). About 88% of the respondents also agreed that they learned why conflicting values of forest stakeholders should be considered and understood the rationale for working together (moral dimension). The 91% of the respondents also either agreed or strongly agreed that the relational/trust dimension of social learning improved as a result of PAC participation. Regarding forest value items (i.e., anthropocentric and ecocentric items), compared to other variables, there was limited skewness to one direction, reflecting a more normally distributed set of value positions amongst the respondents. Regarding demographic variables, the distribution of gender is highly skewed since only 20% of respondents were female.

Table 3 shows factors and loadings for each construct of independent variables. Except for the forest value items, Cronbach's alpha (α) values for all constructs are greater than 0.7, reflecting a high level of internal consistency (Kline 2005). Table 4 depicts the estimated correlation analysis for all variables. The results show that many independent variables are significantly correlated with both dependent variables indicating an initial sense that my key theoretical constructs (justice and learning) are strongly linked to the outcome variables (effectiveness and satisfaction). Based on Cohen's (1988) convention for interpreting the strength of bivariate correlations, there are non-trivial associations between variables that invite further investigation (Table 4). In some cases, the correlations are very strong (e.g., 0.702), indicating the possibility of multicollinearity. Therefore, I address the concern of multicollinearity by testing the impact of

my models when these highly-correlated variables are excluded. Implications of these tests are discussed below.

Table 2: Descriptive analysis for all variables

Variable	Mean	SD	Min.	Max.
Dependent variables				
Effectiveness	.71	-	0	1
Satisfaction	.82	-	0	1
Independent variables				
Social learning variables				
Cognitive dimension	.92	-	0	1
Moral dimension	.88	-	0	1
Relational/trust dimension	3.82	.84	1	5
Procedural justice variables				
Fairness in process	3.71	.81	1	5
Distributive justice variable				
Fairness in outcome	3.76	.88	1	5
Forest values variables				
Anthropocentric	2.77	.88	1	5
Ecocentric	3.77	.71	1	5
	57.36	13.26	24	91
Demographic variables				
Age				
Gender (1=female, 0=male)	.20	-	0	1
Education (1=Grade 9 or less, 5=Some Graduate studies or graduated)	3.72	.93	1	5
N=312				

Table 3: Factors and loadings for independent variables

Factors and statements		Loading	Mean (SD)
Social learning (alpha=0.737)			
Cognitive Dimension	I have learned technical aspects of forest management as a result of participating on the committee	.830	.91 (.29)
	I have gained new scientific knowledge as a result of participating on the committee	.830	.91 (.29)
Moral Dimension	I have come to understand the need to incorporate many different perspectives into forest management processes.	.671	.96 (.19)
	I am more patient with people who do not share my point of view since serving on this committee.	.682	.75 (.432)
	I have learned to work productively with people who think differently than I do	.703	.91 (.281)
Relational/ trust dimension	The general level of trust between forest stakeholders has improved since the committee was established	.873	3.89 (.97)
	I trust the information presented to me about the impacts of forest management plans	.873	3.74 (.98)
Procedural Justice (alpha = 0.802)			
Deliberations accommodate the full spectrum of public interests		.836	3.64 (1.10)
I have been given adequate opportunity to voice my concerns within the committee		.641	4.22 (.81)
I believe that community forest management decision-makers consider all viewpoints		.868	3.55 (1.10)
I trust forest managers to make the right choices about forest		.809	3.37 (1.15)
Distributive Justice (alpha = 0.837)			
Our recommendations have guided forest managers		.927	3.74 (.98)
I think forests are managed better because of the existence of the committee		.927	3.78 (.97)
Anthropocentric (alpha =0.681)			
Forests should be managed to meet as many human needs as possible		.581	4.17 (1.11)
Forests should exist mainly to serve human needs		.797	2.46 (1.27)
Forests that are not used for the benefit of humans are a waste of our natural resources		.641	1.97 (1.32)
The primary function of forests should be for products and services that are useful to humans		.830	2.45 (1.21)
Ecocentric (alpha =0.59)			
Forests are sacred places		.807	3.38 (1.28)
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans		.726	2.30 (1.18)
Wildlife, plants, and humans should have equal rights to live and develop		.688	3.77 (1.28)

Table 4: Correlation analysis for all variables

Correlates	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	
1. Effectiveness	-											
2. Satisfaction	.599**	-										
3. Fairness in process	.584**	.624**	-									
4. Fairness in outcome	.583**	.584**	.702**	-								
5. Cognitive dimension	.315**	.330**	.256**	.378**	-							
6. Moral dimension	.215**	.249**	.252**	.339**	.309**	-						
7. Relational/trust dimension	.523**	.574**	.746**	.702**	.278**	.207**	-					
8. Anthropocentric	.145**	.130*	.280**	.219**	.089	.068	.245**	-				
9. Ecocentric	-.098	-.086	-.344**	-.195**	-.011	.023	-.275**	-.403**	-			
10. Age	.130*	.097	.070	.094	.158**	.183**	.029	.113*	.045	-		
11. Gender (Female)	-.100	-.006	.060	.014	-.029	-.043	.050	-.156**	.088	-.242**	-	
12. Education	-.051	-.026	.051	.017	-.032	-.068	.032	-.158**	.058	-.138*	.176**	-

From two-tailed tests *$p < .05$. **$p < .01$.

Logistic regression analysis

Table 5 shows the results of four logistic regression models. These models' parameters identify the factors that are linked to the self-reported effectiveness of public forest advisory committees. Table 6 depicts the results of four logistic regression models that identify factors associated with self-reported satisfaction with the overall committee process. The independent variables are the same in each table and the way models were estimated are also the same for each table. The rationale behind estimating four models for each dependent variable was to test the predictive potential of a different set of independent variables. In both tables, Model 1 estimates the predictive value of social learning variables; Model 2 estimates the predictive value of justice variables; Model 3 estimates the combined value of Model 1 and 2, and Model 4 includes all theoretical constructs and socio-demographic variables.

Three statistical tests provide an indication of model performance. First, Chi-square results are significant for all models, which indicate that all models fit the data. Second, Nagelkerke's R Square results slightly increase from Model 1 to Model 4 for both tables, which show the predictive potential of added predictor variables in subsequent models. Third, for both tables (6 and 7), the overall percentage of explained variance in Model 4 is relatively influential compared to all other prediction of the dependent variable within sample.

In both tables (6 and 7), the results of Model 1 show that cognitive ($P < 0.05$) and relational/trust ($P < 0.01$) dimensions of social learning variables are significantly associated with both effectiveness and satisfaction. The results indicate that as technical learning and trust increase, it is more likely that the survey participants will see PAC outcomes as effective and satisfactory. In the same way, Model 2 illustrates that procedural justice ($P < 0.001$) and distributive justice ($P < 0.001$) variables have statistically strong association with both outcome variables (effectiveness

and satisfaction). If the committee members perceive fairness in process and outcomes, they are more likely to claim that the committee is effective and satisfactory.

Model 3 combined social learning explanatory variables with procedural and distributive justice variables. The results show that when the two sets of independent variables are combined, the strength and significance of justice variables persist but the social learning variables are no longer statistically significant. I also note that the relational/trust ($P < 0.05$) dimension remains significant as a predictor of satisfaction. Procedural justice and distributive justice variables remain strongly associated with both effectiveness and satisfaction. However, the strength of statistical significance between distributive justice and satisfaction is diminished in Model 3. There are two possible explanations for Model 3 results. First, they indicate that there is collinearity between social learning variables (Model 1) and justice variables (Model 2) that enabled some variables to hide the effects of other variables. The bivariate analysis shows a larger correlation between procedural and distributive justices variables and relational dimension of social learning variable, which is greater than 0.7 (Table 4). Examining these issues further, this explanation is ruled out because tolerance tests within the software program SPSS indicate no issues with collinearity between these variables in both tests. Second, procedural and distributive justice variables are stronger predictors of effectiveness and satisfaction than social learning variables.

Table 5: Binary Logistic Regression Model for the question "level of agreement with effectiveness of PAC process" (1 = agree, 0 = disagree)"

	(Model 1)		***(Model 2)***		***Model 3***		***Model 4***	
Predictor	*B*	e^B	*B*	e^B	*B*	e^B	*B*	e^B
Social learning variables								
Cognitive	1.862**	6.436			1.283	3.609	1.060	2.888
Moral	.582	1.790			-.525	.591	-.533	.587
Relational/trust	1.671***	5.319			.292	1.339	.395	1.485
Procedural justice variable								
Fairness in process			1.504***	4.500	1.352***	3.864	1.795***	6.020
Distributive justice variable								
Fairness in outcome			1.336***	3.805	1.207***	3.345	1.189***	3.283
Forest values variables								
Anthropocentric							-.149	.861
Ecocentric							.635*	1.887
Demographic factors								
Age							.014	.014
Gender (Female)							-.960*	.3831
Education							-.594*	.552
Aboriginal (yes)							.054	1.056
Constant	-7.461***		-9.297***		-10.090***		-12.062***	
χ^2	*113.28****		*158.562****		*162.767****		*171.102****	
Nagelkerke R Square	*0.414*		*0.545*		*0.558*		*0.607*	
% correct overall	*81%*		*87.3%*		*87.5%*		*89.0%*	
N	*331*		*331*		*329*		*310*	

Tests significant at *p < .05. **p < .01. ***p < .001 Model 1 = social learning variables; Model 2 = Justices variables; Model 3 = Model 1 + Model 2; Model 4 = Model 3 + demographic variables

Table 6: Binary Logistic Regression Model for the question "level of Satisfaction with overall PAC process" (1=satisfied, 0=dissatisfied)"

	(Model 1)		***(Model 2)***		***(Model 3)***		***(Model 4)***	
Predictor	*B*	e^B	*B*	e^B	*B*	e^B	*B*	e^B
Social learning variables								
Cognitive	1.888**	6.607			1.295	3.650	.989	2.701
Moral	1.273	3.571			.706	2.026	.701	2.071
Relational/trust	1.921***	6.825			.810*	2.248	.981*	2.700
Procedural justice variable								
Fairness in process			1.957***	7.080	1.651***	5.212	2.069***	7.916
Distributive justice variable								
Fairness in outcome			1.131***	3.100	.705*	2.024	.668	1.950
Forest values variables								
Anthropocentric							-.113	.893
Ecocentric							.938*	2.555
Demographic factors							-.205	.815
Age								
Gender (Female)							.023	1.023
Education							-.349	.705
Aboriginal (yes)							.307	1.360
Constant	-7.987***		-8.977***		-11.052***		-15.783***	
χ^2	*123.600****		*155.160****		*164.041****		*162.537****	
Nagelkerke R Square	*0.496*		*0.601*		*0.629*		*0.655*	
% correct overall	*89%*		*89.9%*		*90.7%*		*90.5%*	
N	*337*		*336*		*334*		*315*	

Tests significant at *p < .05. **p < .01. ***p < .001 Model = social learning variables; Model 2= Justices variables Model 3 = Model 1 + Model 2; Model 4 = Model 3 + demographic variables

Model 4 combined Model 3 with socio-demographic variables. In other words, it contains all independent variables that are theorized to influence the committee members' judgment about effectiveness and satisfaction of committee process and outcome. As far as predictive values of justices and social learning variables are concerned, Model 4 is not much different from Model 3 except that the association between distributive justice and satisfaction became insignificant. In this model, we can observe persistent results from previous models. For instance, the concept of procedural justice remains a strong predictor of effectiveness where in Table 5 the strength of this relations suggests that with a unit increase in perceived procedural justice, a respondent is about six times more likely to agree that the process is effective ($e^B = 6.020$).

Model 4 also shows that the ecocentric variable is significantly associated with both effectiveness and satisfaction variables at $P < 0.05$. This means that the committee members who are ecocentrist (nature-centered) are more likely to judge that the committee is effective as well as satisfactory. Lastly, most socio-demographic variables are statistically significant in the effectiveness models while none of them are significant in the satisfaction models. Accounting for all other factors, female committee members are slightly less likely to perceive the PAC process as effective ($e^B = .383$). Accounting for all other factors, it also appears that a unit increase in the level of education of committee members will increase the odds of judging the committee process as ineffective.

Discussion and Conclusion

The main objective of this paper is to analyze to what extent self-reports of procedural justice, distributive justice, and social learning variables are associated with self-reports of forestry PAC members' experiences of public participation effectiveness and satisfaction in Canada. In other

words, the paper empirically tries to measure the extent to which the PAC respondents are influenced by the personal perceptions of procedural justice, distributive justice, and social learning factors when they judge effectiveness and satisfaction of their participation in the committee decision processes and outcomes. To do so, I have developed an investigative model and corresponding hypotheses based on theories of justice and social learning. We have tested the hypotheses by using a 2016 online national survey data of PAC members in Canada.

In this study, I have tested three hypotheses. It can be concluded that the empirical findings partly support the first hypothesis and strongly support the second and third hypotheses. The first hypothesis was about the relationships between the three social learning predictors and the two dependent variables (effectiveness and satisfaction). The analysis shows that cognitive and relational/trust predictors are statistically significant with both dependent variables. With this being said, the more the committee members gain new knowledge and skills and develop trust with other actors in the committee decision processes and outcomes, the more they will be satisfied and perceive that participation is effective. The second and third hypotheses are procedural and distributive justice variables. Briefly, the empirical evidence supports that if committee members think that there exists procedural and distributive justice in the decision process and outcomes of the committee, they will more likely judge that the committee process and outcome are effective and satisfactory.

The significant finding of this empirical analysis is that when advisory committee members evaluate their experience of participation, their perception of justice in the decision process and outcome in the committee strongly determine their perception of satisfaction and effectiveness. This finding supports accounts of Smith and McDonough (2001), who suggest the applicability of the theory of justice (both procedural and distributive) to understanding effectiveness of

public participation in resource decision making. The empirical work also shows how public satisfaction is strongly linked with beliefs about the fairness of participation processes (Hourdequin et al. 2012). In my analysis, although both procedural and distributive justice variables are statistically significant, the former is more significant than the latter. This finding indicates that respondents are more contented with procedural justice (process) than distributive justice (outcome) as an indicator of effectiveness and satisfaction.

The second key point is that although procedural justice, distributive justice, and social learning variables are conceptually distinct, the empirical analysis shows they are not mutually exclusive. We have examined these distinctions by testing the predictive values of justice variables and social learning variables separately in different models, as well as by combining them in the same model. Separately, both justice (distributive and procedural) and social learning variables are significantly associated with both outcome variables. However, in combining justice variables and social learning variables in one model, the predictive power of social learning variables became insignificant. This empirical outcome does not necessarily indicate that the theory-driven constructs I developed are invalid, but rather that there is multicollinearity among independent variables. However, the tolerance test indicates that multicollinearity is below the level of concern. Future research may need to explore these distinctions more thoroughly.

Third, I intentionally use "satisfaction of public participation" and "effectiveness of public participation" as separate dependent variables to test if the same independent variables influence them differently, as argued by Coglianese (2002). Our analysis shows that the association of procedural justice, distributive justice, and social learning variables with 'satisfaction' and 'effectiveness' are not much different. It signals that for survey respondents the two dependent variables, 'satisfaction' and 'effectiveness', could be synonymous.

Last but not least, since this research relies on online survey data of PAC, it cannot be proven that the PAC members who participated in the survey represent diverse forest values and interests of local citizens across Canada. Most of the respondents could be those who felt positively or negatively about the committee process. Thus, I am unable to confidently suggest the policy implications of these findings. Hoping that a sampling frame of PAC members might be available, the future study may capitalize on these findings and conduct research on a representative sample of the PAC.

Chapter three: Understanding Indigenous and nonindigenous experiences with public participation in sustainable forest management

Introduction

Although some Indigenous communities inhabit forests, and their identities and cultures have been inextricably connected with forestlands and territories for millennia, governments across the world are only recently starting to recognize the rights of Indigenous peoples (Notzke 1995; Daes 2001). A key reason for failure to recognize Indigenous rights involves conflicting values, interests, and knowledge between Indigenous and nonindigenous peoples regarding natural resource utilization and management (Beaudoin et al. 2016; Wyatt 2008). As an example, over the last century, reductionist scientific knowledge has typically guided the nonindigenous actors (governments, private forest companies, and forestry experts) who prioritize economic values of forests (Bowie 2013; Cubbage et al. 2007). These priorities have often systematically alienated Indigenous peoples from both use and management of forest (Wyatt 2008). Efforts to address Indigenous issues through participatory forest planning and management have not been as effective as intended (Beaudoin et al. 2015).

Nevertheless, as the concept of 'sustainable development' has received global prominence after the Brundtland Report in 1987, the rights and roles of Indigenous peoples have been gaining global recognition in sustainable development in general and in sustainable forest management (SFM) in particular (Smith 1998; Adam & Kneeshaw 2008). The global community has recognized the importance of strengthening the role of Indigenous peoples in resource management; for example at the United Nations Conference on Environment and Development (UNCED), held in Rio de Janiero in 1992 (UNCED 1992) and the United Nations Declaration

on the Rights of Indigenous Peoples (UNDRIP 2007). In particular, the Statement of Forest Principles at the UNCED (1992) prompted more than 150 countries to confirm their commitment to forest sustainability and to develop their own sets of criteria and indicators for a sustainable forest management (C&I-SFM) (Smith 1998; Adam & Kneeshaw 2009). Since then, within Canada, the C&I-SFM framework has become a framework for achieving social, economic and ecological forest values through the engagement of key stakeholders (Adam & Kneeshaw 2009; Varghese & Reed 2012). C&I-SFM is also adapted to forest management settings at global, national, regional and landscape-level scales (Adam & Kneeshaw 2009; FAO 2015). In Canada, different initiatives have developed and promoted Indigenous C&I at a local level as tools of incorporating Indigenous forest values and interests in participatory SFM processes (Beaudoin et al. 2016; Adam & Kneeshaw 2008). Scholars are optimistic that the adoption of C&I-SFM in Canada would correct the past flaws in participatory forest management process by "defining [Indigenous] forest perspectives through values and objectives", which could incentivize Indigenous peoples to participate in forest management planning processes and, thereby, promote mutual understating between Indigenous and nonindigenous Canadians (Adam & Kneeshaw 2009: i). To date, published case studies indicate that C&Is are a valuable tool for incorporating Indigenous values and objectives in SFM (Adam & Kneeshaw 2009; Wyatt 2008).

Although some scholars expressed optimism about the role of C&I-SFM in advancing Indigenous participation in forest management, I have limited information on the extent to which Indigenous peoples perceive that their forest values and objectives have been included into forest management practices. To fill this gap in knowledge, I use national survey data collected in 2004 and 2016 from PAC members in Canada to answer two specific questions. First, to what extent do Indigenous and nonindigenous members differ in their level of satisfaction regarding diverse

dimensions of forest management processes. Second, to what extent has Indigenous participation in PACs resulted in greater understanding between Indigenous and nonindigenous PAC members about forest values?

Position of PACs in Canada's Crown forest management

Over the last two decades, government at all levels and forestry companies have been involving Indigenous and nonindigenous peoples in forest management processes in many diverse ways Canada (Wyatt 2016). PACs are a dominant form of fostering public participation in Crown forest management is about 93% of Canada's forest land (CCFM 2006). PAC members are selected from diverse local interest groups and are intended to "represent the voice and history of their constituencies on equal footing" (Parkins and Davidson 2008: 181) in public forest planning and decision-making across Provinces and Territories. In theory, the PAC process is open to all public members, it serves as a local arena where the public is expected to deliberate about multiple forest values and influence forestry decision making (Bowie 2013). In practice, the composition and purposes of the PAC members may differ from region to region, yet it is a form of public deliberation process that is supposed to represent multiple values and interests of local citizens (e.g., Indigenous rights, recreation, fishing, wildlife, tourism, etc.) (Parkins 2006).

As Notzke (1995: 190) puts it, "the establishment of *advisory committees* marks the stage at which partnership in decision making starts" in Canada. In general, scholars conclude that PACs could be a useful space for public deliberation to take place, where debates and discussions on multiple values and interests of local forest influence forest planning and sometimes challenge experts to integrate new knowledge to addressing socio-ecological concerns (Parkins 2006; Hunt 2015).

Primary driver of Indigenous involvement in Canada's forest management

In Canada, Indigenous communities have maintained strong links with forest environments for millennia, resulting in identities and cultures with 'deep roots in the forests' (Beaudoin et al. 2016). Early relationships between Indigenous and nonindigenous settlers were relatively friendly and cooperative, based mostly on the fur trade and military alliances (Smith 2013). However, from the middle of the 1700s to the end of the 2000s, consecutive treaties, legislation, and policies of Canadian governments had been systematically displacing Indigenous peoples from their lands and assimilating them into the mainstream nonindigenous Canadian society (McGregor 2011; Smith 2013).

Scholars argue that the key reason for exclusion of Indigenous peoples from forest resource management in Canada involves the substantial difference between Euro-Canadian and Indigenous worldviews about forest values (McGregor 2011). Euro-Canadian views about forests have been largely dominated by utilitarian values of forest. Hence, if forests should be managed, they should be managed for maximization of utility (Wyatt 2008; McGregor 2011). In contrast, Indigenous peoples have "developed a way of life and spirituality based on respect for the land and all living things" (Smith et al., 1995 cited in McGregor 2011) although all scholars may not agree with this statement. Specifically, throughout the industrialization period in the Canadian history, Indigenous peoples had been perceived as a hindrance to resource utilization, protection, and development and were therefore excluded from any form of representation (Natcher 2001). As a result, there have been a growing misunderstanding and conflicts between Indigenous and nonindigenous Canadians (McGregor 2011; Wyatt et al. 2013).

Nonetheless, from the 1970s onward, the needs to involve Indigenous peoples in land and forest management has received prominence in Canada (Wyatt et al. 2013; Beaudoin et al. 2015).

Primarily, the need to involve Indigenous peoples has been driven by "long judicial battles, protests, and hard-fought negotiations [which] indicates that forestry institutions are not easily modified" (Wyatt 2008: 176). Following the new Constitution Act of 1982, a series of rulings from Canada's Supreme Court has largely recognized Indigenous rights and mandated governments to consult and accommodate Indigenous peoples before approval of any resource development projects that may have negative impacts on Indigenous rights (Wyatt 2008; Beaudoin et al. 2015). Since then, there have been many drivers that prompted forest companies and governments at all levels to involve Indigenous peoples and collaborate with them in forest management (Beaudoin et al. 2016; Wyatt 2008).

Review of effectiveness of PAC in addressing Indigenous values in Canada

Measuring effectiveness of participatory forest management

Ideally, "participation is about finding consensus in diversity and reflects a normative shift towards multiple-use values that recognize that forest management should blend multiple management objectives into a coherent set of practices." (Appelstrand 2002: 281). In practice, many participatory approaches have evolved in natural resource management with diverse and overlapping purposes, strategies, and evaluation criteria (Diduck et al. 2015). Thus, almost all scholars agree that there is no best way of assessing effectiveness of public participation in achieving better policy outcomes in natural resource management. Rather, criteria for evaluating effectiveness should depend on the purpose of participation, the chosen method of participation, and the intended outcomes of participation, among other aspects (Buchy & Hoverman 2000; Diduck et al. 2015).

Notwithstanding this lack of consensus, Appelstrand (2002: 288) argues that the fundamental precondition for the success of any public participation depends on "a sincere desire among decision-makers, authorities and forest owners to pay attention to the beliefs and opinions of all stakeholders." Rydin & Pennington (2011) contend that although what is effective is different for different stakeholders, the public expects that participation outcomes are "more in tune with society's values and preferences" (p. 155). Scholars further articulate that in the eyes of stakeholders, a successful public participation process must be representative, transparent and fair, and stakeholders must feel that they have an influence on the outcome of decision-making (Smith & McDonough 2001; Appelstrand 2002). Many scholars also argue the importance of giving attention to stakeholder power relationships and their beliefs and values (Appelstrand 2002; Buchy & Hoverman 2000). The underlying assumption is that the need for public participation in the first place is to share power with public members and, hence, enable them to influence outcomes of forest decisions (Buchy & Hoverman 2000; Ross et al. 2002). Specifically, power sharing is a vital issue when state and private actors hold forest property rights and have controls over final forest decisions (Wyatt et al. 2015).

PAC processes and Indigenous values in Canada

Canada's national C&I-SFM 2005 (CCFM 2006) document reports progress toward sustainable forest management, showing that 74 percent of public participants were somewhat or completely satisfied with the PAC process; more than two thirds of respondents felt the process was fair; almost more than half of the participants felt PAC process accommodated all public interests and the participants felt they were able to influence the PAC decision-making (CCFM 2006).

However, drawing on other criteria of success for public participation discussed in the preceding section, many scholars show that PACs in Canada have not fulfilled Indigenous peoples'

expectations. For example, a national survey conducted in 2004 reveals that the majority of PAC members' values are aligned with government and forest companies, resulting in questions about the extent to which PAC represents a diversity of forest values in Canada (Parkins et al. 2006). The survey further shows the limitation of PACs regarding the use of diverse information sources in deliberation, time constraints, consensus building, and decision-making (Parkins et al. 2006). Reed & Varghese (2007) articulate the dominance of PACs by resource extraction oriented elites, the use of common sources of scientific and technical information, and limited participation of members with lower socio-economic status. Hunt (2015) also indicates how the lack of diversity of committee members regarding gender and age hampered PACs from connecting more meaningfully with pluralistic social values in Ontario forest management.

Notwithstanding these challenges, many scholars are optimistic that the adoption of C&I-SFM in Canada in the 1990s may fulfill Indigenous expectations for at least three reasons. First, Canada's SFM initiatives call for active participation of the public in Crown forest management and planning, including in forest certification systems (Beckley et al. 2005). Second, C&I directly emphasizes the inclusion of all social values in SFM practices (Sheppard 2005). Third, C&I can be compatible with an Indigenous traditional approach to the utilization of forest lands. Therefore, C&I as such may reinforce the inclusion of Indigenous values and objectives in SFM (Smith 1998; Wyatt 2008). Thus, PAC processes can be a lens through which one can evaluate if the adoption of C&I-SFM has impacts on participatory forest management and planning (Sheppard 2005).

Integrating Indigenous values in Canada's forest management

Since the adoption of SFM principles in Canada, many efforts have been made to encourage forestry institutions to pursue a paradigm shift from sustained yield production to balancing economic, social, and ecological forest values (Wyatt 2008; Adam & Kneeshaw 2009). Specifically, after the development of Canada's C&I of SFM through the support of the Canadian Council of Forest Ministers (CCFM) in 1995, the literature shows that efforts were made to define an Indigenous C&I framework taking the former as a foundation (Adam & Kneeshaw 2009; Sherry et al. 2005). Acknowledging the evolving concept of sustainability and how to measure its progress, the C&Is have been subjected to three stages of participatory review and a revised version with 6 criteria and 46 indicators was published in 2003 (CCFM 2003). According to CCFM, the indicators of C&I framework reflect all important forest values of Canadians and Indigenous values are specifically addressed in the 6th indicator known as "society's responsibility" (CCFM 2003). However, the Indigenous peoples and their organizations have been expressing that Indigenous values and interests are not adequately considered in the C&I framework (Adam & Kneeshaw 2011; Sherry et al. 2005).

'Society's Responsibility' (SR) is one of the six criteria of Canada's C&I-SFM. As CCFM puts it, the SR "criterion addresses the effectiveness of institutions in managing resources in ways that accurately reflect social values, the responsiveness of institutions to change as social values change, how we deal with the special and unique needs of particular cultural and/or socio-economic communities, and the extent to which the allocation of our scarce resources can be considered to be fair and balanced" (CCFM 2003: 17). While the SR criterion has five elements, only the last two elements, effective and fair decision making (element 6.4) and informed

decision-making (element 6.5), are pertinent to addressing Indigenous social values and fostering mutual understanding between Indigenous and nonindigenous actors.

Element (6.4) effective and fair decision making

Element 6.4 explains challenges of fair and effective decision-making in SFM. These challenges are due to differences in cultural, economic and risk perceptions of stakeholders. CCFM states that "[t]he satisfaction of the public with their involvement in these processes is an indicator of how fair and effective the decision-making process is" (CCFM 2003). Scholars argue that throughout the history of forest management institutions, influential actors often prioritize their interests and values over subordinate actors (Appelstrand 2002). Thus, achieving effective and fair decision making needs a public participation model that create power balance among multi-stakeholder so that values and needs of all stakeholders are incorporated in balanced ways, as intended in C&I-SFM framework (Beckley et al. 2005; Sheppard & Meitner 2005).

The concept of power has many meanings (Cirera & Lovett 2006). Some scholars equate power with coercion and authority, where actor A has power over actor B and, hence, actor A coerces actor B to do what she or he would not otherwise do (Haugaard 2008). However, for the purpose of this paper, I am interested only in legitimized power, which is established through everyday social institutional practices (Haugaard 2008). Power, in this context, means abilities or capacities of reinforcing particular forest values, ideologies, and knowledge in forest planning and management decisions (Spak 2005). In general, it is argued that to provide a check on power in public spaces, the following conditions should be considered:

- a nondiscriminatory social environment, the willingness of stakeholders to negotiate, freedom of expressing needs and concerns, equal access to information, and confidences that each party respects agreements (Borrini-feyerabend et al. 2007)
- an appetite for vigorous discussion and debate, diversity in membership, autonomy from powerful local actors, independent sources of knowledge and information (Parkins 2006: 200)

Considering the above arguments, I will test if there is statistically significant difference between Indigenous and nonindigenous PAC members regarding the level of satisfaction with different dimensions of PAC process.

Element (6.5) informed decision-making

Element 6.5 of the SR points out the importance of "collective understanding of ecosystems and the relationship between the environment and the economy"(CCFM 2003:20). It raises the necessity of making "an effort to learn and understand each other's perspectives relative to resource use and forest values" at the individual level "and that individuals make an effort to become fully informed about the issues" (CCFM 2003:20). For successful decision-making, the element argues that learning and understanding each other's perspectives about forest values is important.

Scholars have debated the notion of 'value' for millennia (Pearce & Pearce 2001), and its meaning varies across disciplines (Kant & Lee 2004). However, almost all disciplines define value from three broad realms: conceptual, relational, and objective (Bengston 1994). In theory, as Bengston (1994: 520) puts it "[t]he conceptual realm is concerned with an important part of the *basis* of value, the relational realm is concerned with the valuation *process,* and the objective

realm is concerned with the end *result* of the valuation process". In practice, however, most studies define value from one of the three value realms, which shows that we cannot capture a broad notion of value (Bengston 1994).

In forest literature, economists (mostly natural resource economists) have studied forest values based on individual preferences (Kant & Lee 2004). Preference is defined as "a value relationship based on individual desire", which is expressed in terms of monetary value (Bengston 1994: 520).

The second value relationship in forest studies is an obligation, which is defined as "a relationship of social norms" (Bengston 1994: 520). Obligation based value relationship is not an individual preference; it is an aggregate or collective behaviours of a group of individuals. Anthropologists and sociologists study cultural values as an obligation or norm-based ideals that explain social identities: languages, geographic locations, a common ethnic heritage, and so on (Bengston 1994). Most social scientists, except conventional economists, currently support the notion that forest values are multidimensional, which are interconnected with a broader economic, social, ecological, and cultural values of society.

The last value relation in forest literature is functional value, which is defined as "a relationship of usefulness or service or system maintenance"(Bengston 1994: 522). Ecologists argue that irrespective of individual or social awareness of environment services or functions, forest ecosystems contribute a lot to the survival of human beings on the planet Earth (Ibid). Some ecological economists suggest "a nonanthropocentric approach based on the energy content or energy cost of production of [forest] goods and services" (Bengston 1994: 22).

Studying forest values from different perspectives shows the complexity of the concept and social forest values shift over time (Mcfarlane & Boxall 2000; Bengston 1994). For the purposes of this paper, I conceptualize forest value as "the various ways in which forests are important to people" in different contexts (Duinker 2008:1). Our intention, in this paper, is not to prioritize one value over another or compare one with another, but to analyze if forest values are discussed in PAC processes and the extent to which these values differ between Indigenous and nonindigenous people. Since growing forest value pluralism is one of the drivers for evolution of public participation in forestry, a successful PAC needs to incorporate all forest values in discussion and bring mutual understandings among stakeholders regarding the ways that forests are important to each actor.

In my analysis, based on ethnic differences and expected differences in forest values, I aggregated respondents into two groups (i.e., Indigenous, and nonindigenous PAC members). We compared responses of the two groups to understand if the PAC process has brought different forest values to the table and if still, ethnicity determines forest value differences.

Research methodology

Survey respondents and sampling procedure

In this study, I used national survey data of PAC members in Canada, collected in 2004 and 2016. Although almost all collaborative forest management arrangements across Canada operate through public advisory committees and/or advisory boards, the exact number of PAC members is unknown since there is no central registry (Bowie 2013; Parkins et al. 2006). Based on the 2004 survey, the total number of PAC members across Canada is estimated to be more than 1,000 where some provinces have less than ten committees and the largest has more than 100

(Parkins et al. 2006). The 2016 survey questionnaire was also based on the 2004 information. The committees are established under different circumstances in different provinces. In Alberta, for instance, PACs are associated with area-based tenure holders and participate in forest planning processes and hosted by the forest industry (Parkins 2006). In Ontario, in contrast, the provincial government hosts the committees. However, the common denominators are that PACs are intended to represent a range of local interest groups in forest decision making including Indigenous peoples and others who are usually associated with industrial forestry.

In both 2004 and 2016 surveys, attempts were made to reach all PAC members in all nine provinces, excluding territories. The 2004 survey data were gathered through distributing paper copies by post. A total of 1079 committees responded, from which only 61 (5.7%) respondents self-identified as Indigenous community members (Table 1). For 2016 survey, the online questionnaire was sent to all chairpersons and to many PAC members directly when the chairs provided email addresses of the committee members. A total of 345 committee members responded from across the country, of which 30 (8.7%) respondents self-identified Indigenous peoples (Table 1).

Owing to the substantial difference between the two surveys in terms of number of responses, the 2004 survey is likely more representative of the total population of PAC members in Canada than the 2016 survey. However, there is no way to confirm the surveys are an accurate reflection of the overall experience of committee members in Canada. Therefore, I am cautious about claims of generalizability, focusing the analysis of this study on the relationships between variables and the examination of theoretical assumptions.

Measurement of variables

In both 2004 and 2016 national surveys of PAC, there were questions that evaluated how respondents feel about forest values and the performance of PAC processes. The questions for both forest values and PAC process performances included a series of statements, measured by a five-point Likert scale from strongly disagree to strongly agree scale. Table 3 and 6 illustrate forest values and PAC process performance items that were measured in the surveys. Since my objective is to test for statistically significant differences between Indigenous and nonindigenous members regarding their perception of the statements (forest values and PAC performances), a key independent variable is an ethnicity (Indigenous and nonindigenousIndigenous groups). Ethnicity was measured by using the question "Do you consider yourself to be an Indigenous person? (Status Indian, Non-status Indian, Inuit, Métis)", which was coded as a dichotomous variable (1 = yes, 0 = no).

Study design

For studies that are designed to test for significant differences between outcomes from two groups, researchers often use independent groups test (also known as student's *T*-test) to compare two independent groups. However, if data are not normally distributed, dependent variables are not continuous, and groups sample sizes are not equal, a Mann-Whitney U test has three to four times more predictive power than the student's *t*-test (Zimmerman 1987; Sawilowsky 2005). Sawilowsky (2005: 598) also argues that even when normality of data is met, Student's *t*-test has a very small power advantage over the Mann-Whitney U test.

Both dependent and independent variables of this study do not fulfill the assumptions of Student's *t*-test. The sample size of Indigenous and nonindigenous PAC groups are unequal in

both 2004 and 2016 surveys. Regarding dependent variables (forest values, and performance of PAC process), the distribution of most variables was not normal, and all variables are ordinal. Thus, for this study, I chose the Mann-Whitney U test.

Results

Descriptive Analysis

Table 7 depicts the distribution of Indigenous and nonindigenous PAC respondents by province from the 2004 and 2016 surveys. Of all 2004 and 2016 survey respondents, Indigenous respondents account for 5.7% and 8.7% respectively. When I compare the two surveys, the proportion of Indigenous respondents increased by 3% in the 2016 survey. The distribution of Indigenous respondents by province does not show a large variability between two surveys, except in Alberta (7% in 2004, 14.3% in 2016) and Newfoundland (7.1% in 2004, 20% in 2016). However, since the total numbers of respondents in two surveys were not proportional, any comparison between surveys and subsequent interpretation of proportional changes is problematic.

As of 2011, 70% of Indigenous communities remained situated in forested areas across Canada (Government of Canada 2016). Thus, one might expect that the proportion of Indigenous groups member participation to be higher than what it reveals in these surveys. From 2004 survey results, 31.1% of respondents perceived that Indigenous groups were not represented in the committee. The 2016 survey results show in the open-ended responses that Indigenous groups were not interested in participating in the committees.

Table 7: Distribution of Indigenous and nonindigenous respondents by province, survey 2004 and 2016

	Survey 2004			Survey 2016		
Province	No. of all survey respondents	No. of Indigenous respondents in overall survey	% of Indigenous in overall survey	No. of all survey respondents	No. of Indigenous in overall survey	% of Indigenous in overall survey
Alberta	128	9	7.0	49	7	14.3
British Columbia	77	4	5.2	70	3	4.3
Manitoba	39	9	23.1	13	3	23.1
New Brunswick	111	8	7.2	13	1	7.7
Newfoundland	14	1	7.1	15	3	20.0
Nova Scotia	12	0	0.0	6	0	0.0
Ontario	253	13	5.1	106	7	6.6
Quebec	408	11	2.7	50	2	4.0
Saskatchewan	37	6	16.2	23	4	17.4
Total	1079	61	5.7	345	30	8.7

Table 8 shows demographic information for both surveys. In terms of gender parity, the percentage of females was low in both Indigenous and nonindigenous groups for both surveys. In 2004, the proportion of females in Indigenous and nonindigenous groups was 19.7% and 16.9% respectively. This result indicates that for the 2004 survey the proportion of female participants in Indigenous groups was higher than nonindigenous by 2.8%. The same was true for the 2016 survey, where female percentage in the Indigenous group was higher by 6.4%. Regarding education level, more than 32% of nonindigenous groups had a university degree in both survey samples. As can be seen from Table 8, other categories of education levels vary for both Indigenous and nonindigenous groups for both surveys.

Table 8: **Demographic information of respondents (2004 and 2016 surveys)**

Characteristics	% of respondents, by ethnicity			
	Indigenous		Nonindigenous	
	2004 (N=61)	2016 (N=30)	2004 (N=1018)	2016 (N=315)
Gender				
Male	80.3	73.3	83.1	79
Female	19.7	26.7	16.9	20.3
Age category				
18-35	23.0	13.3	14.9	6.4
36-50	34.4	20.0	38.5	20.7
51-60	24.6	40.0	27.5	20.0
≥ 61	16.4	20.0	19.1	52.9
Highest level of education completed				
Grade 9 or less	13.1	3.3	2.5	0.6
Some high school	8.2	10.0	4.5	2.9
High school graduate	19.7	13.3	9.5	8.1
Technical school or community college	27.9	26.7	20.5	25.4
Some university	8.2	10.0	10.8	9.0
University degree (bachelors)	9.8	16.7	32.1	32.1
Some graduate study	3.3	6.7	5.9	6.6
Graduate university degree	6.6	13.3	14.3	13.9

The Mann-Whitney U test for PAC process performance

Table 9 and 10 depict results of Mann-Whitney U tests that were performed to determine if there were differences in the levels of agreement scores between Indigenous and nonindigenous groups regarding statements about the success of PAC process from 2004 and 2016 surveys respectively. We tested ten statements that were repeated in both surveys. The results from both surveys show that, mostly, the levels of agreement scores for Indigenous and nonindigenous groups are statistically different. The findings echo that Indigenous groups less likely to perceive that PAC processes are effective in terms of satisfying their expectations.

Looking at each statement, the first statement examines the fairness of PAC processes. From both surveys, compared to nonindigenous participants, it is statistically significant that

Indigenous groups are less likely to perceive that the process is fair. Allied with the fairness issues, the next two statements tested if the respondents feel that they were given adequate opportunities to raise their concerns, and could influence forest decision making. In both surveys, agreement scores for Indigenous groups were significantly less than for nonindigenous groups. In other words, the results suggest that Indigenous respondents are less likely to feel that they are given enough opportunities to raise their concerns and to influence forest decision-making.

The subsequent statement inquired if there was a chance that any new information was usually incorporated in forest decision-making. The result from the 2016 survey shows statistically significant differences that Indigenous respondents are less likely to agree that new information was usually incorporated in subsequent forest decisions. From both surveys, it is also statistically significant that Indigenous participants are less likely to feel that controversial issues receive genuine attention in the committee meetings. The other statement tested if the respondents felt the committee meeting was interactive and personal. From both surveys, agreement scores for Indigenous groups were significantly lower than for nonindigenous groups. This means that, compared to nonindigenous respondents, the Indigenous respondents were less likely to sense that the committee meetings were interactive and personal. Relatedly, from the 2004 survey results, Indigenous groups were less likely to have trust in forest managers to make the "right" choices about forest management.

The succeeding statement tested respondents' level of agreement about decision makers' regular attendance and participation in the committee's activities. Results from the 2016 survey showed that Indigenous groups were significantly less likely to feel that decision-makers regularly attend and participate in the committee's activities. The last two statements tested if the respondents were satisfied with the efforts of the committee's sponsor and overall decision-making processes

of the committee. The results from the 2016 survey show statistically significant differences between Indigenous and nonindigenous respondents. This means that Indigenous committee members are less likely to be satisfied with the sponsor's efforts and the overall decision-making processes of the committee.

Table 9: Mann-Whitney U test for Indigenous and nonindigenous respondents' perceptions regarding the following PAC performance statements, (survey 2004)

Variables (5 -point Likert scale strongly disagree to strongly agree)	Indigenous			Nonindigenous				
	N	Mean	Mean Rank	N	Mean	Mean Rank	Mann-Whitney *U*	*P value
The process is fair	59	3.55	441.70	962	3.82	515.25	31191.0	0.045
I am able to influence the decisions that are made by the committee	59	3.40	433.53	912	3.58	489.39	29999.5	0.109
I have been given adequate opportunity to voice my concerns within the committee	58	4.02	426.53	944	4.28	506.11	31724.0	0.035
When new information arises or a surprise occurs, it is usually incorporated into subsequent decisions	59	3.99	480.49	952	3.99	507.58	29589.0	0.453
Controversial issues receive genuine attention and a sufficient response by the committee sponsor(s)	59	3.62	436.78	954	3.93	511.34	32286.0	0.041
Committee meetings are interactive and personal	59	3.70	381.12	950	4.11	512.69	35334.0	0.000
I trust forest managers to make the right choices about forest management	59	2.78	418.87	936	3.18	502.99	32280.5	0.016
Decision-makers regularly attend and participate in the committee's activities	58	3.74	474.00	954	3.86	508.48	29551.0	0.356
Satisfaction in the decision-making process in the committee	58	3.63	477.19	951	3.76	506.70	29192.0	0.423
Satisfaction in the efforts of the committee's sponsor	56	4.00	483.21	945	4.10	502.05	27456.0	0.610

* Asymptotic significance (two-tailed test) $P < 0.05$

Table 10: Mann-Whitney U test for Indigenous and nonindigenous respondents' perceptions regarding the following PAC process statements, (survey 2016)

Variables (5 -point Likert scale strongly disagree to strongly agree)	Indigenous			Nonindigenous				
	N	Mean	Mean Rank	N	Mean	Mean Rank	Mann-Whitney U	*P value
The process is fair	29	3.36	114.45	300	4.01	168.88	5816.0	0.001
I am able to influence the decisions that are made by the committee	29	3.25	133.05	296	3.65	165.93	5160.5	0.049
I have been given adequate opportunity to voice my concerns within the committee	29	3.93	137.78	299	4.26	167.09	5110.5	0.077
When new information arises or a surprise occurs, it is usually incorporated into subsequent decisions	27	3.52	124.24	296	3.90	165.44	5015.5	0.008
Controversial issues receive genuine attention and a sufficient response by the committee sponsor(s)	28	3.57	136.93	298	3.91	166.00	4916.0	0.084
Committee meetings are interactive and personal	29	3.78	131.03	301	4.15	168.82	5364.0	0.021
I trust forest managers to make the right choices about forest management	29	3.21	154.31	300	3.41	166.03	4660.0	0.512
Decision-makers regularly attend and participate in the committee's activities	29	3.59	127.97	298	3.89	167.51	5366.0	0.019
Satisfaction in the decision-making process in the committee	29	3.39	133.67	304	3.97	170.18	5374.5	0.040
Satisfaction in the efforts of the committee's sponsor	28	3.71	131.38	304	4.17	169.74	5239.5	0.030

*Asymptotic significance (two-tailed test) $P < 0.05$

The Mann-Whitney U test for forest values

Tables 11 and 12 show the result of a Mann-Whitney U test for Indigenous and nonindigenous feelings regarding forest values statements from both surveys. Seven forest statements were tested. In both surveys, the results indicate that the feelings of Indigenous and nonindigenous respondents about spiritual and inherent worth values of forests are significantly different. In other words, Indigenous peoples are more likely to believe in the inherent worth and spiritual values of forests than nonindigenous groups. For instance, from the 2004 survey, the Indigenous respondents (Mean Rank=662.88) strongly feel that the forests are sacred places; more so than nonindigenous participants (mean rank = 479.79), $U = 16423.0$, $P < 0.00$. Similarly, from the 2016 survey, forests were felt to be a more sacred place for Indigenous respondents (mean rank = 195.16) compared to nonindigenous respondents (mean rank = 155.92), $U = 3156.5$, $P < 0.024$.

As an exceptional case, the 2004 and 2016 survey results differ in economic values of forests. From the 2004 survey, there was no significant difference between Indigenous and nonindigenous respondents regarding forest economic value statements “forests should be managed to meet as many human needs as possible” and “the primary function of forests should be for products and services that are useful to humans.” In contrast, the 2016 survey results show statistically significant differences between Indigenous and nonindigenous respondents regarding the above two statements. In the 2016 sample, Indigenous members are less likely to agree with the idea that the primary function of forests is products and services for humans. Indigenous groups are also less likely to agree with the statement “forests should be managed to meet as many human needs as possible.”

Table 11: Mann-Whitney U test for Indigenous and nonindigenous respondents' perspective regarding the following forest value statements, survey 2004

Variables (5 -point Likert scale strongly disagree to strongly agree)	Indigenous			Nonindigenous				
	N	Mean	Mean Rank	N	Mean	Mean Rank	Mann-Whitney *U*	*P value
Forests should be managed to meet as many human needs as possible	58	4.25	521.84	959	4.27	508.22	27066.5	0.700
Forests are sacred places	57	3.94	662.88	923	3.08	479.79	16423.0	0.000
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	58	2.60	584.08	958	2.06	503.92	23398.5	0.033
Forests rejuvenate the human spirits	56	4.60	587.45	918	4.28	481.40	20107.0	0.003
The primary function of forests should be for products and services that are useful to humans	57	2.62	499.91	954	2.74	506.36	27536.5	0.867
Forests should have the right to exist for their own sake, regardless of human concerns and uses	56	3.89	579.90	943	3.48	495.43	22097.5	0.034

* Asymptotic significance (two-tailed test) $P < 0.05$

Table 12: Mann-Whitney U test for Indigenous and nonindigenous respondents' perspective regarding the following forest value statements, survey 2016

Variables (5 -point Likert scale strongly disagree, strongly agree)	Indigenous			Nonindigenous				
	N	Mean	Mean Rank	N	Mean	Mean Rank	Mann-Whitney U	*P value
Forests should be managed to meet as many human needs as possible	30	3.70	137.38	305	4.23	171.01	2493.5	0.046
Forests are sacred places	29	3.93	195.16	289	3.48	155.92	3156.5	0.024
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	29	2.93	204.64	305	2.23	163.97	3345.5	0.023
Forests can be improved through management by humans	30	3.43	114.48	303	4.16	172.20	6120.5	0.001
The primary function of forests should be for products and services that are useful to humans	30	2.00	128.90	303	2.52	170.77	5688.0	0.019
Climate change should influence how forests are managed	30	3.57	123.95	298	4.24	168.58	5686.5	0.008

* Asymptotic significance (two-tailed test) $P < 0.05$

Discussion and conclusion

The objectives of this paper are twofold. First, I have examined thoughts of Indigenous and nonindigenous PAC groups concerning the success of PAC processes in fulfilling their expectations. Second, I have tested potential differences between Indigenous and nonindigenous PAC members regarding their perspectives on different forest values. To achieve these objectives, I have crafted a conceptual framework based on "society's responsibility" as one of the criteria in Canada's C&I-SFM. In particular, I have explained the importance of two elements: the effective and fair decision-making (element 6.4), and informed decision-making (element 6.5) for effective public participation as intended in SFM principles. Attaining element 6.4. mainly requires balanced power relations in PAC process, while element 6.5 requires a consideration of all forest values in PAC process.

Accordingly, I used a Mann-Whitney U test to estimate if there is a statistically significant difference between Indigenous and nonindigenous PAC members regarding the above two objectives. Our findings from both 2004 and 2016 surveys indicate that despite the dominance of PAC process in Crown forest land for almost two decades, statistically significant differences between Indigenous and nonindigenous PAC members regarding their views about different forest values and their evaluation of the success of PAC process still persist.

Both 2004 and 2016 survey results indicate that Indigenous and nonindigenous PAC members significantly differ in their assessment of many PAC success indicators. The result indicates that Indigenous PAC members are less likely to be satisfied with many aspects of the PAC process and outcomes. Compared to nonindigenous PAC members, Indigenous members are less likely to feel that the PAC process is fair. It is statistically significant that Indigenous members are not as confident as

nonindigenous members in raising their concerns. Further, Indigenous members are less likely to agree that they are able to influence forest decision-making through PAC membership.

Regarding forest values, both 2004 and 2016 surveys show that Indigenous PAC members significantly differ from nonindigenous members in their perception of the inherent worth and spiritual value of forest. In other words, it indicates that Indigenous PAC members give much more weight to the inherent worth and spiritual values of forest than nonindigenous members.

Since the 1960s, public survey research in Canada shows that public support for multi-value forest management system has been evolving (Robson et al. 2000; Ken Drushka 2003). As such, PACs are in a better position to serve as a public space for local citizens to debate and discuss how these multiple values will be supported in final forest management decision-making (Parkins 2006; Hunt 2015). This does not mean that in a PAC processes everybody is expected to agree with all values of forest management. Rather, in the course of meaningful deliberation, it is anticipated that stakeholders develop an environment of social learning and mutual understanding (Parkins & Mitchell 2005). However, from the findings of this study, it is reasonable to be skeptical about the success of PAC processes in Canada's Crown forest in terms of bringing all forest values to the table. Research indicates that statistically significant differences still persist between Indigenous and nonindigenous members regarding forest values. Several anthropological and sociological qualitative case studies support this finding (Rolston & Coufal 1991; Booth & Skelton 2011), which suggests that nonindigenous Canadians hardly recognize how land and allied natural resources are inextricably linked to Indigenous cultural, moral, and spiritual values (Spak 2005; McGregor 2011).

These two findings indirectly show that PAC deliberation processes continue to lack the capacity to support the values and interests of Indigenous members. As Bowie (2013) argues, PAC based public

participation rarely questions principles of conventional forest institutions, addresses epistemological differences or facilitates knowledge-sharing between Indigenous and nonindigenous actors. Beaudoin et al. (2016) also point out how Indigenous peoples are involved in PAC processes already predefined and often have no space for an open discussion.

Finally, although C&I-SFM based Canada's progress report toward SFM "shows 74% of public participants are somewhat or completely satisfied with the [public advisory] committee process" (CCFM 2006) as one of the success indicators under the society's responsibility criterion, this finding shows that the level of satisfaction of Indigenous and nonindigenous participants is significantly different. The strength of the finding is that I tested satisfaction levels of respondents in 10 varied items (statements) that evaluate the success of PAC processes across a number of features. The statements include issues of fairness, confidence in raining concerns, trust, whether PAC is interactive, the capacity of influencing the decision, among others. Indigenous participants are less likely contented with almost all issues. By building on this finding, future studies could further explore rationales behind persistent satisfaction differences between the two groups.

Given the sampling limitations from 2004 and 2016 data, it is far from clear whether the responses to these surveys are representative of the PAC membership countrywide. Further, since 2004 and 2016 data were not collected from the same samples, I cannot directly compare the two results as a time series data. Therefore, generalizations beyond the participants of these surveys are cautioned. What is valuable here; however, is the focus on the experiences of survey participants and some persistent trends in the data from 2004 and 2016 corroborate evidence of PAC process deficiencies found in other studies (Robson & Rosenthal 2014; (Parkins et al. 2006).

Chapter four: Conclusion

In this thesis, I seek to achieve two main goals. Our first goal is to empirically measure the link between self-reports of procedural justice, distributive justice, and social learning variables in self-reports of Public Forest Advisory Committee (PAC) members' experiences of committee process effectiveness and satisfaction. To do so, I developed an analytical model and corresponding hypotheses based on theories of (procedural and distributive) justice and social learning theories. We tested the hypotheses by using the 2016 online national survey data of PAC members in Canada.

Our findings largely confirm that the personal perception of procedural justice, distributive justice, and social learning variables in committee process have predictive power about individual judgments about effectiveness and satisfaction of the PAC process. In other words, when advisory committee members evaluate their experience of participation, their perceptions of justice in the decision process and outcome and what they believe they learned from participation, strongly determines their perception of satisfaction and effectiveness of the committee process. We have understood this by testing each of the three variables separately in different explanatory models. From three social learning variables I tested, cognitive and relational/trust variables are statistically significant with both effectiveness and satisfaction variables. When tested separately, both procedural and distributive justice variables have almost equal predictive power of satisfaction and effectiveness.

However, when I combine all three variables in one model, all variables do not have equal predictive power. By combining these variables in one model, I have found that predictive power of procedural justice variable increases, distributive justice variable slightly decreases, and social learning variables become insignificant. The combined model infers two important findings. First, the respondents are more contented with procedural justice (process) than distributive justice (outcome) as an indicator of

effectiveness and satisfaction in PAC experiences. Second, more importantly, it indicates that although variables of (procedural and distributive) justice and social learning are theoretically different, the empirical results demonstrate that they are not mutually exclusive. In statistical terms, there is multicollinearity among these variables although the tolerance test indicates that it is below the level of concern. By capitalizing on this finding, future research may need to explore these distinctions more thoroughly.

Further, I deliberately used two outcome variables, "members' satisfaction with PAC process", and "members perception of overall PAC effectiveness". In theory, scholars argue that "satisfaction" is much more subjective than "effectiveness". However, the finding shows that procedural justice, distributive justice and social learning variables association with 'satisfaction' and 'effectiveness' are almost the same. It signals that for survey respondents the concepts of 'satisfaction' and 'effectiveness' could be synonymous. However, further study is needed to substantiate this finding.

From the findings of my first goal, I propose that in the participatory public process like PAC in Canada, policymakers and researchers ought to focus on what is fairer in the eyes of stakeholders and how social learning could be enhanced. Specifically, the procedural justice variable is the strongest predictor of effectiveness and satisfaction means that in PAC process the respondents give more weight to four aspects of participation processes. Such as if participatory process is (1) representative of all local views, (2) chances of raising their concerns, (3) how their concerns are considered in final decision- making and (4) a logic behind the final decision. Future study may build on these findings and conduct further research on a representative sample of the PAC.

Given the evolving theory and practice of sustainable forest management, reflected in Canada through the C&I-SFM, the second goal of this thesis is examining potential differences between Indigenous and

nonindigenous participants regarding their opinions about the success of the PAC process in fulfilling their expectations and their perspectives about forest values. Under the second goal, I have had two district objectives. First, examining opinions of the two groups concerning the success of PAC processes in fulfilling their expectations. Second, statistically testing potential differences between Indigenous and nonindigenous public advisory committee (PAC) members regarding their feelings about different forest values. We have attempted to address this goal in Chapter 3 by using the 2004 and 2016 national surveys data of PAC members in Canada. We used a Mann-Whitney U test to estimate if there is statistically significant difference between indigenous and nonindigenous PAC members regarding the two objectives (forest values and success of PAC process in fulfilling expectations).

Our findings from both the 2004 and 2016 surveys indicate that despite the application of PAC based public participation in Crown forest in Canada for almost two decades; there remain statistically significant differences between Indigenous and nonindigenous members regarding their perceptions about different forest values and successes of the PAC process. First, both 2004 and 2016 results indicate that Indigenous and nonindigenous PAC members significantly differ in their evaluation of many PAC success indicators. The result indicates that Indigenous PAC members are less likely to be satisfied with many aspects of the PAC success indicators. Compared with nonindigenous PAC members, Indigenous members are less likely to feel that the PAC process is fair, they are not confident in raising their concerns, and are less likely to agree that they are able to influence forest decision-making.

Second, Indigenous PAC members significantly differ from nonindigenous members in inherent worth and spiritual values of forest. In other words, Indigenous PAC members give much more weight to the inherent worth and spiritual values of forest than nonindigenous members. In fact, all PAC are not

expected to agree with all values of forest. Rather if there had been an open discussion about all values of forests, I expect that Indigenous and nonindigenous PAC members would have influenced each other's views about forest values. Based on these findings, it is reasonable to be skeptical about the success of public advisory committee consultation processes in Canada's public forest regarding developing shared understanding between the two groups. Based on the findings of second goal, it is rational to question the extent to which the PAC deliberation process facilitates equitable relationships between Indigenous and nonindigenous and encourages rising of divergent views in discussion. Future research may answer this question using a representative sample of PAC members if a sampling frame of the members will be available and accessible.

Future Research

Drawing on my experiences of using 2004 and 2016 national survey data of PAC members in Canada for this thesis, I suggest the following three lessons to be considered for future research. First, in chapter 2 by using 2016 survey data, I estimated if three variables (procedural justice, distributive justice, and social learning) predict the effectiveness of PAC process. The survey instruments measured many dimensions of concepts of procedural justice, distributive justice, and social learning. However, there is no universally agreed definition of these concepts. Rather, they are evolving and multidimensional concepts in participatory resource management, and other disciplines. Thus, taking this study as the basis, future research design survey instruments that measure each concept distinctly in participatory forest decision-making.

Second, since Canada is a leading country in adopting SFM principles, it is expected that SFM practices embrace all values of forest and, thus, public opinions toward forest management would improve. In particular, Canada's C&I-SFM calls for meaningful public participation and direct inclusion of all social

values in forestry practices. However, SFM is not the only driver of change in forest management, there are many drivers. Thus, I cannot attribute changes in public opinions to only SFM practices. Rather, I determined that there are significant differences between Indigenous and nonindigenous experiences in the era of SFM practices. Thus, in chapter 3, I tested if there are statistically significant differences between Indigenous and nonindigenous PAC members regarding (1) their level of satisfaction with success of PAC process and (2) their opinions about different forest values. To attain my objectives, I used both 2004 and 2016 surveys. We chose 10 diverse measurement items from different section of the survey to estimate the level of satisfaction of the two groups with PAC process. Building on my efforts, the future survey may categorize these items into typologies. For example, some items measure representativeness of PAC, some measure fairness of PAC, and so on. The forest values items measure the level of agreement of respondents with different statements that reflect different forest values. The future survey design may add items that measure respondents' preferences of one forest value over another for more comparison of the two groups.

Third, there are limitations in survey sampling methods. First, as no central registry of PACs in Canada, exists and thus the exact population of PAC members in the country is unknown (Bowie 2013; Parkins et al. 2006). Second, the PACs were established for diverse purposes and under different circumstances across counties and provinces (Parkins et al. 2006). Due to these stated reasons, it was not possible to get an accurate sample frame of PAC members for both the 2004 and 2016 surveys. As a result, instead of probability sampling, research administrators attempted to collect data from all PAC members who provided their mail and email addresses. For the 2004 survey, 2256 paper-based questionnaires were distributed to PAC members via mail address and 1079 were returned. For the 2016 survey, the questionnaire soft copy and internet link were emailed to all PAC members and 345 members

responded. For example, the number of Indigenous respondents was between 7-9% in both surveys, which was lower than anticipated, given the proximity and attachment of Indigenous communities to forestlands. Since mail and internet data collection methods are prone to self-selection bias, it is challenging to prove that those members who responded represent the population of PAC members. Thus, I am cautious about claims of generalizability of the findings. Rather, the findings should be understood as an attempt at estimating relationships between variables and the examining theoretical assumptions. Therefore, drawing on these findings, future research could conduct studies with a representative sample of the PAC members and this might support policy implications of the success of PAC process as a dominant form of public participation in forest management in Canada.

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