

## **Local Innovation for Public Transfers and Management Policy in the Case of Canada\***

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For the critical knowledge area of the nuclear industry and nuclear waste management what has come into evidence is the attachment to territorial and identity norms. Most studies have referred to environmental politics and environmental justice but, at the same time, it needs to be addressed the territorial national dimension. In connection with public and private partnerships (PPPs) in Canada, the sectoral development has been experienced in terms of public performances and territorial practices. For the management of nuclear power plants through the PPPs, political relationships have been shaped according to different levels of productive interactions, which have been related to environmental affectation policies. The comparative increase of regional productions and trans-sectoral economic interests has determined social adaptive patterns indicating the interrelated environmental justice issues, which have been expressed on the basis of common knowledge platforms and social open confrontations.

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## 1. INTRODUCTION

For the public interaction process affirmed on technology innovation systems across multicultural societies, comparative international scholars acting in public policy have discussed about the type of institutional characterization that refers to economic innovation alliances and transnational partnerships combined with societal groups' formation adapted in governance; these affirmative notions have pointed at the need of understanding normative collaborative settings when accompanied in terms of knowledge integrated economies (Mothe, 2004; Clarke, 2005; Howlett, 2014). In relationship with comparative 'science, technology, society' (STS) background studies that have been introduced in reference to managerial innovation changes in local governance, it can be directed a comparative analysis specifically on Canada's nuclear policy case. This major case in Canada has been related to comparative effects produced in connection with regional knowledge innovation plans and technology energy systems that have corresponded to comparative application processes, which have been aggregated on STS development issues, while also involving the case of nuclear management policies.

This paper introduces a literature overview about functional institution adaptation within public-private partnerships (PPPs). In the following sections, it emphasizes the changing relationship in nuclear policy debates in Canada. Comparatively, main institutional drivers pointing at the tradeability of international innovation assets explored in East and South-East Asia, like Taiwan, Japan or Vietnam have been analysed in connection with interdependent organizational changes that again have involved the economic and political adaptation plans (Mothe, 2004; Howlett, 2014). The establishment of contracting dynamics in governance which refer to the preparation of institutional arrangements and PPPs offering networking information options, has emerged through complementary regulatory programs applied for the aggregation of preparatory adaptive settings (Mothe, 2004; Howlett, 2014). Particularly, the comparative increasing degree of

national innovation interactions involving responsible public distribution agencies — operating in cross-national environments with resource-based transfers for the implementation of complex organizational dynamics emerging in governance — has been reviewed by taking into account the managerial local implications of knowledge organization systems consolidating within internalized production contexts (Mothe, 2004).

## 2. CANADA INNOVATION AGREEMENTS

At the core of knowledge formation capacities in science and technology innovation designs, have been promoted functional analyses that have been related to the introduction of systematic organizational interactions referring to composite associative environments, also connected with the dimension of public-private cooperation networks, which are very significant. Moreover, we can find an emerging trend of national socioeconomic philosophies which can better describe either conservative or progressive views proposing the parallel integration of societal and technical transitioning processes (Mothe, 2004; Clarke, 2005). Basically, the national corroboration of governmental mechanisms that might tend to reproduce what we understand about the knowledge practices and networked integration based on public alliances and private partnerships — has also come into place through normative adaptive functions (Clarke, 2005).

In Canada's regional case, the presence of national and supranational normative recognition for socioeconomic related practices, has led to institutional identification processes involving participatory societies that have remained attentive to central programmatic undertakings, which have involved public distributive measures and common reforming agendas (Clarke, 2005). In the last two decades, the critical mobilization of new ideal STS platforms that can include challenging adaptation dynamics, associated with comparative governmental arrangements — has been interrelated with the development of technical integrated mechanisms, as well as, convergent innovation knowledge

systems. These processes have involved institutional mediation options addressing, for instance, the modern requirements of constitutive administration agencies, connected with local participatory groups spreading out, for example, across Canada's localities or in European states.

In addition to these elements, the comprehensive distribution of organizational and cognitive (power-related) effective measures targeting industrial knowledge-based societies — have comparatively meant the formation of creative variation models responding to the adoption of liberal and social reforming ideologies, which have over-passed the public regulatory aims of centralized and decentralized regional administrations (Mothe, 2004; Clarke, 2005). The STS progressive factors or the science technology innovation (STI) integration in learning societies have been often recalled in combination with major organizational and evolution changes that have determined multi-level management transfers operated through comparative strategic mechanisms, which have been instrumental to the distribution of coherent programs that have been established in view of formalized regulatory practices (Mothe, 2004; Howlett, 2014). The actual implementation of science and technology innovation programs conducted through the application of sustainable integration plans, also for consolidation aims referring to PPP initiatives, has remained interlinked to functional multilateral collaboration patterns diffused at regional and international level.

The territorial scale of integrated technology applications operated for comparative energy systems that can support science policy strategies and common technical agreements has been analysed in relationship with the national diffusion of multilateral harmonized procedures (Liming *et al.*, 2008; Meadowcroft, 2009). Policy innovation studies conducted about the progressive inclusion of managerial transitioning procedures that have been established for comparative assessment cases, which have referred to energy sustainability plans and technical directives promoting advanced renewals of common adaptation plans, have included the study of technical available measures targeting distributed managerial operations of i.e. nuclear energy

reactors CANDU<sup>1)</sup> located in Canada<sup>2)</sup>; basically, transitioning energy strategies have testified the different historical modifying approaches that have been adopted in view of environmental strategic orientations, as well as, common learning assessment methods, considered among other organizational issues (Liming *et al.*, 2008; Winfield, 2013). In fact, the gradual search to find efficient governmental coordination approaches related to energy diffusion policies has been difficult to classify when there have been into cause multiple STS energy transition strategies, changing overtime (Liming *et al.*, 2008).

The national integration of multi-level organizational characteristics for energy innovation planning, interrelated with direct or indirect renewals of energy sustainability measures, has corresponded to possible diversified resolutions including public distribution targets, which have specifically involved the aggregation of commercial power tariff policies and exploration of societal learning adaptations (Liming *et al.*, 2008; Meadowcroft, 2009). In fact, it can be considered that an evolving nature of energy technological management systems has been traditionally assessed in terms of national technical performances, integrating distribution measures with local monitoring stages that have been evaluated for compliance of local performing activities, which have involved the adoption of multilateral innovation approaches (Meadowcroft, 2009). In line with this process, there have been into question the normative requirements specified for the national prioritization of operable energy systems that have been either based on fossil fuels or renewable sources of energy such as: wind, hydro, nuclear, and solar energies; at the national level, the corresponding managerial transitioning implications have contributed to the examination of renewable energy promotion activities, as they have also become effective for Canadian northern provinces (Liming *et al.*, 2008; Meadowcroft, 2009).

Moreover, in view of the increasing environmental concerns in Canada over the development of national oil energy trade and managerial efficiency transitions, there have been prospective indications at federal level about the

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<sup>1)</sup> CANDU (Canadian Deuterium-Uranium) reactors.

<sup>2)</sup> See U.S. Department of Commerce (2016).

need to support common renovation stages of regional energy programs, which can be adapted in favour of alternative STS energy designs, gradually arranged across time, while operated through regional production companies and provincial regulatory entities (Winfield, 2013). For instance, in the case of closed and decommissioned mines and mills in Canada, the private owners, and federal and provincial governments have been in charge of long term activities while the Canadian nuclear safety commission (CNSC) provides the access to environmental monitoring and long term regulation that includes nuclear decommissioning activities and nuclear waste safety management.<sup>3)</sup>

### 3. DESCRIPTIVE THEMES

In practice, the regional acceleration of PPP on multi-purpose development strategies addressing the formulation of centralized and decentralized energy sustainable programs, has been promoted through the formal establishment of committed international agreements, which have referred to environmental energy protocols such as: Kyoto Treaty Protocol (KP), interlinked to the United Nations Framework Convention on Climate Change (UNFCCC) for the official reduction of global GHG emissions' targets set among other goals, which have affected industrialized and non-industrialized populations (Liming *et al.*, 2008; Winfield, 2013).

The possible delivery of regional integrated organizational models advanced in connection with alternative renewable energy demand-supply systems, which have followed interdependent collaborative paths aggregated within sub-national structural regulatory plans, has been concretized through multi-level organizational assets of corporate capacities. These formalized distribution patterns at industrial level have corresponded to systematic regulatory requirements for the critical transformation of national energy resources involving e.g.: the uranium mines based in Canadian provinces (Hurlbert *et al.*, 2010). In essence, the planning and evaluation stages evolving

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<sup>3)</sup> See Canadian Nuclear Safety Commission (2018).

in relation with technology distribution and adaptation systems have been put into practice in terms of federal and state strategic plans that have been adopted in association with public provincial guidelines, which have referred to programmatic aspects of territorial managerial transitions (Hurlbert *et al.*, 2010; Kleffner *et al.*, 2003).

Moreover, the PPP regulatory contribution, in governance, has been modified because of the organizational delivery of provincial sustainable programs relying on the presence of industrial energy corporations operating through comparative innovation integrated assets, which have fundamentally resulted into complex entrepreneurial models, while associated with cooperative transition elements of multilateral management systems (Kleffner *et al.*, 2003; Hurlbert *et al.*, 2010).

The analytical and practical regulatory orientations that have been expressed about the establishment of public collaborative STS programs operated through integration of decisional adapting processes conducted by multi-level agencies, acting at federal and provincial levels in Canada's case, have also relied on the validation of responsive socioeconomic environments based on participatory diffusion criteria. In other words, national societal interactions that have emerged about technology and innovation programs STI have been evaluated through distinctive territorial practices and categorization processes, including formal decisional patterns, reflecting multi-level public-private deliberative choices (Richie *et al.*, 2012).

For such reasons, institutional policy approaches prepared according to territorial adaptation models incorporating science and innovation dynamics have resulted in correspondent patterns for territorial distribution practices, for example, put in relation with managerial distribution operations on national energy resources. The consolidation of energy innovation policies has also led to the alignment of standardized organizational options forming through internal and external facilitation activities of regulatory entities, which have tended to reflect normative motivations for governance participation models that have been in place during recent decades (Hurlbert *et al.*, 2010; Richie *et al.*, 2012). For instance, the increasing involvement of community-based

projects at provincial level has been consolidated through PPP managerial effective mandates, which have been dependent on the performance of technological managerial systems and societal territorial networks, eventually defined according to decisional transition determinants involving open conducive choices.

Fundamentally, there have been material expectations for political collaboration designs based on environmental national orientations, concerning contractual governance, which have been developed through public representative agents and corresponding industrial counterparts, involved with science and innovation designing agencies that have concurrently transformed different distributive mandates (Hurlbert *et al.*, 2010). In fact, the conjugation of institutional increasing factors, deliberative progressive interactions, and managerial opportunities for territory-related socio-technical innovation networks in Canada, has facilitated the incremental prospects for local collaborative practices and common decision-making activities assessed in view of economic transnational trading aims (Ilcan *et al.*, 2003; Hurlbert *et al.*, 2010).

To this, when there is a formal and informal need to try to reproduce diffused environmental exchanges between civil society, representative actors, and multilateral interest groups, associated in governance activities, it has been created a voluntary mediation ground for deliberative environmental participation, with the purpose of advancing both normative and organizational converging objectives (Parkins and Davidson, 2008; Graham and Hanna, 2011; Doberstein and Millar, 2014). The development of community-based projects for environmental management in Alberta's Canada has converged toward the formation of deliberative consultations including the local civil committees for political advisory involvement (Parkins and Davidson, 2008). The sustained juxtaposition of civilian consultation committees and industrial operating representatives, involved in natural energy resources management, has possibly corresponded to municipal constitutional mandates in Canadian provinces, however confronted with practical deliberative limitations, which have affected autonomous environmental groups for restrictions on local

consulting options and civil integration processes (Parkins and Davidson, 2008).

Essentially, there has been a legitimacy process in governance that refers to the national evolution of public service partnerships and private distributive interactions related to managerial innovation conditions, which have indirectly involved quantitative evaluative analyses and practical monitoring changes, influencing the distribution of regulatory deliberations formulated at national, provincial, and local level (Parkins and Davidson, 2008; Doberstein and Millar, 2014). In addition, provincial or municipal regulatory interaction processes have been renewed through a possible adoption of technology networking resources associated with common diffusion practices that are used for the promotion of Canada's e-governance initiatives (Graham and Hanna, 2011; Doberstein and Millar, 2014). The information and communication technologies (ICTs) integration path in governance has represented a further major step for the provision of deliberative tools involving conditional adaptation stages undertaken between public administrations and community-based environments.

In the case of industrial partnering programs and ICTs e-governance initiatives, there has been a corresponding public transition favoring a participatory advancement for national citizens, even though it has been a controversial process for a number of material reasons (Graham and Hanna, 2011). The technological change associated with constant fragmentation of respective knowledge managerial designs and information exchange networks emerging in e-governance, has been a matter of industrial configured organization, but also of public service with multi-level arranged provisions (Graham and Hanna, 2011). In Canada's case, after an initial popularity of internet with a diffused provision of common services, associated with integrated information functions, it has been formed a comparative similar public users' experience, which has consequentially entailed progressive reforming stages in the public sector while supporting the delivery of knowledge-based distribution e-services that can also involve distinctive programming activities of stratified departmental entities (Graham and Hanna,

2011).

In terms of functional deliberative accesses for the involved territorial participants, established through the production of direct practical feed-backs about e.g. upgrade of health systems, common approaches on education training, or material identification of economic opportunities, the responsive cooperation agencies, as well as, industrial research bureaus and multilateral innovation groups have processed vertical distributed access models and horizontal open accesses, which have remained a matter of mutual cooperation strategies set in connection with community-based services, that have also led to societal exclusion conditions affecting distinctive territorial populations (Graham and Hanna, 2011).

To these aspects, we can consider that legitimacy in governance has come also in the form of national coordination and public accountability; these two interdependent elements should reflect the relevance of planned administration measures and institutional facilitation practices (Doberstein and Millar, 2014). The regulatory interconnection formed in agency-based distribution models, specifically in view of promoting functional integrated capacities and local assessed dynamics of decision-making processes, can progressively sustain a public deliberative dimension throughout selective time-periods in order to support environmental territorial plans on e.g. the control levels on greenhouse gas emissions in Canada 1990-2015.<sup>4)</sup> However, the direct environmental deliberations and qualitative resulting approaches emerging in typified provincial and national interactions have reflected particular organizational strategies and mediation activities, which have not been necessarily configured in terms of contractual innovative reforms (Mazouz and Tremblay, 2006).

#### **4. COMPARATIVE PUBLIC APPROACHES**

In this sense, the level of necessary commitment for the arrangement of industrial systems and institutional networks has been shifted in terms of

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<sup>4)</sup> See Environment and Climate Change Canada (2017).

deliberative normative confirmations. This process has involved the inclusion of an internal and external correspondence for organizational counterparts, which have been interrelated to common associative spheres at the national and local level; regulatory performance associated with local integrated exchanges and progressive learning adaptations has been aggregated through distinctive managerial determinants that have been required for the possible distribution of common delivery services, tackling STS innovation factors and diffused management transitions (Mazouz and Tremblay, 2006; Doberstein and Millar, 2014).

For instance, comparative political analysts have highlighted the significance of structural governmental interactions that have been defined between the federal and provincial authorities based in Canada (Rabe, 1999). In recent decades, there have been regulatory ecological engagements expressed in terms of environmental protection policies that have resulted in national associative initiatives; which have simultaneously involved the federal and provincial autonomous constituencies based in Canada (Rabe, 1999; Hvenegaard *et al.*, 2015). On the one hand, the formation of specific interdependent objectives interrelated to science and innovation diffusion models, has been facilitated at the country level through the sectorization of national industrial aims, incorporating research and development (R&D) activities (Boekholt *et al.*, 2002). Instead on the other hand, the presence of centralized financial schemes that have been granted for research and innovation activities, has been reviewed by Canadian state authorities through the involvement of public central departments, common environmental advisory bodies, and specialized technology operating agencies, in order to pursue scientific and cooperation objectives; for this reason the programmatic STS incentives that are identified about comparative clustering designs on management performance targets have been promoted in many cross-field areas, including the environmental research domains related to industrial energy programs (Boekholt *et al.*, 2002).

Therefore, it can be observed that in the case of multi-level national distribution plans combined with institutional local mandates in Canada, the

supporting research and innovation schemes have been prepared in connection with federal financial mechanisms; while the implementation of territorial regulatory directives has become operable through statutory decentralized initiatives sustained at provincial level (Rabe, 1999; Boekholt *et al.*, 2002). For comparison purposes, the publication of a series of environmental studies about public protection initiatives in the case of Alberta's Forest campaigns has provided important highlights about the provincial committees' involvement for local integrated accesses, which have been quite key for trying to improve public consultations and common associative decisions favoring community stakeholders' intra-dialogues (Rabe, 1999; Hvenegaard *et al.*, 2015).

As consequence, both regulatory and managerial plans applied about forests and parks' policies in Canada have been operated through multiple regional public-private partnerships, which have involved transnational industrial groups' representatives, local planning agencies, and community stakeholders, among others; which have actively responded to progressive regional innovation partnerships through e.g. public consultative resolutions, while taking into account the protection of autonomous aboriginal communities (Hvenegaard *et al.*, 2015).

Overall, the multi-level adaptive affirmation of federal, and provincial institutional bodies in Canadian sectoral collaborative partnerships, has emerged in terms of a complex ecosystem that operates within entrepreneurial management associations, urban development centres, and community-based provincial agencies (Hvenegaard *et al.*, 2015). In such *modus operandi* of intra-governmental environment partnerships combined with industrial regional consolidation plans, we need to specify that strategic orientations in Canadian provincial regions, promoting respective deliberation assets and normative capacities have been pursued through the inclusion of environmental protection policies e.g. in Ontario's regional case<sup>5)</sup>; such public strategic dispositions have basically evolved toward both centralized and decentralized regulatory networking systems that have favoured relational

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<sup>5)</sup> More Information at Ontario Power Generation (2018).

**Table 1 Canadian Regulation System**

Management of hazardous waste and hazardous recyclable material in Canada
In Canada, all three levels of government contribute to environmental protection and have a role to play in managing hazardous waste and hazardous recyclable material.
<ul style="list-style-type: none"> <li>• Municipal governments establish collection, recycling, composting and disposal programs within their jurisdictions.</li> </ul>
<ul style="list-style-type: none"> <li>• Provincial and territorial governments establish measures and criteria for licensing hazardous-waste generators, carriers, and treatment facilities, in addition to controlling movements of waste within their jurisdictions.</li> </ul>
<ul style="list-style-type: none"> <li>• The federal government regulates transboundary movements of hazardous waste and hazardous recyclable material, in addition to negotiating international agreements related to chemicals and waste.</li> </ul>
Environment and Climate Change Canada implements the terms of international agreements related to hazardous waste and hazardous recyclable materials to which it is a Party. In signing these agreements, Canada made a commitment to develop national legislation to promote the environmentally sound management of hazardous waste and hazardous recyclable material.

Source: Government of Canada (2016).

interconnections while, at the same time, have encountered limited sets of achievements (Bradford, 1998). For instance, table 1 summarizes environmental protection roles which have reflected international and national priorities about the management of hazardous waste disposal programs operated in Canada.

The corresponding methodological approaches that have been undertaken for the diffusion of deliberative formulations adapted in governance have remained characteristically intertwined with cooperative planning designs and PPP responsive partnerships. For this reason, the continuity of trust for STS innovation plans and corresponding societal reforms — which have gradually expanded through regional business consortia, national cooperation groups, and local advisory agencies, commonly engaged into formal Canadian governmental coordination exercises — has been the result of available structural capacities, as well as, political parties' representative identifications associated with functional regulatory responses, which have been established at federal and provincial level, also in view of reaffirming democratic changing

dynamics (Bradford, 1998).

## 5. THE LOCAL AGENTS

In comparative political resolutions emerging about the issue of environmental participatory integration which has been aggregated in progressive statutory exercises that have been related to knowledge and information capacities, there are resulting actions which have reflected the status of governmental adaptation models. About participatory integration subjects there have been a number of institutional scholars marking a particular attention on the knowledge management theories which can incorporate: community-based approaches; sectoral networked arrangements, and complementary functions dependent on professional local expertise; these structural elements validated in governance have been interrelated to the development of environmental sciences, innovation and technology reforms, and resource management capacities, among other knowledge areas (Davis and Wagner, 2003; Frickel and Davidson, 2004; Ostrom *et al.*, 2004; Ellis, 2005; Mackendrick, 2005; Tengo *et al.*, 2014; Baird *et al.*, 2015; Koontz *et al.*, 2015) .

Following on environmental perspectives, there has been the need to identify key aggregation factors for the institutional understanding of environmental policies that have involved public discussions concerning the natural resources management and technology aggregated programs, which in turn have been consolidated through applied environmental science disciplines. In essence, there has been a specific convergence suggesting common policy directions undertaken in the case of critical environmental adaptive transfers that have been set in conjunction with structural learning definitions. Per se, the comparative learning systems and established functional networks in governance have been interlinked with the environmental adaptation analysis and decision-making activities; while the public transfer systems, in particular, have been identified for their ability to

operate across the multilateral changing domains, involving respective counterparts as the local citizens and formal central representatives that have been aligned for the provision of territorial-related concerted plans (Koontz *et al.*, 2015).

To consider the fact that there has been a specific enhancement of public information tools and distribution systems operating through PPP networked ecosystems such as in Canada's case, which has led to redefine critical environmental propositions indicating the necessary level of inclusion of national, federal, and provincial actors, which have operated in knowledge-based industries including ICT corporate capacities; through regional corporate affiliations the social environmental negotiations have been identified in view of granting favourable conditions and inclusive approaches referring to the maintenance of common national values, traditional local knowledge, and individual protective exposures (Koontz *et al.*, 2015; Ellis, 2005).

At strategic community level, the evolution of coordination and information processes for knowledge transfer factors in PPPs has been adapted through various experimental performing stages, becoming more effective through the national implementation of environmental adaptation mechanisms, including the local planning measures, which have involved complementary material arrangements and the use of common knowledge provisions, particularly connected with public information organizations and territorial distribution bodies (Ellis, 2005). National comparative policy experts however have testified the need to better understand the diffusion of comparative knowledge transfers and common integration models in local environmental governance that have been specified according to related environmental cases. Major highlights discussed below:

- a) Local Traditional Knowledge of Aboriginal Communities (Canada for example) remains technically distinctive from specialized environmental science and technology disciplines. So that governance integration entails dualistic conduct adaptations about environmental knowledge

- representation and advisory consultation in autonomous provinces (Ellis, 2005).
- b) Environmental initiatives related to socio-ecosystem networks have to rely on distinctive groups of actors as major participants for the preparation of projects that presuppose deliberative collaboration and consistency of networking strategies across time (Baird *et al.*, 2015).
  - c) Centralized and decentralized governmental resources targeting adaptive organizational strategies about environmental networking systems have emerged in connection with participatory interactions that can be strengthened or weakened depending on the evolution of organizational changes (Baird *et al.*, 2015).
  - d) The inclusion of communication systems has involved social learning and community interactions that generate public and private knowledge frameworks. Despite addressing stakeholders' concerns on the protection integration rules about multi-layered production systems; at industrial level, environmental strategies have remained correlated to voluntary designs based on internal and external factors of business leaderships in managerial performance conditions (Mackendrick, 2005).
  - e) Responsive socio-ecosystems in transformation models have involved a level of complementary for understanding about social knowledge systems and information networks. Cooperation and collaboration through social dialogues have been operated in environmental assessment cases at the federal and provincial level for the facilitation of indigenous and local knowledge procedures with multiple comparative evaluation approaches also inserted in multi-level planning systems (Tengo *et al.*, 2014).
  - f) Central to the scientific expertise debate it has been the emphasis on governance evaluation and validation procedures which basically rely on different knowledge information diffusion and social cooperative practices (Tengo *et al.*, 2014). The problem with quantitative models as mentioned is that: "unfortunately, many indigenous knowledge systems and related institutions have been destroyed as a result of new rules

imposed by external authorities” (Ostrom, 2004).

- g) The elaboration of local environmental knowledge defined with research objectives has involved dissimilar views on natural resource management leading to critical regulatory implementation of national agencies (Davis and Wagner, 2003).
- h) Long-term participation plans on technical environmental identifications and public resolutions require knowledge anticipated approaches which can reflect major localities’ capacity for regional commitments involved in Canada and elsewhere (Davis and Wagner, 2003; Frickel and Davidson, 2004).

The Canadian regulatory case about the collaborative and adaptive governance models that have been structured through local inclusive terms applied on natural resources management has also been integrated through the community-based approaches (Kearney *et al.*, 2007; Bradshaw, 2003). On one side, public scholars have discussed the conditions of territorial engagements in order to defuse public tension and facilitate the process of local and provincial interactions regarding in particular environmental arrangements, such as the fishery and oceans networked sectors that are based in Canada (Kearney *et al.*, 2007). The common programmatic indications which have been provided on participatory partnerships PPP have led to the constitution of provincial and federal committees, specifically supporting sustainable dialogues and corresponding institutional feedbacks (Kearney *et al.*, 2007).

Under similar undertakings, the common knowledge factors and integration transfers KT connected with local management issues have emerged in line with institutional provisions of ministerial coordination agencies and community-based groups; the KT dynamics have been progressively going in favour of collaboration practices and social empowerment approaches, also validated in the case of natural resources management for PPP socio-economic distribution targets based in Canada (Kearney *et al.*, 2007). Nonetheless, in Canadian community-based approaches it has been put forward the level of national credibility that has been provided on environmental sector-based

provincial interests, determined at specific territorial levels (Bradshaw, 2003).

More specifically, public environmental resources' management has been developed in view of protecting the traditional knowledge of local community stakeholders involved in administrative ruling proceedings. However, the inter-ministerial regulatory commissions which have kept the use of legitimate principles concerning the federal and regional populations, have had to re-address emerging institutional questions about participatory levels in governance, promoting local information capacities and direct integrated interactions; this regulation activity also happens in order to achieve a common managerial formation of environmental collaborative designs that have been aggregated on common territorial projects regarding, for instance, the national forest management sectors, which have become functional to national territories coming under review (Bradshaw, 2003).

Similarly, there has been the formation of a national divide about specific community land agreements in Canada (First Nations organizational regime)<sup>6)</sup> for the co-management services involving aboriginal communities, which has led to the preparation of institutional adaptation programs involving the common normative acceptances and procedural categorizations, referring to the level of public involvement that has been established in federal and provincial districts about aboriginal and non-aboriginal distribution plans (Usher, 2003).

The co-management of natural resources in the forest sector has been combined with fishery provisions and rural subsistence activities, which have experienced limitations in terms of economic gaining opportunities that in time can reduce local profit benefits for community-based aboriginal groups, especially during the implementation of public management practices (Usher, 2003). Therefore, political adaptive conditions established in connection with normative changes based on common democratic principles have involved deliberative governance initiatives, including the environmental practices and concurrent implications for knowledge-based actors, community partners, distributive agencies, particularly in reference to Canadian states and

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<sup>6)</sup> See Canada's First People (2007).

territories; essentially it has been granted the composition of effective environmental directives formed through PPP knowledge transfers, while maintaining common implementing factors for regional exploratory interventions (Usher, 2003).

As highlighted, the public and private managerial partnerships have involved common regulatory environments for the aggregation of local management arrangements which have been based on the selection of multiple knowledge-transfer criteria related to local community systems, which have tended to converge into local mitigation programs and resilience action plans, reflecting the socio-ecological changes (Bradford, 2003). Through the analysis of socio-ecosystems with prospective regulatory inclusion of public stakeholders and private interest groups, the emerging organizations adapting for the promotion of collective environmental designs related to territorial co-management issues, have critically varied in terms of national, federal, and provincial coordination levels, depending on the local applicability of functional expanded guidelines. Essentially, functional regulatory domains have to reflect traditional local knowledge and, at the same time, complementary of comparative managerial interactions. Instead, local partnerships established for collaborative knowledge exchanges and ICT's inclusion processes have tended to remain institutionally committed to sectoral programmatic shifts that can preclude the effectiveness of long-term targeted interactions, especially when assessed in relation with public environmental recognitions that have been translated in socioeconomic cooperative arrangements.

## **6. PARTICIPATION AND KNOWLEDGE PROVISIONS**

The pluralistic compromise lines of collaborative knowledge and managerial exchanges developing at government level have been analysed in relationship with deliberative normative systems based in Canada, Europe, and the United States, for contextual participatory regulations. Here it is used the

term compromise as a comparative understanding about the aggregation of institutional determinants interrelated with the energy innovation programs and environmental climate policies. In effect, the confluence of diverse organizational fields promoted through science and technology development has been institutionally framed through the knowledge integration programs and deliberative constitution platforms favoring the inclusion of multi-level stakeholders, which have been a fundamental base to study for political analysts and institutional practitioners (Vasi, 2007; Stirling, 2008; Hisschemoller *et al.*, 2009).

What can be specified is the comparative acquisition of formal and informal approaches that have been debated in public policy literature through national investigation studies exploring transition levels of mutual public engagements for corresponding environmental programs run in deliberative democratic contexts. Public democratic aims have been associated with institutional representative powers, promoting common decentralized initiatives on environmental learning possibilities, basically entailing adaptive changes reflecting regulatory functions enhanced through open apparatuses which are able to establish progressive environmental knowledge transfers with correspondent local implications.

From a comparative perspective, there has been a progressive intensification of aggregated development processes addressing common trading conditions of international production systems, which have been lined up through regional provincial approvals that have been followed up in connection with formal governance mandates; this also happens through the formation of normative and organizational approaches, which through the organizational practices should be able to trigger collaboration activities and participation procedures for regional PPPs of stakeholders involved (Stirling, 2008).

In specific normative configurations which have corresponded to different regional geographies such as in Canada and Europe characterized by international commerce exchanging zones, there have been institutional common designs incorporating environmental facilitation proceedings in order to grant societal inclusiveness interrelated with structural processes, which

have been dependent on science and technology policies, that have basically reflected value-based normative systems of the regional societies involved (Stirling, 2008; Hisschemoller *et al.*, 2009). The material mediation of different ideological issues about the competing distribution of PPPs trends involving environmental learning entities and organizational systems has been advanced for the possible elaboration of sectoral innovation policies, which can materially develop local management directives that are assessed in view of promoting common environmental planning aims diffused locally, nationally, and transnationally (Hisschemoller *et al.*, 2009). The international environmental literature that has been available about multi-level socio-economic distribution systems developed by Ostrom (1991), Jenkins-Smith and Sabatier (1993),<sup>7)</sup> among other main scholars (Hisschemoller *et al.*, 2009) has been expanded in association with common environmental governance theories that have been studied according to primary sets of systematic cognitive elements which can be identified in reported local cases on PPPs institutional diffusion and STS transnational learning systems, involving comparative technological assessments and societal participatory inclusions, particularly seen in connection with i.e. transnational nuclear energy policies (Hisschemoller *et al.*, 2009; Stirling, 2008). The range of governmental management transfers arranged for the national allocation of production patterns linked with energy distribution systems has been performed through complementary organizational dimensions that have been interlinked to PPPs for the knowledge transfers and information initiatives, which have been related to a set of common issues such as: PPP public-private cooperation practices; common learning institutions; and regulatory actor-based integration networks, when supported at the national and local agency level (Stirling, 2008; Hisschemoller *et al.*, 2009). From an environmental perspective, the science-based functioning organizations in turn have been intertwined with states' delivery expectations that have been dependent on the

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<sup>7)</sup> More information on retrieved literature: Axelrod (1976), Argyris and Donald (1978), Anton (1980), Atkinson and Coleman (1989), Binger and Hoffman (1989), Coleman and Skogstad (1990), Ostrom (1991), Jenkins-Smith and Sabatier (1993).

structural adjustment programs and on citizens' participatory orientations emerging in relation to common approval systems; there is also to consider the deliberative practices that can combine prospective integrative elements such as: legitimacy of public action; trust of formal commitments; and quality of learning innovation, which have been emphasized for long-term planning objectives (Vasi, 2007).

Similarly, the diffusion of environmental innovation policies interrelated with centralized or decentralized functional administrations linked to organizational distributive changes at transnational level, has reaffirmed the consolidation of PPP cooperation transfer activities; the knowledge transfer practices have been conducted by engaging representative agencies according to the legitimate concretization of formal and informal regulatory orientations, favoring the community-based practices, civilian alliances, and local agency formations (Vasi, 2007). Nonetheless, the competitive systematic inclusion of diversified open information domains and technology knowledge practices — which have been managed through national and local activity plans implementing the public knowledge transfers — has drawn attention to the delivery process supported by multi-level networking partners of interconnected agencies, which have to be responsive for the application of substantive compliance rules and complementary integration measures operated through a series of distinctive policy interventions, practised in terms of both formal and informal engagements (Mossberger and Wolman, 2003). For the systematic transfer of national knowledge information provisions, the national advisory bodies and organizational agencies based in Canada for instance, can pursue respective regulatory practices by undertaking correspondent procedural steps which can lead to the application of material operable guidelines serving the national, federal, and local bodies (Woolley, 2008).

### **6.1. Territorial Nuclear Debate**

In effect, depending on territorial governmental contexts and multilateral

parties which have involved national industries and local production interests, the respective regulatory conditions of environmental governance organizations can be assessed in terms of structural supporting processes that have been formed through the necessary consultative stages with open discussions, formulated more in view of reaching the actual delivery stage of legitimate approvals applied in terms of national provision policies. In relation to this, progressive regulatory transfers including territorial political indications as well as organizational implications are then evaluated at sectoral productive level — while integrating complex pending civil disputes about e.g. Canada's environmental conflict cases (Woolley, 2008). In table 2 it is summarized a short overview of STS nuclear regulatory organizations for PPPs based in Canada.

For the promotion of democratic debating and consultation phases, the public arranging organizations have normally chosen internal consensual procedures for the rationalization of strategies that need to be nationally implemented (Woolley, 2008). Instead, on the regulatory diffusion of prospective environmental policies the typified confirmation methods have been the result of public-private evaluation and monitoring exercises, based on reporting activities which have relied on the support of knowledge integrating processes and local information transfers that have been amplified through environmental management of territorial resources linked with complementary networking agencies and managerial systems at the local and national level (Mossberger and Wolman, 2003; Woolley, 2008).

Some critical elements emerging about the combination of deliberative environmental proceedings and evaluative monitoring actions involving technical approaches operated for the regulatory components of convergent organizational strategies — have referred to the exercise of compatible managerial dynamics going in favour of mutual public exchanges. In relation to public agencies activities, linked with environmental distributive plans and multi-level information spheres, one material issue has been about reaffirming qualitative configured interests, as well as, a possible correspondence of PPP supporting mutual trusting spheres; mutual confidence criteria have become

**Table 2 Overview Canada STS Nuclear Policy**

Science Technology Organizations in Canada	Regulatory Development in Canada	Nuclear Energy Partnerships
<p>-The Canadian Nuclear Industry has been designed since 1941</p> <p>-In 1944, 1945, and 1946 the nuclear energy technology entered development stages with facilities based in Chalk River, Ontario for experimental research</p> <p>-In 1952 the Atomic Energy of Canada Limited (AECL) is formed</p> <p>-In 1973 the Nuclear Power Plant (NPP) Pickering A is opened with a total energy capacity of 2060 MWe, the first nuclear power plant with such capacity in the world.</p> <p>-The Government of Canada has developed an historical legacy on Science and Technology policies focused on the nuclear industry.</p> <p>-The nuclear industry operated across national research institutions, academic bodies, and specialized service agencies.</p> <p>-The Nuclear energy reactors are the CANDU technology and Canada has 22 CANDU reactors which are managed by public utility agencies as well as by private companies</p> <p>-Since the II World War CANDU system has been developed worldwide.</p>	<p>-The legislative and regulatory agencies in Canada for environmental protection and hazardous waste involve the statutory act known as the Canadian Environmental Protection Act 1999 (CEPA)</p> <p>- In 2000 under the authority of the Nuclear Safety and Control Act is formed the CNSC</p> <p>-In 2002 is created the Nuclear Waste Management Organization (NWMO) under the authority of the Nuclear Fuel Waste Act.</p> <p>-At the Federal level under the CEPA the implementation of environmental agreements involves regulatory mechanisms favoring territorial environmental protection.</p> <p>-At the federal, provincial, and municipal level, involved public stakeholders have taken part to public consultations about nuclear waste policies</p> <p>-The CEPA Environmental Registry provides various public consultation tools on environmental regulations approved by the Canadian government.</p>	<p>-In Canada the federal government implements regulatory framework on nuclear energy policy</p> <p>-The regulatory body CNSC implements health and safety protection policies including environmental regulation and security</p> <p>-The CNSC implements the NPPs license environment for the full development process involving radioactive waste management facilities.</p> <p>-In terms of PPPs the nuclear industry and the government have developed common initiatives on long-term radioactive waste management through: The Nuclear Fuel Waste Act (NFWA) for long-term management programs.</p> <p>-The Ontario region has a large use of nuclear energy, over 55% of commercial use</p> <p>-The Government has designed progressive legislative initiatives to regulate the area of radioactive waste management. In 1996 the Policy Framework for Radioactive Waste provided a national blueprint on waste organization.</p>

<p>-Ministry of Natural Resources; Atomic Energy of Canada; Canadian Nuclear Safety Commission; Department of Foreign Affairs and International Trade; Canadian Environmental Assessment Agency; Federal Environmental Assessment Panels.</p>	<p>-The legislative environment at the Federal level comprises the Nuclear Safety and Control Act (NSCA); NFWA; Nuclear Liability Act; Nuclear Energy Act. For environmental protection it is implemented the Canadian Environmental Assessment Act</p> <p>-The implementation of the agency Natural Resources Canada (NRCan) is supported for the development of governmental policies on radioactive waste management and monitoring activities. The NRCan has authority for the application of the NFWA including the coordination of the NWMO for regulatory initiatives.</p>	<p>-In the province of Alberta and Ontario the commercial electricity utilities have shifted to competitive models involving the private companies instead of vertically-oriented public distribution models</p> <p>-Environmental Assessment (EA) remains a regulatory framework for the promotion of protection and safety mechanisms</p> <p>-Public participation is required during EA at nuclear disposal sites</p> <p>-The 2012 Canadian Environmental Assessment Act (CEAA) for the participation of Aboriginal communities is promoted at early stages of the planning process on nuclear waste disposal project</p> <p>-For the Nuclear Waste Management Decommissioning (NWMD) and Environmental Restoration (ER), the consolidation of technical approvals and service management has led to advanced adaptation plans and material transformation across Canadian nuclear provinces.</p>
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Sources: Canadian Nuclear Laboratories (2017), Canadian Nuclear Association (2013), Canada CNPP (2009), OECD/NEA Report (2008), Doern *et al.* (2001).

essential for the promotion of comparative knowledge and information transfers, fundamentally modeled according to different assimilation of structural and societal dynamics (Mossberger and Wolman, 2003). Through comparative political and environmental regulatory assessments referring, in

particular, to nuclear NPPs environmental measures, deliberative performing criteria adopted for common integration of public participation initiatives have remained essential determinants.

For the NPPs public regulatory designs, have been advanced delivery methods involving public consulting reviews and collaborative management processes, through which the nuclear energy regulatory authorities based in Canada such as NWMO have functioned in terms of national advisory entities while establishing collaborative exchanging platforms (Johnson, 2011). Nonetheless, it should be considered that Canada's NWMO has also been defined in connection with specific governing aspects regarding the structural configurations and identification patterns, which have included the promotion of public collaboration platforms that have converged toward the maintenance of different historical legitimization positions, reaffirmed in democratic terms (Johnson, 2011). Essentially, the environmental community-based promotion dialogues in Canada have been facilitated by corporate international groups, national energy agencies, and centralized organizations regulated under the NWMO Canada, which overall have contributed to the maintenance of public negotiating efforts for conciliatory conditions of distinctive environmental decisional positions, involving cross-areas organizational issues about nuclear waste management in disposal sites, having long-term material implications (Johnson, 2011).

In particular, the national legalistic composition associated with constructive decision-making implementation guidelines in the case of nuclear energy development, nuclear facilities programs, and nuclear waste disposal activities in Canada, has led to normative reconsideration for national advisory bodies and public organizational agencies; which have aggregated multi-level industrial ventures while addressing provincial populations' requirements involved in this process. For instance, about the case of Saskatchewan province in Canada, which has been reported as comprehensive environmental study of the province itself put in relationship with the nuclear industry,<sup>8)</sup> has involved an overlapping of managerial monitoring situations of distinctive

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<sup>8)</sup> See Global Research Institute (2013).

structural issues, related to the mining uranium industry and development of larger nuclear power plants, particularly in view of sustaining future energy needs which have been delineated as a problematic regulatory commercial evolution (Hurlbert, 2014).

Substantially, at provincial level, the application of knowledge transfer dynamics including nuclear industry's practical mandates and comparative scientific assessments has been publicly enhanced through the national formalization of normative participatory platforms, involving national citizens for the resulting communication and exchanging goals. However, at governmental level, in the Saskatchewan's case, the provision of knowledge information resources made available through consulting advisory bodies, corporate interest groups, and scientific expert panels, has been regarded with great local disaffection, causing civil awareness and open-ended concerns in the populations involved (Hurlbert, 2014). In essence, the functional constitution of public delivery mandates for legislative consultations and practical advisory specifications, formulated on disputed organizational ground, particularly in the case of energy renewable diversification plans which have been supported through transnational industrial groups and national advisory bodies — has been difficult to readdress in a systematic way for the lack of mutual operational conditions, including i.e. public environmental revision of provincial development plans adapted for the uranium industry. In effect, this organizational process has been combined with normative environmental indications that have been critical in reference to the nuclear management issues emerging about nuclear energy facilities maintaining integrated technical components that must be able to ensure safety and protection standards through the maintenance of common reliable protection mechanisms adopted at sectoral level (Hurlbert, 2014).

In comparative view, what can be said at the level of formalized PPP commitments on technology and innovation policies has been associated with national energy requirements also identified through either direct or indirect implementation of nuclear energy industry programs.<sup>9)</sup> There have been

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<sup>9)</sup> See Brouard and Guinaudeau (2015).

legislative deliberations and national international public consultations of science advisory commissions, which have constantly acted in line with multi-level public organizational frameworks that however have been unable to consolidate directly the distribution of energy efficient plans targeting the sectoral knowledge innovation capacities, involving systematic local advisory conditions (Hurlbert, 2014).

There is another comparative example which can be made about nuclear waste disposal policy adopted in California U.S. for Low-Level Radioactive Waste (LLRW)<sup>10)</sup> that has involved deliberative consultations and public scientific advisory sessions as well. The environmental consultative processes on LLRW have led to historical confrontations about national stakeholders maintaining respective evaluative and monitoring positions, which have been supported in terms of material identifications of critical industrial organizational issues which have remained undetermined for the long-term conditions, especially without the provision of public consensual views about regulatory resolutions of LLRW nuclear waste disposal decisions (Bedsworth *et al.*, 2004).

Therefore, nuclear energy public policy intertwined with STS know-how management agreements focused on transnational technical standardized models — set in combination with structural deliberations involving PPPs integrated with local partners — has basically reflected national regional organizational orientations. Composite STS transfer factors associated in connection with national opinion trends have been diffused in view of assessing multi-level adaptive environmental dynamics and corresponding decisional formations, which have actually changed from centric configurations through concerted power acquisitions to distributed territorial policies promoted at local level.

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<sup>10)</sup> More Information: U.S. Government, Printing Office Washington (2001).

## 7. NATIONAL SCHEMES

The national power shift which has concerned the Canadian federal and provincial administrations has been aggregated in structural regulatory stages that have been assessed for public devolution of responsibilities evolving over time. Modern relational shifts in governance have been modified in recent time-periods particularly between the 1990s and 2000s. To this, the public disclosure of environmental resource-based schemes in Canada has put into question organizational integration of centralized powers, which have basically legitimized ministerial-type distribution models with central decision-making proceedings — addressing national cooperation for socioeconomic innovation and managerial plans that are validated in contemporary governance systems (Lewis, 2013). Such type of propensity toward public implementation of ministerial programs has been followed according to complex restructuring directions that have been operationalized both formally and informally by federal and provincial agencies, which have been in charge of developing collaborative PPP and multi-layered environmental renewed initiatives at programmatic level (Lewis, 2013).

From an environmental perspective, regional policy scholars which have focused on regional multi-level adaptations of national and transnational ecosystems, have also specifically researched thematic aspects referring to management areas facilitating decentralized operational abilities of co-sharing industrial practices that are defined at territorial level (Howlett, 2002; Berkes, 2010). On the functional distinction of federal coordination systems and sub-governmental units located in provinces, regional experts have suggested that there have been in place essential structural elements, which have involved a dualistic instrumental understanding about centralized powers' configuration and decentralized systematic relations (Howlett, 2002).

Moreover, material overlapping of past regulatory conditions including present corresponding tendencies of Canadian administration policies has led to the constitution of structural policy adaptations, which have incrementally absorbed material organizational changes of resilient co-management systems

(Howlett, 2002; Berkes, 2010). The description that has been provided about the evolution of programmatic powers and integration of reconstitution bodies, which have inter-crossed boundaries through different regulatory changes has reaffirmed polarization aspects about significant political implications based on qualitative knowledge innovation and managerial reforms experienced in Canada's case i.e. with environmental community-based studies (Howlett, 2002; Berkes, 2010).

In Canada's case, regulatory powers and devolution mechanisms in place involving local distribution networks and provincial operating bodies with respective environmental distribution processes have also been associated with technical empowerment resolutions for involved stakeholders; however there is to consider the fact that technical adopted resolutions have generated contrasting outcomes because of a different ability to maintain common knowledge transfers between public-private organizations which have been involved in distinctive managerial productive sectors (Berkes, 2010). In Canadian context, public reforms addressing the decentralization process of public allocation activities, performed through common power sharing practices and local co-management services based on mutual agencies' feedbacks for environmental collaboration — have required technical adaptive capacities, also supported through digital configurations of ICTs knowledge exchanges (Dunleavy *et al.*, 2006; Calista and Melitski, 2007; Berkes, 2010).

Formal planning targeting advanced technology-based innovation platforms in governance has been quite significant in terms of material provisions and local responsive adaptations merging common participatory exercises promoted in the public sector (Calista and Melitski, 2007). However, there have been distinctive emerging theories about the organizational understanding of functional centralized powers and provincial bodies which have been commonly overlooking at the realization of national environmental objectives. Essentially, public formations of multi-layered independent networks set for e-governance programs in Canada (Allen *et al.*, 2001; Roy, 2006) as already mentioned, have caused an overlapping of modern fruition models that are based on automation approaches and innovation diffusion

determinants, which have been assessed for the maintenance of local communication tools and information dissemination processes, as well as, intergovernmental communication flows associated with resulting national open practices (Dunleavy *et al.*, 2006; Calista and Melitski, 2007).

In general, it can be observed that the moderate acquisition of managerial innovation and knowledge platforms operated in governance has been developed in line with structural management components, which have referred to key elaborate aspects such as: public integrated levels of cost-based procurement processes; operable data sharing powerhouses; interactive public-private networking models; and national agencies/bureaus/bodies provisions of regular integrated feedbacks; these requirements are due to comparative common exchanges related to permanent regulatory needs which have emerged within fragmented assimilation processes (Dunleavy *et al.*, 2006). In a way, the elitist functions of hierarchical distributed relations in policy innovation analysis have involved the recognition of intergovernmental designs which can engage different territories within multiple organizational models of specialized innovation and technology plans, operated also for the maintenance of future transmission models.

In the past decade, there has been in Canada's case a valuable testing dimension which refers to citizens' cognitive facilitation in the case of legitimate regulatory recognition that can allow increasing institutional flexibility being characterized by exploratory, interpretative, and legalistic material options still related to comparative ideological assumptions. Comparative analyses introduced about normative fragmentation factors of federal systems such as Canada, Germany, or Switzerland have advanced interpretative and adaptive cognitive dimensions about common institutional understanding, which has been related to changing dynamics of intergovernmental relations taking place in terms of participatory aims and collective sharing tasks (Cameron and Simeon, 2002; Wibbels, 2005; Bolleyer, 2006; Braun, 2008; Broschek, 2010).

When considering an historical background put in connection with respective single provinces, there have been progressive appraising assessment

methods diffused through formalized institutional relations, as well as, through federal implementation plans; the multi-level action planning process with cost-sharing related factors regulated at provincial level — has implicitly translated reviewed interpretations of distributed power relations, which have been enhanced through a mutual distribution of civilian roles and civic open responsibilities (Broschek, 2010).

Instead, in the case of co-management on environmental natural resources and promotion of community integration, we can consider that important conditional changing elements interrelated with territorial characteristics and regional economic consolidations, have reflected a diversity of converging public interests intertwined with a multiple aggregation of common learning notions, defined through the materialization of innovative productions and knowledge orientations explored across similar evolving regions (Wibbels, 2005).

In Canada, the affirmation of multi-layered determinant factors of federal and provincial elites has involved a decentralized devolution of inherent relations, as well as, cooperative economic arrangements (Braun, 2008). In terms of maintenance of respective boundaries, federal systems and sub-state entities have been responsible for the implementation of environmental transfers involving the harmonization of public rules and the formulation of quality sharing agreements, among other areas (Cameron and Simeon, 2002; Braun, 2008). For instance, on the constitution of public reforms and redistribution of environmental plans that have been selected among other national priorities, it is important to understand that the federal systems have approved either divergent or convergent public guiding lines depending on mutual levels of inclusive incentives on public environmental designs, which have relied on the ability to overcome overlapping conditions of contained schemes and restrictive competition models (Cameron and Simeon, 2002; Braun, 2008).

The public transfer of managing decisions on environmental resource-based programs arranged in provincial dimension has been followed through rational coordination of applicable functional designs implemented in Canada's case

through the New Public Management (NPM) model for an efficient distribution of governmental roles and responsibilities (Braun, 2008). However, there have been major limitations to NPM organization approach for the structural reforms<sup>11)</sup> intertwined with divergent managerial trajectories that are implemented by local provincial units and independent federal structural bodies, operating as an overall systemic ensemble of national performing systems.

For instance, there have been local proximity policies associated with local environmental arrangements which have involved provincial cooperation and PPP actors-based negotiations, established in collaboration with community stakeholders and comparative interest groups. However, the common mitigation efforts have modified delegated powers of involved authorities for the federal interactions already centralized in Ottawa's institutional environment (Cameron and Simeon, 2002). As a result, the development of federal and provincial collaborative strategies has been influenced by the common course of action related to intergovernmental relations (IGR) systematically assessed in view of transformation policies (Bolleyer, 2006). In federal policy systems, the regulatory characterization of institutional internal relations has been shaped through sectoral distribution provisions and independent public interactions.

In addition, the resulting capacity of authority delegations and provincial bodies' affirmation has been re-framed according to the evolution of deliberative and collaborative conditions which have reflected countries' population consensual base for common cooperation and progressive integration on transmissible regulatory cases such as federal adaptive relations established in the United States, in Switzerland or in Germany in the *Deutsche Bundesländer* (Bolleyer, 2006). In comparative operable conditions, the intergovernmental progressive relations involving PPP market-based strategies have led to the empowerment of local socioeconomic networks for the establishment of private interest groups interlinked in organizational trading programs (Skogstad, 2003). To this, it is better not to underestimate

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<sup>11)</sup> See Jun (2008).

the prevalence for cost-incentives innovation programs destined for private actors through the allocation of resources which have been connected to industrial relations and corporate protection policies (Skogstad, 2003).

In other words, efficient IGRs in comparative institutional environments in Canada have formed concurrent paths for preparation of either convergent or divergent collaborative proceedings, which nonetheless have not necessarily conformed to the need of having similar standardized policies and harmonization of public rules that can or cannot gather full consensus about diversified assimilation modes of public innovative recognition (Skogstad, 2003). Essentially, national or transnational power shifts which have characterized subordinate networked relations adapted in governance, as in Canada's case, have testified a formal and informal institutional development of voluntary independent relations; where corresponding practice activities have been a resulting reaction to the public-private organizational interactions, which have remained aggregated according to regional territorial boundaries, as well as, material structural components of federal and provincial market-based societies that are coordinated by distinctive political leaderships (Carroll, 2007).

## 8. CONCLUSION

In energy policy development case, when it is translated the nuclear participation debate according to public reliability aspects regarding nuclear disposal facilities and nuclear waste management, then historical introductory experiences about Canada's nuclear energy policy have come across in comparative organizational configurations. Through collective understanding, it can be reached a point of reflective analysis explaining the constitution of supporting regulatory components that have been related with regional technology and innovation systems, which have been surrounding the living boundaries of industrially charged areas.

For the governmental adaptive process associated with the nuclear industry

in Canadian case, there have been comparative policy discussions that have emerged about the perpetuation of risk-exposures activities of national societies, which are involved in diversified energy provisions; managerial energy provisions, in essence, have assumed factual and distinctive technical directions — that have prompted the formulation of concurrent questions about the public development of technical knowledge interfaces and coordinating mandates (Durant, 2009).

Fundamentally, the constitution of long-term management of nuclear energy facilities and nuclear waste disposal programs in Canada has entailed multi-layered PPPs, which have involved the engaged institutional parties such as environmental NGOs, AECL, Hydro industry actors, and public implementing agencies (Durant, 2009). For this reason, the corroboration process for building up common statutory relations among participant stakeholders has historically been the result of material compromises emerging together with local power shifts of authority, which have been indirectly associated with critical interpretations provided about industrial technological changes and participatory integration determinants linked to concerned citizens (Durant, 2009; Saji, 2003). In terms of consistent deliberative contexts, the experience that has been acquired in governance about the distribution of reliable consultative processes, referring to the nuclear industry, has been quite critical for the type of PPPs, which have been formed on national energy agreements involving federal agencies, community-based environmental groups, and transnational industry representatives, among other societal groups and national constitutive parts (Durant, 2009).

To this view, what has come into place across a divisive ground of monopolistic-oligopolistic energy interests and technology-based management systems has been the exclusionary conditions concerning national and provincial initiatives of civil environmental groups due to technical production arrangements, which have been addressing respective managerial changing needs of renewable energy programs connected with complex nuclear-based energy compounds situations (Saji, 2003; Durant, 2009; Goodfellow *et al.*, 2011). In other words, the historical availability of

safety and performance programs on nuclear disposal facilities and nuclear fuel waste (NFW) has been combined with monitoring and assessment activities that have put into question the responsibility of controlling corporate agents on organizational and regulatory changes, including possible territorial increases of radioactive risks' exposure conditions (Saji, 2003).

Basically, the specified management life cycles that are based on qualitative and quantitative analyses have been implemented within co-sharing interacting systems operating through public and private multi-level advisory bodies and consulting international panels, while leaving the issue of public risk perception of local stakeholders on the technical background level (Saji, 2003). The application of methodological safety components about the organizational performance of direct and indirect structural measures, comprising public regulatory provisions, has implied risk-avoidance assessments and systematic management processes, which have been technically insulated from the historical streaming of information detailing local introductory provisions kept in place, for different number of inclusive reasons (Saji, 2003). In fact, in Canada's nuclear policy case, the apparent multiple indications signaling the formation of open public mistrust for information exclusion conditions concerning environmental and civil interest groups, despite the AECL's provision of national technical reports, have led to the preparation of additional governmental industrial arrangements, which have been publicly included through, for instance, the mediation activity led by NWMO on nuclear policy issues related to NFW and deep geological disposal in location sites, favoring deliberative accountability of responsive industrial management practices (Durant, 2009).

However, the diffusion of federal and provincial implementation services regarding deliberative regulatory choices that are established in connection with technical performing systems, and waste management programs has been intertwined with systematic risk and safety conditions, involving the dimension of public reliable accountability (Goodfellow *et al.*, 2011). In comparative reviews about the nuclear industry in Canada, the application process of early stages of technology automation and scientific experts'

propagation of specific regional industrial outcomes has still left an open gap about statutory rules, organizational dynamics and participatory implications (Goodfellow *et al.*, 2011). Basically, the project-based management designs have incorporated multi-level normative approaches reflecting the driving facilitation guidelines of managerial processing cycles, which have been disaggregated from the material practices and consultative stages (Goodfellow *et al.*, 2011).

Public scholars have often times referred to an overlapping use of different selective categories that are pointed out to identify descriptive cross-areas analyses related to e.g. the nuclear risk and public perception surveys; the safety and accountability norms; the technical changes of multiple research knowledge-based designs; or the NFW management security levels for public disposal acceptance. On these aspects, there have been further ideological explorations that comparative experts have been producing through a combination of material systematic explanations, which have been focused on specific energy policy issue-areas such as: motivational delivery factors and facilitation of public standardized provisions about energy planning policies — which in turn have also been quite openly in conflict with common enhancements of knowledge — sharing information capacities associated with the affirmation of public trusting recognition (Goodfellow *et al.*, 2011).

About the case of First Nations people in Canada, the nuclear industry and nuclear waste disposal programs have either directly or indirectly affected public decision-making on community-based lands management, including geographical implications activated from systematic land-based pollution activities (Stanley, 2008; Stanley, 2006; Mileti and Peek, 2000). The common drafting of mutual bargaining conditions which have been arranged for Aboriginal people based in Canada about the NFW disposal programs, have been developed by the NWMO<sup>12)</sup> functioning as a public-private industry negotiator for the technical diffusion of public upgraded information on the nuclear fuel chain production and landscape management of local natural resources (Stanley, 2005; Stanley, 2008).

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<sup>12)</sup> See Nuclear Waste Management Organization (NWMO).

In this instance, national risk assessments about NFW organization put in connection with participatory tools, specifically targeting Aboriginal people through instrumental mechanisms, knowledge diffusion activities, and local accountability practices, have been a public concern, because of the lack of deliberative information platforms that can take into account the cultural and beliefs systems of respective Aboriginal people in Canada (Stanley, 2005; Stanley, 2008). From an environmental side, national ecology accounts referring about radioactivity claims and operational threats posed by nuclear power facilities have been integrated with emergency disaster-risk plans and normalization of control protection areas, which have entailed progressive early warning information and operable communications tools diffused at national and local levels (Mileti and Peek, 2000).

In fact, the potential configurations of emergency risk-avoidance plans in the case of natural and industrial pollution, including national health hazards, have required long-term socioeconomic protection policies, which have still needed to correspond with internal and external regulatory programs and structural measures that have been adopted for qualitative organization aims, and multilateral responsive targets, based on central disaster-risk issues, involving local knowledge practices and environmental communication guidelines (Mileti and Peek, 2000). The environmental knowledge transfers and technical organizational provisions have been re-framed through decentralized horizontal policy strategies, which have involved provincial agencies and, at the same time, distinctive municipalities able to deliver final confronting results (Winfield and Jenish, 1998). Environmental protection policies associated with infrastructural designs and ecological activities have delivered to public the continuity of common values for local organizational transitions and local adaptive processes, which have been shaped for the provinces and municipalities involved, even though there have been a series of limitations such as: environmental conservation standards, cost-benefit welfare indications, annual national budgets, and law enforcement procedures (Winfield and Jenish, 1998).

In a way, this means that the development of municipal and provincial

agreements, introduced for socioeconomic environmental restructuring processes, including energy implementation plans has drawn toward a particular line of attention about the need to reaffirm environmental preservation and sustainable conditions, which still rely upon the ministerial and federal systems for the regulatory transitional provisions, as stated a: "... federal Energy Minister's speech ...1) Canada is working hard to ensure that it has a world-class regulatory system to protect the environment, 2) Canada is committed to develop its energy resources, including the oil sands, in a socially and environmentally way, 3) Since 2006, the federal government has invested more than \$10 billion in reducing greenhouse gas emissions, through investments in green infrastructure, energy efficiency, clean energy technologies, and the production of cleaner energy and fuels ..." (Northey, 2013).

These formal declarations that have referred to practical expectations about a federal system having a strategic focus on the case of energy development, have been historically connected with national and regional multi-layered decision-making agencies, as well as, societal diversification networks, which in time have positioned themselves through participatory common frameworks, maintaining respective knowledge determinants and local learning relations (Eyles and Fried, 2012).

However, for the mutual construction of public trusting behaviour and PPP accountability of management organizations associated with the nuclear industry and waste disposal activities, it has been reaffirmed the formation of contrasting distribution elements that are identified for communities' environmental protection mechanisms; which have tended to reflect normative risk criticalities about sectoral performance interests highlighted through technical regulatory operations (Eyles and Fried, 2012). At ground organizational level, "nuclear companies Ontario (Atomic Energy of Canada Limited (AECL), Bruce Power, Cameco, Ontario Power Generation (OPG), and industry associations (CAN, World Nuclear Association (WNA) and national international regulators (CNSC, IAEA)"<sup>13)</sup> have operated through the

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<sup>13)</sup> Eyles and Fried (2012).

material institutional segmentation of annual configured roles and responsibilities that have been structured in line with private-public managerial technical compositions. This type of regional complex exploration on NFW and NPPs has been defined through a public safety culture in which social stakeholders and national civil groups at territorial level have collected respective divergent accounts about participatory knowledge and information transfers that are made available across multiple national parties involved (Eyles and Fried, 2012).

The effective presentation of national energy development aims associated with reliability factors of federal distribution agencies has been characterized by critical interpretations formulated about the perception of nuclear risk management and waste disposal policies (Kim and Bie, 2013). The additional progressive public debates about nuclear risk perceptions and functional monitoring and evaluation procedures have also been diffused through international information tools that are available in digital media campaigns, including local coverage of distinctive information providers (Kim and Bie, 2013). There has been a great variety of information mechanisms which have been used on key nuclear regulatory mandated issues such as: public health impacts, environmental risk perceptions, deep waste disposal campaigns, and community-based pollution controversies — which have remained intertwined with deliberative information platforms enhanced by more inclusive policy communication designs (Kim and Bie, 2013). Therefore, we need to consider that reliability of information for actor-based performance systems run in governance has been related to a number of emerging questions on the nuclear industry's position in Canadian provinces — which can be explained through comparative knowledge identifications incorporating targeted information areas that have been evolving thanks to regional networked accesses, geographically established according to Canadian industry and society's development directions (Kim and Bie, 2013). Nonetheless, specific positions of national innovation commissioning agencies, and municipal distribution corporate actors have been structured in view of the changing elements related to organizational industry dynamics, which have referred to comparative

markets' structural designs, including institutional local players. Essentially, national energy production systems have to commit to the regional distribution of structural capacities with public transmission provisions that in Canada's case have included "... 18 operating nuclear reactors in three provinces — Brunswick, Ontario, and Quebec — that provide around 12,000 MWe of capacity or 15 percent of the country's total electricity generation"<sup>14)</sup> for long-term sustainable operational practices. In fact, commercial identifications of energy collaborative designs assessed in governance have presupposed a multi-level operability of sectoral managerial dimensions, which have tended to innovate but, at the same time, have needed to produce transparent regulatory environments socially credible and environmentally trusted. Despite this, there have been potential prospects for abuses of loaded distributive capacity systems and technical management organizations based in Canada, as well as, in comparative nuclear-based energy clusters of incremental strengthened regions (Cadham, 2009).

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