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The structural transformation of territories and the climate governance of an urban area: The mediating role of human capital in adaptation processes

Ahmed Ait Bari[1]
Mustapha Amzil[2]✉
Abdeljalil Mazzaourou[3]
Jamal Agouram[4]


(✉ Corresponding Author)

[1,2,3]*Faculty of Legal, Economic and Social Sciences Agadir, University Ibn Zohr, Morocco.*
[1]*Email: a.aitbari@uiz.ac.ma*
[2]*Email: mustapha.amzil@edu.uiz.ac.ma*
[3]*Email: mazzaourou@gmail.com*
[4]*Faculty of Economics and Management Guelmim, University Ibn Zohr, Morocco.*
[4]*Email: jamal.agouram@edu.uiz.ac.ma*

Abstract

This article forms a crucial part of an economic essay exploring the dynamics of territorial climate governance and its potential impact on the structural transformation of Agadir, a vibrant city. In this context, the role of human capital is also examined while considering the theoretical nuances and empirical analysis tools. The central question drives this study: "to what extent can territorial climate governance contribute to the structural transformation of Agadir, and how does human capital mediate this process?". To tackle this question, we adopted an abductive reasoning approach and aligned our methodology with a post-positivist paradigm. By meticulously aligning theory with observed reality, we formulated a hypothetical model that interconnects the trio of climate governance, structural transformation, and human capital in the context of Agadir. This model was put to the test with data collected from 416 stakeholders involved in the management of territorial affairs in the city. The findings reveal compelling evidence of significant contributions and correlations among the concepts studied. However, our results also highlight the necessity of recognizing and involving new actors to strengthen Agadir's climate governance mechanisms. In conclusion, our research sheds light on the crucial role of territorial climate governance and human capital in driving the structural transformation of Agadir. By providing a novel perspective on this topic, our study underscores the need for inclusive and proactive engagement of various stakeholders to bolster climate governance measures in the city, paving the way for sustainable development and growth.

Keywords: City of Agadir, Climate governance, Human capital, Structural transformation, Territory.
JEL Classification: C13; O00; P00; Q58; Q59.

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Contribution of this paper to the literature
It exists in the mobilization of the key concepts of our work, namely, structural transformation, climate governance, and territorial human capital. Thus, to the empirical contributions.

1. Introduction

This research endeavour seeks to advance our understanding of the contribution of climate governance mechanisms to the structural transformation of territories, specifically within the context of Morocco. Despite the significant attention the concept has garnered in recent years, the current theoretical framework remains predominantly descriptive, needing more explanatory and predictive capabilities. This gap in knowledge of objective and subjective measures of governance processes is particularly evident in the context of research on climate governance in Morocco, which forms the geographic scope of our study.

Furthermore, while the concept of governance has been widely explored in various disciplines, there needs to be more consensus on its construct and empirical studies remain limited. This theoretical gap can be attributed to the diverse disciplinary perspectives and purposes that employ the concept of governance. In addition to its academic significance, this research also holds economic relevance, as the absence of widely accepted indicators hinders our understanding of the impact of governance on the potential for structural change in a juxtaposed space, such as a territory.

Notwithstanding the geographical limitation of our study, our theoretical and conceptual framing sheds light on this under-theorized phenomenon and contributes to the existing knowledge on the topic. We hope this research will pave the way for further investigations and discussions on the role of climate governance in driving structural transformation in Morocco and other contexts, ultimately informing policies and practices aimed at promoting sustainable development and growth.

This study addresses the question: "Can territorial climate governance contribute to the structural transformation of Agadir city? And to what extent can human capital play a mediating role?" To achieve this, we have adopted a methodological approach that draws inspiration from post-positivism and utilizes an abductive reasoning mode. This involves formulating hypotheses and deriving predictions to assess their validity.

To answer the research question, we have undertaken a comprehensive analysis that includes a theoretical and conceptual framework, selection of study variables, and empirical verification using the structural equations model (SEM) approach. The paper is organized into three main axes. The first axis delves into the conceptual and theoretical foundations of critical concepts. The second axis outlines the methodology employed and details the research field. The third axis focuses on the analysis and discussion of the obtained results.

Overall, the findings of this study have allowed us to address the research question and provide insights into the spatial mechanisms of climate governance in the context of the structural transformation of the territory. Through our research, we have contributed to understanding the role of territorial climate governance and human capital in driving transformative processes in Agadir City.

1.1. Climate Governance and Structural Transformation at the Crossroads of Different Territorial Conceptions

Structural transformation and climate governance of territories are two central notions for understanding current environmental challenges. However, it is essential to emphasize that these issues are closely linked to the question of human capital, i.e. the sum of knowledge, skills, experiences and values held by individuals and mobilized in the transformation and governance processes.

Indeed, human capital plays a crucial role in the capacity of territorial actors to understand environmental issues and propose appropriate solutions. It also helps strengthen citizen participation and democratic governance by involving local communities in decision-making. However, considering human capital is essential to promote a sustainable structural transformation and effective climate governance of territories.

In this axis, we will outline the theoretical concepts related to the territorial transition of climate governance and aspects of structural transformation to identify causal relationships and draw up the research model.

1.2. The Territorial Inclusion of Climate Governance

"Governance" is a multifaceted notion encompassing a broad range of literature and diverse jargon. This resurgence of interest in governance is closely tied to the evolving dynamics of the global production system and the growing complexity of institutional requirements, which necessitate developing and utilizing various tools to articulate and assess the scope of different visions and policies. However, debates on governance are not homogenous, as the concept remains multidisciplinary, and its meaning can vary depending on the field of analysis, discipline, and even the object of study.

Climate governance is how actors discover, transmit and coordinate their actions to solve climate problems. This awareness occurs at different levels, individual, team and organizational levels, notwithstanding that climate governance at the individual level is crucial for a community or network of actors.

At the territorial level, climate governance of territories is an issue that is receiving increasing attention from local and national governments, especially in the context of the current environmental crisis. To achieve environmental and social objectives, it is crucial to implement public policies that consider the requirements of environmental protection and sustainable development. As highlighted by Rifkin, Long, and Perry (2018) this implies reorienting public policies and integrating environmental concerns into all policies.

In order to implement these public policies, continuous monitoring of environmental quality and data collection are fundamental elements of territorial climate governance. Collecting environmental data is essential for political decision-making, particularly regarding biodiversity conservation (Daily, 1997). Devices for measuring air quality, water quality, biodiversity and greenhouse gas emissions must be put in place. The data collected are then used for decision-making, environmental policy development and dissemination of information to stakeholders.

Moreover, the debate on public policies for environmental protection and sustainable development is crucial to climate governance in the territories. In particular, the active involvement of territorial actors in the decision-making process is essential for implementing effective environmental policies. To this end, it is crucial to allow stakeholders' active participation and establish mechanisms for citizen participation, such as dialogue forums and public consultations. In this regard, climate governance of territories is a significant challenge for achieving environmental and social objectives. Fundamental mechanisms include :

- The compliance of public policies.
- The continuous monitoring of environmental quality.
- The collection and exploitation of data.
- The debate on public policies for environmental protection and sustainable development.

These elements require active collaboration between political, economic, and social actors, as well as increased transparency and accountability on the part of policymakers (Daily, 1997).

One of the most significant challenges posed to the scientific community is to better align the concept of territorial climate governance. To this end, we will bridge the gap between leading theoretical works and on-the-ground observations by regarding climate governance as an organic extension of territorial governance in climate affairs management. (Cf. Figure 1).

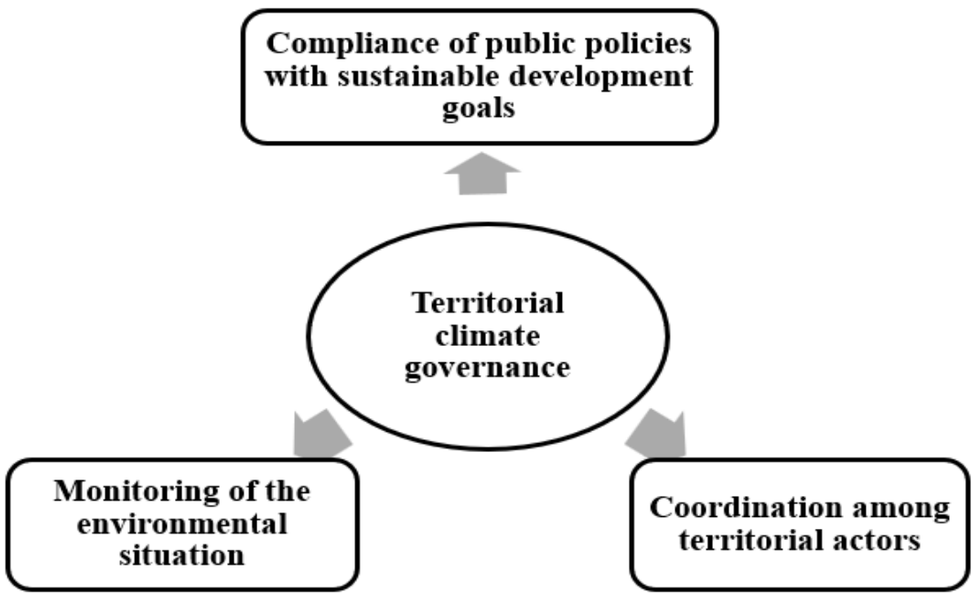

Figure 1. Rapprochement of the concept of territorial climate governance.

In conjunction with the discussions surrounding territorial climate governance, novel interpretations have emerged that focus on the concept of structural transformation of a territory, exploring how a territory can change to organize and innovate its spatial dynamics effectively.

1.3. The Structural Transformation of the Territory

The structural transformation of territories can be understood from various perspectives, particularly considering this change as a transition from an agricultural territory to an industrial or service territory. This transformation depends on the capacity of a territory to accommodate the surplus labor force of the primary sector and to allow the migration of the population to other sectors. This transition requires judicious management of human resources to ensure a smooth transition without economic and social disruption.

However, the structural transformation of territories is more expansive than this economic dimension. It also involves all the processes that enable decision-makers to master better the terrain in which they operate, using the available data to make informed strategic decisions. It thus assumes that decision-makers can understand territorial dynamics and use the appropriate tools to optimize their effects.

Several authors have addressed the issue of the structural transformation of territories. Among them is (Chamard & Schlenker, 2017) who considers that this transformation is linked to the evolution of production modes and the globalization of the economy. For him, the territories must adapt to the new economic realities by developing specific skills and implementing ambitious territorial strategies.

For their part, Khan, Taraporevala, and Zérah (2018) look at how territories are transformed according to population flows, investments, infrastructures and public policies. He emphasizes the importance of coordination between different territorial actors to ensure a harmonious and sustainable transformation.

Similarly, Lacquement and Quéva (2016) highlight the importance of innovation and entrepreneurship in transforming territories. According to them, the most prosperous regions have developed a culture of innovation and collaboration between businesses, universities and public actors.

The structural transformation of territories is a complex process, integrating various economic, social and territorial dimensions. To succeed in this transformation, decision-makers must be able to understand territorial dynamics and rely on reliable data to make informed strategic decisions. Based on the arguments put forward by the researchers concerning the structural transformation of the territories, we can summarize them through the Figure 2.

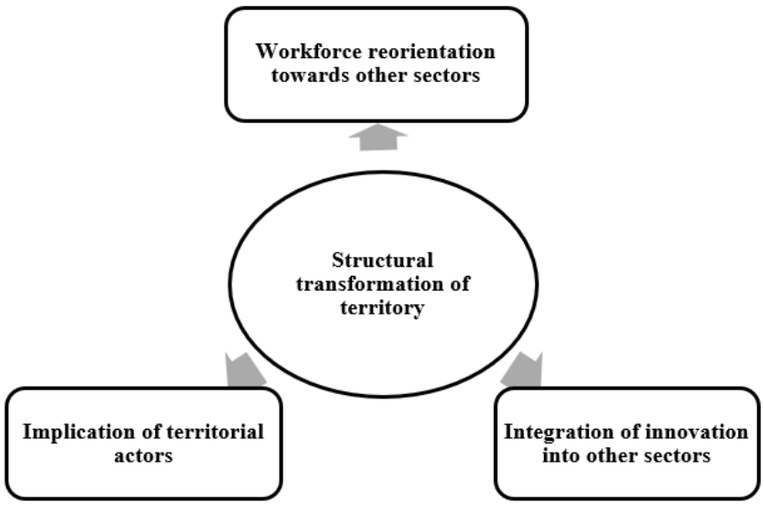

Figure 2. Rapprochement of the concept of structural transformation of territory.

Nevertheless, it is crucial to recognize that territorial climate governance alone is insufficient. The mechanisms of human capital within a territory are necessary to facilitate a more effective structural transformation. As such, the multifaceted territorial actors can serve as catalysts to ensure a more meaningful integration of climate governance within the spatial dynamics of the territory.

1.4. Territorial Human Capital

The concept of territorial human capital has its roots in the economic theory of human capital, developed in particular by Becker (1962) and Mincer (1958) who consider that the education, professional training and experience acquired by individuals are investments that can increase their future productivity and income. This theory was subsequently enriched by many authors, including Schultz (1961) who introduced the notion of human capital in the context of economic development.

Territorial human capital can be defined as the skills, knowledge and abilities of individuals who live and work in a given territory and their capacity to collaborate and exchange information with other local actors. This notion has been developed by the French economists Grossetti (2001) and Boutinet (2005) who stress the importance of social capital and the relational dimension in constructing territorial human capital.

Territorial human capital can positively affect a territory's economic and social development. Moreover, according to a study conducted by Boutinet (2005) on creative cities, territories with significant human capital, particularly in art, culture and new technologies, tend to be more innovative and more competitive economically.

However, the construction of territorial human capital can be hindered by various factors, such as geographic isolation, lack of educational and cultural infrastructure, or social and ethnic discrimination. Similarly, regions that have experienced significant spatial segregation tend to have less developed human capital and lower economic growth.

In conclusion, territorial human capital is a complex social and economic process that involves mobilizing the skills and abilities of individuals living and working in a given territory and their ability to collaborate and exchange information with other territorial actors. This concept can positively affect a territory's economic and social development, but various structural and social factors can also hinder it.

Ultimately, bringing the concept of territorial human capital together leads to the same territorial dimensions of social capital developed by many researchers. This is how we will present them in the Figure 3.

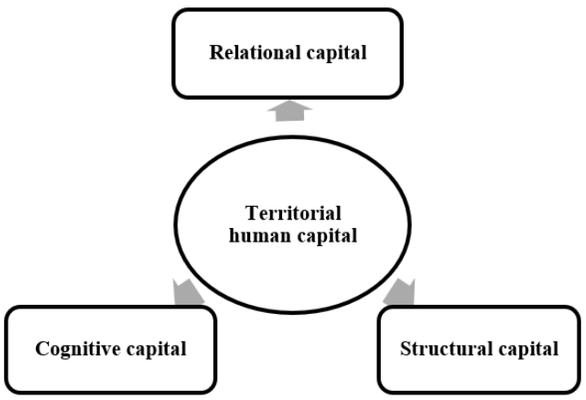

Figure 3. Rapprochement of the concept of territorial human capital.

The comprehensive review of relevant literature in this axis has facilitated the development of an analytical framework that delineates the three pivotal concepts and their hypothesized interconnections from diverse theoretical perspectives. This framework serves as a robust foundation for constructing and validating measurement scales. The resultant research model, which emerged from a rigorous integration of theory and empirical observations, is visually depicted in the Figure 4.

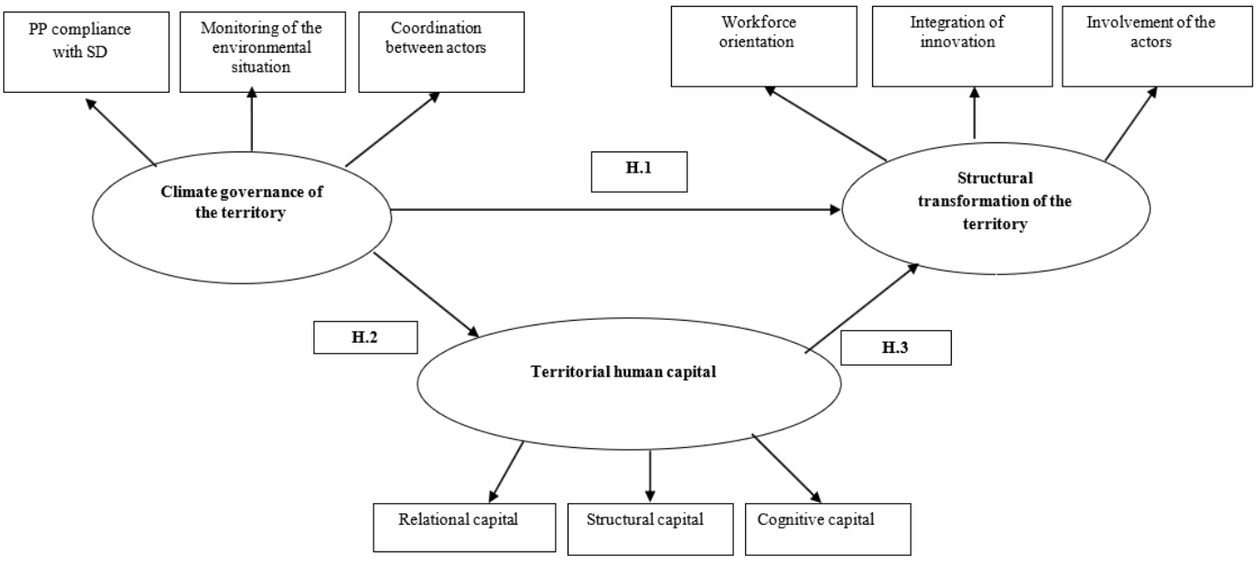

Figure 4. Research model.

The next crucial phase involves operationalizing our research model by leveraging the core concepts and sub-concepts. To this end, we have employed twenty measurement items that capture the critical dimensions of climate governance, structural transformation, and territorial human capital. These measurement items will be coded using the established procedures of the five-point Likert scale. The Table 1 presents the items operationalizing the latent concepts under investigation.

Table 1. Operationalization of the concepts.

Concepts	Scales of measurement	Codes
Territorial climate governance	The collective mobilization of actors allows for thedesign of public policies that enable sustainable development	PPCS_1
	Climate governance refers to the movement of all actors in the preparation and implementation of environmental public policies	PPCS_2
	Visibility and integrity allow for better monitoring of the environmental situation	MES_1
	Access to environmental information strengthens actors involvement	MES_2
	Transparency and accountability lead to better climate governance	COOA_1
	Collaboration among territorial actors represents a potent approach to climate governance	COOA_2
	The spirit of initiative of the territorial actors can solve the climate problems	COOA_3
Structural transformation of territory	Inter-sector labor mobility reinforces structural transformation	WORO_1
	Transparency and availability of information helps to guide the workforce	WORO_2
	The integration of innovation implies the dumping of productive sectors	IINOV_1
	The management of innovation activities leads to structural change in the territory	IINOV_2
	The collective engagement of actors contributes to their active participation and involvement	IA_1
	The collaborative engagement of actors is an effective form of territorial participation	IA_2
Territorial human capital	Having a common culture, shared values, and similar lifestyles	COGC_1
	Having a shared philosophy and similar approaches to business relationships	COGC_2
	Aligning on a shared vision with compatible goals and objectives	COGC_3
	Regular and close personal interaction, and intensive engagement	RELC_1
	Respectful and trusting relationship	RELC_2
	Efficient dissemination and exchange of information within business networks	STRC_1
	Interaction across various territorial levels and through diverse means	STRC_2

Now, it is imperative to provide a thorough justification of our methodological choices and a comprehensive description of our research field to uphold our study's ethical rigor.

2. Materials and Methods

Our choice of methodology is heavily influenced by the abductive approach, which falls under the post-positivist paradigm. This method involves a "back and forth" process between abstract theory and the observed reality in the field. The researcher formulates research questions based on pre-existing theoretical constructs without testing causal relationships beforehand. Hypotheses are then generated to either confirm or disprove these constructs.

To address our research problem, we consulted various works that provided an overview of conceptual frameworks and theoretical and empirical literature related to our keywords. This allowed us to develop a suitable analytical framework. Following the logic of the post-positivist paradigm, we then modelled the facts to understand better the issues surrounding climate governance and structural transformation.

It is also essential to justify our methodological choices and provide transparency in our research to uphold ethical standards.

To justify our methodological approach, we selected Agadir as our research field due to its diverse range of institutional, economic, and civil actors involved in the city's affairs. Agadir holds a significant position in Morocco's economic and administrative landscape, making it an ideal location to study the intersection of climate governance and structural transformation. The city also provides a rich array of territorial actors who play a role in its management. Given that structural transformation is a complex and long-term process requiring the involvement of numerous actors, conducting a sufficient number of surveys with a representative sample of stakeholders was necessary to gain a comprehensive understanding of the process. We also took into account the sampling lists and strata when extracting samples. The table below provides a clear overview of the information underlying our sample collection process.

As per statistical criteria, we had to select a sample for our survey, as choosing a target population would have been impractical for our study, given the numerous territorial actors operating in the city of Agadir, which forms a known and finite population. Therefore, a pilot study was conducted with randomly selected actors to identify the parameters characterizing the respondents. The pilot study allowed us to validate the questionnaire and calculate central tendency and dispersion characteristics for the variable of interest, "Annual frequency of participation in territorial projects during the last ten years." Specifically, 52 actors provided information on the number of territorial projects they had participated in over the past decade, allowing us to calculate the annual frequency of participation (Number of participations/10 years).

The next step is to test the normality of the distribution of training frequencies in order to determine the appropriate method for calculating the sample size. If the distribution is normally distributed, we will use the recommended formula for sample size calculation. Otherwise, we will utilize the developments of the designed for populations with an unknown distribution of the variable of interest.

At first glance, we can see that the mean, median and mode of the variable of interest are equal, which implies that the distribution is normal. However, we performed the Kolmogorov-Smirnov and Shapiro-Wilk normality tests to refine our statistical thinking. It turned out that the null hypothesis, which assumes the normality of the distribution, is verified in both cases since the P-value is higher than the significance level of 5%. Hence, the distribution of the variable of interest is Gaussian.

In the same wavelength, to calculate the size of the sample in the case of a finite population normally distributed, it is necessary to apply the formula of calculation recommended by the statisticians in this sense and which is stated as follows:

$$\boldsymbol{n = \frac{Z^2_{1-\frac{\alpha}{2}}\, Var(x) N}{\varepsilon^2 N + Z^2_{1-\frac{\alpha}{2}}\, Var(x)}}$$

- x: Interest variable.
- ε: Precision.
- n : Sample size.
- N: Population size.
- Z : Value of the reduced and centered variable for a probability of $1 - \frac{\alpha}{2}$.
- α : Signification level.

It is necessary to proceed with extracting the sample, considering the parameters and the calculation formula developed above. The Table 2 gives a clear overview of the information underlying the sample selection and the calculation procedures used to deduce the number of territorial actors to be interviewed.

Table 2. Sample size calculation.

Parameters	Symbols/Formulas	Values
Variance of the interest variable	Var (x)	35.479%
95% Probability threshold	$Z_{1-\frac{\alpha}{2}}$	1.96
Precision	ε	5%
Population	N	1753
Sample	$n = \frac{Z^2_{1-\frac{\alpha}{2}}\, Var(x) N}{\varepsilon^2 N + Z^2_{1-\frac{\alpha}{2}}\, Var(x)}$	416 Territorial actors

In the final phase of our study, we administered a questionnaire survey to 416 actors actively involved in managing territorial affairs in the city of Agadir. The data collected from this survey were then extrapolated to test the specified model and provide insights into the contribution of climate governance to the structural transformation of Agadir. This approach allowed us to gather empirical evidence and generate meaningful responses to the research questions.

3. Data Analysis Results and Discussion

In order to test our Structural Equation Modeling (SEM) model, we employed the Partial Least Squares (PLS) approach, which is considered more suitable for our study due to its objectives and constraints. PLS allows for testing of developing models, accommodating non-normally distributed data, and working with small sample sizes. Accordingly, we will utilize the PLS approach to conduct our analyses and discuss the results obtained from our study.

3.1. Results

After importing the data obtained from the survey, we proceeded to test our model using the latest developments in the PLS algorithm. Following the standard SEM modelling process, we followed five key steps: model specification, model identification, model estimation, model goodness-of-fit evaluation, and model confirmatory analysis.

Model specification involved creating a graphical representation of the overall measurement scheme of our model. In this phase, we specified the various elements of the model, including the observed variables and their assumed relationships, as depicted in the Figure 5.

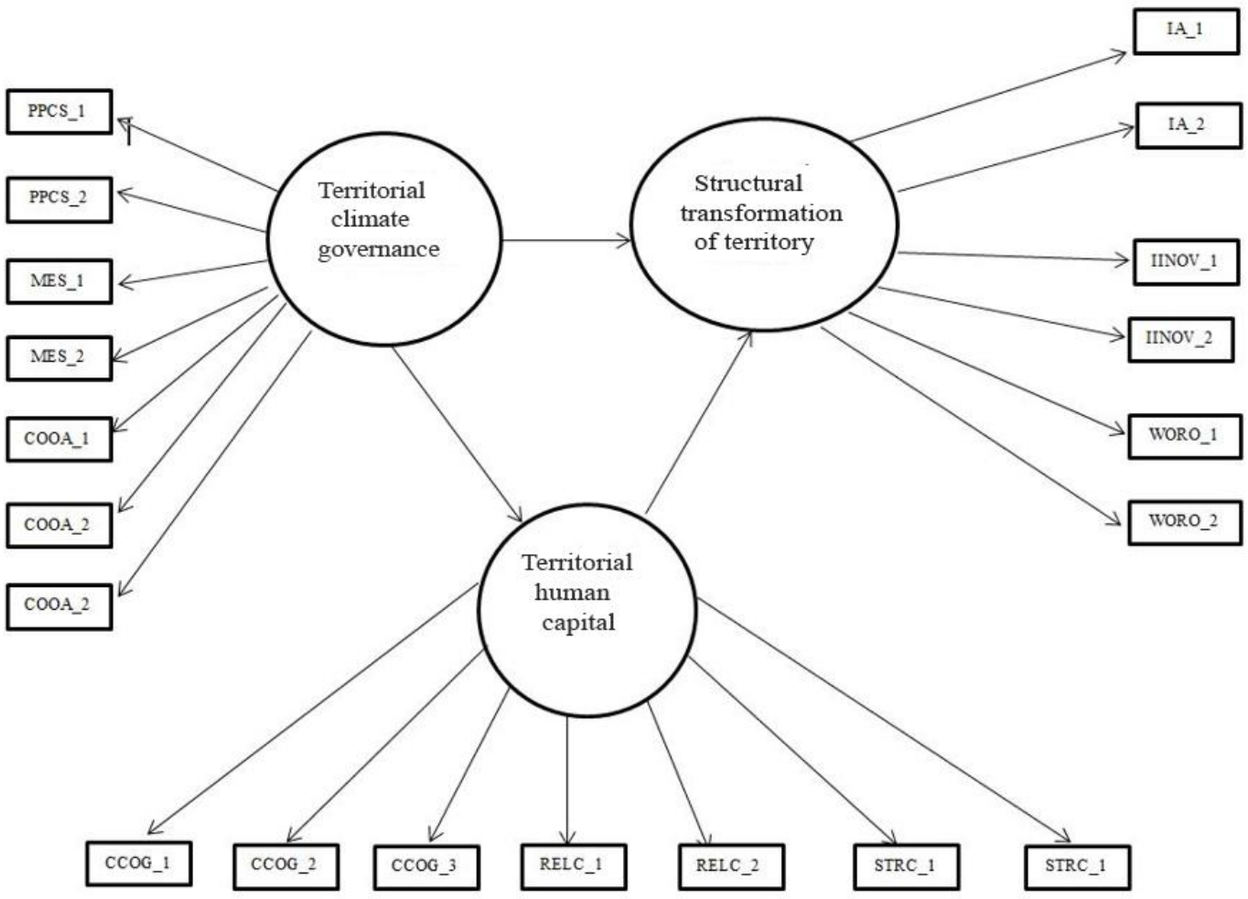

Figure 5. Global model.

In our model, we have twenty observed variables that are supposed to measure three latent variables (factors). The second phase of our SEM modelling approach is model identification. As Schumacker and Lomax (2004) recommended, we evaluated the order condition by checking if the number of degrees of freedom is greater than zero. Our model's order condition is met, and the degree of freedom is positive (dof=373).

The third phase of our approach involved estimating the model using the factorial algorithm of PLS on all 416 statistical units, which are the territorial actors operating in the city of Agadir. This resulted in the Figure 6, which presents the estimated model.

The estimation results of the model's parameters confirmed that most of the measurement items used had loading factors greater than 0.7, indicating a solid contribution to the respective latent variables. However, one item, STRC_2, which operationalizes the territorial human capital dimension, recorded a relatively low correlation coefficient. As per the condition of order and validity, a readjustment is necessary by deleting this item to capture the dimensions and underlying contribution links better. Consequently, the new globally respecified model is as in Figure 7.

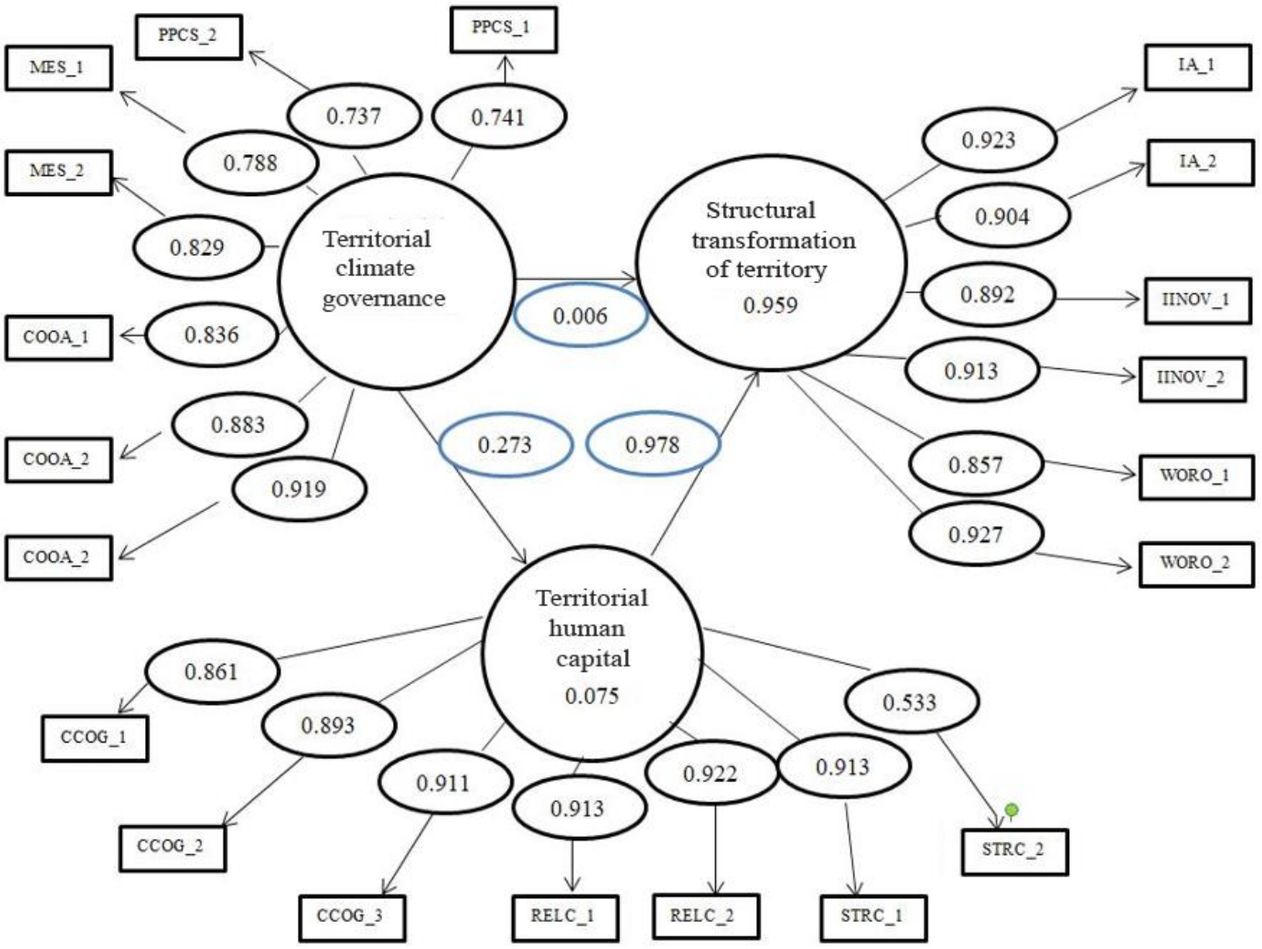

Figure 6. Global model estimation.

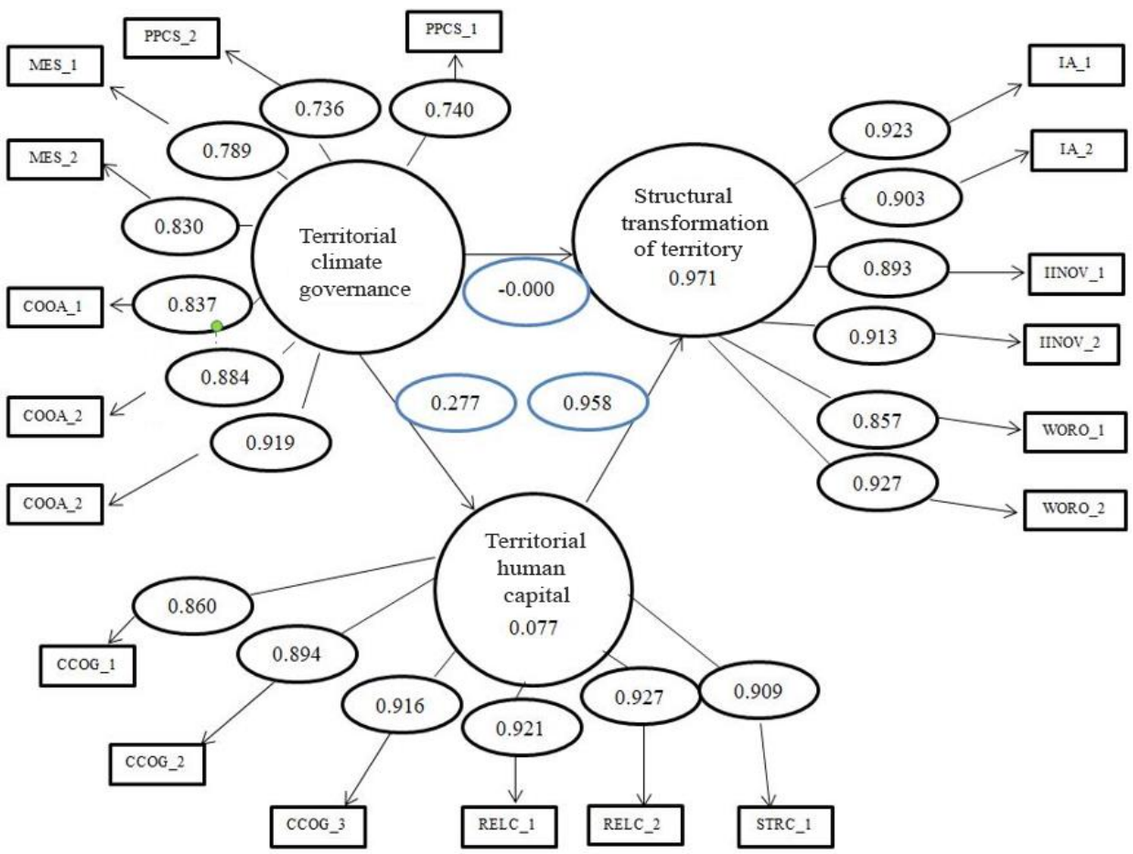

Figure 7. Estimation of respecified model.

Figure 7 shows the revised model estimate. To evaluate the goodness of fit of the respecified model, we need to examine its explanatory power and ensure the convergent validity and discriminant validity of the model. Convergent validity involves calculating one or two measures, such as Cronbach's alpha and the internal consistency developed by Fornell and Larcker (1981). Nunnally (1978) guideline can also be used for interpreting the obtained values.

Discriminant validity refers to using the average extracted variance shared between the construct and its

measurement indicators. It must be greater than the variance shared between the construct and other constructs in the model. Additionally, Chin (1998) recommends an average variance extracted (AVE) greater than 0.5. Therefore, we evaluate the global model based on the recommended tests and critical values. The Table 3 presents the values of various indicators, including Cronbach's alpha, composite reliability, average extracted variance, R^2, and the Gof (Goodness of fit) index.

Table 3. Evaluating the goodness of fit of the global model.

Latent variables	Cronbach's alpha	Composite reliability	AVE	R^2	Gof index
Territorial climate Governance	0.921	0.935	0.615		0.392
Structural transformation of the territory	0.955	0.964	0.815	0.971	
Territorial human capital	0.956	0.965	0.819	0.077	

Based on the findings, our model exhibits an acceptable level of representational quality per the recommended data analysis standards. However, to further assess the robustness of the results, it is essential to conduct a bootstrapping analysis to determine the significance of the contribution relationships between climate governance, structural transformation, and human capital under different scenarios. The results of this analysis are summarized in the Table 4 provided.

Table 4. Estimation of the causal model by bootstrapping and hypothesis testing.

Hypotheses	β (Correlation coef.)	t-Student (Bootstrap)	P-values	Decision
H1. Territorial climate governance => Structural transformation of the territory	0.000	0.029	0.977	Rejected
H2. Territorial climate governance => Territorial human capital	0.277	2.323	0.020	Supported
H3. Territorial human capital => Structural transformation of theterritory	0.985	117.506	0.000	Supported

To ensure reliable and robust answers to the research problem, we will thoroughly examine and discuss the main findings obtained from our analysis in light of the existing literature review. This will allow us to draw meaningful comparisons and establish connections between our results and relevant scholarly research.

3.2. Discussion

Upon concluding this analysis, it becomes apparent that this work's contribution to research lies in its focus on both a theoretical approach and field application in addressing the issue of climate governance concerning the mechanisms of structural transformation within the urban territory of Agadir. Today, it is only possible to discuss climate governance by considering the evolution of participation, involvement, and coordination mechanisms among territorial actors, which underlie its current configuration and development. Based on the research results, we can conclude that climate governance does not directly and significantly contribute ($\beta = 0.000$) to stimulating structural change in Agadir. However, suppose we view climate governance as a mode of production and regulation within territorial management. In that case, that is, the negotiation of environmental operations between the urban government representatives and economic actors, we can assert, with little risk of error, that Agadir's actors have long possessed a significant relational and cognitive potential, shaping their interventions in the promotion of public policies that support sustainable development.

The study's findings suggest that the structural transformation of Agadir is primarily based on collective mobilization and management of resources, as well as enhancing territorial resilience to tackle ecological, economic, and social challenges.

On the downside, the study reveals that when viewed solely as an actor capacity-building approach, climate governance may pose a risk and even a threat to democracy and citizenship. The public interest could be reduced to just one of many categorical interests in the game of negotiated actions between actors. This could create permanent confusion between democracy and management and subject cities solely to ecological and economic logic.

Therefore, promoting a system of solidarity and coordination through networks and decentralized environmental services of administrations at the city level is crucial. Such a system should be part of a policy that focuses on strengthening the network in a city like Agadir, inspired mainly by sustainable development practices. This would help refocus actors' roles towards creating a more sustainable future for the city.

However, it must be acknowledged that managing a city like Agadir presents significant challenges, and the task of coordination, participation, and involvement among actors is complex. Thus, any proposal for such a transition should be indicative rather than prescriptive. Re-founding the territorial approach must be contextualized and undertaken considering the various contingencies of the specific application environment.

4. Conclusion

In this paper, which focuses on studying the contribution of territorial climate governance to the structural transformation of Agadir City, we have developed a comprehensive framework of theoretical concepts, definitions, and analytical tools that interrelate these concepts and their underlying links. The article is organized into three main sections.

The first section delves into key concepts' conceptual genesis and theoretical meanings. We provide a thorough overview of the conceptual and evolutionary dynamics that offer concrete definitions, followed by a discussion on the measures that can be identified.

The second section outlines the methodological choices and the research field. We conducted a survey using questionnaires with a sample of territorial actors operating in Agadir city, resulting in 416 completed questionnaires, from which data were extrapolated for the subsequent analyses.

The third section presents the results of the analyses using state-of-the-art structural equation modelling techniques under the SmartPLS procedure. These results lead to conclusions regarding climate governance's contribution to the territory's structural transformation.

Numerous indications exist that the relationship between coordination among actors and structural transformation in a territory has evolved into a mutually beneficial relationship where the strengthening of one does not come at the expense of the unity and integrity of the other. The transition of the urban environment and various mutations of social, institutional, and management nature, in which the city of Agadir is immersed, are a testament to this fact. These elements demonstrate that diversifying actors and establishing new standards are crucial in enhancing the transition from a monocentric to a polycentric conception of the environment based on ecological enhancement.

Despite the significant contributions of this research, the conclusions drawn must be seen in the context of certain limitations. The survey instrument used has its limitations, particularly in terms of the difficulties involved in collecting data from stakeholders. The identification of these limitations leads us to propose new avenues of research to refine the study.

To investigate the relationship between climate governance and structural transformation, we plan to conduct a study targeting the city of Agadir and all the public and private players involved in the management of territorial affairs in the Souss Massa region.

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