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From compliance to competence: Aligning training and skill development with new public management principles in Greek forestry administration

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Abstract
The strategic enhancement of human resource capacity within the Greek Forest Service is examined through the lens of New Public Management (NPM). In this study, I adopted a structured quantitative approach to design composite indicators that reflect training encouragement, transparency in evaluation, and technological readiness. Through the use of factor analysis, I was able to identify the underlying dimensions that shape organizational performance. Additionally, bibliometric mapping provided insight into the administrative trends and priorities that are gradually emerging in the field of environmental governance.
The empirical results are interpreted in direct alignment with the EFQM 2020 excellence model, Environmental, Social, and Governance (ESG) standards, and the Common Assessment Framework (CAF), ensuring consistency with internationally recognized performance evaluation systems and governance principles. The analysis highlights how targeted capacity building can reinforce accountability, improve digital readiness, and support intergenerational resilience in public administration. Drawing on these results, I propose institutional strategies that link evidence-based policy design with adaptive governance, enabling the Greek Forest Service to respond not only to current operational needs but also to longer-term sustainability goals. By bringing together scientific findings with practical, policy-oriented insights, this study contributes a results-driven approach to public sector reform in environmental governance and offers lessons that may be relevant for other organizations pursuing modernization in complex socio-environmental settings.

Keywords: Digital, EFQM, ESG, forestry, human, resilience

1. Introduction
The call to reshape public administration into a system that is not only efficient but also flexible and accountable has been a recurring priority, both nationally and internationally. From my perspective, this enduring demand reflects the growing expectation that public institutions must adapt to complex challenges while maintaining trust and legitimacy. This reform trajectory is rooted in the adoption of New Public Management (NPM) principles, which emphasize effectiveness, goal orientation, transparency, and accountability. Within this framework, human resources are no longer regarded as passive administrative assets but as strategic pillars of organizational renewal, capable of substantially contributing to the implementation of reforms and the enhancement of public policy effectiveness (OECD, 2020; Pollitt & Bouckaert, 2017) [1, 2].
Education and skill development are recognized as fundamental mechanisms for strengthening administrative capacity and adaptability. Targeted investment in human capital facilitates the transition from compliance with procedural rules toward a results-oriented and evaluation-driven administration (OECD, 2020) [1]. At the same time, the integration of innovative technologies such as artificial intelligence, GIS systems, and data analytics enhances reliability and efficiency in human resource management, supporting evidence-based decision-making and transparent evaluation (Tripathi *et al*., 2025) [3]. Organizational resilience, particularly in Forest Services, is closely linked to the ability to leverage internal resources primarily human capital under conditions of administrative pressure and

increasing environmental challenges (Cyfert *et al*., 2022) [4].
The bibliometric analysis accompanying this research confirms the thematic proximity and conceptual interrelation among the axes of human resource management, performance evaluation, transparency, and skill development. The convergence of these concepts highlights the need for comprehensive measurement tools capable of capturing the contribution of training, evaluation, and technological adequacy to the implementation of NPM principles. Furthermore, recent empirical evidence underscores the willingness of public sector employees to participate in training and digital upskilling initiatives, despite the absence of systematic implementation mechanisms (GRI, 2021) [5]. This mismatch between employee readiness and institutional execution underscores the need for strategic reinforcement of human capital, particularly in organizations with high social and environmental responsibility, such as Forest Service.
The research endeavor focuses on the creation and conceptual grounding of composite indicators that reflect critical dimensions of administrative effectiveness: training encouragement, objectivity and transparency in evaluation, adequacy of technological infrastructure, and effective human resource management. These indicators are intended to function not only as measurement tools but also as strategic mechanisms for improving administrative capacity, aligned with international standards such as EFQM 2020, ESG, and CAF.

Based on the theoretical framework and the objectives of this study, the analysis addresses four key research questions

1. To what extent does administrative encouragement for continuous training contribute to professional development and organizational efficiency?
2. What is the relationship between transparency and objectivity in evaluation and the job satisfaction and trust of human resources?
3. In which ways do training, and evaluation support the implementation of NPM and good governance principles in Forest Administration?
4. Which policy interventions can strengthen administrative effectiveness and strategic adaptability of organizations, with particular emphasis on the utilization of indicators?

2. Theoretical Framework

Education and skill development constitute fundamental pillars of administrative renewal and serve as strategic tools for enhancing efficiency and adaptability in public administration, particularly within the framework of New Public Management (NPM). The shift from a bureaucratic logic of mere compliance to a results-oriented form of administration makes investment in human capital not just desirable but essential. In my view, this transition highlights why strengthening skills and capacities must remain at the core of any reform agenda [6, 1, 2]. Training acts as a catalyst for organizational change and employee empowerment, with staff recognized as agents of innovation, critical thinking, and participatory governance. Targeted training facilitates the integration of new technologies, strengthens organizational learning, and creates conditions for accountability and continuous improvement (Mergel, 2019; Bouckaert & Halligan, 2008) [7, 8].

The educational dimension is closely linked to

- the development of digital skills (ICT, AI, GIS) essential for digital transformation (United Nations, 2022; Helsper, 2020; OECD, 2019) [6, 9, 10],
- the strengthening of administrative capacity through indicators for goal setting, transparency, and accountability (European Commission DG HR, 2020; GRI, 2019) [11, 12], and
- lifelong learning as a driver of adaptability (Macedo & da Silva, 2019; Chelimsky, 2006) [13, 14].

Education and evaluation represent critical components of good governance, as they reinforce ethical values, prevent arbitrariness, and foster trust in institutions (Roberts, 2020; Meyer-Sahling *et al*., 2017; Christensen & Lægreid, 2017; Grimmelikhuijsen & Welch, 2012) [22-25]. The Common Assessment Framework (CAF) functions as a bridge between theory and practice, promoting transparency and participation while aligning with ESG principles to strengthen institutional stability and adaptability (European Commission, 2021; OECD, 2020) [15, 1].
The application of CAF can be reinforced through specialized indices, such as the Leadership Index and the Digital Readiness Index, which provide comparable data for assessing leadership, strategic readiness, and technological infrastructure (Karadonta *et aal*., 2025 [16]). Similarly, tools such as the EFQM Excellence Model, the Balanced Scorecard, and ISO 30414 focus on the qualitative upgrading of administration. EFQM 2020 represents a modern framework of strategic excellence, while the OECD framework for leadership and organizational capabilities emphasizes the role of education and transparency as core parameters (Fonseca, 2022; Martinez-Costa *et al*., 2025; Tuesta-Tapia *et al*., 2025) [17-19].
The integration of ESG dimensions into the strategic strengthening of Forest Administration highlights: education and accountability under the Governance pillar, equal access to development under the social pillar, and environmental responsibility under the Environmental pillar (Rolston, 1988; Norton, 2005) [20, 21]. European experience demonstrates that the strategic integration of education is associated with higher efficiency and innovation, particularly when training programs are tailored to the specific needs of each organization (European Commission, 2021; OECD, 2023) [15, 26]. In the forestry sector, strengthening human capital and technological infrastructure enhances resilience and responsiveness to crises (Cyfert *et al*., 2022) [27].
Greek public administration is currently undergoing digital transformation, directly affecting human resource management and organizational performance. The introduction of digital tools and the systematic development of skills through continuous training represent fundamental prerequisites for adapting to new demands (Karampotsis *et al*., 2024; Exarchou *et al*., 2024; Rossidis *et al*., 2022) [28-30]. From this perspective, education and training are not auxiliary functions but strategic priorities for the Forest Service, enabling the implementation of policies, strengthening institutional legitimacy, and promoting open governance and accountability.

2.1 Supplementary Evidence through Bibliometric Review

Bibliometric review is a recognized methodological

approach for mapping scientific production, as it allows the assessment of publication volume, influence, and thematic evolution within a specific domain (Donthu *et al*., 2021) [31]. To position this study within the international framework concerning New Public Management (NPM) and skill development in the public sector, a bibliometric review was conducted using data from the Scopus database. The search focused on the combination of the terms *"Public sector AND Skill development AND New Public Management"*, covering the period 2015-2025.

This review strengthens the theoretical and conceptual foundation of the research framework, demonstrating that education, evaluation, transparency, and accountability constitute fundamental axes of administrative effectiveness in the public sector worldwide. The thematic mapping highlights a growing interest in linking skill development with good governance standards and in integrating innovative technologies into public administration.

Findings derived from VOSviewer and biblioshiny confirm that the study of human resources and organizational capabilities in Forest Services falls within a dynamic and evolving scientific field. The increasing emphasis on transparency, evaluation, and administrative accountability substantiates the need for developing composite indicators capable of offering comparable and reliable measurement of these thematic axes. Based on the above, the construction of indicators that credibly capture the dimensions of training, evaluation, and technological readiness in Forest Services becomes a necessary step.

3. Methodology

To address the research questions, I designed and carried out an empirical survey based on a structured questionnaire, which was completed by 232 employees of the Greek Forest Services. By applying stratified random sampling, I was able to secure geographical, administrative, and educational representativeness, capturing the complexity and diversity of the target population. Participation was voluntary and anonymous, with full adherence to ethical principles and personal data protection (GDPR).

3.1 Questionnaire Design

The questionnaire was designed to capture critical dimensions of New Public Management (NPM) and administrative capacity, such as training and skill development, evaluation and transparency, organizational adequacy, and technological readiness. Its construction was based on the principle of content validity, with reference to established models (Polit & Beck, 2021; DeVellis & Thorpe, 2021; Haynes *et al*., 1995) [32, 33, 34] and was inspired by the Human Resource Management-Performance Link model (Wright & Nishii, 2013) [35].

The questionnaire was addressed to all employees of Forest Services (primarily Forest Engineers and Forest Technicians) at the national level. In total, 232 valid responses were gathered, covering a wide range of geographical regions, administrative levels, and educational backgrounds. Within the sample, 58% of the respondents were male and 42% female, reflecting a gender distribution that adds further nuance to the interpretation of the findings. The majority (45%) belonged to the age group 36-50 years, 35% were under 35, and 20% were over 50. In terms of educational background, 62% of the respondents held a university degree, 28% had completed postgraduate studies, and 10% reported secondary education. This distribution illustrates the relatively high level of formal qualifications within the Forest Services, an aspect that is important when interpreting the results of the study. The professional composition mainly included forestry staff, reflecting the structure of the Service.

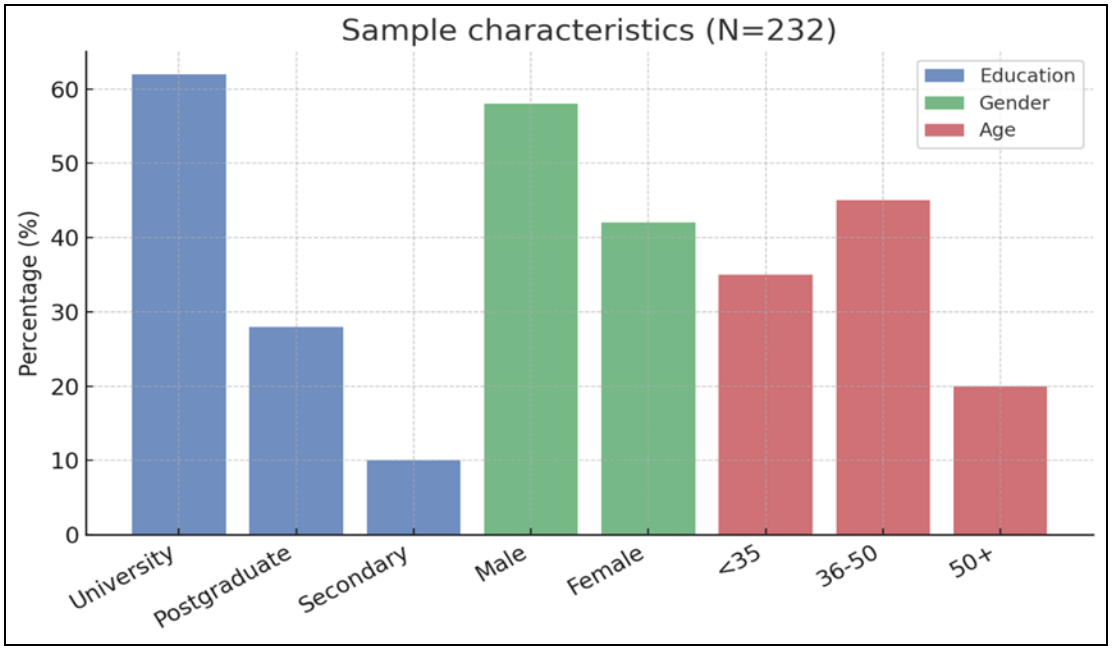

Fig 1*:* Demographic and educational characteristics of the sample (N=232).

The questions were primarily closed-ended, formulated on a five-point Likert scale, in line with established practices for reliable measurement of attitudes in public administration (Taherdoost, 2022; Chyung *et al*., 2018; Joshi *et al*., 2015; Boone & Boone, 2012) [36-39]. Prior to distribution, a pilot test was conducted (Ruel *et al*., 2016; Presser *et al*., 2004) [40, 41] to confirm the clarity and functionality of the questions.

3.2 Composite Indicators

Based on the responses, four composite indicators were constructed: Training, Objective Evaluation, Administrative Support, and ICT/Open Governance. In addition, the Effective Human Resource Management Index (EHRMI) was developed, synthesizing these individual dimensions into a comprehensive measure of administrative effectiveness.

Table 1: Overview of Composite Indicators

Indicator	Content	Purpose	Link with NPM / Institutional Frameworks
Education Index	Administrative encouragement and opportunities for continuous training and skills development	To capture the strategic importance of learning and professional growth	Human Resource Development - HRM axis (OECD, CAF)
Objective Evaluation Index	Transparency, meritocracy, and objectivity in employee performance evaluation	Measuring trust, fairness, and legitimacy in administrative practices	Governance - Accountability (EFQM, ESG)
Administrative Support Index	Perceived degree of managerial and institutional support to employees	To assess leadership quality and strategic commitment	Leadership & Strategic Alignment (EFQM 2020)
ICT/Open Governance Index	Use of ICT tools, digital infrastructures, and open data for transparency and participation	To evaluate digital readiness and technological adequacy	Digital Readiness (OECD, EC, CAF)
EHRMI (Effective HR Management Index)	Integrated measurement of the above axes	To provide a holistic indicator of HRM effectiveness	EFQM 2020, ESG - Governance

The indicators were calculated as mean values and tested for internal consistency using Cronbach's alpha (>0.70). Principal Component Analysis (PCA) was employed to confirm their structure and validity.

3.3 Statistical Methods

Complementary statistical methods were applied, including Pearson and Spearman correlations, Chi-square and Kruskal-Wallis tests, as well as multiple regression analysis. These contributed to the interpretation of trends and the identification of key determinants of satisfaction and effectiveness. The analytical approach followed the methodological logic of triangulation, combining quantitative evidence with institutional interpretations (Flick, 2018; Greene *et al*., 1989; Jick, 1979) [42-44]. The interpretation of findings was grounded in the principles of NPM and good governance, thereby highlighting both statistical relationships and organizational characteristics.

The methodological framework situates the indicators within internationally recognized evaluation schemes for public administration. The CAF and EFQM 2020 provide structured methodologies for assessing quality and strategy, while ESG principles add dimensions of social responsibility and sustainability (European Commission, 2022; OECD, 2020; GRI, 2021) [45, 1, 5]. Within this context, the use of composite indicators most notably the EHRMI enables objective and comprehensive assessment of progress, strengthening transparency, accountability, and the strategic resilience of Forest Services.

4. Results

4.1 Bibliometric Evidence and Research Context

To reinforce the theoretical and empirical framework, a bibliometric analysis was conducted using Scopus data (2015-2025), focusing on the terms *public sector*, *Skill development*, and *New Public Management*. The analysis was processed with the tools VOSviewer and biblioshiny for bibliometrix, which support thematic mapping, co-authorship analysis, and keyword distribution (Donthu *et al*., 2021; Aria & Cuccurullo, 2017) [31, 46].

The publication trend demonstrates a steady increase over the past decade, peaking in 2023, indicating the growing international interest in linking NPM with skill development in the public sector.

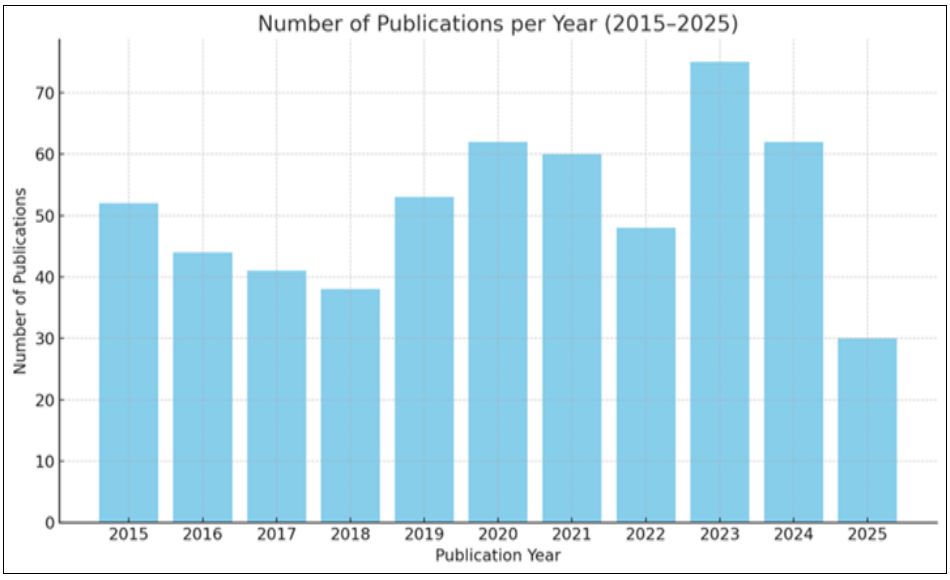

Fig 3: Number of Publications per year

The keyword co-occurrence analysis revealed thematic clusters such as *forestry*, *human resource management*, and *forest management*, along with emerging fields such as *climate change* and *machine learning*. Their distribution confirms the need for interdisciplinary approaches that integrate public administration, technologies, and environmental policies.

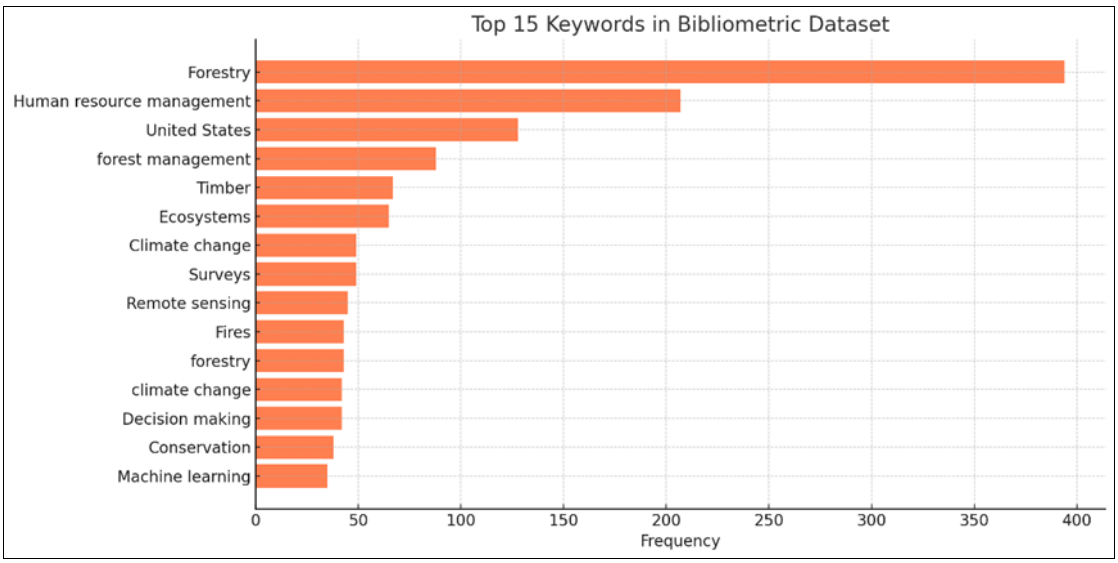

Fig 4: Keyword Frequency Distribution in Forestry and HRM Research

The keyword co-occurrence map identified forestry as a central node, with strong connections to climate change, decision making, training, and human resource *development*. This visualization illustrates the gradual integration of social and technological dimensions into forest governance.

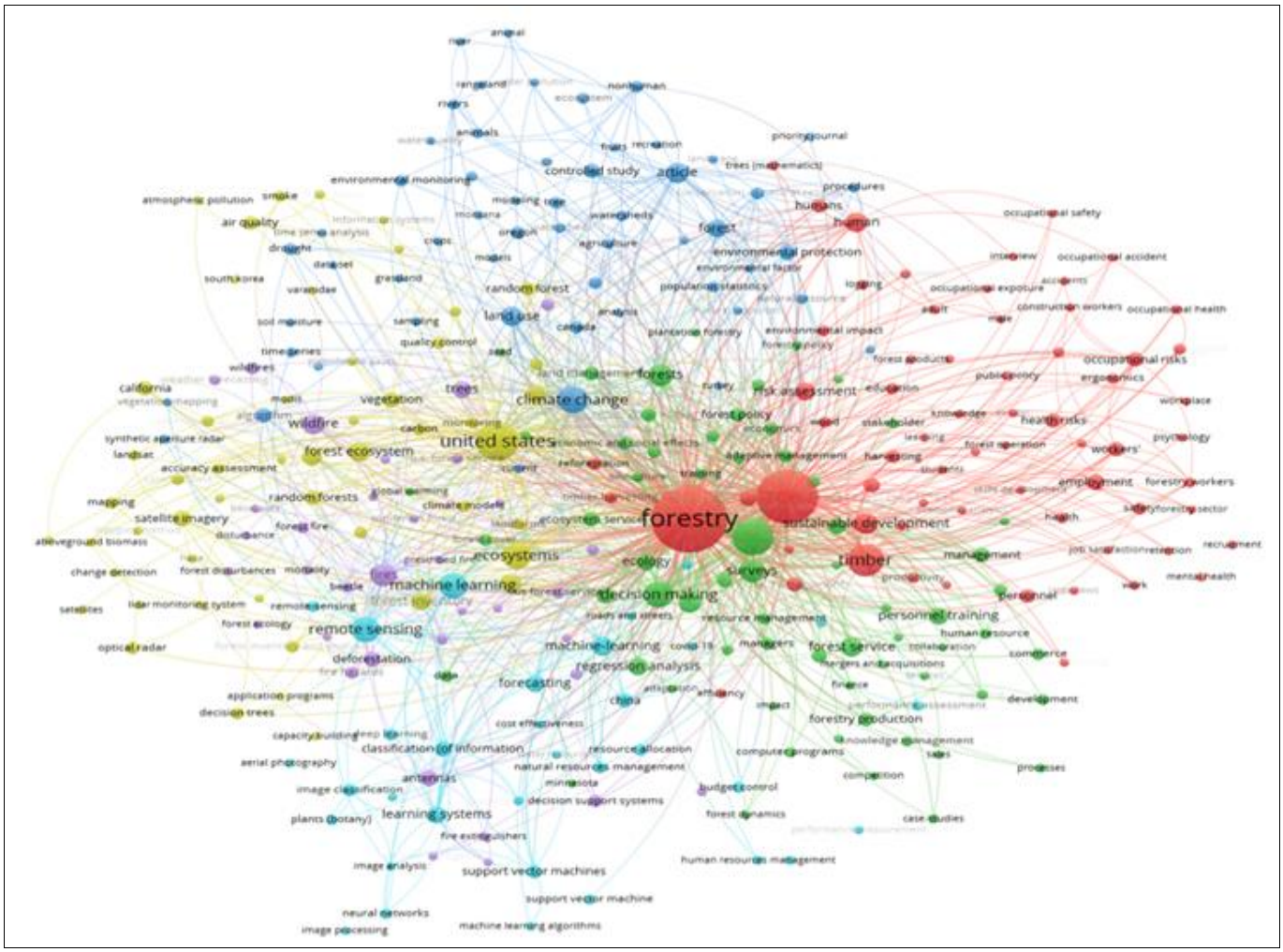

Fig 5: Thematic Network of Co-occurring Keywords in Forestry and Public Management Research

The analysis of author collaborations identified five main clusters, centered on environmental policy, digital technologies, and human resource management. However, the absence of strong linkages indicates that the international research community has not yet fully integrated education, evaluation, and innovation into a unified administrative framework.

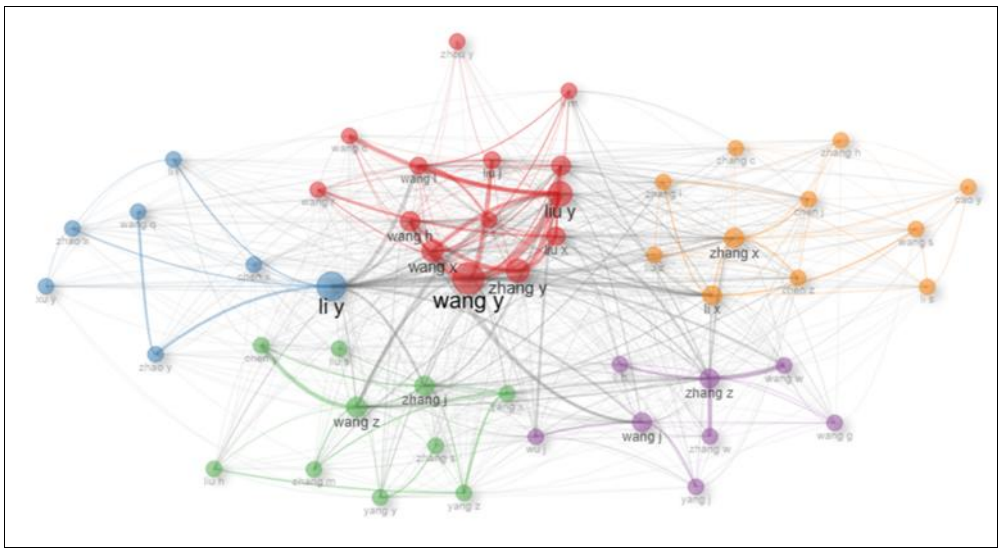

Fig 6: Author Collaboration Network in Public Sector and HRM Research

The thematic evolution (2020-2025) records a shift from sectoral approaches (*forestry*) toward holistic concepts of environmental governance, with artificial intelligence and machine learning being integrated into human-centered strategies.

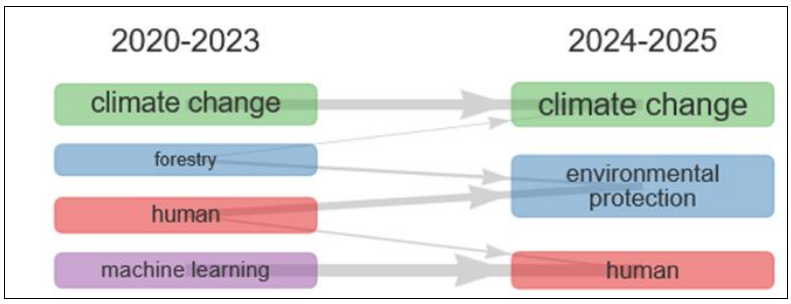

Fig 7: Conceptual Evolution of Key Terms in the Literature (2020-2025)

Finally, the thematic map highlighted digital strategy and skill development as an emerging field of low centrality, while climate change and natural resource protection are classified among the most mature thematic areas.

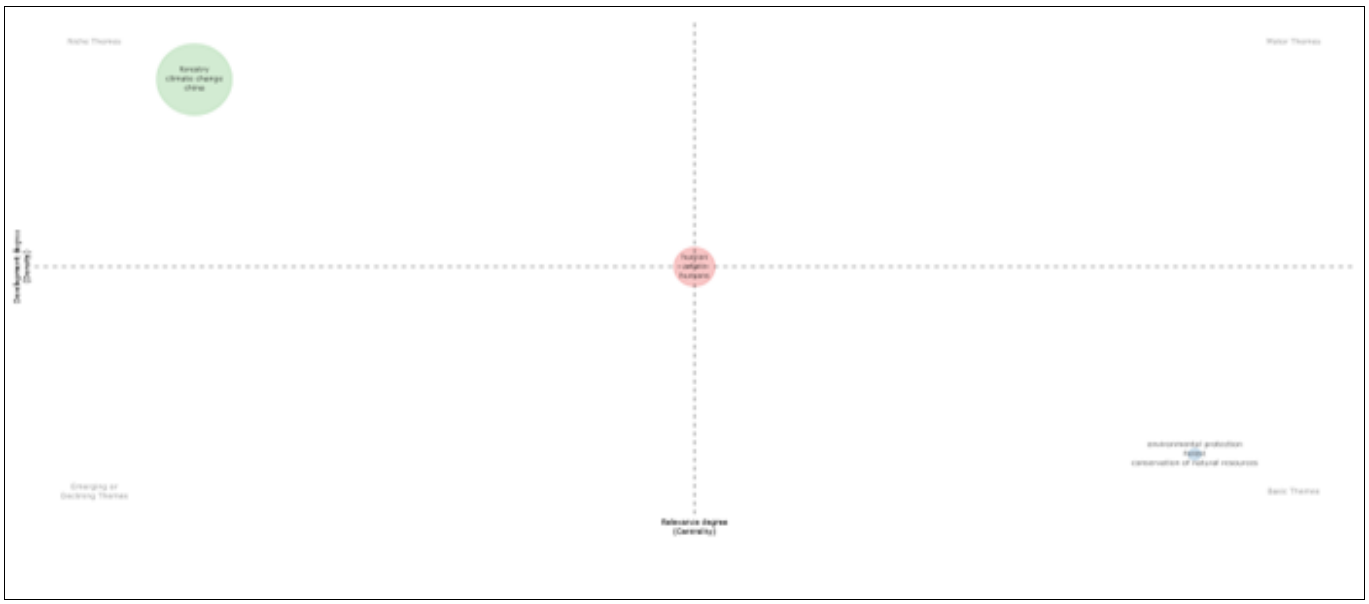

Fig 8: Thematic Map of Research Cluster in NPM and Skill Development

Overall, the bibliometric evidence confirms that education, technological adequacy, transparency, and administrative capacity constitute internationally expanding pillars of NPM and good governance domains to which the present study aspires to make a substantial contribution (Tripathi *et al*., 2025; OECD, 2020; Pollitt & Bouckaert, 2017) [3, 1, 2].

4.2 Statistical Analysis and Synthesis of Findings

The analysis of the empirical data identified five composites indicators that capture critical dimensions of administrative capacity under the lens of NPM: (a) Training Encouragement Index, (b) HR Management Satisfaction Index, (c) Objective and Transparent Evaluation Index, (d) Technology Adequacy and Open Governance Index, and (e) the integrated Effective Human Resource Management Index (EHRMI).

The indicators were calculated as mean values of the relevant variables within each thematic group, ensuring normalization and theoretical consistency. The use of the mean as the metric of choice is justified by three key principles: (a) simplicity and normalization, as it assigns equal weight to items while avoiding distortions caused by varying numbers of questions, (b) comparability, since all indicators are expressed on the same scale (1-5), allowing unified statistical analysis, and (c) theoretical validation, as this practice is considered appropriate for Likert-type data when thematic consistency and satisfactory internal reliability are ensured (Taherdoost, 2022; Chyung *et al*., 2018; Joshi *et al*., 2015; DeVellis, 2017; Boone & Boone, 2012) [47-50].

$$Index = \frac{\sum_{i=1}^{n} Q_i}{n}$$

where Qi is the value of the *i*-th question and nnn the number of questions comprising the indicator.

The choice of the mean ensures normalization, comparability across indicators, and theoretical consistency (Taherdoost, 2022; Chyung *et al*., 2018; Joshi *et al*., 2015; DeVellis, 2017; Boone & Boone, 2012) [47-50].

The reliability of the indicators was confirmed using Cronbach's alpha, with all values exceeding the acceptable threshold of 0.70, while Principal Component Analysis (PCA) validated their latent structure. Complementary analyses included Pearson and Spearman correlations, Chi-square and Kruskal-Wallis tests, as well as multiple regression, which supported interpretation and revealed specific trends and relationships. Despite the application of multiple methods, the central focus of the analysis remained the development and validation of the composite indicators, in direct alignment with the principles of NPM and good governance.

4.2.1 Training Encouragement Index

The Training Encouragement Index reflects the existence of institutionalized training opportunities, employee participation in educational programs, and encouragement from supervisors for continuous skill development. The mean values (M = 3.8, SD = 0.9) indicate a positive attitude toward training, with variations across geographical regions and administrative levels.

The analysis revealed a strong correlation between this index and satisfaction with human resource management (r = 0.535, $p<0.01$), confirming that administrative support acts as a catalyst for participation in training activities. This finding is consistent with international studies highlighting education as a strategic tool for organizational improvement and for strengthening trust in institutions (OECD, 2020; Pollitt & Bouckaert, 2017) [1, 2].

Encouragement from supervisors emerges as particularly critical for increasing participation in training initiatives, confirming the role of leadership in fostering a culture of continuous learning in line with NPM principles.

4.2.2 HR Management Satisfaction Index

This indicator captures employees' perceptions regarding objectivity and transparency in evaluation processes, their level of trust in the existing human resource management system, and their sense of fair treatment. The mean values (M = 3.6, SD = 1.0) suggest a satisfactory but improvable picture of HRM practices, with no statistically significant differences by gender or age group (ANOVA, p > 0.05).

The statistical analysis revealed a positive correlation of the index with objectivity and transparency in evaluation (r = 0.497, $p<0.01$), as well as with the technological adequacy of services (r = 0.438, $p<0.01$). These relationships reinforce the theoretical framework of NPM, according to which transparency, meritocracy, and reliable human resource management act as catalysts for organizational efficiency and institutional trust (European Commission, 2022; OECD, 2020; van de Walle & Bouckaert, 2003) [45, 1, 51].

Overall, the index underscores the role of fair and transparent HRM practices as a prerequisite for enhancing job satisfaction and successfully implementing NPM policies in Forest Administration.

4.2.3 Objective Evaluation Index

This indicator reflects the extent to which employees perceive evaluation processes as fair, clear, and free from bias. The mean values (M = 3.7, SD = 0.8) indicate a generally positive attitude, with relatively homogeneous perceptions across the sample and no significant deviations by gender or educational level.

The statistical analysis revealed a strong positive correlation between the index and the variable *Transparency* (r = 0.88), as well as a moderate-to-strong correlation with *Accountability* (r = 0.57), confirming the importance of reliable evaluation procedures as a prerequisite for good governance. This finding is consistent with the theoretical framework of NPM, according to which meritocracy and transparency strengthen institutional trust and constitute a precondition for effective administration (OECD, 2020; Pollitt & Bouckaert, 2017) [1, 2].

Overall, the index confirms that objective evaluation functions not only as a control mechanism but also as a strategic tool for staff empowerment, performance recognition, and the cultivation of institutional legitimacy.

4.2.4 Technology Adequacy & Open Governance Index

This indicator captures employees' perceptions regarding the availability and quality of technological equipment, the adequacy of technical support, and the use of digital tools that promote transparency and participation. The mean values (M = 3.5, SD = 1.1) indicate a satisfactory but improvable level of technological infrastructure, with variations between regional and central services.

The statistical analyses revealed a positive correlation between technological adequacy and satisfaction with human resource management (r = 0.438, $p<0.01$), confirming that access to modern tools constitutes a fundamental prerequisite for the effectiveness of administrative functions. Furthermore, the presence of digital tools is associated with reduced bureaucracy and the facilitation of open governance, thereby enhancing transparency and accountability (European Commission, 2022) [45].

Overall, the index underscores that technological adequacy is not merely a technical dimension but a critical factor of administrative capacity and strategic resilience, aligned with NPM principles.

4.2.5 Effective HR Management Index (EHRMI)

The Effective Human Resource Management Index (EHRMI) was developed as a composite indicator integrating critical aspects of training, administrative support, and objective evaluation. The descriptive values (M = 3.33, SD = 0.91) suggest a generally positive attitude among employees, with room for improvement, while the distribution of the index shows a symmetrical form with no significant deviations by gender, age, or education.

The analysis revealed a strong positive correlation with *Transparency* (r = 0.88) and a significant correlation with *Accountability* (r = 0.57), confirming that reliable evaluation procedures and active encouragement of training are fundamental drivers of administrative effectiveness. PCA confirmed the EHRMI as a central factor summarizing the dimensions of evaluation and transparency, while cluster analysis identified three groups of employees with differentiated perceptions of administrative capacity.

Overall, the EHRMI functions as a key indicator for assessing the effectiveness of Forest Administration. It highlights that strengthening transparency, objective evaluation, and continuous training are strategic priorities for enhancing institutional trust and implementing NPM principles.

4.3 Comprehensive Statistical Analysis and Synthesis of Findings

The data analysis captures the attitudes and perceptions of employees of the Greek Forest Service regarding training, human resource management, evaluation, and technological adequacy.

Table 1 presents the descriptive statistics of the four main indices as well as the composite EHRMI. The mean values suggest a generally positive attitude, with slightly lower assessments in the domain of technological adequacy.

Table 1: Descriptive Statistics of Composite Indices

Index	Mean	Standard Deviation	Range
Training Encouragement Index	3.8	0.9	1 - 5
HR Management Satisfaction	3.6	1.0	1 - 5
Objective Evaluation Index	3.7	0.8	1 - 5
Technology Adequacy Index	3.5	1.1	1 - 5
Effective HR Management Index (EHRMI)	3.33	0.91	1-5

The exploration of relationships among the indices revealed strong positive correlations, particularly between training encouragement, objective evaluation, and satisfaction with human resource management.

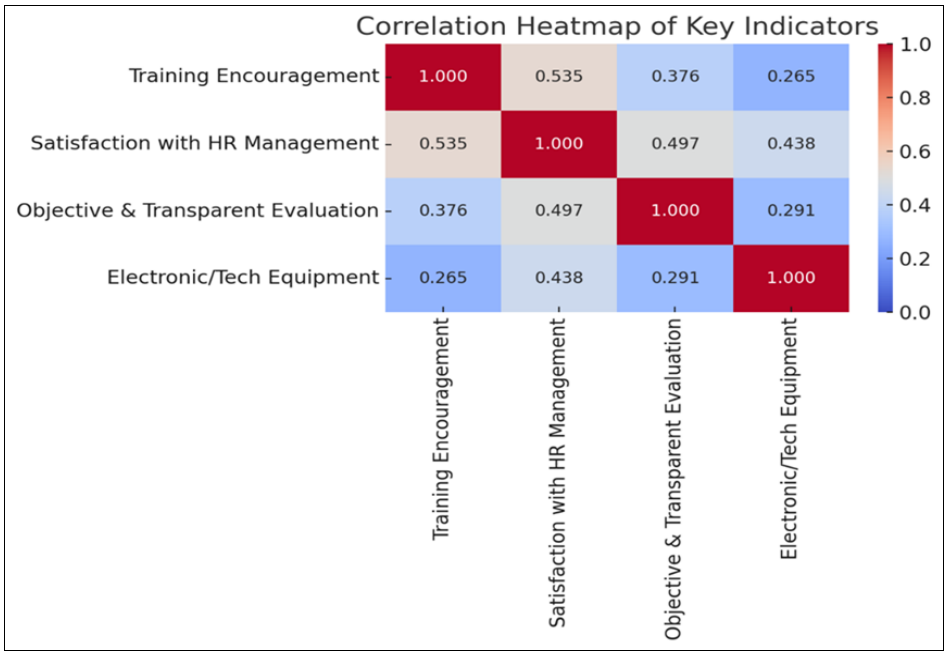

Fig 2: *Correlation heatmap of key composite indicators.*

To assess the factors influencing employee satisfaction, multiple regression analysis was applied. The model showed a high level of fit (R^2 = 0.468, $p<0.001$) and demonstrated that training encouragement, objective evaluation, and technological adequacy are statistically significant predictive factors.

At the same time, the model for Open Governance recorded an even higher level of fit (R^2 = 0.531, $p<0.001$), with accountability and public participation emerging as the most significant predictors, and technology use playing a secondary role.

The exploration of potential differences based on

demographic characteristics (gender, age, education) through the Chi-square test revealed no statistically significant variations (p>0.05). This finding suggests that perceptions regarding training, transparency, and technological adequacy are relatively homogeneous across staff, regardless of socio-demographic parameters.

Table 2: Multiple regression models for HRM Satisfaction and Open Governance

Dependent Variable	Independent Variables	β	p-value	R^2
HRM Satisfaction	Training Encouragement	0.376	0.003	
	Objective & Transparent Evaluation	0.291	0.016	0.468
	Technology Adequacy	0.265	0.020	
Open Governance	Accountability	0.389	<0.001	
	Public Participation	0.382	<0.001	0.531
	Technology Use	0.151	0.009	

Overall, the findings highlight three strategic pillars for strengthening administrative capacity:

- Leadership and encouragement for continuous training,
- Objective and transparent evaluation,
- Adequacy of technological equipment and digital readiness.

Their strong combined effect confirms the theoretical framework of New Public Management, according to which training, meritocracy, and technological infrastructure constitute foundations for enhancing trust, improving efficiency, and reinforcing good governance (OECD, 2020; Pollitt & Bouckaert, 2017; European Commission, 2022) [1, 2, 45].

5. Conclusions and Recommendations

This study demonstrates that the application of New Public Management (NPM) principles with emphasis on continuous training, transparency, and technological support can act as a counterbalance to the "Peter Principle" (Peter, 1969) [53], which describes the risk of inefficiency when organizational hierarchies lack meritocracy and fair evaluation. The findings are linked to the notion of "ethical recognition" (Ricoeur, 2004; Fraser, 2000) [54, 55] and the existential dimension of work (Meyers & van Woerkom, 2014) [56], suggesting that leadership support and objective evaluation enhance professional self-esteem and institutional trust.

References to Camus on the need for meaning, Arendt's warning about the risk of losing critical thinking in technocratic systems (Raelin, 2016) [57], and Weber's critique of the "iron cage" of bureaucracy (Kaufmann, 2016) [58] acquire particular significance for public administration. The analysis of data from the Greek Forest Service shows that administrative encouragement for training, objective evaluation, and technological adequacy constitute fundamental pillars of effectiveness and accountability, consolidating the principles of good governance (OECD, 2020; Pollitt & Bouckaert, 2017) [1, 2].

Effective leadership emerges as a crucial catalyst for transforming administrative principles into practical applications. It ensures that strategies for skill enhancement, objective evaluation, and technological upgrading translate into measurable results (Van de Walle & Bouckaert, 2003; OECD, 2020) [51, 1]. Within the NPM framework, leadership is not limited to resource management but is oriented toward shaping vision, empowering human resources, and fostering a culture of innovation and transparency (Raelin, 2016; Kaufmann, 2016) [57, 58]. Leadership that incorporates accountability, transparent communication, and adaptability can multiply the benefits of training and technological support, deliver measurable outcomes and strengthening trust in administration (Meyers & van Woerkom, 2014; Fraser, 2000) [55, 56].

Finally, linking leadership with indicators of administrative capacity and open governance offers a framework for continuous improvement that strengthens the resilience of Forest Services and their ability to effectively respond to environmental and social challenges (Ricoeur, 2004; Peter, 1969) [54, 53].

5.1 Bibliometric Review and International Research Context

Beyond the analysis of empirical data, the study's contribution is positioned within the international scientific landscape through a bibliometric review, which highlights research trends and thematic approaches related to New Public Management and skill development in the public sector.

The enhancement of administrative capacity and strategic governance in the public sector has emerged as a growing subject of scientific attention over the past decade, particularly within the framework of NPM and ESG standards. In this context, a bibliometric review was conducted in the Scopus database for the period 2015-2025, aiming to capture international research trends on training, reform strategies, and human resource management.

The analysis revealed an upward dynamic of scientific interest, with a significant increase in publications after 2018, reflecting the gradual consolidation of the field within environments of digital transformation and climate governance. The increase in publication volume has been accompanied by a broadening of thematic axes, as shown in the keyword co-occurrence map, where the concept of *forestry* acts as a hub linking terms such as *human resource management*, *machine learning*, *climate change*, and *decision making*.

The dynamic evolution of concepts is reflected in the thematic transition map, which shows a shift from specialized terms to broader strategic categories such as *environmental protection*, highlighting the convergence of environmental policy, technology, and human resource fields. At the same time, the analysis of author collaborations revealed strong thematic clusters but limited cross-sectoral linkages, underlining the need for interdisciplinary integration between public administration, education, and technological innovation.

The bibliometric review does not merely serve a descriptive function but also has interpretive value: it reinforces the position that the study of strategic human resource empowerment in Forest Services belongs to an emerging but highly dynamic scientific field, where NPM principles coexist with the transparency, accountability, and sustainability requirements of ESG standards. In this way, the present study addresses both an existing bibliographic gap and the need for practically applicable governance tools.

The bibliometric review confirms that training, technological readiness, and accountability are internationally recognized axes of NPM, in conjunction with the transparency and sustainability requirements of ESG frameworks.

5.2 Key Challenges and Strategic Directions for Strengthening Administrative Capacity in the Forest Services

The quantitative and qualitative analysis highlighted three critical axes in which Forest Services are called to strengthen their administrative capacity: training and skill development, transparency and objectivity in evaluation, and technological adequacy. A common denominator is the need to reinforce institutional leadership, participation, and accountability.

- **Training and Skill Development:** Despite the importance of continuous training, staff often encounter barriers such as insufficient administrative support, limited time, and the absence of institutionalized incentives for participation (OECD, 2020) [1].
- **Transparency and Objectivity in Evaluation:** The lack of clear and accepted criteria undermines credibility and trust in the human resource management system, contrary to NPM principles (Van de Walle & Bouckaert, 2003) [51].
- **Technological Gaps and Digital Divide:** Unequal digital capacity, equipment shortages, and limited familiarity with modern tools hinder digital transformation (European Commission, 2022) [45].

Strategic Directions for addressing these challenges include:

1. **Leadership Support for Training** through training supervisors in supportive leadership and establishing incentives (certifications, evaluation credits, internal recognition).
2. **Upgrading and Ensuring Transparency in Evaluation** with objective criteria, feedback processes aimed at skill development, and continuous training for evaluators.
3. **Investment in Technological Infrastructure** through digital literacy programs for all staff, upgrading equipment with emphasis on reliability, and establishing a technical support helpdesk.
4. **Horizontal Training Design** with unified frameworks for all employees, adaptation to the needs of units, and hybrid formats (e-learning, face-to-face, mentoring).
5. **Cultivating a Culture of Transparency and Participation** through accountability mechanisms based on open data, staff and citizen involvement in policy design, and the use of digital platforms for participation and oversight.

These strategies link administrative practices with NPM principles and international ESG standards, offering a coherent framework for strengthening institutional resilience and public trust in Forest Administration.

5.3 Linking the Findings with EFQM 2020, ESG, and the Common Assessment Framework (CAF)

The analysis highlighted three pivotal pillars for improving Forest Administration: (a) encouragement for continuous training, (b) objective and transparent evaluation, and (c) adequacy of technological infrastructure. These axes are aligned with the principles of New Public Management and correspond to fundamental dimensions of EFQM 2020: *Direction*, *Execution*, and *Results.*

- The **Training Encouragement Index** is embedded in *Creating Sustainable Value*, underscoring the role of leadership in human resource development.
- The **Objective Evaluation Index** is linked to *Driving Performance & Transformation*, supporting accountability and goal-setting.
- The **Technology Adequacy Index** strengthens organizational resilience, corresponding to *Strategic Resilience.*

The association of the findings with the seven EFQM 2020 criteria leads to specific strategies:

1. **Organizational Culture & Leadership** - training supervisors in supportive leadership.
2. **Driving Performance & Transformation** - clear and well-documented evaluation criteria with feedback.
3. **Creating Sustainable Value** - investment in technological modernization and digital literacy.
4. **Engaging Stakeholders** - meaningful participation of staff and citizens in policy design.
5. **Stakeholder Perceptions** - mechanisms of recognition and transparent accountability.
6. **Purpose, Vision & Strategy** - alignment of training policy with a vision of sustainable innovation.
7. **Strategic & Operational Results** - use of indicators (EHRMI, transparency, participation, technology) as monitoring tools.

The Common Assessment Framework (CAF) complements EFQM by providing a structured quality system that promotes transparency, accountability, and continuous improvement. At the same time, the approach connects with the three dimensions of ESG:

- **Governance:** transparency, merit-based evaluation, and inclusiveness.
- **Social:** equal access to training and empowerment of administrative culture.
- **Environmental:** sustainable environmental management in line with the forestry mandate of the services.

Table 3: Alignment of EFQM 2020 Criteria with CAF Axes and Quality Indicators

EFQM 2020 Criteria	CAF Axes & Quality Indicators	Application in Greek Forest Services
Organizational Culture & Leadership	Leadership, Administrative Capacity	Leadership training, HR engagement
Driving Performance & Transformation	Performance, Goal setting, Evaluation	Clear evaluation criteria, continuous feedback
Creating Sustainable Value	Sustainability, Innovation	Tech investment, digital literacy
Engaging Stakeholders	Staff & Citizen Participation	Hybrid training, peer mentoring, policy input
Stakeholder Perceptions	Satisfaction & Trust	Recognition mechanisms, citizen evaluations
Purpose, Vision & Strategy	Strategic Alignment	Education & evaluation aligned with vision
Strategic & Operational Results	KPIs & Monitoring	Use of composite indices (EHRMI, transparency, participation)

The research analysis confirms the close interconnection of Forest Services with modern ESG principles. Strengthening accountability and transparency (Governance), ensuring equal access to training and development (Social), and promoting sustainable environmental management (Environmental) constitute a comprehensive framework of strategic resilience. The combined utilization of EFQM, CAF, and ESG establishes an integrated institutional framework of strategic resilience that enhances accountability and transparency, reinforces sustainability, and restores trust in the institution of Forest Administration.

6. Limitations of the Study and Prospects for Further Research

The analysis focuses exclusively on the Greek Forest Service, a constitutionally enshrined institution responsible for managing the forest environment as a public good. This distinct institutional and legal position differentiates the Forest Service both from other Greek public agencies and from comparable organizations internationally, where the protection framework is different. Although the sample is geographically and administratively representative, the results cannot be directly generalized to other administrative structures without considering this crucial distinction.

The exclusive use of quantitative data allowed for the precise construction of composite indicators and the statistical representation of critical parameters. However, the future integration of qualitative methods such as in-depth interviews and case studies would provide a deeper understanding of organizational dynamics and cultural characteristics that influence the implementation of reforms. This direction could support comparative studies at national and international levels, enriching the strategic understanding of the sustainability and resilience of institutional changes.

Linking the findings with the EFQM 2020 Model, the Common Assessment Framework (CAF), and ESG principles enhances the potential not only for assessing the current situation but also for designing future cycles of measurement, feedback, and goal-setting. This perspective aligns with internationally recognized standards that promote sustainability, accountability, and continuous improvement, creating an application field that could serve as a model for other European administrative structures.

Strengthening administrative capacity through training, transparent evaluation, and technological adequacy combined with the integration of EFQM, CAF, and ESG standards can position the Forest Services as a benchmark of administrative excellence and institutional resilience, thereby reinforcing sustainability and strengthening societal trust in the institution.

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