Annex 1: Methodology full description

Introduction

The objective of the factor analysis was to reduce the complexity of a survey structured around multiple question batteries by identifying and validating underlying factorial structures through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The analysis has been performed on the following psychometric scales:

- Work-Related Quality of Life (WRQoL). Adapted from Easton and Van Laar (2018), this scale measures the perceived quality of life of employees (12 questions).
- Perceived Subtle Gender Bias Index (PSGBI). Elaborated by Tran et al. (2019), the PSGBI measures the perceptions that an individual holds regarding subtle experiences that are related to their gender identification (21 questions).
- Perspective for just energy transition knowledge production (PJETKP). We created this scale to grasp individuals' thoughts regarding what type of policies need to be adopted to make the energy sector more inclusive (6 questions).
- Workplace Diversity Climate (WDC). Adapted from Ward et al. (2022), this scale measure individual's perceptions about the diversity climate in their workplaces (4 questions).

For the PSGBI we proceeded with a Confirmatory Factor Analysis (CFA), and the latent factors have been developed based on Tran et al. (2019). Since we used the full set of questions, in fact, we decided to code the latent factor as illustrated by the authors. On the contrary, for WRQoL, WDC, and PJETKP, since the first and the

second have been adapted from already available scales and the third has been appositely created for this survey, before proceeding with the CFA

we performed an Exploratory Factor Analysis (EFA). As discussed by Suhr (2006), the EFA is employed to explore the underlying factor structure of the data and to identify the number of latent constructs in the variables' set.

Below, the methodological steps undertaken in each phase are described.

Data Preparation

Transformation of Likert scale variables into numerical variables

For the questions' batteries WRQoL, Discrimination, Policy and organization, survey responses, initially in textual format (Agree strongly, Agree, Neither disagree nor agree, Disagree, Disagree strongly), were recoded into numerical values (1=Disagree strongly – 5=Agree strongly).

Missing responses ("No answer") were treated as missing values (NA) to ensure the accuracy of subsequent analyses.

Creation of dummy variables

Multinomial categorical and other variables (Gender_2, Employer_type, Employment_contract, Research_profile, Energy_sect_RE, Care_child_6, Care_child_7_17, Care_elderly, Care_disability, Care_none) were converted into dummy variables to represent different categories.

This transformation allowed for the inclusion of these variables in quantitative analyses.

Recoding other variables

The variable Seniority, originally coded as categorical (Junior (0-4), Middle career (5-7), Senior (7-x)), has been recoded into an ordinal scale (1 = Junior (0-4), 2 = Middle career (5-7), 3 = Senior (7-x)).

The variable Organization_size, originally coded as categorical (1 to 9, 10 to 49, 50 to 249, 250 or more), has been recoded into an ordinal scale (1 = 1 to 9, 2 = 10 to 49, 3 = 50 to 249, 4 = 250 or more).

The variable Education, originally coded as categorical (High School (ISCED 3), Bachelor's degree (ISCED 6), Professional degree (e.g., law or medicine) (ISCED 6A/7), Master's degree or equivalent (ISCED 7), Doctorate degree (ISCED 8)), has been recoded into an ordinal scale (1 = High School (ISCED 3), 2 = Bachelor's degree (ISCED 6), 3 = Professional degree (e.g., law or medicine) (ISCED 6A/7), 4 = Master's degree or equivalent (ISCED 7), 5 = Doctorate degree (ISCED 8)).

Sociodemographic variables by gender

Below, Table 1 shows the percentage distribution by gender (women and men) of key sociodemographic variables, offering a general overview of the respondents' profiles.

Table 1: Sociodemographic variabls by gender

Variable	**Category**	**Women**	**Men**
Gender	Male	-	58.2
	Female	41.8	-
Age Group	>70	0	1.5
	66-70	1.4	2
	61-65	8.4	8.5
	56-60	14.7	12.1
	51-55	18.9	15.1
	46-50	11.9	13.1
	41-45	14.7	16.1

	36-40	13.3	15.6
	31-35	6.3	9
	26-30	7	5.5
	22-25	3.5	1.5
Seniority	Senior (7+ years)	67.8	80.4
	Middle career (5-7 years)	13.3	9.5
	Junior (0-4 years)	18.9	10.1
Professional Role	Researcher or Technologist	67.8	68.8
	Team Manager/Supervisor	15.4	17.1
	Director/Board Member	5.6	6
	Technician	0.7	3.5
	Research Assistant	5.6	2.1
	Other	4.9	2.5
Care Responsibilities	None	39.2	39.5
	Elderly	13.7	10.1
	Disability	2.6	5.9
	Children 7-17	27.5	27.7
	Children under 6	17	16.8
Education Level	Doctorate (ISCED 8)	67.8	71.4
	Master's (ISCED 7)	25.9	22.1
	Bachelor's (ISCED 6)	4.9	1.5
	Professional degree (ISCED 6A/7)	0.7	3.5
	High School (ISCED 3)	0.7	1.5
Employment Type	Public and Private Academic/Research Organization	92.3	92.5
	Private Company/Corporation	4.2	4.5
	Self-employed (Academic/Research)	1.4	2
	Self-employed (Business)	2.1	1
Contract Type	Permanent position contract	73.4	78.9
	N/A	3.5	3
	Fixed term contract	16.1	13.1
	Apprenticeship/Training (PhD, scholarship, internships)	5.6	3
	Temporary employment agency contract	1.4	2
Energy Sector	Coal	0.4	2.2
	Energy efficiency	17	15.4
	Finance	2.1	2.2
	HVAC	1.8	4.4

	Hydrogen	10.2	12.7
	Nuclear	4.9	3.4
	Oil & Gas	3.9	4
	Other	0	0
	Policy/Regulation	10.6	7.1
	Renewable Energy	25.4	21.4
	Regulation	7.1	6.2
	Retail	1.1	1.5
	Storage	11	12.2
	Transmission & Distribution	4.6	7.3
Renewable Sector	Bioenergy	9.8	9
	Ecosocman	11	12.3
	Geothermal	8.6	8
	Hydropower	4.5	5.7
	Ocean	5.3	4.5
	Other	4.5	3.3
	Policy	9.4	9.6
	Pumps	9.4	9
	Solar	18.8	17.2
	Waste	7.8	7.8
	Wind	11	13.8

Exploratory Factor Analysis (EFA)

EFA was used to explore the latent factorial structures underlying the three question batteries WRQoL, WDC, and PJETKP, and to identify meaningful dimensions.

WRQoL (Work-Related Quality of Life)

Selection of variables

Twelve variables related to work-related quality of life were included after being numerically recoded: WRQoL_influence_N; WRQoL_abilities_N; WRQoL_goals_N; WRQoL_aknowledgement_N; WRQoL_skill_development_N; WRQoL_pressure_N;

WRQoL_decision_involvement_N; WRQoL_career_opportunity_N; WRQoL_needs_met_N; WRQoL_safe_environment_N; WRQoL_working_hours_N; WRQoL_flexibility_N

Sample adequacy tests

The Bartlett's test of sphericity and KMO (Kaiser-Meyer-Olkin) measure confirmed the adequacy of the correlation matrix for factor analysis. The Bartlett's test shows a chi-square value of 1598.183, 66 degrees of freedom and a P value of 0.00.

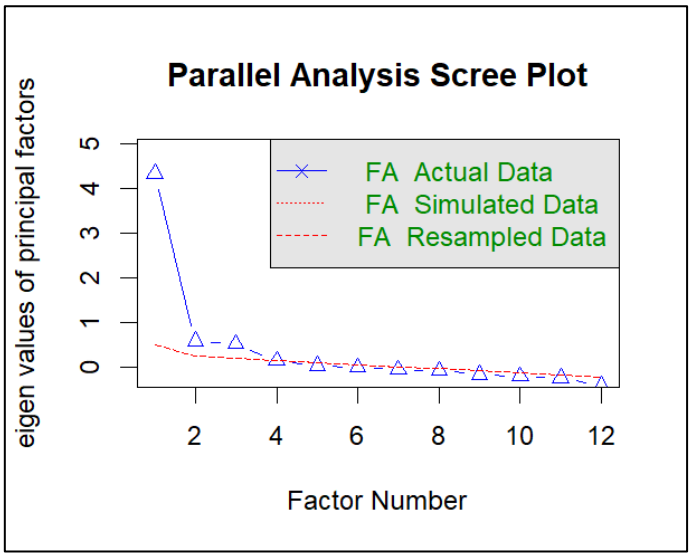
The Kaiser-Meyer-Olkin (KMO) test shows an Overall Measure of Sampling Adequacy (MSA): of 0.87. Item-level MSAs range from 0.73 to 0.94, but WRQoL_pressure_N has a low MSA (0.50).

Determination of the number of factors

The Kaiser criterion identifies the presence of 3 Factors (eigenvalues > 1): Factor 1: 4.93, Factor 2: 1.26, and Factor 3: 1.23.

The Parallel analysis (Figure 1) further validated the selection of three factors.

Figure 1: Parallel analysis for WRQoL



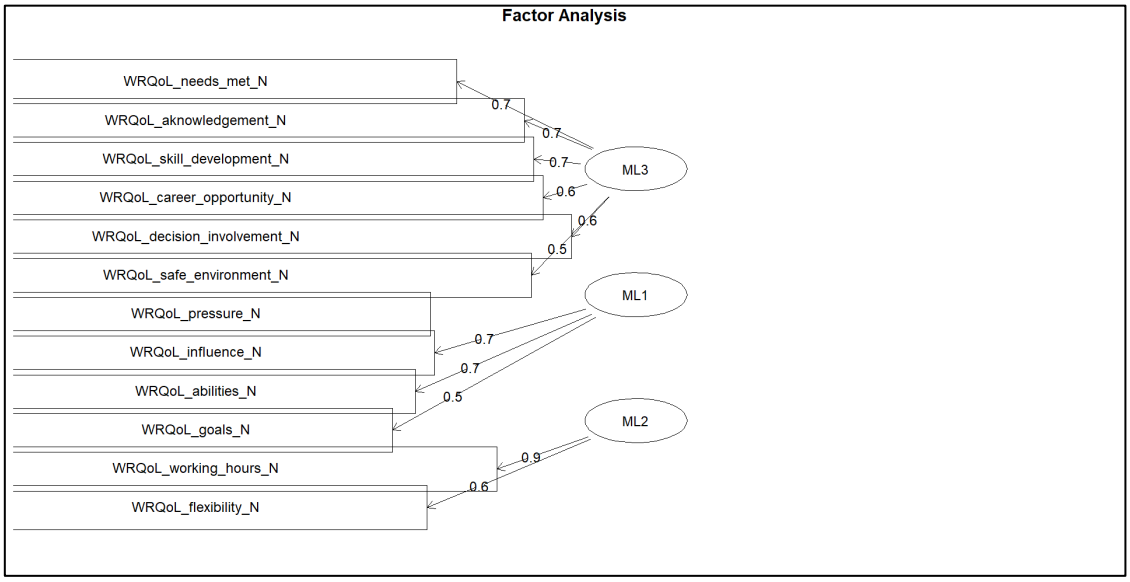
Source: Authors' elaboration.

Factor extraction

Factors were extracted using the Maximum Likelihood (ML) method with Varimax rotation for improved interpretability.

The diagram in Figure 2 shows the factor loadings for all the variables.

Figure 2: Factors extracted for WRQoL and relative factor loadings



Source: Authors' elaboration.

Model fit statistics: RMSR = 0.03; RMSEA = 0.061; Chi-square = 76.12 with $p < 0.000$; TLI = 0.943; BIC = -117.75.

Factor Score Adequacy: ML3 (correlation = 0.87, $R^2 = 0.76$, minimum correlation = 0.52); ML2 (correlation = 0.92, $R^2 = 0.84$, minimum correlation = 0.68); ML1 is slightly weaker but still acceptable (correlation = 0.84, $R^2 = 0.70$, minimum correlation = 0.41).

Perspective for just energy transition knowledge production (PJETKP)

Selection of variables

Six variables related to PJETKP were included after being numerically recoded: Policy_diversity_N; Policy_culture_N; Policy_favoring_groups_N; Policy_society_representation_N; Policy_male_domination_N; Policy_minorities_N

Sample adequacy tests

The Bartlett's test of sphericity and KMO (Kaiser-Meyer-Olkin) measure confirmed the adequacy of the correlation matrix for factor analysis.

The Bartlett's test shows a chi-square value of 809.108, 15 degrees of freedom and a P value of 0.00.

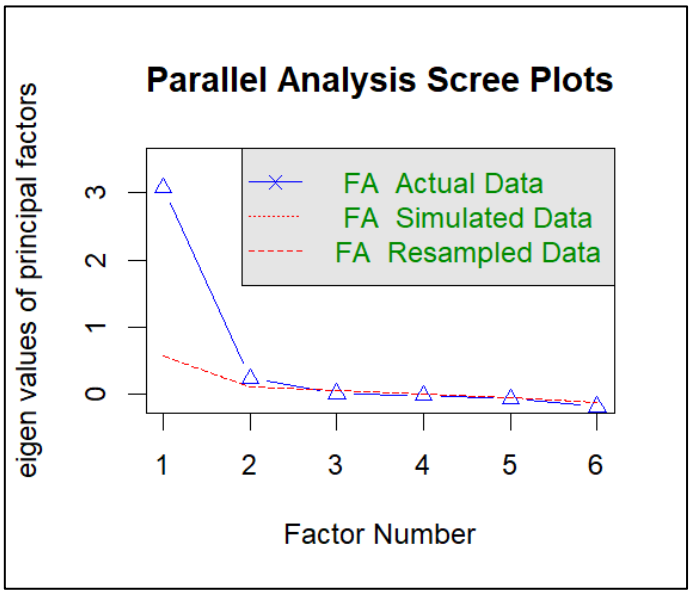
The Kaiser-Meyer-Olkin (KMO) test shows an Overall Measure of Sampling Adequacy (MSA): of 0.86. Item-level MSAs range from 0.82 to 0.89.

Determination of the number of factors

The Kaiser criterion identifies the presence of 3 Factors (eigenvalues > 1): Factor 1: 3.52.

The Parallel analysis further validated the selection of one factor (Figure 3).

Figure 3: Parallel analysis for PJETKP



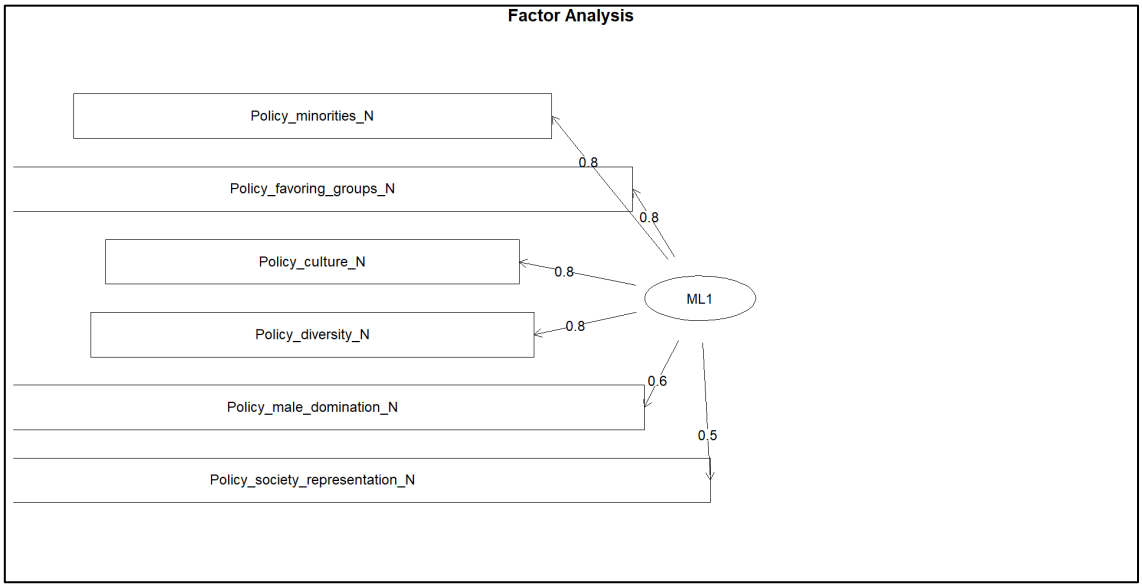
Source: Authors' elaboration.

Factor extraction:

Factors were extracted using the Maximum Likelihood (ML) method with Varimax rotation for improved interpretability.

The diagram in Figure 4 shows the factor loadings for all the variables.

Figure 4: Factors extracted for PJETKP and relative factor loadings



Source: Authors' elaboration.

Model fit statistics: RMSR = 0.06; RMSEA = 0.12; Chi-square = 49.76 with $p < 0.000$; TLI = 0.914; BIC = -1.98.

Factor Score Adequacy: ML1 (correlation = 0.94, $R^2 = 0.88$, minimum correlation = 0.76).

Workplace Diversity Climate (WDC)

Selection of variables

Four variables related to WDC were included after being numerically recoded: Organization_managing_backgrounds_N; Organization_accepted_backgrounds_N;

Organization_hiring_practices_N; Organization_retain_diversity_N

Sample adequacy tests

The Bartlett's test of sphericity and KMO (Kaiser-Meyer-Olkin) measure confirmed the adequacy of the correlation matrix for factor analysis.

The Bartlett's test shows a chi-square value of 622.045, 6 degrees of freedom and a P value of 0.00.

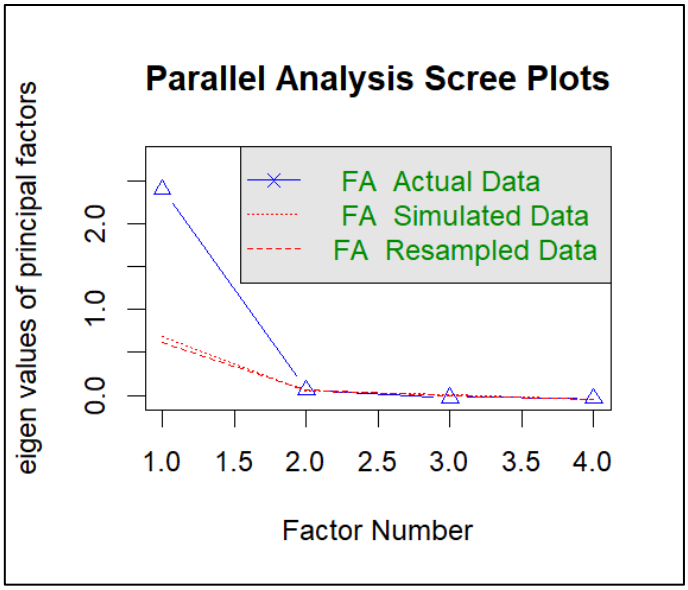
The Kaiser-Meyer-Olkin (KMO) test shows an Overall Measure of Sampling Adequacy (MSA): of 0.81. Item-level MSAs range from 0.78 to 0.85.

Determination of the number of factors

The Kaiser criterion identifies the presence of 3 Factors (eigenvalues > 1): Factor 1: 2.795.

The Parallel analysis further validated the selection of one factor (Figure 5).

Figure 5: Parallel analysis for PJETKP



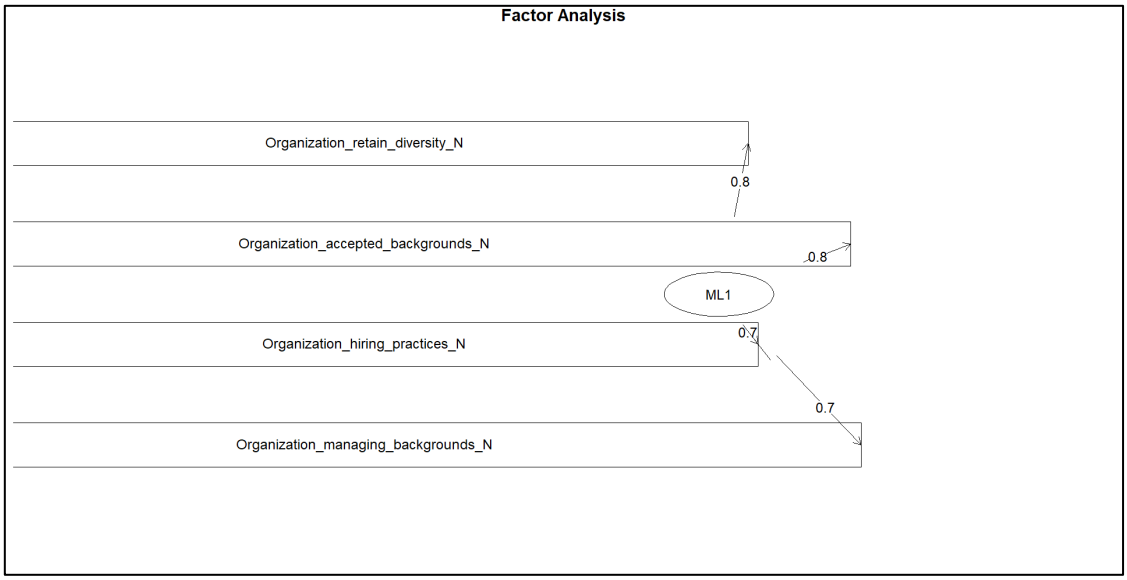
Source: Authors' elaboration.

Factor extraction

Factors were extracted using the Maximum Likelihood (ML) method with Varimax rotation for improved interpretability.

The diagram in Figure 6 shows the factor loadings for all the variables.

Figure 6: Factors extracted for PJETKP and relative factor loadings



Source: Authors' elaboration.

Model fit statistics: RMSR = 0.02; RMSEA = 0.12; Chi-square = 49.76 with $p < 0.000$; TLI = 0.981; BIC = -1.98.

Factor Score Adequacy: ML1 (correlation = 0.93, $R^2 = 0.87$, minimum correlation = 0.73).

Confirmatory Factor Analysis (CFA)

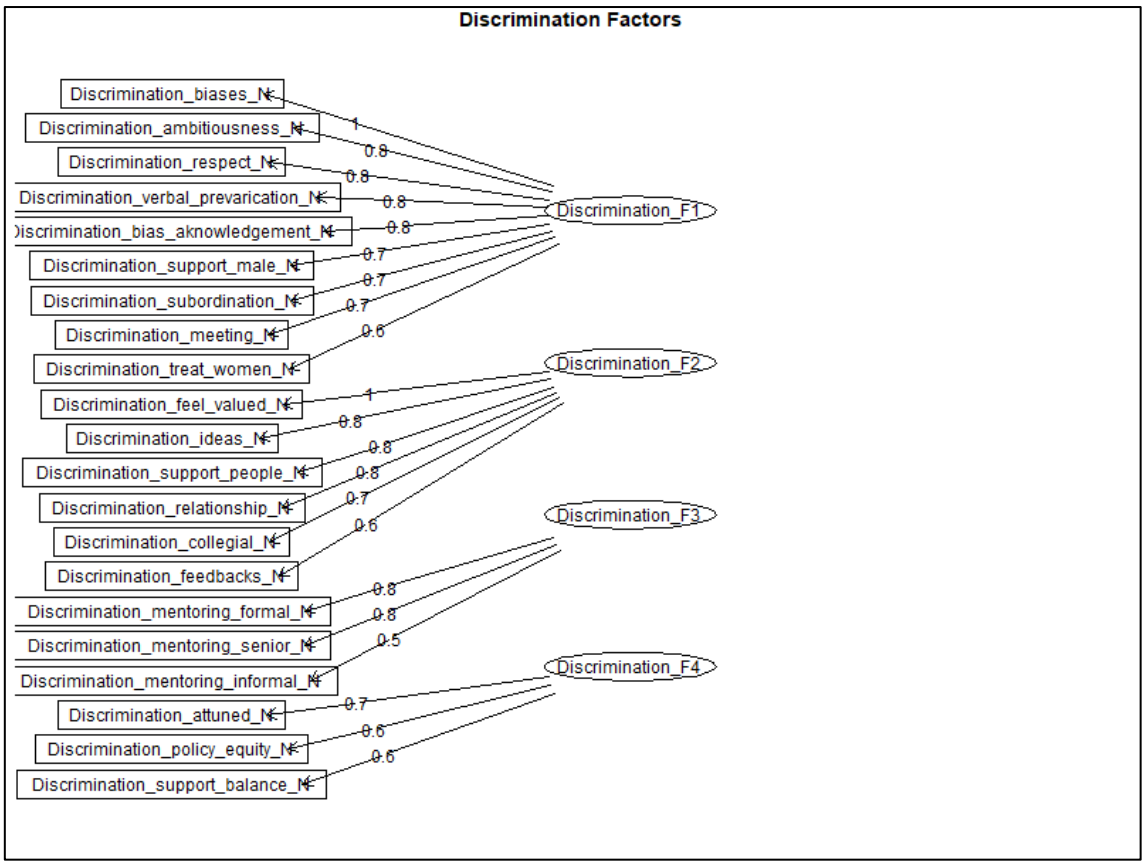
CFA was used to validate the factorial structures identified in the EFA and to obtain fit indices for the proposed models. Concerning the PSDGI, the CFA was based on the structure identified by the authors.

Perceived Subtle Gender Bias Index (PSDGI)

Specified Models

The model specified included four latent factors and was composed as shown in Figure 7 below.

Figure 7: PSDGI Factors composition



Source: Authors' elaboration.

Estimation and validation

Parameter estimates were obtained using the robust Maximum Likelihood Estimation method (MLR) with missing data handled using the "ML" option.

Model fit indices (e.g., CFI, TLI, RMSEA, SRMR) were used to evaluate the goodness-of-fit of the models and are reported in table 1. Acceptable index values confirmed the validity of the proposed factorial structure.

Table 2: Model fit indicators PSDGI CFA

Statistic	Value
Chi-Square Test Statistic	464.412
Degrees of Freedom	183
P-value (Chi-square)	<0.001
Comparative Fit Index (CFI)	0.931
Tucker-Lewis Index (TLI)	0.920
Root Mean Square Error of Approximation (RMSEA)	0.066
RMSEA 90% CI (Lower)	0.058
RMSEA 90% CI (Upper)	0.073
Standardized Root Mean Square Residual (SRMR)	0.057
Bayesian Information Criterion (BIC)	18201.79

Source: Authors' elaboration.

Extraction of Factor Scores

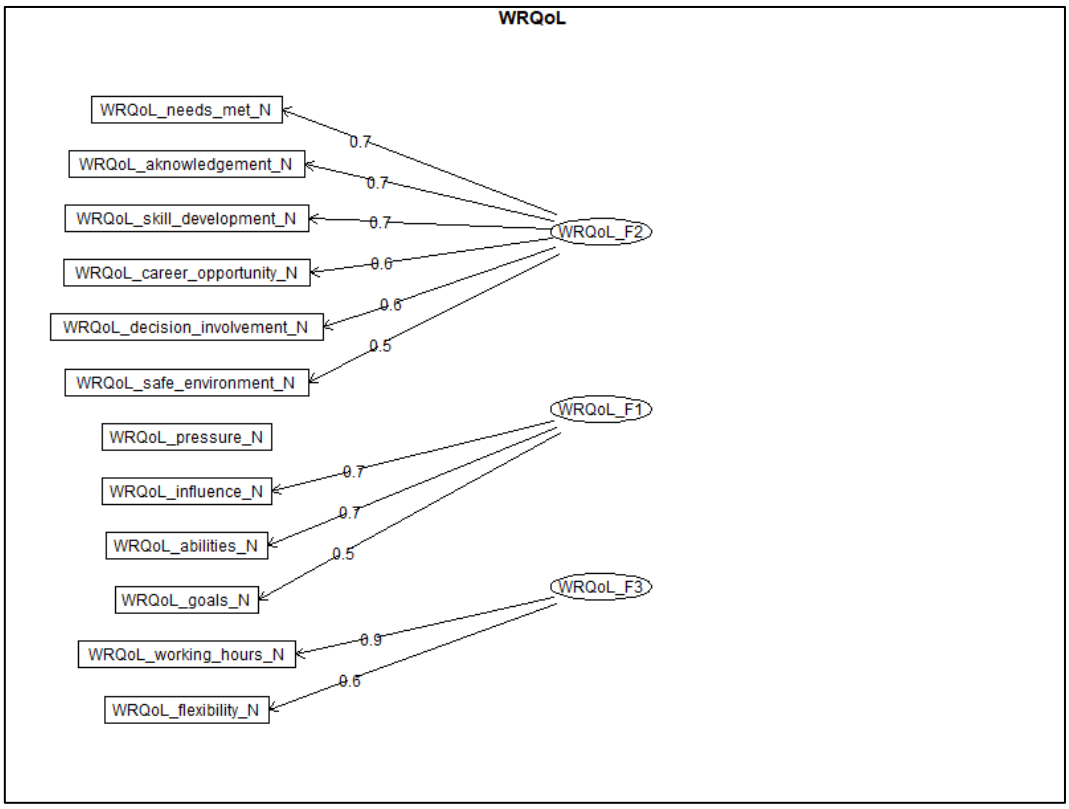
- Factor scores were computed for each validated CFA model and added to the dataset as new variables.
- This allowed the latent dimensions to be represented synthetically, reducing the number of variables in the original dataset. The four factors, discrimination_F1, discrimination_F2, discrimination_F3, and discrimination_F4, respectively identified the following constructs: Perceptions of Gender-Based Inequality; Perceived Workplace Support and Collegiality; Mentorship and Professional Guidance; and Support and Work-Life Balance.

Work-Related Quality of Life (WRQoL)

Specified Models

The model specified included four latent factors and was composed as reported in Figure 8.

Figure 8: WRQoL Factors composition



Source: Authors' elaboration.

Estimation and validation

Parameter estimates were obtained using the robust Maximum Likelihood Estimation method (MLR) with missing data handled using the "ML" option.

Model fit indices (e.g., CFI, TLI, RMSEA, SRMR) were used to evaluate the goodness-of-fit of the models and are reported in Table 2. Acceptable index values confirmed the validity of the proposed factorial structure.

Table 3: Model fit indicators WRQoL CFA

Statistic	**Value**
Chi-Square Test Statistic	120.799
Degrees of Freedom	41
P-value (Chi-square)	0
Comparative Fit Index (CFI)	0.945

Tucker-Lewis Index (TLI)	0.926
Root Mean Square Error of Approximation (RMSEA)	0.076
RMSEA 90% CI (Lower)	0.061
RMSEA 90% CI (Upper)	0.092
Standardized Root Mean Square Residual (SRMR)	0.046
Bayesian Information Criterion (BIC)	9312.359

Source: Authors' elaboration.

Extraction of Factor Scores

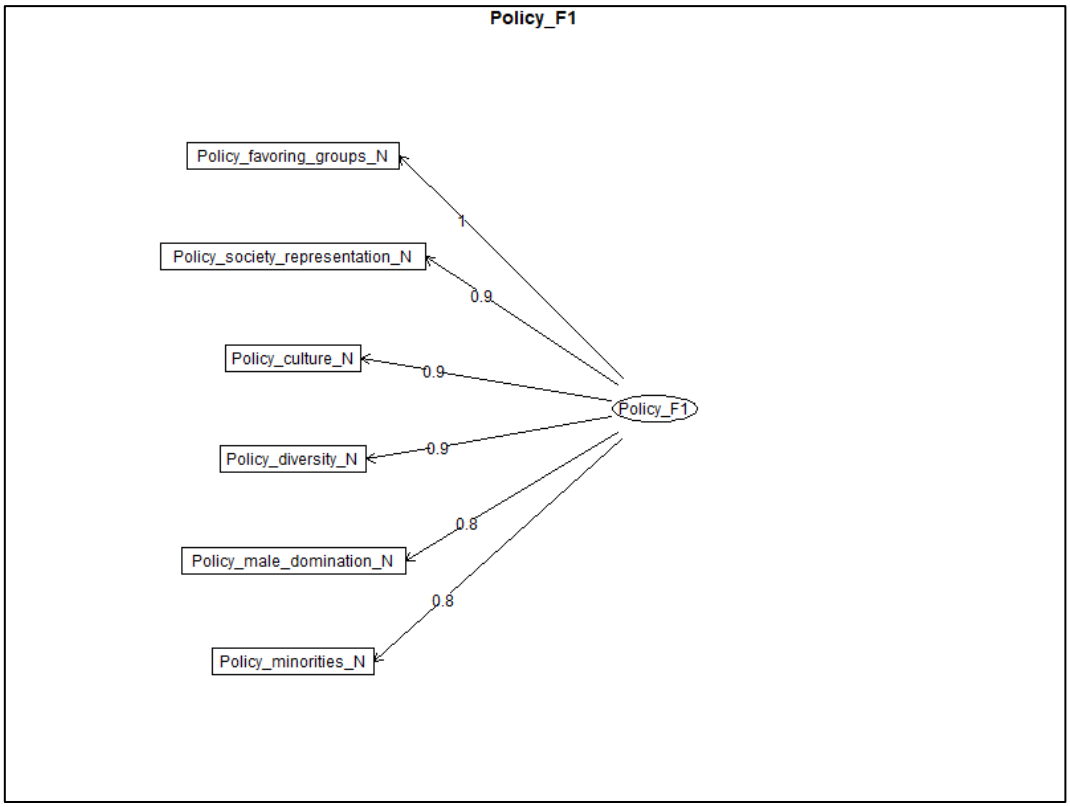
- Factor scores were computed for each validated CFA model and added to the dataset as new variables.
- This allowed the latent dimensions to be represented synthetically, reducing the number of variables in the original dataset. The three factors, WRQoL_F1, WRQoL_F2, WRQoL_F3, respectively identified the following constructs: Empowerment and Goal Clarity in the Workplace; Workplace Support and Professional Development Opportunities; and Work-Life balance and Flexibility.

Perspective for just energy transition knowledge production (PJETKP)

Specified Models

The model specified included four latent factors and was composed as reported in Figure 9.

Figure 9: PJETPK Factors composition



Source: Authors' elaboration.

Estimation and validation

Parameter estimates were obtained using the robust Maximum Likelihood Estimation method (MLR) with missing data handled using the "ML" option.

Model fit indices (e.g., CFI, TLI, RMSEA, SRMR) were used to evaluate the goodness-of-fit of the models and are reported in Table 3. Acceptable index values confirmed the validity of the proposed factorial structure.

Table 4: Model fit indicators PJETPK CFA

Statistic	**Value**
Chi-Square Test Statistic	50.485
Degrees of Freedom	9
P-value (Chi-square)	0.000
Comparative Fit Index (CFI)	0.948
Tucker-Lewis Index (TLI)	0.914

Root Mean Square Error of Approximation (RMSEA)	0.121
RMSEA 90% CI (Lower)	0.090
RMSEA 90% CI (Upper)	0.155
Standardized Root Mean Square Residual (SRMR)	0.047
Bayesian Information Criterion (BIC)	4597.681

Source: Authors' elaboration.

Extraction of Factor Scores

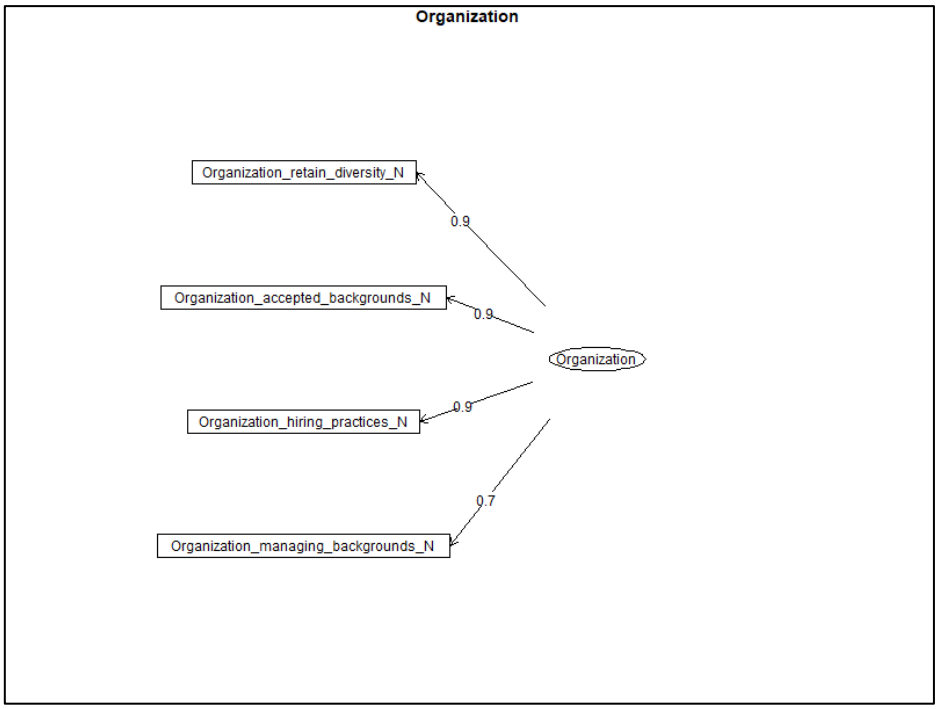
- Factor scores were computed for each validated CFA model and added to the dataset as new variables.
- This allowed the latent dimensions to be represented synthetically, reducing the number of variables in the original dataset. The one factor, Policy_F1, identified the following construct: Commitment to Diversity and Inclusion.

Workplace Diversity Climate (WDC)

Specified Models

The model specified included four latent factors and was composed as reported in Figure 10.

Figure 10: WDC Factors composition



Source: Authors' elaboration.

Estimation and validation

Parameter estimates were obtained using the robust Maximum Likelihood Estimation method (MLR) with missing data handled using the "ML" option.

Model fit indices (e.g., CFI, TLI, RMSEA, SRMR) were used to evaluate the goodness-of-fit of the models and are reported in Table 4. Acceptable index values confirmed the validity of the proposed factorial structure.

Table 5: Model fit indicators WDC CFA

Statistic	**Value**
Chi-Square Test Statistic	5.162
Degrees of Freedom	2
P-value (Chi-square)	0.076
Comparative Fit Index (CFI)	0.994
Tucker-Lewis Index (TLI)	0.983
Root Mean Square Error of Approximation (RMSEA)	0.068
RMSEA 90% CI (Lower)	0.000
RMSEA 90% CI (Upper)	0.144

Standardized Root Mean Square Residual (SRMR)	0.047
Bayesian Information Criterion (BIC)	3425.547

Source: Authors' elaboration.

Extraction of Factor Scores

- Factor scores were computed for each validated CFA model and added to the dataset as new variables.
- This allowed the latent dimensions to be represented synthetically, reducing the number of variables in the original dataset. The one factor, Policy_F1, identified the following construct: Policy Advocacy for Inclusivity in the Energy Sector

Description of the constructs of the extracted factors

Table 6 provides an overview of the factors extracted for each set of questions and the corresponding construct they represent.

Table 6: List of the extracted factors and the relative construct identified

Extracted factor	Construct	Construct description
WRQoL_F1	Empowerment and Goal Clarity in the Workplace	The construct reflects an individual's sense of autonomy, purpose, and meaningful contribution in their professional role. It captures employees' clarity of objectives, effective skills utilization, and freedom to express opinions and influence decisions, emphasizing a workplace that foster personal agency, and alignment with organizational goals
WRQoL_F2	Workplace Support and Professional Development Opportunities	The construct assesses employees' perceived support and recognition at work, including achievement recognition, skill development, decision-making involvement, resource access, and workplace safety. It also reflects career growth satisfaction, emphasizing an organizational culture that prioritizes professional development and well-being.
WRQoL_F3		The construct assesses the extent to which the workplace supports work-life balance through

Extracted factor	Construct	Construct description
	Work-Life balance and Flexibility	flexible working hours and adaptable arrangements, enabling employees to manage professional and personal responsibilities and promoting a healthy work-life balance.
Discrimination_F1	Perceptions of Gender-Based Inequality	The construct assesses perceptions of gender bias in communication, respect, recognition, and support for challenges specific to women. It reflects awareness of disparities in opportunities and treatment between male and female colleagues, including both subtle and overt workplace inequities.
Discrimination_F2	Perceived Workplace Support and collegiality	This construct reflects workplace support and recognition, encompassing collegiality, appreciation, and inclusivity. It captures employees' sense of value, positive feedback on their abilities, and supportive relationships, emphasizing a collaborative and respectful work culture.
Discrimination_F3	Mentorship and Professional Guidance	The construct captures both informal and formal mentoring experiences, including one-on-one interactions and connections with senior leadership mentors, emphasizing the role of mentorship in fostering career growth and development.
Discrimination_F4	Support and Work-Life Balance	The construct reflects the perception of organizational efforts to create an equitable and inclusive workplace. It captures how well the organization recognizes and supports the professional needs of employees, provides resources for balancing work and family responsibilities, and upholds policies that promote fairness and equity.
Policy_F1	Policy Advocacy for Inclusivity in the Energy Sector	The construct reflects support for policies and systemic changes promoting greater diversity and inclusion in the energy sector. This implies the need for clear regulations, cultural shifts, and government intervention to create an equitable workforce, advocating for dismantling existing barriers and fostering inclusivity for the benefit of underrepresented groups.
Organization_F1		The construct represents an organization's commitment to equity and inclusion, encompassing fair hiring, diversity management, and a culture of

Extracted factor	Construct	Construct description
	Commitment to Diversity and Inclusion	acceptance. It also highlights leadership's role in fostering a diverse workforce through equitable actions and inclusive policies.

Source: Authors' elaboration.

Cluster Analysis

This study employed a comprehensive clustering approach to identify patterns within various dimensions derived from survey data, including factors related to: Work-Related Quality of Life (WRQoL), Perceived Subtle Gender Bias Index (PSGBI), Perspective for just energy transition knowledge production (PJETKP), and Workplace Diversity Climate (WDC).

The clustering methodology consisted of several key steps, including data preprocessing, determination of the optimal number of clusters, clustering analysis using k-means, and post-cluster analysis. Each step is detailed below.

For all the cluster analysis performed, the same data preparation process has been applied, and it consists of:

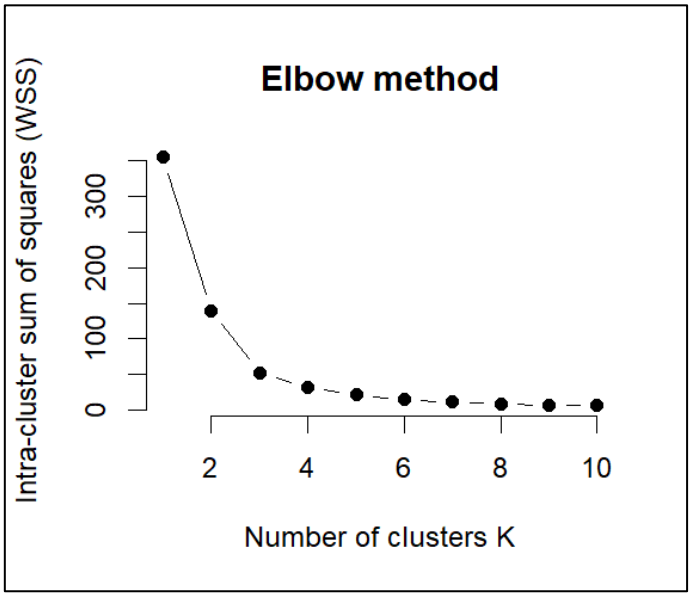
- To ensure accurate clustering results, missing values for the factors extracted from the psychometric scales were imputed using the mean values stratified by gender, prior to performing the cluster analysis. This approach ensured the preservation of any potential gender-based patterns in the data.
- To ensure compatibility with distance metrics and align with algorithms that assume normalized data (such as k-means), and to reduce the impact of outliers, the extracted factors were standardized (z-score) before clustering.

WQRoL_F1

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 11).

Figure 11: Elbow Method representation WQRoL_F1



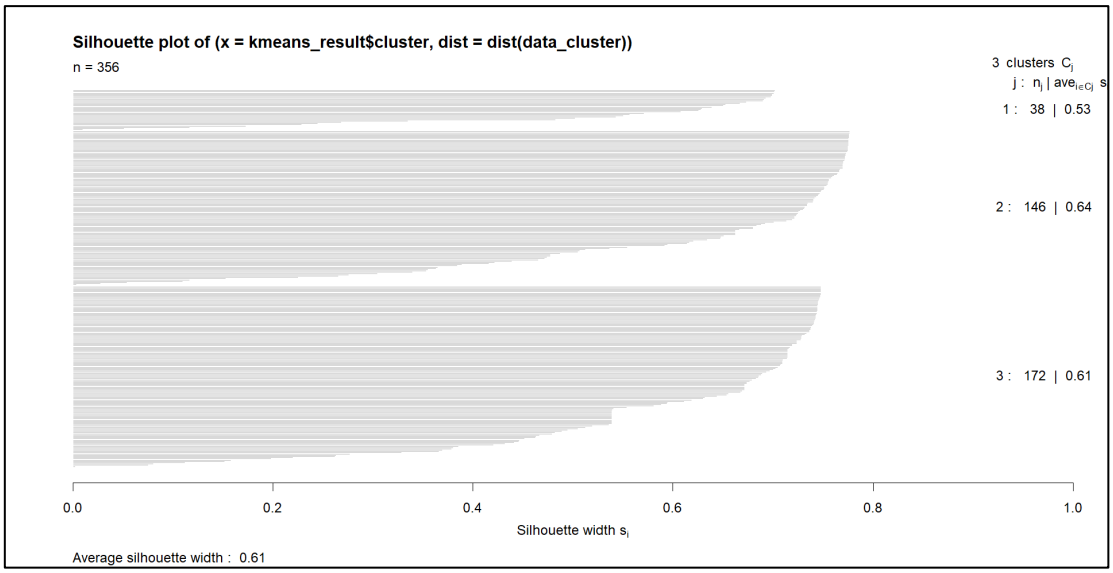
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used.

Figure 12: Silhouette score WQRoL_F1



Source: Authors' elaboration.

The overall average silhouette width is 0.61, which indicates moderately well-separated clusters.

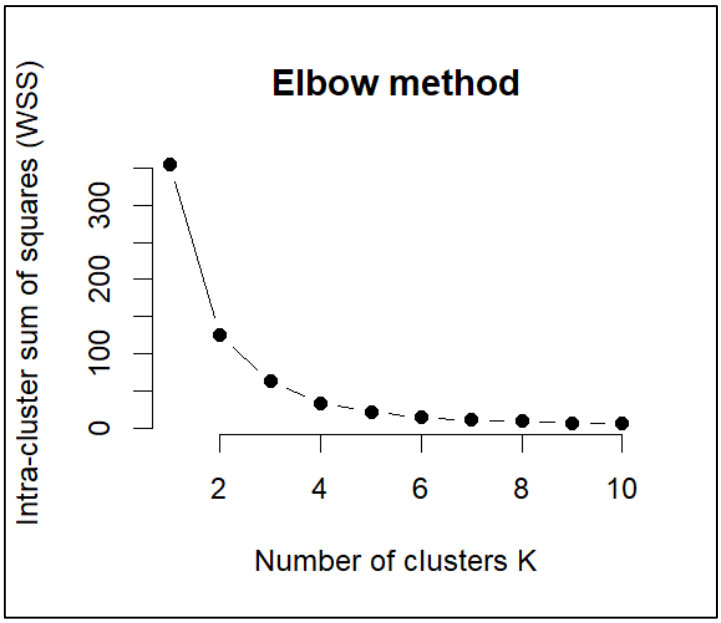
Cluster 1 has the lowest average silhouette width (0.53). Clusters 2 and 3 have higher silhouette widths (0.64 and 0.61).

WQRoL_F2

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 13).

Figure 13: Elbow Method representation WQRoL_F2



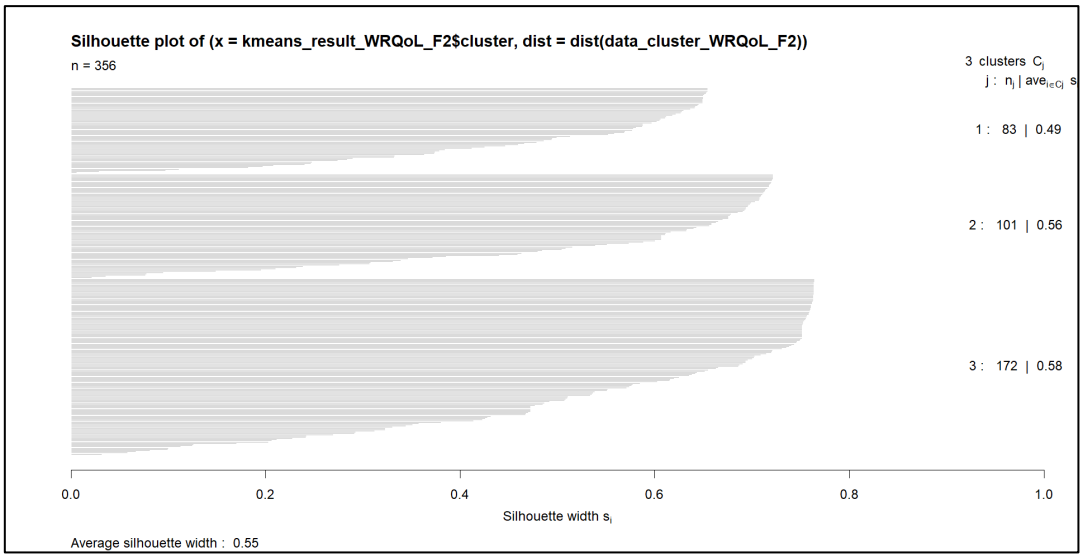
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 14).

Figure 14: Silhouette score WQRoL_F2



Source: Authors' elaboration.

The overall average silhouette width is 0.55, which indicates moderately well-separated clusters.

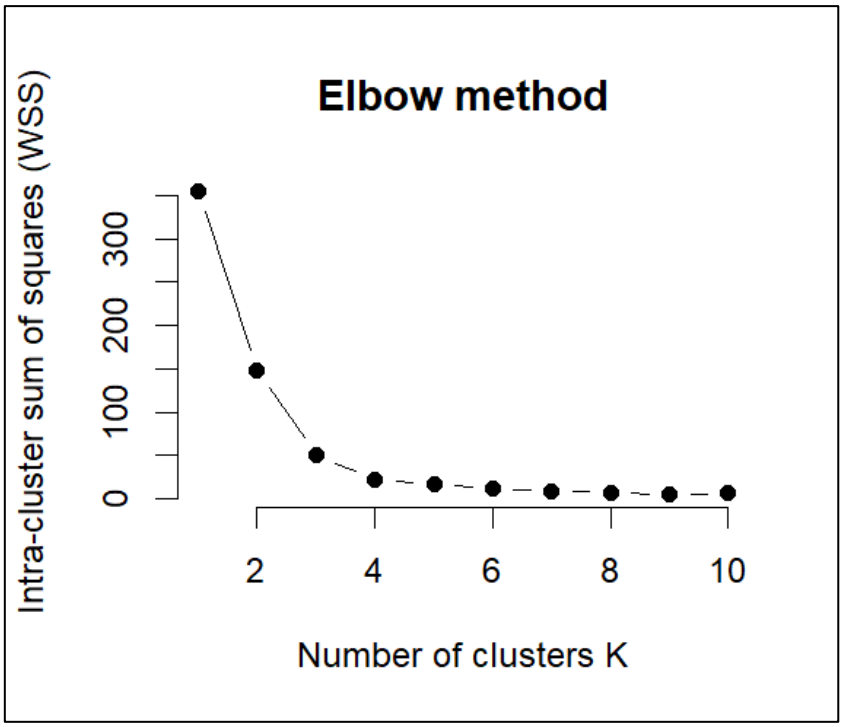
Cluster 1 has the lowest average silhouette width (0.49). Clusters 2 and 3 have higher silhouette widths (0.56 and 0.58).

WQRoL_F3

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 15).

Figure 15: Elbow Method representation WQRoL_F3



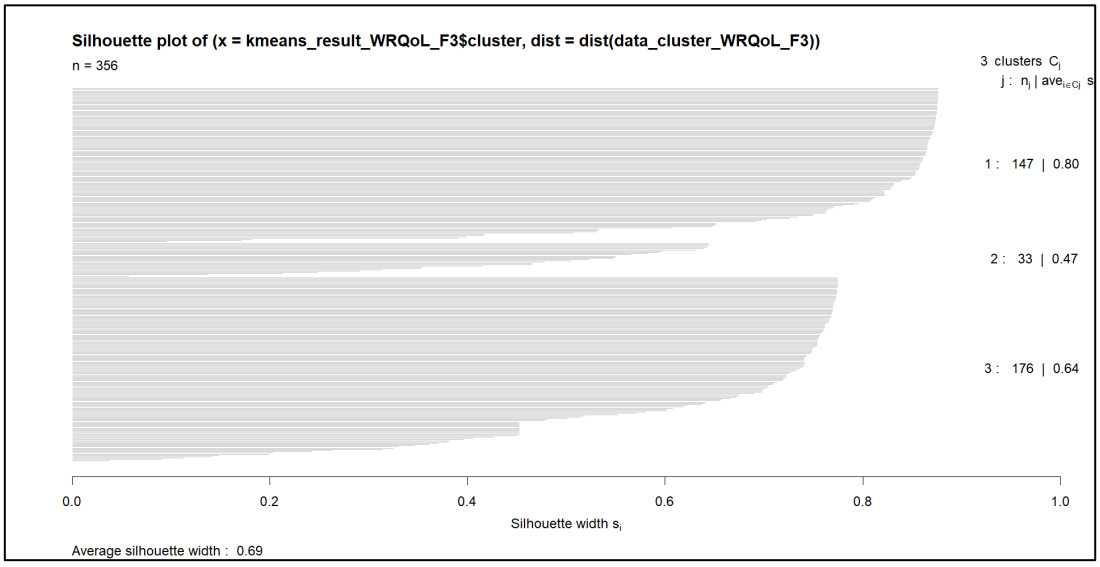
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 16).

Figure 16: Silhouette score WQRoL_F3



Source: Authors' elaboration.

The overall average silhouette width is 0.69, which indicates moderately well-separated clusters.

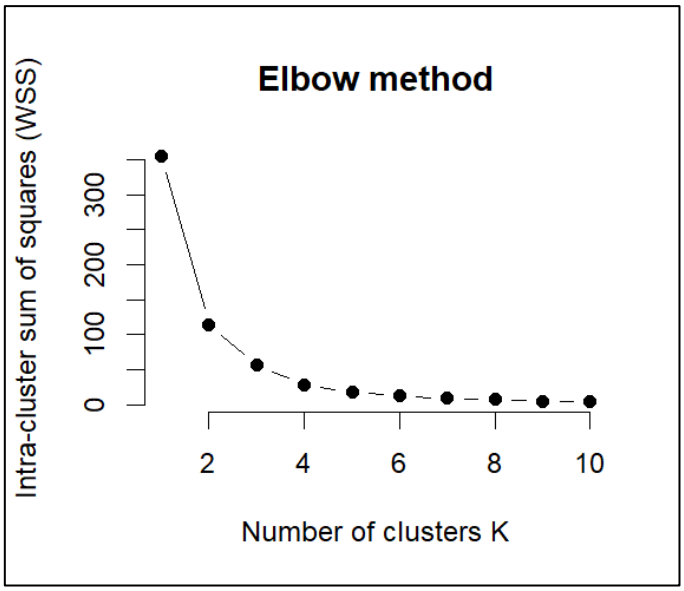
Cluster 2 has the lowest average silhouette width (0.47). Clusters 1 and 3 have higher silhouette widths (0.80 and 0.64).

Discrimination_F1

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed Figure 17).

Figure 17: Elbow Method representation Discrimination_F1



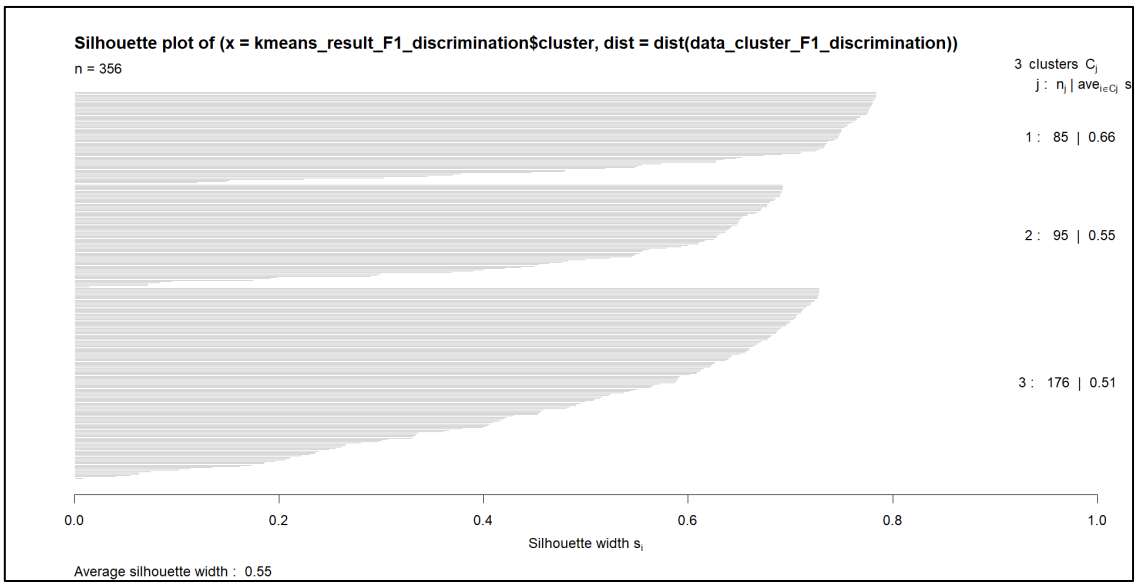
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 18).

Figure 18: Silhouette score Discrimination_F1



Source: Authors' elaboration.

The overall average silhouette width is 0.55, which indicates moderately well-separated clusters.

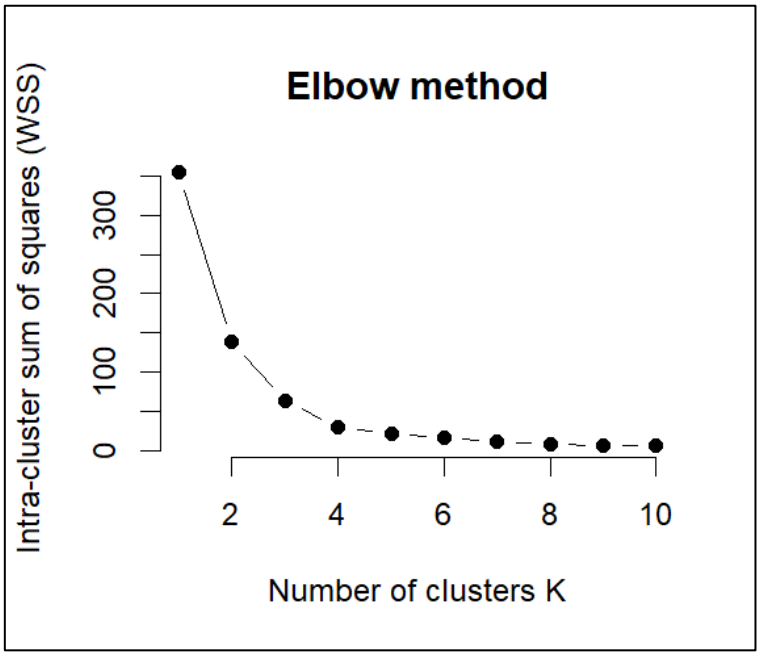
Cluster 3 has the lowest average silhouette width (0.51). Clusters 1 and 2 have higher silhouette widths (0.66 and 0.55).

Discrimination_F2

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 19).

Figure 19: Elbow Method representation Discrimination_F2



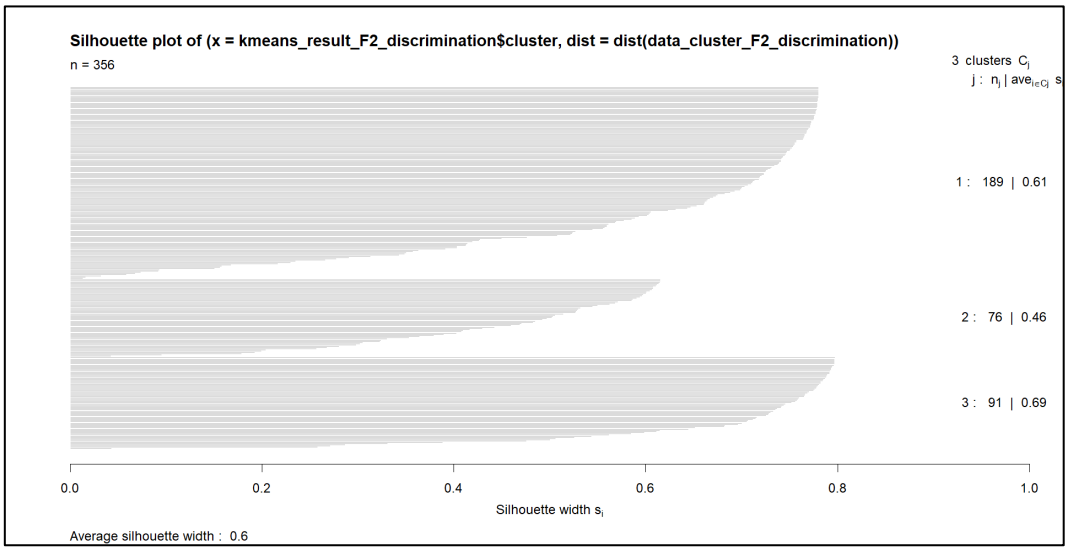
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 20).

Figure 20: Silhouette score Discrimination_F2



Source: Authors' elaboration.

The overall average silhouette width is 0.60, which indicates moderately well-separated clusters.

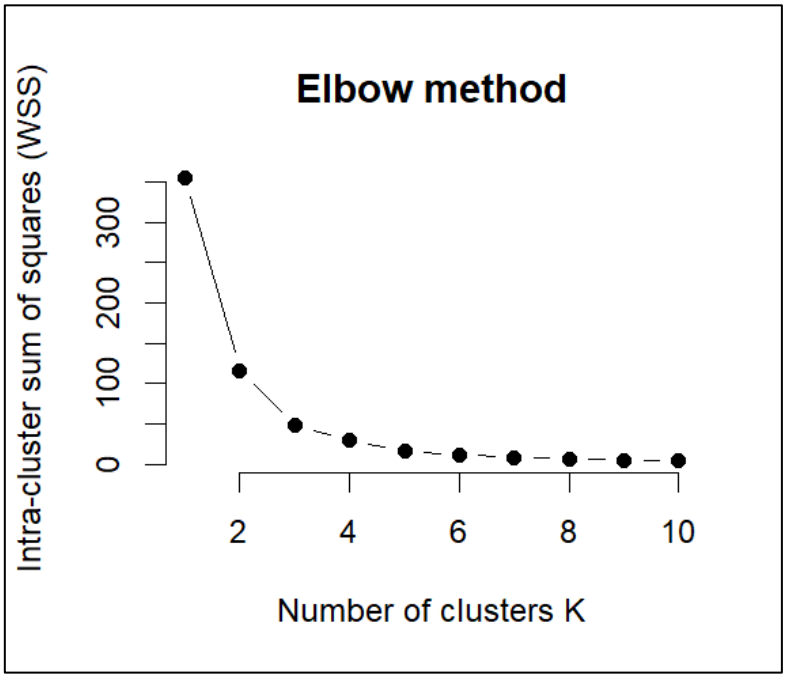
Cluster 2 has the lowest average silhouette width (0.46). Clusters 1 and 3 have higher silhouette widths (0.61 and 0.69).

Discrimination_F3

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 21).

Figure 21: Elbow Method representation Discrimination_F3



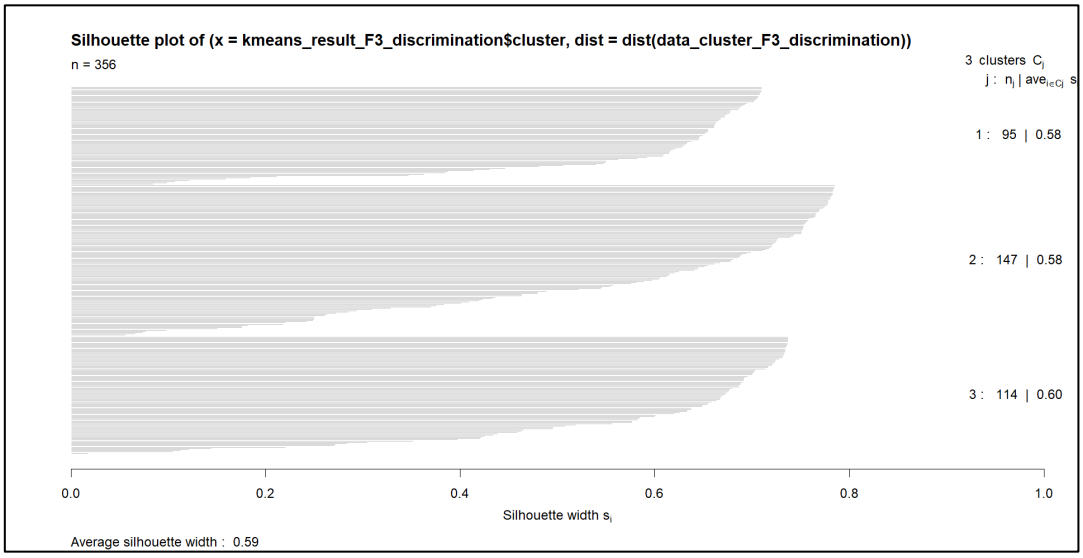
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 22).

Figure 22: Silhouette score Discrimination_F3



Source: Authors' elaboration.

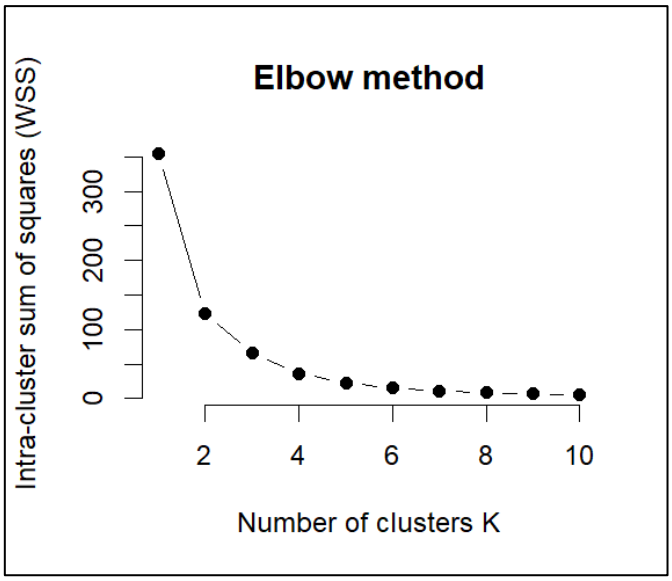
The overall average silhouette width is 0.59, which indicates moderately well-separated clusters. Clusters 1 and 2 have the lowest average silhouette width (0.58). Cluster 3 has a higher silhouette width (0.60).

Discrimination_F4

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 23).

Figure 23: Elbow Method representation Discrimination_F4



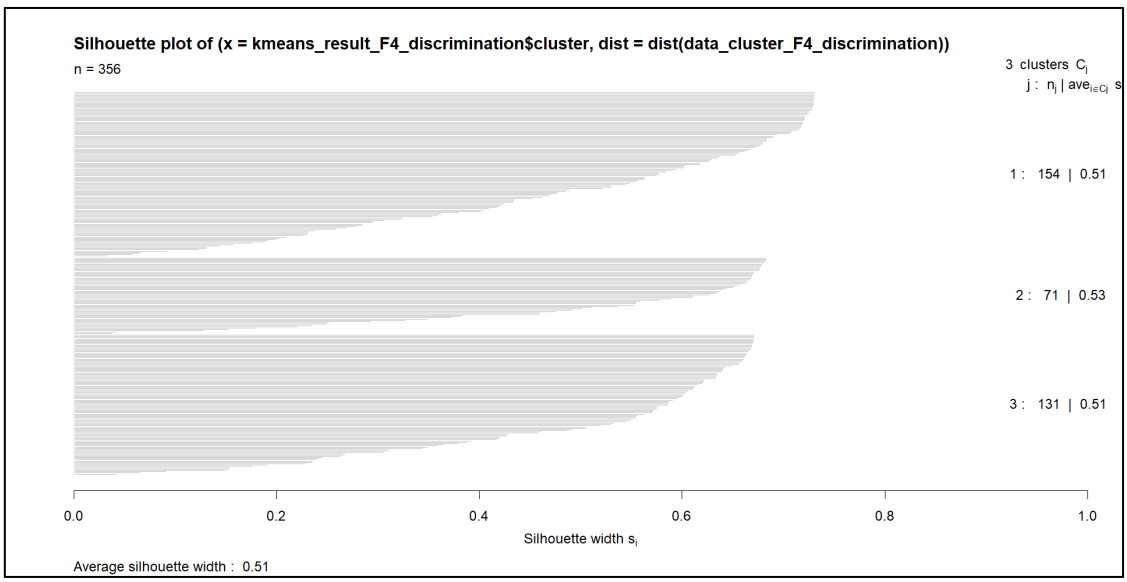
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 24).

Figure 24: Silhouette score Discrimination_F3



Source: Authors' elaboration.

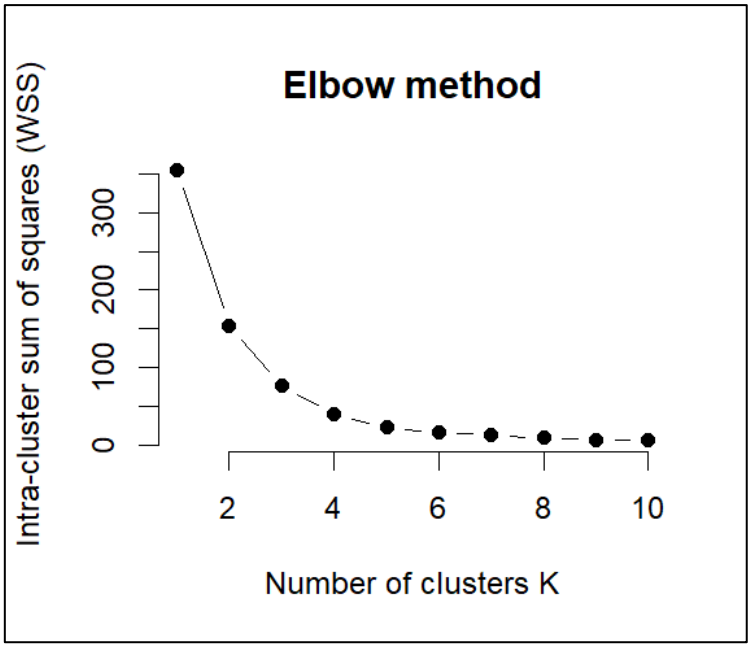
The overall average silhouette width is 0.51, which indicates moderately well-separated clusters. Clusters 1 and 3 have the lowest average silhouette width (0.51) Cluster 2 has a higher silhouette width (0.53).

Policy_F1

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 25).

Figure 25: Elbow Method representation Policy_F1



Source: Authors' elaboration.

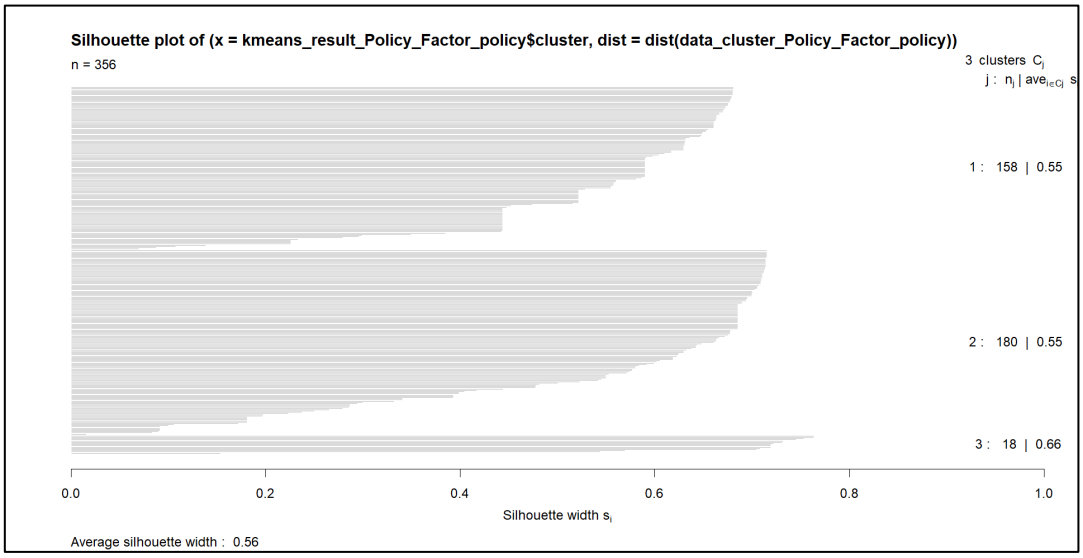
In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor.

The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 26).

Figure 26: Silhouette score Policy_F1



Source: Authors' elaboration.

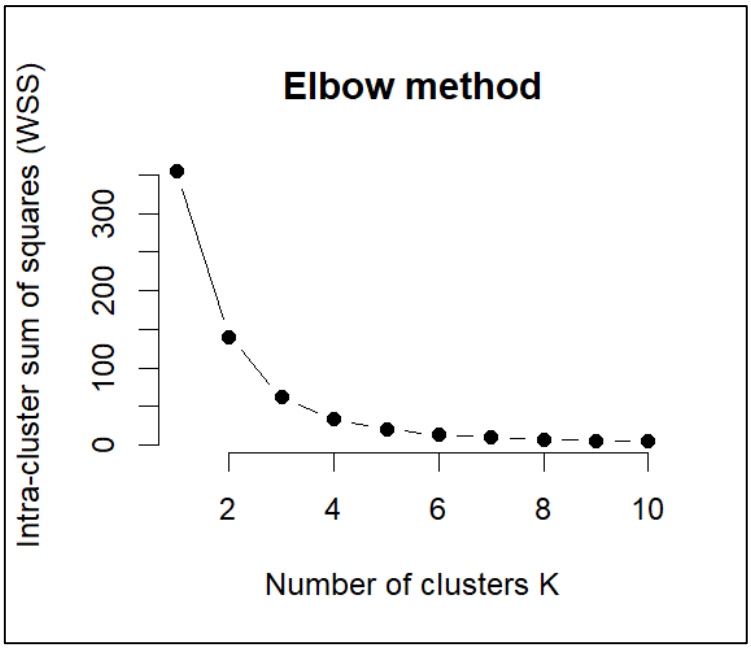
The overall average silhouette width is 0.56, which indicates moderately well-separated clusters. Clusters 1 and 2 have the lowest average silhouette width (0.55) Cluster 3 has a higher silhouette width (0.66).

Organization_F1

Determination of Optimal Number of Clusters

The Elbow Method was used to determine the optimal number of clusters for each factor analyzed (Figure 27).

Figure 27: Elbow Method representation Organization_F1



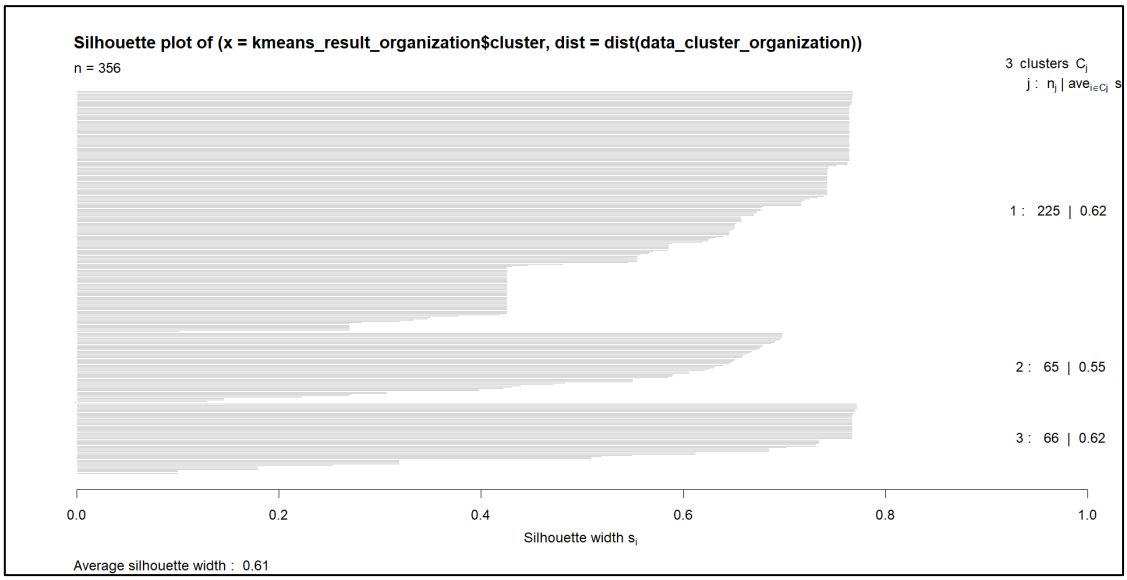
Source: Authors' elaboration.

In the graph, the "elbow" appears to be at K = 3. After this point, the reduction in WSS becomes marginal with additional clusters.

Clustering Analysis and validation

K-means clustering was applied to identify homogeneous groups within each factor. The number of cluster K=3 was used. To evaluate the quality of clustering a Silhouette analysis was used (Figure 28).

Figure 28: Silhouette score Organization_F1



Source: Authors' elaboration.

The overall average silhouette width is 0.61, which indicates moderately well-separated clusters. Clusters 2 has the lowest average silhouette width (0.55) Clusters 1 and 3 have higher silhouette widths (0.62).

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