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Artificial Neural Networks in Leadership Research: Linking Servant Leadership and Work Meaningfulness to Organizational Inclusion

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Abstract

In the contemporary business world, organizations aim to actively engage all employees in core activities to improve outcomes and minimize internal disputes. However, growing workforce diversity has made inclusion an increasingly complex task for leaders. True inclusion depends simultaneously on employees finding their work meaningful and on leaders who can inspire active involvement from everyone. When these elements are missing, alienation and negative attitudes often arise, leading to tension, dissatisfaction, and reduced unity. This study suggests that servant leadership, grounded in the philosophy of "serving others," can substantially enhance organizational inclusion through work meaningfulness. To test this assumption, structural equation modeling (SEM) was utilized to analyze both direct and mediated/moderated influences of servant leadership on inclusion via meaningful work. Additionally, data collected from 400 Turkish employees in both service and manufacturing sectors were examined using an artificial neural network (ANN) approach. Employing a multilayer perceptron model, the research predicts the influence of servant leadership and work meaningfulness on inclusion, considering gender, age, and experience as mediating factors. The outcomes reveal that servant leadership and meaningful work exert a strong and positive impact on inclusion within organizations.

Keywords: Inclusion, Servant Leadership, Meaningfulness, Artificial Neural Networks (ANN), Work Attitudes, Leadership

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Introduction

Despite technological progress, human resources continue to be the core driver of organizational performance [1]. Researchers and business leaders alike continuously seek methods to utilize employee potential more effectively in meeting expanding corporate goals. Many firms hire people from diverse backgrounds to enrich innovation and creativity through varied experiences. Yet, such diversity can also cause divisions and misunderstandings unless leaders take deliberate measures to ensure that every employee feels valued and involved [2]. Without such inclusivity, organizations risk underperformance and negative social dynamics among marginalized individuals [3]. Consequently, there is a growing need for leaders who prioritize inclusion and demonstrate genuine care for staff, clients, and the broader community [4, 5].

Leadership that emphasizes purposeful and motivating work can strengthen collective engagement [6]. Servant leaders, guided by a service-oriented mindset, help employees find moral and ethical meaning in their work [3]. Likewise, employees feel more integrated when their tasks align with the organization's higher purpose and contribute to social good [7]. Based on this reasoning, there appears to be a close interconnection among servant leadership, meaningful work, and organizational inclusion. Despite this link, few studies have empirically explored how servant leadership relates to work meaningfulness [8] or inclusion [9]. The current study proposes that servant leadership acts as a precursor to inclusion, with work meaningfulness mediating the relationship between the two.

Beyond addressing this research gap, the study provides both academic and managerial contributions. It enhances understanding of how these three variables interact within organizational settings and offers practical guidance for leaders aiming to inspire positive work attitudes. By combining traditional SEM techniques with ANN analysis, this research applies a hybrid quantitative approach to identify both linear and non-linear dynamics between servant leadership and inclusion. Moreover, it investigates how demographic characteristics—specifically gender, age, and professional experience—modify these relationships. Overall, the study seeks to clarify how servant leadership promotes inclusion, both directly and indirectly, through the mechanism of meaningful work.

Literature Review

Understanding organizational inclusion

Workforce diversity is unavoidable in any organization, since even groups appearing uniform differ in personality, thinking, and background [10, 11]. When this diversity is effectively integrated, it becomes a competitive advantage and enhances organizational strength [2]. Miller [12] described inclusion as the level to which individuals are permitted and supported to engage in both professional and social functions at work. According to Shore *et al.* [13], inclusion represents employees' perceptions of being valued members of the organization and reflects their emotional connection to the workplace. Evidence demonstrates that inclusion directly enhances outcomes — inclusive teams perform about 17% better, make decisions that are 20% more effective, and show 29% higher collaboration [14].

Prior studies also confirm that inclusion strengthens trust, innovation, commitment, well-being, and creativity [13, 15]. At the same time, inclusive climates help minimize adverse consequences of diversity such as stress, interpersonal conflicts, turnover, and withdrawal from work [16]. Among the several determinants of inclusion, leadership is viewed as a critical driver [2], while work meaningfulness also enhances employees' sense of inclusion [17].

Understanding work meaningfulness

Work meaningfulness arises when an individual perceives alignment between their organizational role and their own personal values, ambitions, and ethical standards [7]. Employees naturally look for meaning in their work that resonates with both personal and societal goals [17]. People tend to perform optimally when contributing to purposes greater than themselves — such as community welfare, religion, or global service [18]. Studies show that meaningful work correlates with higher job satisfaction, commitment, intrinsic motivation, and willingness to stay [19].

Because employees increasingly evaluate how their efforts contribute to a greater cause, researchers have focused on what builds work meaningfulness [20]. Individuals continually assess whether their work provides happiness, value, and fulfillment [21]. Leaders, therefore, need to define purposeful goals that connect employees' roles to broader organizational missions [17, 18]. Interestingly, material rewards are no longer seen as the main work motivator [22, 23]. Instead, the ability of meaningful work to enhance self-worth, respect, and social belonging is now the most influential motivator [17]. Consequently, work meaningfulness has become a core requirement for contemporary organizations and a key element in sustaining long-term employee motivation [24].

Servant leadership and its link to organizational inclusion

Leadership plays a central role in forming inclusive environments [2]. Servant leaders, who emphasize the well-being of others before their own interests, focus on ethics, morality, and service to others [15]. By guiding and supporting employees and prioritizing their development, servant leaders cultivate climates that value diversity and promote inclusion [9, 25]. Empathy toward underrepresented groups further reinforces this inclusivity [26]. Servant leadership also helps build equitable networks based on fairness, respect, and justice, which encourage inclusive practices [27].

This form of leadership aligns organizational strategies with fairness-based behaviors, ensuring inclusion across all hierarchical levels [13]. According to Liden *et al.* [28], servant leadership improves overall performance by promoting inclusion through the principle of serving others. Servant leaders empower, guide, and motivate employees to unlock their potential, which in turn strengthens their feeling of being valued members of the organization [29]. Their inclusive approach enables individuals from diverse backgrounds to express organizational ideals while embracing their unique qualities [30]. Through open communication and mutual respect, servant leaders reinforce that diversity is not only accepted but celebrated [9]. Such proactive engagement encourages employees to feel involved and respected, consistent with Shore *et al.*'s [13] inclusion framework. Therefore, it is reasonable to propose that servant leadership positively shapes organizational inclusion.

Hypothesis 1 (H1): Servant leadership positively affects organizational inclusion.

Servant leadership and work meaningfulness

Leadership credibility is often rooted in linking one's actions to moral standards, ethical conduct, and dedication to serving others [18]. Servant leaders, in particular, gain legitimacy through their commitment to prioritizing others' welfare above

personal benefit [31]. The concept, first articulated by Robert K. Greenleaf in 1970, presents leadership as a moral philosophy founded on humility, empathy, and service. As an ethical and human-centered model, it focuses on empowerment, trust, care, and community building [32, 33]. Through these traits, servant leaders cultivate employees' sense of purpose and strengthen the value of their work experiences.

From this perspective, servant leadership can be seen as a key antecedent to employees' perceptions of meaningful work [34]. According to the Self-Concept Theory [35], a leader's effectiveness stems from the ability to align followers' self-identity with the organization's broader vision [36]. When leaders attach moral or humanitarian significance to work, employees perceive their roles as part of a greater cause [37]. Serving others thus becomes a moral pursuit that provides employees with a deeper sense of meaning [38]. Consequently, servant leadership is expected to strengthen work meaningfulness and, in turn, enhance performance and workplace well-being.

Hypothesis-2 (H2): Servant leadership positively affects work meaningfulness.

Work meaningfulness and organizational inclusion

Meaningful work represents an internal source of motivation, often tied to a sense of belonging, competence, and self-determination [39]. Employees who observe their leaders engaging in socially beneficial actions tend to feel part of that broader mission [40]. Because the notion of service embodies moral worth, servant-led initiatives are known to foster inclusive work environments [41]. Work that is perceived as valuable or purposeful can unite individuals across diverse backgrounds under shared organizational goals. Conversely, a lack of meaning can increase detachment and isolation. Therefore, by redirecting attention from personal gain to collective purpose, meaningful work contributes to an inclusive organizational atmosphere [26]. Based on this reasoning, it is proposed that work meaningfulness is positively associated with inclusion.

Hypothesis-3 (H3): Work meaningfulness influences organizational inclusion.

Mediating role of work meaningfulness between servant leadership and inclusion

Theoretical and empirical insights suggest that work meaningfulness acts as an intermediary between servant leadership and inclusion. This relationship can be explained through Social Exchange Theory [42] and the Leader–Member Exchange (LMX) Theory [43], which assert that social relationships persist when all parties derive value from them [44]. In this context, servant leaders reinforce such exchanges by portraying work as a moral or ethical pursuit aligned with service to others [40]. This approach fosters satisfaction among leaders and employees alike by emphasizing contribution to society [45]. When employees internalize this perspective, they reciprocate through cooperation and engagement, thereby building inclusion. Hence, work meaningfulness likely serves as a mediator in this relationship.

Self-Concept Theory [35] further reinforces this argument by linking an individual's perception of self with their work. Followers of servant leaders often identify with the altruistic mission of serving others, which enhances their self-worth and sense of inclusion [46]. Thus, servant leadership instills meaning in work, and that meaning, in turn, drives inclusion.

Hypothesis-4 (H4): Work meaningfulness mediates the relationship between servant leadership and organizational inclusion.

Moderating effects of demographic factors (Gender, Age, and Work Experience)

Following a detailed analysis of prior research, a conceptual framework was formulated to depict the interaction between servant leadership, work meaningfulness, and inclusion. Previous findings confirm that both servant leadership and meaningful work influence organizational inclusion [2, 34, 37]. However, the strength of these relationships may vary depending on demographic factors such as gender, age, and professional experience. Therefore, Hypotheses 4, 5, and 6 address these moderating influences. **Figure 1** illustrates the proposed conceptual model that visually represents these interconnections among servant leadership, work meaningfulness, and organizational inclusion.

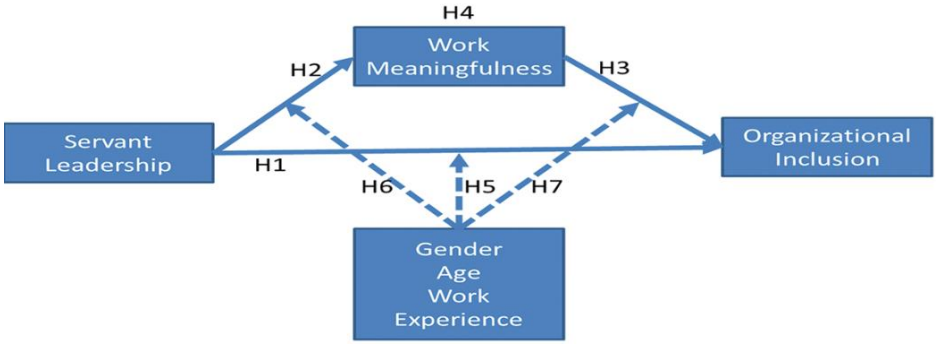

Figure 1. Conceptual Model

Hypothesis-5 (H5): Gender, age, and work experience act as moderating factors between servant leadership and organizational inclusion.

Hypothesis-6 (H6): Gender, age, and work experience act as moderating variables between servant leadership and the sense of work meaningfulness.

Hypothesis-7 (H7): Gender, age, and work experience moderate the association between work meaningfulness and organizational inclusion.

Methodology

Research framework

The connection between servant leadership and inclusion within organizations, together with the mediating effect of meaningful work, has rarely been explored through quantitative evidence. To address this research void, the current study employed a quantitative method to analyze information gathered from Turkish organizations functioning in the manufacturing and service sectors. These two sectors constitute the core of most economies, accounting for roughly 70–80% of Turkey's GDP and supplying jobs to around 40–50% of its total labor force. Since workforce motivation in these areas strongly influences productivity, it provides a suitable context for this investigation [38].

Sampling and data gathering

The research focuses on employees from Turkey's service and manufacturing sectors. Since the total number of individuals in this group is not precisely known and relevant population data are unavailable, it was not possible to construct an exact sampling frame. Consequently, the required sample size was derived using Cochran's formula as follows:

$$n_o = \frac{z^2 pq}{e^2} = (1.96)^2(0.5)/(0.5)^2 = 385 \quad (1)$$

In total, 400 valid survey responses were gathered, which was considered an adequate number for analysis [47]. This figure surpasses the sample size estimated via Cochran's equation (385) as well as the minimum of 111 generated by G*Power (Effect size = 0.3, Alpha = 0.05, Power = 0.95) [48]. It also satisfies the "50-times rule of thumb" applicable to artificial neural network modeling [49]. **Table 1** displays the demographic breakdown of participants, covering factors such as gender, age, marital status, job title, and professional experience.

Table 1. Demographic Distribution of Respondents

Variable	Category	Frequency	Percent (%)
Gender	Male	231	57.8
	Female	169	42.3
Industry Sector	Manufacturing Sector	200	50.0
	Services Sector	200	50.0
Age	Less than 25 years	61	15.3
	25–35 years	180	45.0
	36–45 years	129	32.3
	46 years and above	30	7.5
Marital Status	Married	207	51.8
	Unmarried	193	48.3
Designation	Non-managerial	132	33.0
	Line Manager	217	54.3
	Middle Manager	46	11.5
	Top management	5	1.3
Work Experience	Less than 5 years	125	31.3
	5–10 years	236	59.0
	10 years and above	9	2.3

Measurement tools

All constructs were measured using validated items from prior research that had been employed in several published studies. These items were slightly reformulated to match the Turkish context, in accordance with Shareef *et al.* [50]. To keep participation simple and time-efficient, responses were recorded on five-point Likert scales, which are known to reduce response fatigue and improve completion rates [51].

Gender was coded as a two-category nominal variable, while age and work experience were rated on five and three levels, respectively.

Servant leadership

Servant leadership was evaluated using self-assessment questionnaires on a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The scale contained 23 statements adapted from Barbuto and Wheeler [52], achieving a Cronbach's alpha of 0.825, confirming strong internal consistency. Example statements include:

- "My leader prioritizes my welfare before his or her own."
- "My supervisor continuously seeks to serve me."
- "My leader gives up personal gains to meet my needs."

Work meaningfulness

Work meaningfulness was determined using a six-item measure adapted from May *et al.* [53]. Respondents rated each statement on a five-point Likert scale. The instrument displayed excellent reliability with a Cronbach's alpha value of 0.91. Sample items were:

- "What I do at work holds great personal importance."
- "The activities in my job have personal significance for me."
- "The work I perform feels valuable."

Organizational inclusion

Organizational inclusion was captured using a six-statement scale adjusted from Mousa and Puhakka [2], with reliability recorded at $\alpha = 0.86$. Items were rated on a five-point Likert continuum, and reworded slightly to reflect the local organizational culture. Illustrative statements included:

- "Everyone in my organization is treated as an insider."
- "I have not experienced bias or discrimination in my workplace."

Preliminary testing and refinements

Reliability and validity analysis

After adapting and refining the scale items, a pilot study was executed among 100 participants to verify clarity and content relevance, following the procedure of Kim *et al.* [54]. Additionally, input from six organizational managers—three from each sector—was gathered to further enhance the instrument's quality.

Reliability tests revealed that Cronbach's alpha coefficients surpassed 0.70 for all constructs, confirming acceptable internal consistency. The validity was examined using Pearson correlation coefficients between each variable's total score and its individual items. Aggregate coefficients ranged from 0.51 to 0.68, all exceeding the 0.5 threshold, and most single items also scored above 0.5, indicating sound validity of the instrument.

Multivariate statistical assumptions

Before conducting multivariate analyses, it was essential to verify the fundamental statistical assumptions for accuracy and consistency [55]. The linearity assumption was tested using SPSS/AMOS by reviewing deviations from linearity. As displayed in **Table 2**, results indicated that the connection between servant leadership and organizational inclusion ($p = 0.031 < 0.05$) and between servant leadership and work meaningfulness ($p = 0.001 < 0.05$) was non-linear, based on the significance of deviation. In contrast, the association between work meaningfulness and organizational inclusion was found to be linear ($p = 0.158 > 0.05$). Because some links were non-linear, neural network analysis was incorporated to model these non-linear effects effectively.

To identify any multicollinearity problems, Variance Inflation Factors (VIF) and tolerance levels were reviewed. The VIF range of 1.578–5.971 was within the acceptable boundary (<10), while the tolerance values (0.536–0.117) exceeded 0.10. Hence, no significant multicollinearity was present among predictors [56].

Table 2. Linearity/Non-linearity of Relationships

Relationship	Type	Sum of Squares	df	Mean Square	F	Sig.
Servant Leadership → Organizational Inclusion	Combined	36.828	20	1.841	9.809	.000
	Linearity	30.691	1	30.691	163.493	.000
	Deviation from Linearity	6.137	19	0.323	1.721	.031
Servant Leadership → Work Meaningfulness	Combined	33.631	19	1.770	9.047	.000
	Linearity	25.211	1	25.211	128.863	.000
	Deviation from Linearity	8.420	18	0.468	2.391	.001

Work Meaningfulness → Organizational Inclusion	Combined	64.880	20	3.244	12.736	.000
	Linearity	53.331	1	53.331	209.338	.000
	Deviation from Linearity	11.548	19	0.608	2.386	.158

Homoscedasticity was examined through a scatter plot of standardized residuals **(Figure 3)**. The residuals were scattered evenly along a horizontal line, confirming that the data met the assumption. For normality testing, both the Kolmogorov–Smirnov and Shapiro–Wilk tests were applied, which indicated that the dataset was non-normally distributed, as p-values were less than 0.05. Due to this, the Partial Least Squares Structural Equation Modeling (PLS-SEM) method was chosen, as it is well-suited for non-normal datasets [57].

Given that non-linear patterns were also identified, Artificial Neural Network (ANN) techniques were utilized alongside SEM. SEM was employed to test hypotheses, whereas ANN was used to model the non-linear relationships between constructs [58, 59].

Exploratory Factor Analysis (EFA)

As the measurement scale had not been tested in the Turkish context previously, Exploratory Factor Analysis was undertaken to confirm the instrument's suitability. The Kaiser-Meyer-Olkin (KMO) and Bartlett's tests **(Table 3)** verified that the dataset was appropriate for factor analysis. **Table 4** presents the factor loadings of the observed variables.

Eight statements related to servant leadership (five from the wisdom domain and one from each of the remaining dimensions) were excluded because of weak loadings. The finalized version of the survey contained 15 items for servant leadership, and 6 items each for work meaningfulness and organizational inclusion, making 27 items in total. Adjusting or removing low-loading indicators due to contextual variation aligns with existing research practices [60, 61].

Table 3. KMO and Bartlett's Test

Test	Statistic	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**.882**
Bartlett's Test of Sphericity	Approx. χ^2	**5158.557**
	df	**210**
	Sig.	**.000**

Table 4. Exploratory Factor Analysis (EFA)

Construct & Item	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
Servant Leadership						
Service to Others						
1. This person goes above and beyond call of duty to meet my needs.	**0.863**					
2. This person is talented at helping me to heal emotionally	**0.744**					
3. This person sacrifices his/her own interests to meet my needs.	**0.726**					
4. This person does everything he/she can to serve me.	**0.701**					
5. This person seems in touch with what is happening.	**0.703**					
6. This person puts my best interests ahead of his/her own.	**0.705**					
Persuasive Mapping						
7. This person is good at convincing me to do things		**0.804**				
8. This person is very persuasive		**0.780**				
9. This person encourages me to "big dreams" about the organization		**0.725**				
Organizational Stewardship						
10. This person sees organization for its potential to contribute to society			**0.775**			
11. This person believes that organization needs to play moral role in society			**0.774**			
12. This person encourages me to have a community spirit in workplace			**0.735**			
Emotional Healing						

13. This person is good at helping me with my emotional issues	**0.847**		
14. This person is one I would turn to if I had a personal trauma	**0.748**		
15. This person is one that could help me mend my hard feelings	**0.706**		
Work Meaningfulness			
1. The work I do on this job is meaningful to me		**0.783**	
2. The work I do on this job is worthwhile		**0.776**	
3. I feel that the work I do on my job is valuable		**0.753**	
4. My job activities are significant to me		**0.723**	
5. My job activities are personally meaningful to me		**0.763**	
6. The work I do on this job is very important to me		**0.731**	
Organizational Inclusion			
1. My organization appreciates all members regardless of their differences.			**0.876**
2. My organization respects the uniqueness of every member.			**0.891**
3. My organization treats all members as insiders.			**0.775**
4. I did not feel any discrimination while working at my organization.			**0.793**
5. My organization recruits and develops all members based on their qualifications.			**0.772**
6. Equality, tolerance and sameness are the main feature of my organization.			**0.895**

Convergent and discriminant validity

To verify validity, convergent validity and reliability were assessed through Average Variance Extracted (AVE) and Composite Reliability (CR) values [62]. In addition, McDonald's Construct Reliability (MaxR(H)) was computed to reinforce reliability findings. As stated by Hair *et al.* [47], Coefficient H expresses the association between a latent construct and its indicators, taking all item weights into account without being affected by sign direction.

Results **(Table 5)** revealed that all CR values exceeded 0.70, and AVE values surpassed 0.50, confirming both construct reliability and convergent validity [63]. The square roots of AVE were larger than any inter-construct correlations, establishing discriminant validity [64]. Furthermore, each indicator loaded strongly on its intended construct, confirming satisfactory construct distinction. Collectively, the measurement model accounted for 68.54% of the variance in organizational inclusion.

Table 5. Validity Analysis

Construct	CR	AVE	MSV	MaxR(H)
Servant Leadership (SL)	0.797	0.567	0.518	0.799
Work Meaningfulness (MW)	0.883	0.558	0.523	0.884
Organizational Inclusion	0.851	0.538	0.518	0.881

Reliability

To ensure reliability, a one-tailed test with a 0.05 significance level was applied. As presented in **Table 6**, the Cronbach's alpha and Composite Reliability (CR) values for all constructs were higher than 0.70, demonstrating strong internal consistency and reliability [65].

Table 6. Reliability of Construct Measurement

Variable	Rho_A	CR	Cronbach's α
Servant Leadership	0.791	0.877	0.882
Work Meaningfulness	0.887	0.913	0.894
Organizational Inclusion	0.879	0.902	0.867

CR = Composite reliability

Confirmatory Factor Analysis (CFA)

Model fit was assessed through a range of indices, including Chi-square (χ^2), Normed Chi-square (χ^2/df), Root Mean Square Error of Approximation (RMSEA), and the Comparative Fit Index (CFI). The CFA yielded the following results:
$\chi 2 = 843.1$, $p > .001$; $\chi 2/df = 2.62$; RMSEA = .064 (90% CI [.059, .069]); CFI = .915.
These values confirm that the model fit was satisfactory and aligned with established guidelines [47, 62, 63, 66].

Common Method Bias (CMB)

Since data for both independent and dependent variables were obtained through the same questionnaire, the potential for common method bias was evaluated. The Harman's single-factor test revealed that one factor explained only 18.6% of the total variance, far below the 50% threshold, suggesting that CMB was not problematic.
To further substantiate this, a common latent factor analysis was performed, converting all observed items into a single higher-order construct [65]. The analysis showed that most method loadings were either minimal or negative, supporting Harman's test result and confirming that common method bias was negligible.

Structural model

The analysis began with the use of Structural Equation Modeling (SEM) and was later supplemented by the Artificial Neural Network (ANN) method. The SEM procedure explored how servant leadership, work meaningfulness, and organizational inclusion were interconnected. Within this model, servant leadership functioned as the predictor variable, influencing organizational inclusion both directly and indirectly through the mediating role of work meaningfulness.
SEM results were used to evaluate not only the magnitude but also the direction of these connections. Additionally, the individual effects of gender, age, and work experience on organizational inclusion were tested, together with their moderating influences on the paths connecting servant leadership, work meaningfulness, and organizational inclusion. The overall path framework appears in **Figure 4**, while **Table 7** summarizes the regression outputs.

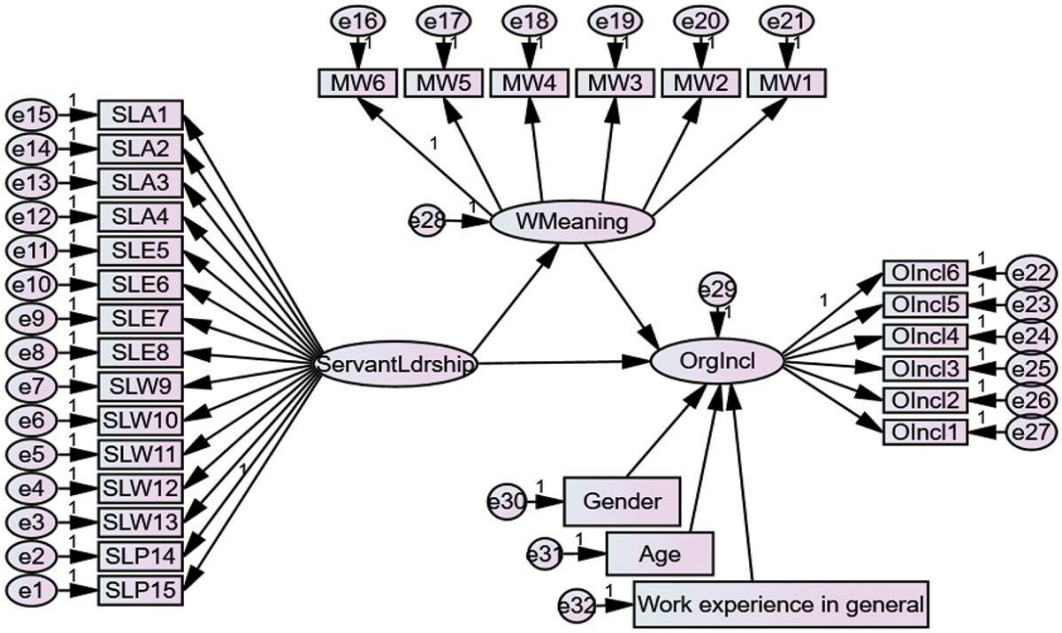

Figure 4. Structural Model

Table 7. Regression Weights (Group 1 — Default Model)

Path / Indicator	Estimate	S.E.	C.R.	P	Label
WM ← SL	.434	.048	9.041	***	par_25
OI ← WM	.626	.103	6.059	***	par_26
OI ← SL	.281	.055	5.129	***	par_27
OI ← Gender	.236	.051	4.655	***	par_28
OI ← Age	.057	.029	1.965	.049	par_29
OI ← Work Experience	−.019	.035	−.558	.577	par_30
SL15 ← SL	1.000				
SL14 ← SL	.922	.066	13.926	***	par_1
SL13 ← SL	.848	.064	13.346	***	par_2
SL12 ← SL	.835	.067	12.524	***	par_3
SL11 ← SL	.670	.077	8.697	***	par_4
SL10 ← SL	.177	.064	2.753	.006	par_5
SL9 ← SL	.401	.075	5.376	***	par_6
SL8 ← SL	−.205	.106	−1.943	.049	par_7

SL7 ← SL	.677	.065	10.375	***	par_8
SL6 ← SL	.196	.069	2.822	.005	par_9
SL5 ← SL	.138	.078	1.766	.047	par_10
SL4 ← SL	.439	.075	5.830	***	par_11
SL3 ← SL	.556	.076	7.310	***	par_12
SL2 ← SL	.582	.065	8.921	***	par_13
SL1 ← SL	.316	.072	4.367	***	par_14
MW6 ← WM	1.000				
MW5 ← WM	.508	.088	5.787	***	par_15
MW4 ← WM	1.042	.133	7.830	***	par_16
MW3 ← WM	1.259	.116	10.842	***	par_17
MW2 ← WM	1.137	.116	9.833	***	par_18
MW1 ← WM	1.296	.120	10.805	***	par_19
OI1 ← OI	1.000				
OI2 ← OI	.616	.097	6.340	***	par_20
OI3 ← OI	1.101	.119	9.265	***	par_21
OI4 ← OI	1.199	.113	10.625	***	par_22
OI5 ← OI	1.359	.115	11.809	***	par_23
OI6 ← OI	1.183	.102	11.604	***	par_24

The statistical outcomes displayed in **Table 7** confirmed that the three constructs—servant leadership, work meaningfulness, and organizational inclusion—were significantly linked, as each p-value fell below 0.05. Among these associations, the most powerful connection was observed between work meaningfulness and organizational inclusion, followed sequentially by the relationship between servant leadership and work meaningfulness, and then between servant leadership and organizational inclusion.

Results further revealed that work experience did not exert a notable influence on organizational inclusion ($p = 0.577$), whereas both gender and age were found to have meaningful effects ($p < 0.05$). Moreover, the findings verified that work meaningfulness acted as a significant intermediary between servant leadership and organizational inclusion. The model displayed strong data congruence, which was supported by the fit indices listed in **Table 8**.

Table 8. Model Fit Indices

Measure	Estimate	Threshold	Interpretation
Chi-square (CMIN)	843.104		
Degrees of Freedom (DF)	321		
CMIN/DF	2.626	1–3	Excellent
CFI	0.909	>0.9	Acceptable
SRMR	0.060	<0.08	Excellent
RMSEA	0.058	<0.06	Excellent
PClose	0.929	>0.05	Excellent

Source: Gaskin and Lim [67], "Model Fit Measures", AMOS Plugin. Gaskination's StatWiki.

Mediation Assessment: The Role of Work Meaningfulness

To examine the mediating impact of work meaningfulness, a bootstrapping approach at the 95% confidence interval was applied within the AMOS (SEM) framework. The standardized coefficients for the direct, indirect, and total effects of servant leadership on organizational inclusion were all statistically significant ($p < 0.05$).

These results suggest that work meaningfulness acts as a partial mediator in the relationship between servant leadership and organizational inclusion. The indirect pathway accounted for approximately 46% of the overall effect, underscoring that work meaningfulness plays a substantial intermediary role within the proposed model.

Moderation Analysis: Effects of Gender, Age, and Work Experience

To evaluate moderating variables, multigroup analysis was conducted, and the critical ratio (CR) statistics were examined (**Tables 9 and 10**). The results revealed that gender significantly altered the association between servant leadership and organizational inclusion, with a CR value of −2.965, lying outside the range of −1.96 to +1.96. However, gender did not moderate the link between work meaningfulness and organizational inclusion (CR = 0.502), nor between servant leadership and work meaningfulness (CR = −0.945).

When age was considered, it exhibited no notable moderating effect on the connection between work meaningfulness and organizational inclusion. Similarly, no moderating role was found in the relationship between servant leadership and organizational inclusion, except for participants aged 26–35 years. Age, however, showed a significant impact on the association between servant leadership and work meaningfulness, excluding respondents older than 45 years.

For work experience, no moderation was detected in the relationships linking servant leadership with organizational inclusion or work meaningfulness with organizational inclusion. Nevertheless, work experience did moderate the connection between servant leadership and work meaningfulness among respondents with 2–5 years and more than 10 years of job experience.

Table 9. The Mediating Role of Work Meaningfulness in the Relationship between Servant Leadership and Organizational Inclusion

Effect Type	Standardized Estimate	P-value	Result
Direct Effect	0.397	0.000	Significant
Indirect Effect	0.340	0.000	Significant
Total Effect	0.737	0.000	Significant

Table 10. Moderating Effects of Gender, Age, and Work Experience (Critical Ratios)

Ser	Path Relationship	Moderator Variable	Critical Ratio	Effect
1.	SL → OI	Gender	−2.965	Significant
2.	WM → OI	Gender	0.502	Insignificant
3.	SL → WM	Gender	−0.945	Insignificant
4.	SL → OI	Age (<25)	−1.810	Insignificant
5.	SL → OI	Age (26–35)	−2.121	Significant
6.	SL → OI	Age (36–45)	−0.615	Insignificant
7.	SL → OI	Age >45	0.267	Insignificant
8.	SL → WM	Age (<25)	−2.386	Significant
9.	SL → WM	Age (26–35)	2.533	Significant
10.	SL → WM	Age (36–45)	2.018	Significant
11.	SL → WM	Age >45	1.076	Insignificant
12.	WM → OI	Age (<25)	−0.531	Insignificant
13.	WM → OI	Age (26–35)	−1.382	Insignificant
14.	WM → OI	Age (36–45)	−1.260	Insignificant
15.	WM → OI	Age >45	−1.410	Insignificant
16.	SL → OI	Exp <1	−0.410	Insignificant
17.	SL → OI	Exp 2–5	−1.619	Insignificant
18.	SL → OI	Exp >10	−1.734	Insignificant
19.	SL → WM	Exp <1	−0.854	Insignificant
20.	SL → WM	Exp 2–5	−2.278	Significant
21.	SL → WM	Exp >10	−2.273	Significant
22.	WM → OI	Exp <1	1.727	Insignificant
23.	WM → OI	Exp 2–5	0.639	Insignificant
24.	WM → OI	Exp >10	0.186	Insignificant

Servant Leadership = SL, Work Meaningfulness = WM and Organizational Inclusion = OI

Hypothesis Testing — Results

Statistical examinations revealed that servant leadership had a significant effect on both organizational inclusion and work meaningfulness. In addition, work meaningfulness showed a notable positive link with organizational inclusion. The analysis also confirmed that work meaningfulness acted as a partial mediator between servant leadership and organizational inclusion. Variables such as gender, age, and work experience did not exhibit meaningful differences across their respective subgroups. Therefore, Hypotheses 5, 6, and 7 received only partial statistical validation. A condensed overview of these results is presented in **Table 11**.

Table 11. Hypothesis Testing Results

Hypothesis	Statement	Result
Hypothesis-1	Servant leadership influences organizational inclusion.	Supported (Table 7)
Hypothesis-2	Servant leadership influences work meaningfulness.	Supported (Table 7)
Hypothesis-3	Work meaningfulness influences organizational inclusion.	Supported (Table 7)
Hypothesis-4	Work meaningfulness mediates the relationship between servant leadership and organizational inclusion.	Supported (Table 9)
Hypothesis-5	Gender, age, and work experience moderate the relationship between servant leadership and organizational inclusion.	Partially Supported (Table 8)
Hypothesis-5a	Gender moderates the relationship between servant leadership and organizational inclusion.	Supported
Hypothesis-5b	Age moderates the relationship between servant leadership and organizational inclusion.	Not Supported except for the 26–35 years age group.
Hypothesis-5c	Work experience moderates the relationship between servant leadership and organizational inclusion.	Not Supported
Hypothesis-6	Gender, age, and work experience moderate the relationship between servant leadership and work meaningfulness.	Partially Supported (Table 8)

Hypothesis-6a	Gender moderates the relationship between servant leadership and work meaningfulness.	Not Supported
Hypothesis-6b	Age moderates the relationship between servant leadership and work meaningfulness.	Not Supported except for the over 45 years age group.
Hypothesis-6c	Work experience moderates the relationship between servant leadership and work meaningfulness.	Supported except for groups with one year or less experience.
Hypothesis-7	Gender, age, and work experience moderate the relationship between work meaningfulness and organizational inclusion.	Partially Supported (Table 8)
Hypothesis-7a	Gender moderates the relationship between work meaningfulness and organizational inclusion.	Not Supported
Hypothesis-7b	Age moderates the relationship between work meaningfulness and organizational inclusion.	Not Supported
Hypothesis-7c	Work experience moderates the relationship between work meaningfulness and organizational inclusion.	Not Supported

ANN modelling and variable prioritization

To further explore the data, an Artificial Neural Network (ANN) model—an analytical approach inspired by human cognitive processes—was applied. This model can detect non-linear interactions among variables and was employed to assess whether such relationships existed among servant leadership, work meaningfulness, and organizational inclusion.

Adopting this technique represents a novel direction in social science research, extending the methodological frontier of behavioral analysis. Neural networks have previously been utilized in diverse disciplines such as finance [68], property studies [69], and civil engineering [70]. The present research developed the ANN using the Multilayer Perceptron (MLP) algorithm in SPSS. In accordance with Hastie *et al.* [71], the value of the predicted variable was obtained as the average outcome of multiple neural network iterations.

The adopted model architecture followed a 5–H–1 structure, meaning five inputs, one hidden layer, and one output. The input layer consisted of five neurons—two representing independent variables and three representing control variables—alongside a bias term. Details regarding the data input into SPSS appear in **Table 10**.

For validation purposes, the dataset was divided into two subsets: 70% for training and 30% for testing, following recommendations by Li and Zhang [72], who noted common ratios of 90:10, 80:20, and 70:30 in prior studies. The hidden layer (H) contained a maximum of 50 nodes, limited by SPSS's iterative capability.

Model performance was assessed based on the accuracy percentage of correctly predicted cases within the testing subset. The general functional form of the network was defined as:

$$Organizational\ Inclusion = \int(SL, WM, G, A, OT) \quad (1)$$

In this expression, organizational inclusion is modeled as a function of Servant Leadership (SL), Work Meaningfulness (WM), Gender (G), Age (A), and Work Experience (WE). The structure follows the development guidelines suggested by Cortez *et al.* [73].

The ANN achieved an overall predictive accuracy of 78.95%, showing that organizational inclusion can be reliably anticipated from these five input variables. Unlike regression analysis, the ANN does not yield numerical coefficients. Therefore, sensitivity analysis was performed—following Cortez and Embrechts [74]—to identify the relative influence of each input variable.

The case processing summary **(Table 12)** indicates that no data were excluded. The architecture of the neural model, illustrated in **Figure 5**, consists of five input nodes, three hidden nodes, and one output node, representing organizational inclusion.

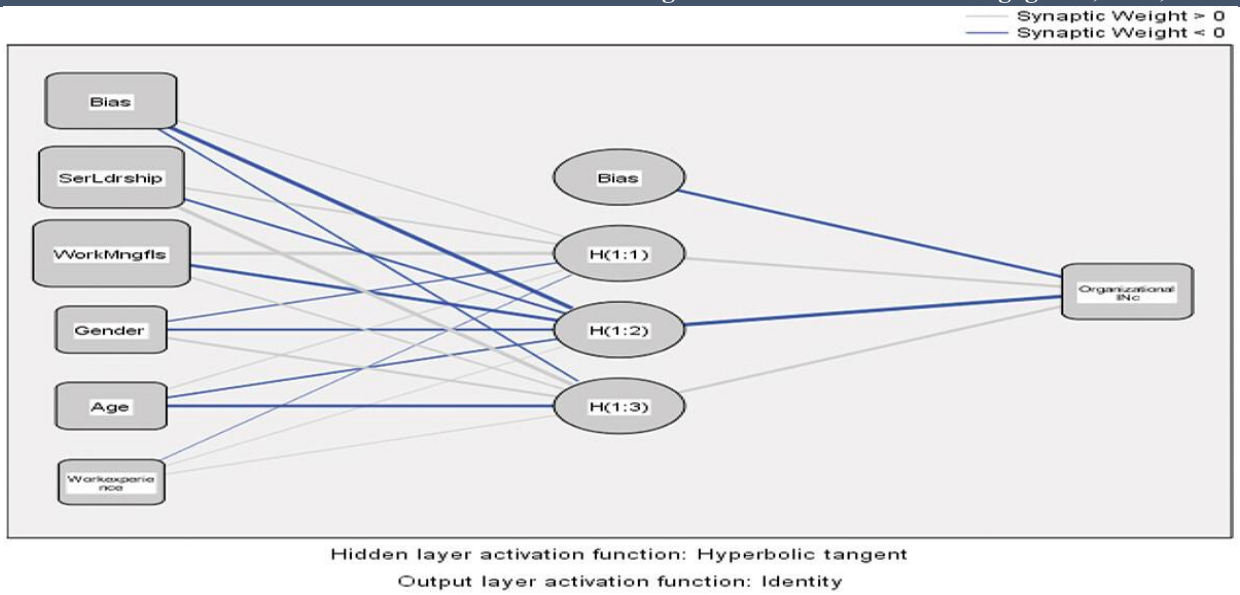

Figure 5. ANN Model Structure (5–H–1)

Information regarding the model's configuration is reported in **Tables 12 and 13**. The input layer incorporated five covariates—servant leadership, work meaningfulness, gender, age, and work experience. The hidden layer included three neurons, employing the hyperbolic tangent activation function. The output layer contained a single neuron, corresponding to the dependent variable, with an identity activation function and an error function based on the sum of squares.

Table 12. Case Processing Summary

		N	Percent
Sample	Training	271	67.8 %
	Testing	129	32.2%
Valid		400	100.0%
Excluded		0	
Total		400	

Table 13. Neural Network Input Information

Layer	Parameter	Details
Input Layer	**Covariates**	1. Servant Leadership 2. Work Meaningfulness 3. Gender 4. Age 5. Work experience
	Number of Units[a]	**5**
	Rescaling Method for Covariates	**Standardized**
Hidden Layer(s)	**Number of Hidden Layers**	**1**
	Number of Units in Hidden Layer 1[a]	**3**
	Activation Function	**Hyperbolic tangent**
Output Layer	**Dependent Variables**	1. Organizational Inclusion
	Number of Units	**1**
	Rescaling Method for Scale Dependents	**Standardized**
	Activation Function	**Identity**
	Error Function	**Sum of Squares**

The model summary **(Table 14)** shows a training-phase sum of squares error of 64.677 and a relative error of 0.479. During the testing phase, the sum of squares error was 35.492 with a relative error of 0.585.

As shown in **Table 15**, the covariates were connected to the outcome variable through the hidden layer. Among all predictors, work meaningfulness contributed most strongly (0.834), while work experience had the smallest contribution. These findings aligned closely with results obtained from the regression analysis. The bias error between input and hidden layers was −1.427, and the bias from the hidden to the output layer was −0.720.

Table 14. Model Summary

Phase	Metric	Value
Training	Sum of Squares Error	64.677

	Relative Error	.479
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	00:00:00.058
Testing	Sum of Squares Error	35.492
	Relative Error	.585

Dependent Variable: OrganizationalINc

a. Error computations are based on the testing sample.

Table 15. Neural Network Results

Output Layer: Organizational Inclusion Dependent Variable: Organizational Inclusion

Predictor	H(1:1)	H(1:2)	H(1:3)	H(1:4)	Total Contribution
Input Layer (Bias)	0.037	0.085	1.086	0.219	**1.427**
Servant Leadership	−0.035	−0.055	0.074	0.472	**0.476**
Work Meaningfulness	−0.440	0.488	0.921	−0.135	**0.834**
Gender	0.225	−0.132	0.291	0.125	**0.509**
Age	0.291	0.109	0.346	0.189	**0.935**
Work Experience	0.008	−0.084	−0.059	−0.168	**−0.303**

Hidden Layer Contributions to Output

Hidden Unit	Weight to Output
(Bias)	−0.720
H(1:1)	−0.454
H(1:2)	−0.267
H(1:3)	1.111
H(1:4)	0.223

To quantify variable importance, sensitivity analysis was carried out. This analysis evaluates the drop in model accuracy when an input variable is removed. A greater decline signifies a more critical predictor [70, 75].

According to the findings summarized in **Table 16** and **Figure 6**, work meaningfulness emerged as the most influential factor (100%), followed by servant leadership (88.8%), age (12.4%), gender (12.3%), and work experience (1.2%). These rankings are in full agreement with the results obtained through SEM analysis.

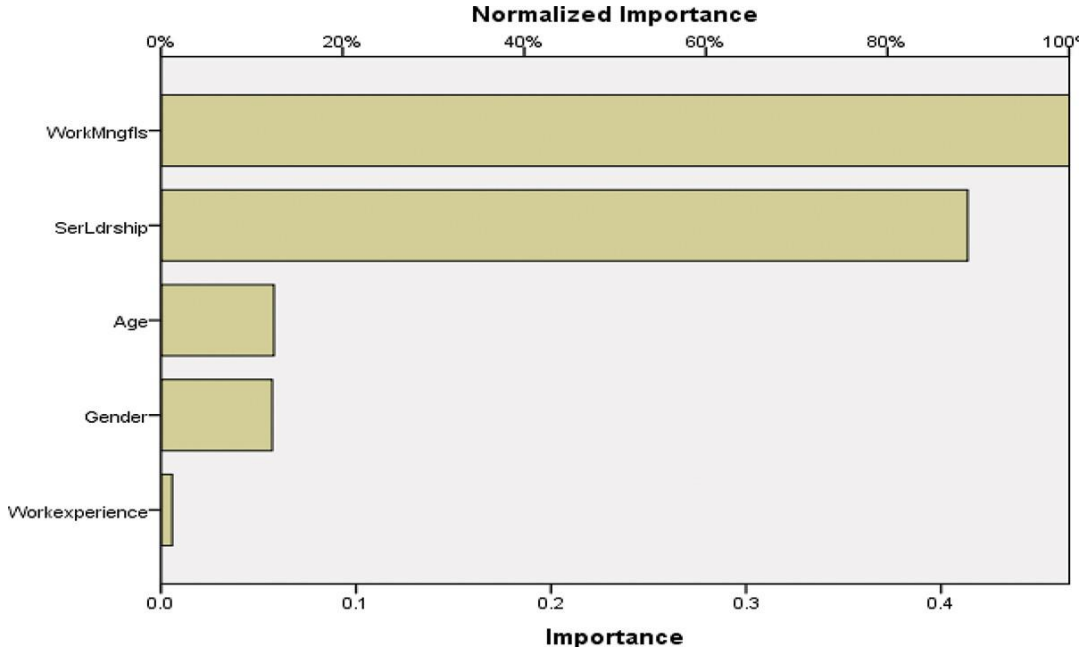

Figure 6. Sensitivity Analysis — Relative Importance of Inputs

Table 16. Independent Variable Importance

Predictor	Importance	Normalized Importance
Servant Leadership	.414	88.8%
Work Meaningfulness	.466	100.0%
Gender	.057	12.3%
Age	.058	12.4%
Work Experience in general	.006	1.2%

Discussion

Both SEM and ANN analyses confirmed that servant leadership positively influences organizational inclusion, validating Hypothesis 1 (H1). This outcome aligns with earlier works such as Gotsis and Grimani [76] and further resonates with Mousa and Puhakka [2], who emphasized a link between servant leadership and inclusive workplace climates. Servant-oriented leaders tend to earn the trust of employees by offering continuous help and exceeding the limits of their formal duties [77]. They are also instrumental in resolving disputes and ensuring that employees are actively involved in key organizational decisions [78]. When diverse employees are invited to participate in these processes, they are more likely to perceive their leaders as empathetic, fair, and genuinely supportive [79].

Regarding the association between servant leadership and work meaningfulness, the findings revealed this relationship as the strongest among all those tested within the proposed framework. Employees from different backgrounds—varying in gender, age, experience, and other demographics—tend to align with servant leaders in their mission to benefit others [80]. Such employees begin to perceive their professional efforts as purposeful and morally valuable contributions to society [81]. The altruistic attitude of servant leaders further heightens the sense of meaning employees attach to their roles [76]. Thus, the robust connection between servant leadership and work meaningfulness substantiates Hypothesis 2 (H2), echoing the perspectives of Lips-Wiersma *et al.* [18] and Lythreatis *et al.* [82]. Leaders who are sincerely committed to serving others can effectively transfer that conviction to their teams, enabling employees to see their daily work as an ethical extension of both the leader's and their own core values [83].

The analysis also demonstrated a significant influence of work meaningfulness on organizational inclusion, corroborating earlier findings [34, 84]. In their pursuit of enhanced productivity, organizational leaders often focus on strategies that boost employee motivation [85]. Workers with different cultural and demographic traits can be unified into a cohesive, high-performing unit when they feel a genuine sense of belonging and respect [79]. A shared sense of meaningful work acts as the foundation for this cohesion, binding employees together through a moral or ethical mission [36]. This moral dimension transforms the workplace into a space where individuals act out of duty and purpose, setting aside personal or group differences in the pursuit of collective good. Consequently, leaders can use this approach as a framework to align organizational objectives with moral integrity and ethical conduct [86]. In this regard, the mediating role of work meaningfulness between servant leadership and organizational inclusion becomes clear and well justified, echoing insights from Lythreatis *et al.* [82].

Gender emerged as a significant moderator between servant leadership and organizational inclusion, indicating that male employees were more strongly influenced by servant leadership behaviors in fostering inclusion. This result corresponds with prior studies highlighting gender-based variations in how leadership styles affect organizational outcomes [87]. According to gender socialization theory [88], men and women internalize different social values, expectations, and behavioral norms—men being generally motivated by achievement and control, and women by empathy and relationship-building [88-90]. As such, men often prioritize resource control and advancement, whereas women emphasize collaboration, support, and emotional well-being. Consequently, it is understandable that male and female employees respond differently to leadership, organizational transformation, and interpersonal dynamics [91, 92].

Age showed a significant moderating effect on the connection between servant leadership and the perception of meaningful work. This observation aligns with previous studies suggesting that as individuals grow older, their attitudes toward colleagues, managers, and subordinates evolve [93]. Older employees tend to value ethics and morality more, which helps them find deeper meaning in their professional roles [82]. Conversely, age did not significantly influence the association between servant leadership and organizational inclusion, nor between work meaningfulness and inclusion. One plausible explanation is that as individuals age, their sense of belonging to particular social, ethnic, or cultural circles increases, often limiting interactions with those outside these familiar groups [94]. Consequently, older employees tend to remain within restricted social boundaries. Likewise, motivational discourse from servant leaders becomes less persuasive for senior staff, who may respond better to leaders' tangible actions or firm reinforcement measures [95].

Furthermore, work experience did not considerably moderate any of the relationships between servant leadership, work meaningfulness, and organizational inclusion. This unexpected outcome contrasts with initial assumptions and warrants further exploration through dedicated research.

Study contributions and directions for future research

This research expands existing literature in three main aspects. First, it examines the interaction between servant leadership and organizational inclusion, emphasizing the mediating function of work meaningfulness. Second, it explores how gender, age, and work experience might moderate these relationships. Third, it introduces the combined use of Artificial Neural Networks (ANN) and Structural Equation Modeling (SEM) for data evaluation. The findings offer relevant implications for practice at individual, team, and organizational levels. The insights gained underscore the role of servant leaders in shaping strategies and policies that enhance employees' intrinsic motivation through meaningful work and inclusive environments.

The analysis revealed that ANN can effectively forecast organizational inclusion both directly through servant leadership and indirectly via work meaningfulness. The proposed ANN framework thus serves as a useful analytical instrument for such

estimations. Promoting work meaningfulness results in more committed, engaged employees who integrate themselves into organizational life. Future studies should further investigate how organizational inclusion influences overall outcomes across various cultural and organizational contexts. As servant leadership promotes deeper psychological engagement, it becomes instrumental in cultivating meaningful work and fostering inclusive, high-performing organizations [17, 18].

Conclusion

The research concludes that servant leadership exerts a strong positive impact on organizational inclusion, with work meaningfulness mediating this link. Gender and age were found to significantly moderate the relationships among these variables, whereas work experience did not exhibit a moderating role. Overall, servant leaders are expected to actively foster inclusion and meaningfulness in the workplace to minimize adverse behaviors. Their leadership philosophy, grounded in serving others, allows them to embed motivational values within employees' sense of purpose. By aligning organizational goals with observable actions under the notion of "meaningful work," employees begin to reflect their leaders' perspectives and adopt similar attitudes.

Challenges and negative influences on meaningful work are inevitable; thus, leaders must continuously engage in emotional support and restorative practices to sustain positive meaning [8]. The connection between leaders and employees serves as the foundation for developing meaningful work and, consequently, organizational inclusion. Emotional healing, as practiced by servant leaders, is a proactive strategy to reduce conflicts before they hinder employee performance. In parallel, leaders must uphold a socially responsible image—both personally and organizationally—to strengthen perceptions of meaningful work [96]. Practicing servant leadership helps organizations evolve into socially conscious and employee-centered institutions that nurture meaningful engagement [76].

Finally, this study utilized a neural network model to estimate organizational inclusion based on servant leadership, both directly and through work meaningfulness. The model demonstrated high predictive reliability, confirming that work meaningfulness was the most impactful determinant of inclusion, followed by servant leadership, gender, and age. Collectively, these findings underscore that servant leadership practices significantly contribute to establishing and maintaining meaningful work environments that promote organizational inclusion.

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