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Human Resource Management, Work Engagement, and Teacher Commitment: A Path Model Analysis on Teamwork Effectiveness among Public School Teachers

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Abstract

This study examined the relationships among human resource management, work engagement, teacher commitment, and teamwork effectiveness among public secondary school teachers in Region XII, Philippines, and identified the best-fitting structural model explaining teamwork effectiveness. A quantitative, non-experimental, descriptive-correlational design was employed, involving 400 teachers selected through proportionate stratified random sampling across eight Schools Division Offices. Data were collected using four adapted questionnaires and analyzed through descriptive statistics, correlation analysis, and path model analysis. Results revealed very high levels of human resource management (M = 4.42), work engagement (M = 4.47), and teamwork effectiveness (M = 4.48), while teacher commitment was high (M = 4.14). Teamwork effectiveness demonstrated significant positive relationships with human resource management (r = .903), work engagement (r = .960), and teacher commitment (r = .431). The best-fitting model explained 92.7% of the variance in teamwork effectiveness, with work engagement emerging as its strongest direct predictor (β = .794). The findings indicated that supportive management practices and sustained professional engagement were strongly associated with effective teacher collaboration. Strengthening professional development, employee participation, mentoring, and collaborative school practices is recommended. The study's regional scope and correlational design limited the generalizability of the findings and prevented causal conclusions. Its integrated structural model provides empirical guidance for educational leadership, sustainable human resource management, and institutional strategies supporting collaborative effectiveness and professional engagement in public secondary schools.

Keywords: Human Resource Management, Path Model Analysis, Public Secondary Teachers, Teacher Commitment, Teamwork Effectiveness, Work Engagement

1. Introduction

Effective teamwork among public school teachers is essential for achieving shared educational goals, strengthening professional collaboration, and maintaining a supportive school environment. However, teamwork effectiveness depends on organizational practices, teachers' engagement in their professional responsibilities, and their commitment to the teaching profession. Human resource management, work engagement, and teacher commitment represent interconnected factors that may explain variations in teachers' collaborative performance. This study examined the relationships among these variables, including their direct and indirect associations with

teamwork effectiveness, through an integrated path model. The investigation aimed to provide an empirical basis for improving human resource management practices, professional engagement, teacher commitment, and collaboration in public schools.

1.1 Background of the Study: Human Resource Management, Work Engagement, Teacher Commitment, and Teamwork Effectiveness

Effective teamwork remains a challenge in public schools despite the increasing emphasis on professional collaboration. Waldejer, Jensen, and Solheim (2026) emphasized the multidimensional nature of teacher collaboration and its relationships with work engagement, burnout, and organizational conditions. Basister, Petersson, and Baconguis (2026) identified contextual awareness, integrated support services, and distributed leadership as important conditions for developing meaningful teacher collaboration and inclusive educational practices. Similarly, Ma and Marion (2024) found that distributed leadership influenced teacher collaboration directly and indirectly through professional learning and an innovative school climate. School administrators also encountered difficulties in sustaining collaborative practices. Gato and Escote (2025) identified resistance, emotional discomfort, and time constraints as challenges experienced by school heads in promoting teacher teamwork. Remandaban, Angangan, Gaviola, Cabolao, and Olarte (2026) further demonstrated that collaboration played an important role in connecting school culture and professional development with teacher leadership agility. These findings suggest that effective teamwork requires supportive management practices, active professional participation, and sustained organizational commitment. Within this context, human resource management provides organizational mechanisms that support teacher development and participation, while work engagement reflects teachers' involvement in their professional responsibilities. Teacher commitment represents their attachment to and sense of obligation toward the teaching profession. Examining these factors collectively provides a basis for understanding how workplace conditions and individual professional attitudes relate to teamwork effectiveness among public school teachers.

1.2 Themes and Insights from Related Literature on Teacher Management, Engagement, Commitment, and Collaboration

Existing literature identifies human resource management as an important organizational factor associated with teamwork effectiveness. Shahzad, Hong, Jiang, and Niaz (2023) demonstrated that knowledge-intensive human resource management systems were positively associated with team performance through knowledge exploration and exploitation. Meredith, Moolenaar, Struyve, Vandecandelaere, Gielen, and Kyndt (2023) emphasized the importance of collaborative school cultures in strengthening teachers' job satisfaction and affective commitment. Similarly, Navajas-Romero, Ceular-Villamandos, Pérez-Priego, and Caridad-López del Río (2022) established the relevance of sustainable human resource management, workplace conditions, and teamwork to employee work engagement. These findings indicate that supportive organizational practices contribute to professional relationships and collaborative work environments. Work engagement represents another important dimension of teamwork effectiveness. Bakker, Demerouti, and Sanz-Vergel (2023) explained that work engagement reflects a positive motivational state characterized by vigor, dedication, and absorption, while organizational resources contribute to employee motivation and performance. Lingcob and Quines (2025) found significant relationships among work engagement, professional development, and teamwork among public elementary school teachers. Likewise, Li, Xu, and Huang (2025) demonstrated that work engagement mediated the relationships between social connectedness, job control, and organizational commitment among Chinese teachers. These findings suggest that supportive professional relationships and organizational resources are important considerations in understanding teachers' engagement and collaborative performance. Teacher commitment also contributes to professional collaboration and organizational effectiveness. Ağalday (2025) found that inclusive leadership was positively associated with teacher commitment, with teacher collaboration and professionalism serving as mediating factors. Similarly, Zhao, Li, and Kang (2025) identified important relationships among distributed leadership, teacher commitment, collaboration, and instructional innovation. These findings indicate that organizational leadership, professional involvement, and teacher commitment are interconnected aspects of effective school collaboration.

1.3 Local, National, and Global Context of Human Resource Management and Teacher Teamwork

Studies conducted in Philippine educational settings generally reported favorable human resource management practices, although their relationships with organizational outcomes varied. Basman and Abellana (2025) identified high levels of human resource management and teaching engagement among teachers in selected central schools in Valencia City, Bukidnon. Solidarios et al. (2024) similarly found that human resource management practices in Norala District, South Cotabato, were very well implemented, particularly in recruitment, performance management, training, compensation, career planning, and employee welfare. However, Dela Peña, Fulgencio, and Decena (2023) found that despite favorable human resource management practices at Tacurong National High School, training and development, performance appraisal, work-life balance, and rewards and benefits did not significantly predict teachers' work engagement in their regression analysis. Evidence concerning teacher engagement also revealed generally positive conditions, with notable variations across educational settings. Alutaya and Guhao (2024), in a study involving 402 public school teachers in the Davao Region, reported

high work engagement alongside favorable psychological capital, academic job satisfaction, and emotional intelligence. Marcelino (2024) also identified high work engagement among teachers in Bacong District, Negros Oriental. Internationally, Drouin-Rousseau et al. (2024), using data collected from 1,004 teachers over eight months, demonstrated that work engagement and burnout could coexist, indicating that professional involvement did not necessarily eliminate workplace strain. Teacher commitment and teamwork effectiveness likewise varied across educational contexts. Francia and Espiritu (2024) reported favorable teacher commitment across affective, continuance, and normative dimensions, while Tanutan and Laya (2024) identified very high commitment among public senior high school teachers in Region XI. In contrast, Celis, Policarpio, Agapito, Alfonso, and Villanueva (2026) reported moderate to high commitment among public primary school teachers in Angeles City, emphasizing the importance of institutional conditions in understanding professional commitment. Regarding teamwork effectiveness, Lingcob and Quines (2025) found very high teamwork levels among 400 public elementary school teachers in Region XII, particularly in communication and mutual support. However, Msonge and Lekule (2024) identified inadequate managerial knowledge, technical skills, and training among school heads as barriers to effective collaboration in Tanzanian secondary schools. Collectively, these findings indicate that favorable management practices, work engagement, and teacher commitment do not necessarily guarantee consistently effective teamwork across educational settings.

1.4 Theoretical and Conceptual Basis of the Integrated Teamwork Effectiveness Model

The study was anchored in the Theory of Group Development developed by Tuckman (1965), which explains how groups progress through forming, storming, norming, and performing. The theory provides a foundation for understanding teamwork effectiveness through shared purpose and goals, clearly defined roles, positive professional relationships, and commitment to collective responsibilities. Within this perspective, human resource management, work engagement, and teacher commitment represent factors associated with the development of effective collaborative practices among public school teachers. The study was also grounded in the Social Exchange Theory of Homans (1958), which explains social relationships through reciprocal exchanges of valued contributions. In educational workplaces, supportive management practices, recognition, professional development, and constructive feedback may encourage positive relationships between teachers and school administrators. These exchanges provide a theoretical basis for understanding how organizational support, professional engagement, and teacher commitment relate to cooperation and shared responsibilities. The conceptual framework integrated four major variables: human resource management, work engagement, teacher commitment, and teamwork effectiveness. Human resource management encompassed training, performance appraisal, teamwork, employee participation, job definition, and compensation. Work engagement included physical, cognitive, and emotional engagement, while teacher commitment comprised affective, continuance, and normative commitment. Teamwork effectiveness was characterized by shared purpose and goal setting, clearly defined roles, positive relationships, and passion and commitment. The proposed Best Fit Path Model positioned human resource management and teacher commitment as exogenous variables, work engagement as an endogenous intervening variable, and teamwork effectiveness as the endogenous outcome variable. The model specified four directional relationships: human resource management and work engagement, teacher commitment and work engagement, human resource management and teamwork effectiveness, and work engagement and teamwork effectiveness. This structure provided a basis for examining direct and indirect associations, particularly the intervening role of work engagement in the relationships between organizational practices, teacher commitment, and teamwork effectiveness.

1.5 Research Gaps and Rationale for Integrated Path Analysis of Teamwork Effectiveness

Despite growing research on human resource management, work engagement, teacher commitment, and teamwork effectiveness, important empirical, model-related, methodological, and contextual gaps remain. Previous investigations generally examined selected relationships rather than integrating all four variables within a unified framework. Shahzad, Hong, Jiang, and Niaz (2023) examined human resource management in relation to team knowledge processes and performance, while Meredith, Moolenaar, Struyve, Vandecandelaere, Gielen, and Kyndt (2023) investigated collaborative school culture, job satisfaction, and affective commitment. Lingcob and Quines (2025) explored work engagement, professional development, and teamwork among public school teachers. Although these studies established meaningful associations, their individual models did not fully address the combined relationships proposed in the present investigation. A model-related gap remains concerning the integration of human resource management and teacher commitment as predictors of work engagement, with human resource management and work engagement linked to teamwork effectiveness. Although Li, Xu, and Huang (2025) demonstrated the mediating role of work engagement in relationships involving organizational commitment, their model examined different directional relationships and outcomes. Similarly, Zhao, Li, and Kang (2025) investigated commitment and collaboration within a model of teacher innovation rather than teamwork effectiveness. Methodologically, further application of path analysis is needed to clarify the direct and indirect associations among the four variables within the proposed framework. Contextually, additional evidence is necessary to explain how these relationships operate collectively among public school teachers. To address these gaps, the study examined an integrated structural model that positioned work engagement as an intervening variable and sought to identify the pathways that best explained teamwork effectiveness.

1.6 Alignment with Relevant Sustainable Development Goals (SDGs)

The study aligns with Sustainable Development Goal 4 (Quality Education), which emphasizes inclusive and equitable quality education and opportunities for lifelong learning (United Nations, 2015). By examining human resource management, work engagement, teacher commitment, and teamwork effectiveness, the study provides a basis for identifying organizational conditions that may support professional development, collaborative teaching practices, and shared educational responsibilities. Strengthening these conditions may contribute to more supportive and effective educational institutions. The study also supports Sustainable Development Goal 8 (Decent Work and Economic Growth), particularly its emphasis on decent working conditions, professional development, and productive employment (United Nations, 2015). Navajas-Romero, Ceular-Villamandos, Pérez-Priego, and Caridad-López del Río (2022) emphasized the importance of sustainable human resource management and workplace conditions in promoting work engagement. Within public education, examining these relationships may provide insights into management practices that support teachers' professional well-being, organizational participation, and sustained collaboration.

1.7 Importance of the Study to Multidisciplinary Sustainability in Public School Management and Teacher Development

The study contributes to multidisciplinary sustainability by connecting educational, institutional, socio-economic, and policy and governance dimensions of sustainable school management. From an educational sustainability perspective, understanding teamwork effectiveness may support continuous professional development, collaborative teaching practices, and the achievement of shared educational goals. The relationships among human resource management, work engagement, and teacher commitment provide a basis for identifying workplace conditions that encourage sustained professional participation and cooperation. In terms of institutional sustainability, the study offers a framework for strengthening teacher training, performance appraisal, employee participation, job definition, and organizational support. Its findings may assist the Department of Education, school administrators, and educational policymakers in identifying management practices and professional development priorities responsive to teachers' workplace needs. These improvements may contribute to stronger professional relationships, consistent collaboration, and sustained institutional effectiveness. The study also has socio-economic and governance relevance by emphasizing decent working conditions, employee recognition, professional commitment, and participatory management. Its integrated path model provides a reference for developing evidence-informed interventions that support teacher engagement and teamwork effectiveness. Furthermore, the framework may guide future investigations across school divisions and educational contexts, contributing to the continued development of sustainable human resource management and collaborative practices in public education.

2. Materials and Methods

2.1 Research Design

The study employed a quantitative, non-experimental, descriptive-correlational research design using Path Model Analysis to examine the relationships among human resource management, work engagement, teacher commitment, and teamwork effectiveness. The design allowed the researcher to determine the levels and associations of the variables without manipulating the respondents' working conditions. Creswell and Creswell (2023) emphasized the suitability of quantitative research designs for examining measurable variables and their relationships. Similarly, Maier et al. (2023) explained that cross-sectional research provides evidence of associations among variables but does not independently establish causality. Path Model Analysis was applied to examine the direct and indirect relationships among the variables and identify the structural model that best represented teamwork effectiveness among public secondary school teachers.

2.2 Locale of the Study

The study was conducted in Region XII, also known as SOCCSKSARGEN, located in southern Mindanao, Philippines. It covered eight Schools Division Offices: General Santos City, Kidapawan City, Koronadal City, North Cotabato, Sarangani Province, South Cotabato, Sultan Kudarat, and Tacurong City. These divisions represented different educational contexts, school sizes, and teacher populations, providing an appropriate setting for examining teamwork effectiveness among public secondary school teachers.

2.3 Respondents of the Study

The respondents consisted of 400 permanent public secondary school teachers employed by the Department of Education (DepEd) in Region XII. They represented different teaching positions, educational qualifications, and lengths of service. Most respondents held Teacher I positions, comprising 210 teachers (52.5%), followed by Teacher II with 100 (25.0%), Teacher III with 71 (17.75%), Master Teacher I with 15 (3.75%), and Master Teacher II with four (1.0%). Their teaching experience ranged from one year to more than 16 years, with the largest group having one to three years of service (20.0%). Regarding educational attainment, 40.0% had earned master's units, 37.5% held bachelor's degrees, 13.75% had completed master's degrees, 7.0% had earned doctoral units, and

1.75% had completed doctoral degrees. Eligible respondents were regular public secondary school teachers holding permanent plantilla positions and assigned to schools within Region XII. Participation required informed consent and willingness to complete the survey. Private school teachers, substitute teachers, temporary or non-plantilla personnel, and individuals who declined or withdrew their consent were excluded.

2.4 Sample and Sampling Procedure

The study employed proportionate stratified random sampling to ensure representation across the eight Schools Division Offices. Ahmed (2024) explained that stratified random sampling facilitates subgroup representation by dividing the population into distinct strata and selecting respondents within each group. The total study population comprised 12,908 public secondary school teachers. Using the Raosoft Sample Size Calculator with a 95% confidence level, 5% margin of error, and 50% response distribution, the researcher determined the required sample size. These parameters were consistent with considerations discussed by Althubaiti (2023) and Hasan and Kumar (2024) regarding sample size determination in quantitative survey research. A total of 400 respondents participated in the study, exceeding the minimum sample requirement. Respondents were proportionately allocated across the divisions according to their teacher populations. North Cotabato contributed 114 respondents, South Cotabato 74, Sarangani Province 62, Sultan Kudarat 55, General Santos City 53, Kidapawan City 17, Koronadal City 16, and Tacurong City nine. The sample was also evaluated for its suitability for Path Model Analysis. Kline (2023) emphasized that sample adequacy in structural equation modeling depends on model complexity, estimation requirements, and the relationships being examined rather than a universal minimum sample size. The study's 400 respondents provided a substantial number of observations for estimating the proposed direct and indirect relationships among the variables.

2.5 Research Instrument

The study utilized four adapted survey questionnaires measuring human resource management, work engagement, teacher commitment, and teamwork effectiveness. The Human Resource Management questionnaire, adapted from Iqbal et al. (2011), contained 18 items covering training and development, performance appraisal, teamwork, employee participation, job definition, and compensation. The Work Engagement questionnaire was based on the instrument used by Abun et al. (2021) and consisted of 15 items measuring physical, cognitive, and emotional involvement. Huang et al. (2022) likewise identified these dimensions as components of work engagement. The Teacher Commitment questionnaire was adapted from Ebuenga-Amora (2016) and included 12 items addressing affective, continuance, and normative commitment. The Teamwork Effectiveness questionnaire, adapted from Kabbah et al. (2021), comprised 16 items measuring purpose and goals, roles, relationships, and passion and commitment. The questionnaires were contextualized to suit the study respondents while retaining their intended constructs and indicators. Five experts evaluated their clarity, relevance, and appropriateness, producing an overall average validation rating of 4.57, interpreted as highly valid. Individual ratings ranged from 4.43 to 5.00. Minor revisions were incorporated based on the validators' recommendations. DeVellis and Thorpe (2021) emphasized the importance of construct relevance and reliability in scale development and application, while Stefana et al. (2025) highlighted expert evaluation and systematic validation as essential components of sound measurement practices. Following validation, the questionnaires underwent pilot testing to assess internal consistency using Cronbach's alpha. The Human Resource Management instrument obtained $\alpha = .785$, Work Engagement $\alpha = .678$, Teacher Commitment $\alpha = .760$, and Teamwork Effectiveness $\alpha = .838$. The Work Engagement instrument yielded an internal consistency coefficient of $\alpha = .678$, slightly below the commonly applied .70 threshold, indicating that results involving this variable required cautious interpretation. Stefana et al. (2025) emphasized the importance of interpreting reliability coefficients in relation to measurement quality rather than relying solely on numerical thresholds. The Work Engagement instrument was retained based on its theoretical relevance, established indicators, prior application, and expert validation results, while its internal consistency was acknowledged as a measurement limitation. Its reliability limitation was considered when interpreting the findings. All questionnaires used a five-point Likert scale ranging from 1 (Never) to 5 (Always). Weighted means were interpreted as Very High (4.20–5.00), High (3.40–4.19), Moderate (2.60–3.39), Low (1.80–2.59), and Very Low (1.00–1.79). These classifications provided a consistent basis for determining the reported levels of human resource management, work engagement, teacher commitment, and teamwork effectiveness.

2.6 Data Gathering Procedure

The researcher secured ethical clearance from the University of Mindanao Ethics Review Committee (UMERC) before requesting permission from the DepEd Region XII Regional Director and the concerned Schools Division Superintendents. The approved requests were subsequently endorsed to the Public Schools District Supervisors and School Heads to authorize data collection in the selected schools. After obtaining the necessary permissions, the researcher personally distributed the questionnaires to the selected respondents. Participants were informed about the study's purpose, voluntary participation, and confidentiality measures before completing the survey. Data collection was scheduled to avoid disrupting classroom instruction and teaching responsibilities. The researcher remained available to clarify instructions and questionnaire items when necessary. These procedures reflected the survey administration principles discussed by Zimba and Gasparyan (2023), particularly the importance of clear instructions, appropriate questionnaire administration, and ethical treatment of respondents.

Completed questionnaires were retrieved and reviewed for completeness. The responses were organized, coded, tabulated, and encoded into the appropriate statistical software for analysis. The collected data were processed according to the research objectives and the statistical techniques established for the study.

2.7 Data Analysis Techniques

The study employed descriptive statistics, correlation analysis, and Path Model Analysis to examine the relationships among the research variables. Weighted means were used to determine the levels of human resource management, work engagement, teacher commitment, and teamwork effectiveness. Correlation analysis assessed associations among the variables, while Path Model Analysis examined their direct and indirect relationships and identified the structural model that best represented the observed data. The proposed models were evaluated using established goodness-of-fit indices. The study applied a p-value above .05 for the chi-square model-fit test, a CMIN/DF ratio between 0 and 2, an RMSEA value below .05, a PCLOSE value above .05, and NFI, TLI, GFI, and CFI values greater than .95 as its model-fit criteria. Kline (2023) emphasized the importance of examining multiple fit indices when evaluating structural models. Similarly, Sathyanarayana and Mohanasundaram (2024) discussed the use of chi-square statistics, comparative fit indices, and approximation-based measures in structural equation modeling. These indices were considered collectively to assess the adequacy of the proposed model in representing the relationships among the variables.

2.8 Ethical Considerations

The study complied with the ethical standards approved by the University of Mindanao Ethics Review Committee (UMERC). Before participation, respondents received informed consent forms explaining the research purpose, procedures, benefits, minimal risks, and their rights as participants. Participation was voluntary, and respondents could decline or withdraw without penalty. Zimba and Gasparyan (2023) emphasized informed consent, confidentiality, and appropriate ethical safeguards as important considerations in survey research. The researcher maintained respondents' privacy, anonymity, and confidentiality throughout the study. Personal identifying information was not disclosed, and collected data were used exclusively for academic and research purposes. Research records were securely stored and accessible only to the researcher. The study also complied with the Data Privacy Act of 2012 (Republic Act No. 10173), which established requirements for the lawful processing and protection of personal information (Republic of the Philippines, 2012). Findings were presented in aggregated form to prevent the identification of individual respondents.

3. Results and Discussion

3.1 Levels of Human Resource Management, Work Engagement, Teacher Commitment, and Teamwork Effectiveness

3.1.1 Human Resource Management

Human Resource Management obtained an overall mean of 4.42 (SD = 0.301), interpreted as Very High. Among the six indicators, Teamwork recorded the highest mean of 4.52, followed by Employee Participation (4.50), Performance Appraisal (4.49), Training (4.41), Job Definition (4.36), and Compensation (4.25). All indicators were rated Very High, indicating that human resource management practices were consistently evident in participating schools. Teachers reported opportunities for professional development, performance appraisal, collaborative problem-solving, participation in school decisions, clearly defined responsibilities, and recognition of competence and performance in compensation. The findings indicate that human resource management practices support teacher development, professional accountability, organizational participation, and collaboration. Solidarios et al. (2024) found that effective human resource management practices, particularly performance management, training, compensation, and employee welfare, were positively associated with teachers' job satisfaction in Philippine public schools. Similarly, Cai et al. (2023) emphasized that supportive leadership, interpersonal trust, and professional resources contribute to teacher engagement. These studies reinforce the importance of maintaining organizational practices that support professional growth and provide opportunities for teachers to participate in school improvement.

3.1.2 Work Engagement

Work Engagement obtained an overall mean of 4.47 (SD = 0.349), interpreted as Very High. Cognitive Engagement recorded the highest mean of 4.53, followed by Emotional Engagement (4.47) and Physical Engagement (4.39), all classified as Very High. These findings indicate that teachers demonstrated sustained mental concentration, positive emotional involvement, and considerable effort in performing their professional responsibilities. Teachers also reported enthusiasm, persistence, willingness to improve instructional practices, and satisfaction in fulfilling their duties. The findings suggest that teachers' work engagement reflects their motivation, dedication, and involvement in teaching. Bakker et al. (2023) explained that work engagement develops through the interaction of job resources, personal resources, and motivational processes. Similarly, Holmström et al. (2023) established associations between teachers' work engagement, professional efficacy, and interprofessional collaboration. Barrot and Andal (2024) also emphasized the importance of collaborative attitudes

and supportive leadership in teachers' work engagement. These findings indicate that workplace support and professional collaboration are relevant to sustaining teachers' physical, cognitive, and emotional involvement.

3.1.3 Teacher Commitment

Teacher Commitment obtained an overall mean of 4.14 (SD = 0.502), interpreted as High. Continuance Commitment recorded the highest mean of 4.25, followed by Normative Commitment (4.20), both classified as Very High. Affective Commitment obtained the lowest mean of 3.99, although it remained within the High category. These findings indicate that teachers maintained strong professional commitment, particularly in terms of their investment in the teaching profession and sense of responsibility toward their duties. Although teachers demonstrated positive emotional attachment to teaching, this dimension was less pronounced than their continuance and normative commitment. The findings suggest that teachers' commitment was strongly associated with professional responsibility and the perceived costs of leaving the profession. Bantilan et al. (2024) found that organizational culture, policies, and practices were significantly related to the commitment of Philippine public school teachers. Similarly, Gamboa (2025) examined affective, continuance, and normative commitment among Filipino educators and identified differences in their relationships with work engagement. Dağdeviren Ertaş and Özdemir (2024) also emphasized the connection between organizational commitment, collective teacher efficacy, and work engagement. These studies highlight the importance of strengthening teachers' professional identity, sense of belonging, and organizational support.

3.1.4 Teamwork Effectiveness

Teamwork Effectiveness obtained an overall mean of 4.48 (SD = 0.353), interpreted as Very High. Roles, Relationship, and Passion and Commitment recorded identical means of 4.51, while Purpose and Goals obtained 4.41. All dimensions were classified as Very High. These findings indicate that teachers understood their professional responsibilities, maintained productive working relationships, demonstrated commitment to shared objectives, and actively participated in school improvement. Teachers also reported mutual trust, cooperation, constructive feedback, collaborative problem-solving, and alignment with school and DepEd goals. These findings demonstrate that effective teamwork was characterized by shared responsibilities, role clarity, supportive professional relationships, and collective commitment to organizational goals. Pu et al. (2024) found that collaborative school culture was positively associated with teachers' instructional practices, with teacher efficacy and organizational commitment serving important intermediary roles. Similarly, Park et al. (2025) established that teacher collaboration was associated with instructional clarity and that organizational commitment strengthened this relationship. These studies support the importance of collaboration, shared goals, and professional commitment in maintaining effective teamwork within schools.

3.2 Significant Relationships Between the Study Variables and Teamwork Effectiveness

3.2.1 Relationship Between Human Resource Management and Teamwork Effectiveness

Human Resource Management demonstrated a very strong positive relationship with Teamwork Effectiveness ($r = .903$, $p = .000$), indicating statistical significance at the .05 level. Among the human resource management indicators, Employee Participation recorded the strongest association with overall Teamwork Effectiveness ($r = .843$), followed by Performance Appraisal ($r = .812$), Teamwork ($r = .794$), Training ($r = .614$), and Job Definition ($r = .580$), all with p-values of .000. However, Compensation demonstrated no significant relationship with Teamwork Effectiveness ($r = .008$, $p = .866$). The dimensions of Teamwork Effectiveness were also significantly associated with overall Human Resource Management, with coefficients ranging from .475 to .842. Thus, the null hypothesis concerning the overall relationship between Human Resource Management and Teamwork Effectiveness was rejected. The findings indicate that employee participation, performance management, professional development, and clearly defined responsibilities were positively associated with teamwork effectiveness, while compensation alone showed no significant relationship. Solidarios et al. (2024) emphasized the relevance of human resource management practices in supporting favorable employee outcomes within public schools. Similarly, Cai et al. (2023) identified supportive leadership and workplace resources as important factors in teachers' professional engagement. Pu et al. (2024) further highlighted the importance of participatory and collaborative school environments in improving professional practices. These findings suggest that teamwork effectiveness is closely connected with organizational practices that promote collaboration, participation, and professional support.

3.2.2 Relationship Between Work Engagement and Teamwork Effectiveness

Work Engagement demonstrated a very strong positive relationship with Teamwork Effectiveness ($r = .960$, $p = .000$), indicating statistical significance at the .05 level. Cognitive Engagement recorded the strongest relationship with overall Teamwork Effectiveness ($r = .872$), followed by Emotional Engagement ($r = .834$) and Physical Engagement ($r = .789$), all with p-values of .000. The dimensions of Teamwork Effectiveness were also significantly associated with overall Work Engagement, with coefficients ranging from .515 to .881. Passion and Commitment recorded the strongest association ($r = .881$), followed by Relationship ($r = .853$), Roles ($r = .838$), and Purpose and Goals ($r = .515$). These results supported the rejection of the null hypothesis. The findings indicate that teachers with greater physical, cognitive, and emotional engagement tended to demonstrate stronger

teamwork effectiveness. Corbeanu and Iliescu (2023), through a meta-analysis, established a positive relationship between work engagement and job performance, including contextual performance. Similarly, Holmström et al. (2023) identified meaningful associations between teachers' work engagement and interprofessional collaboration. Bakker et al. (2023) further explained that engaged employees demonstrate motivation and dedication that support positive work-related outcomes. These studies support the observed relationship between teachers' engagement and their effectiveness in fulfilling collaborative responsibilities.

3.2.3 Relationship Between Teacher Commitment and Teamwork Effectiveness

Teacher Commitment demonstrated a moderate positive relationship with Teamwork Effectiveness ($r = .431$, $p = .000$), indicating statistical significance at the .05 level. Continuance Commitment recorded the strongest association with overall Teamwork Effectiveness ($r = .413$), followed by Normative Commitment ($r = .361$) and Affective Commitment ($r = .339$), all with p-values of .000. The dimensions of Teamwork Effectiveness were likewise significantly associated with overall Teacher Commitment, particularly Roles ($r = .388$), Passion and Commitment ($r = .381$), Purpose and Goals ($r = .319$), and Relationship ($r = .293$). These findings supported the rejection of the null hypothesis concerning the relationship between Teacher Commitment and Teamwork Effectiveness. The findings suggest that teachers' professional attachment, willingness to remain in teaching, and sense of responsibility were positively associated with collaborative effectiveness. Park et al. (2025) found that organizational commitment strengthened the relationship between teacher collaboration and instructional clarity. Similarly, Pu et al. (2024) demonstrated that organizational commitment contributed to the relationship between collaborative school culture and teaching practices. Bantilan et al. (2024) also established that organizational conditions were significantly associated with public school teachers' commitment. These findings emphasize the importance of strengthening professional commitment alongside collaborative school practices.

3.3 Evaluation of the Structural Equation Models of Teamwork Effectiveness

3.3.1 Generated Model 1

Generated Model 1 examined the direct relationships of Human Resource Management and Teacher Commitment with Work Engagement and Teamwork Effectiveness. Human Resource Management demonstrated strong standardized direct effects on Work Engagement ($\beta = .88$) and Teamwork Effectiveness ($\beta = .89$), while Teacher Commitment showed weaker effects on Work Engagement ($\beta = .06$) and Teamwork Effectiveness ($\beta = .04$). Human Resource Management and Teacher Commitment were positively correlated ($r = .44$). The model explained 83% of Work Engagement variance ($R^2 = .83$) and 82% of Teamwork Effectiveness variance ($R^2 = .82$). However, the goodness-of-fit results were P-close = .000, CMIN/DF = 366.236, $p = .000$, GFI = .769, CFI = .800, NFI = .800, TLI = -.201, and RMSEA = .957, indicating unacceptable model fit. Despite its substantial explanatory power, Generated Model 1 failed to satisfy the established goodness-of-fit criteria. The excessive CMIN/DF and RMSEA values, together with inadequate comparative fit indices, indicated that the proposed structure did not adequately represent the observed data. Cheung et al. (2024) emphasized the importance of evaluating structural equation models using appropriate statistical criteria and assessing model adequacy before interpreting their relationships. Consequently, Generated Model 1 was not retained as the best-fitting structural model.

3.3.2 Generated Model 2

Generated Model 2 specified Human Resource Management and Teacher Commitment as predictors of Work Engagement, while Work Engagement and Teacher Commitment were specified as predictors of Teamwork Effectiveness. Human Resource Management demonstrated a strong direct effect on Work Engagement ($\beta = .88$), whereas Teacher Commitment showed a weaker effect ($\beta = .06$). Work Engagement exhibited a very strong direct effect on Teamwork Effectiveness ($\beta = .96$), while Teacher Commitment had a negligible direct effect ($\beta = .00$). Human Resource Management and Teacher Commitment remained positively correlated ($r = .44$). The model explained 83% of Work Engagement variance ($R^2 = .83$) and 92% of Teamwork Effectiveness variance ($R^2 = .92$). Its goodness-of-fit indices were P-close = .000, CMIN/DF = 31.399, $p = .000$, GFI = .964, CFI = .983, NFI = .983, TLI = .900, and RMSEA = .276. Generated Model 2 demonstrated improved explanatory power and several better fit indices compared with Generated Model 1. However, its excessive CMIN/DF and RMSEA values, together with unacceptable P-close, probability, and TLI results, indicated that the model still failed to achieve satisfactory overall fit. Cheung et al. (2024) emphasized that structural equation models should be evaluated using multiple statistical criteria rather than relying on selected favorable indices. Accordingly, Generated Model 2 was not selected as the final structural model.

3.3.3 Generated Model 3: Best-Fitting Structural Model

Generated Model 3 specified Human Resource Management and Teacher Commitment as direct predictors of Work Engagement, while Human Resource Management and Work Engagement directly predicted Teamwork Effectiveness. Human Resource Management demonstrated a strong standardized effect on Work Engagement ($\beta = .88$) and a smaller direct effect on Teamwork Effectiveness ($\beta = .18$). Work Engagement showed a strong direct effect on Teamwork Effectiveness ($\beta = .79$), whereas Teacher Commitment had a relatively weak direct effect on Work Engagement ($\beta = .06$). Human Resource Management and Teacher Commitment were positively correlated ($r = .44$). The model explained approximately 83% of Work Engagement variance and 93% of Teamwork

Effectiveness variance. Its goodness-of-fit results were P-close = .650, CMIN/DF = .526, p = .468, GFI = .999, CFI = 1.000, NFI = 1.000, TLI = 1.002, and RMSEA = .000. Generated Model 3 satisfied all the established goodness-of-fit criteria and was identified as the best-fitting structural model of Teamwork Effectiveness. The reported fit indices indicated that the final model was consistent with the observed data in the study sample, although model fit alone did not establish causal relationships or external validity. Cheung et al. (2024) emphasized that evaluating model adequacy is essential when examining relationships among latent constructs. Similarly, Hayes (2022) explained that regression-based models can distinguish direct and indirect relationships among variables. The final model highlighted Work Engagement as an important pathway linking Human Resource Management and Teacher Commitment with Teamwork Effectiveness.

3.4 Explanatory Power and Effects of the Best-Fitting Structural Model

3.4.1 Explanatory Power of Generated Model 3

The squared multiple correlations of Generated Model 3 demonstrated substantial explanatory power. Work Engagement obtained an R^2 of .827, indicating that Human Resource Management and Teacher Commitment explained 82.7% of its variance, while 17.3% remained unexplained by the specified predictors. Teamwork Effectiveness obtained an R^2 of .927, indicating that the model explained 92.7% of its variance, while 7.3% remained unexplained by the specified model. These values demonstrated that the final structural model accounted for considerable variation in both endogenous variables. The high coefficients of determination indicate that the predictors included in Generated Model 3 provided substantial explanatory information about teachers' work engagement and teamwork effectiveness. Wang (2024) demonstrated the application of structural equation modeling in examining relationships between organizational support, work engagement, and teachers' psychological well-being. Similarly, Cheung et al. (2024) emphasized the importance of appropriate model assessment when interpreting relationships among latent variables. These studies support the use of structural modeling to examine interconnected organizational and professional factors among teachers.

3.4.2 Regression Weights and Direct Effects of the Final Model

The regression analysis demonstrated that Human Resource Management had a strong and statistically significant positive direct effect on Work Engagement ($B = 1.023$, $\beta = .880$, $p < .001$), while Teacher Commitment had a smaller but significant effect ($B = .044$, $\beta = .063$, $p = .007$). For Teamwork Effectiveness, Work Engagement demonstrated the strongest standardized direct effect ($B = .802$, $\beta = .794$, $p < .001$), followed by Human Resource Management ($B = .215$, $\beta = .183$, $p < .001$). No direct path from Teacher Commitment to Teamwork Effectiveness was specified in the final model; therefore, no direct regression coefficient was estimated for this relationship. The model also produced a chi-square value of .526 with one degree of freedom and a probability level of .468, supporting its acceptable fit. These findings indicate that Human Resource Management was the strongest direct predictor of Work Engagement, whereas Work Engagement was the strongest direct predictor of Teamwork Effectiveness. Bakker et al. (2023) explained that supportive organizational resources contribute to employee engagement and positive work-related outcomes. Similarly, Cai et al. (2023) emphasized the importance of supportive leadership and interpersonal trust in strengthening teachers' engagement. Corbeanu and Iliescu (2023) established a positive association between work engagement and performance, while Liu and Watson (2023) highlighted the relationships among distributed leadership, teacher collaboration, and organizational commitment. Together, these studies reinforce the relevance of supportive management and professional engagement to collaborative effectiveness.

3.4.3 Total and Standardized Total Effects

The total effects analysis showed that Human Resource Management had the strongest unstandardized total effect on Work Engagement (1.023), followed by Teacher Commitment (.044). For Teamwork Effectiveness, Human Resource Management recorded the highest total effect (1.035), followed by Work Engagement (.802) and Teacher Commitment (.035). The standardized results followed the same pattern. Human Resource Management demonstrated the strongest standardized total effect on Work Engagement ($\beta = .880$), compared with Teacher Commitment ($\beta = .063$). For Teamwork Effectiveness, Human Resource Management obtained the highest standardized total effect ($\beta = .881$), followed by Work Engagement ($\beta = .794$) and Teacher Commitment ($\beta = .050$). These findings indicated that Human Resource Management was associated with Teamwork Effectiveness through direct and indirect pathways in the estimated model, with Work Engagement occupying an intervening position. Bakker et al. (2023) emphasized that workplace resources support motivational processes and positive organizational outcomes. Similarly, Manaig et al. (2024) identified significant relationships among organizational commitment, professional self-esteem, and work engagement among Filipino educators. Gamboa (2025) also emphasized the relevance of different dimensions of teacher commitment to professional engagement. These studies reinforce the importance of organizational support and teacher engagement in understanding professional and collaborative outcomes.

3.4.4 Indirect and Standardized Indirect Effects

The indirect effects analysis showed that Human Resource Management and Teacher Commitment had no indirect effects on Work Engagement, with both recording values of .000. However, Human Resource Management

demonstrated a substantial unstandardized indirect effect on Teamwork Effectiveness (.820), while Teacher Commitment recorded a smaller indirect effect (.035). The standardized indirect effects followed the same pattern. Human Resource Management demonstrated a standardized indirect effect of β = .698 on Teamwork Effectiveness, while Teacher Commitment recorded β = .050. Both variables had standardized indirect effects of .000 on Work Engagement. The estimated indirect paths suggested an intervening role for Work Engagement in the relationships of Human Resource Management and Teacher Commitment with Teamwork Effectiveness. However, the statistical significance of these indirect effects was not reported. The findings highlight the importance of Work Engagement in explaining the indirect relationships between the predictor variables and Teamwork Effectiveness. Hayes (2022) explained that mediation analysis examines how relationships between variables operate through intervening mechanisms. Similarly, Bakker et al. (2023) emphasized the motivational role of work engagement in connecting organizational resources with employee outcomes. Dağdeviren Ertaş and Özdemir (2024) also demonstrated the relevance of organizational commitment and collective teacher efficacy to work engagement. These studies support the interpretation that Work Engagement represents an important pathway linking organizational practices and professional commitment with collaborative effectiveness among public school teachers.

4. Conclusion & Recommendations

The findings revealed that human resource management, work engagement, and teamwork effectiveness were manifested at very high levels among public secondary school teachers in Region XII, while teacher commitment was manifested at a high level. Compensation and affective commitment obtained comparatively lower ratings within their respective variables, although compensation remained at a very high level and affective commitment remained at a high level. Human resource management, work engagement, and teacher commitment were generally positively associated with teamwork effectiveness, although compensation showed no significant relationship. The best-fit path model established significant direct relationships between human resource management and work engagement, teacher commitment and work engagement, human resource management and teamwork effectiveness, and work engagement and teamwork effectiveness. Work engagement occupied an endogenous intervening position in the model, although the identified relationships did not establish causation or confirm mediation. The findings were consistent with concepts drawn from Tuckman's Theory of Group Development and Social Exchange Theory, highlighting the relevance of organizational support, professional engagement, commitment, and collaborative relationships to teamwork effectiveness. Overall, effective human resource management practices, sustained work engagement, and teacher commitment were important factors associated with productive teamwork among public secondary school teachers.

Based on the findings, Department of Education officials are encouraged to strengthen human resource management programs through professional development, teacher participation, mentoring, and collaborative activities that promote work engagement and teamwork effectiveness. Greater emphasis may be placed on non-financial practices supporting professional growth and collaboration, considering the nonsignificant relationship between compensation and teamwork effectiveness. School heads should strengthen teachers' affective commitment through recognition, meaningful participation, supportive professional relationships, and opportunities that foster belonging and professional pride. Regular Learning Action Cell (LAC) sessions, peer mentoring, and collaborative planning should also be sustained to enhance engagement and teamwork. Teachers are encouraged to participate actively in professional collaboration, share effective teaching practices, maintain positive relationships with colleagues, and contribute to shared school goals. Future researchers may replicate the study across different regions, school divisions, and educational settings, examine additional variables, and employ longitudinal or other appropriate research designs to further investigate the relationships among the variables.

The study focused on public secondary school teachers in Region XII; therefore, the consistency of its findings across other regions, school divisions, and educational settings remains to be established. Furthermore, the correlational findings and structural relationships identified in the best-fit path model did not establish causal relationships among human resource management, teacher commitment, work engagement, and teamwork effectiveness. Although work engagement occupied an intervening position in the model, its mediating effect could not be established solely from the significant structural paths without statistical confirmation of the corresponding indirect effects. These considerations highlight the importance of further investigations involving additional variables and longitudinal or other appropriate research designs.

5. Compliance with Ethical Standards

The study received ethical clearance from the University of Mindanao Ethics Review Committee (UMERC) before data collection and complied with the Data Privacy Act of 2012 (Republic Act No. 10173). Respondents' privacy, anonymity, and confidentiality were maintained throughout the research process. Collected data were used exclusively for academic and research purposes, securely stored, and accessible only to the researcher.

Personal identifying information was not disclosed, and findings were presented in aggregated form to protect respondents' identities.

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