



Regular Article

Quality of work life and organizational citizenship behavior: Beyond net effects

Dang Thien Tam^a, Mai Xuan Binh^a, Le Hoang Thien Tan^a, Nguyen Thi Thao^a,
Ha Thi Duy Linh^a, Tran Thanh Hai^a, Hai Nguyen Ngoc Dang^{b,*}

^a Faculty of Business Administration, Duy Tan University, Da Nang, Viet Nam

^b Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia

ARTICLE INFO

Keywords:

Quality of work life
Organizational citizenship behavior
Job satisfaction
Organizational commitment
Necessary condition analysis

ABSTRACT

Quality of work life (QWL) is often treated as a set of additive predictors of organizational citizenship behavior (OCB), but this view says little about whether some work-life conditions must be present before high employee attitudes and discretionary behavior can occur. Focusing on Da Nang, Vietnam, in the post-COVID-19 period, this study examines the QWL-OCB relationship through job satisfaction and organizational commitment. Drawing on the stimulus-organism-response (S-O-R) framework and social exchange theory, survey data were collected from 735 full-time employees across multiple sectors. Partial least squares structural equation modeling (PLS-SEM) and necessary condition analysis (NCA) were used to estimate both net associations and threshold conditions. PLS-SEM showed that QWL was strongly associated with job satisfaction ($\beta = 0.864$) and organizational commitment ($\beta = 0.852$). Organizational commitment was the strongest proximal correlate of self-reported OCB ($\beta = 0.532$), and the model accounted for 72.0% of OCB variance. NCA further showed that selected QWL dimensions were necessary conditions for high job satisfaction and organizational commitment, with the largest CE-FDH effect size reaching $d = 0.186$. Job satisfaction and organizational commitment were also necessary conditions for high self-reported OCB. By combining sufficiency-based and necessity-based reasoning, this study shows that QWL relates to citizenship behavior not only through average positive associations but also through minimum enabling conditions for satisfaction and commitment. Findings are specific to the Da Nang sample and require validation in other contexts.

1. Introduction

Vietnam's post-pandemic labor market presents a paradox. Aggregate output and employment have rebounded at the national level (General Statistics Office of Viet Nam, 2025). Yet the recovery is uneven. The labor market still faces persistent skilled-labor shortages, a widening gap between organizational needs and employee capabilities, and continued reliance on the informal sector (International Labour Organization, 2025; International Monetary Fund, 2025). These structural constraints are particularly pronounced in fast-growing secondary cities such as Da Nang. As a multi-sector hub spanning tourism, professional services, and technology-driven industries, Da Nang exemplifies the type of transitional urban labor market shaping Vietnam's next growth phase. Under such conditions, formal role compliance alone

may not be sufficient to sustain organizational performance, and organizations may depend more heavily on employees' extra-role contributions that extend beyond prescribed job duties (Worku & Debela, 2024).

Organizational citizenship behavior (OCB), characterized as discretionary actions that transcend formal job obligations, has consequently acquired strategic significance. OCB supports coordination, service quality, innovation, and problem-solving capabilities, all of which are particularly important for organizational functioning under conditions of rapid change (Organ, 1997; Organ et al., 2006). While previous studies have examined job satisfaction (JSS), organizational commitment (OCM), and leadership as important antecedents of OCB, these factors are often examined as separate predictors (Lepine et al., 2002; Meyer & Allen, 1991; Nguyen et al., 2022). This gap suggests the need to move beyond isolated antecedents and consider quality of work life

* Corresponding author. Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia.

E-mail addresses: dangthientam@dtu.edu.vn (D.T. Tam), maixuanbinh1@dtu.edu.vn (M.X. Binh), lehoangthientan@dtu.edu.vn (L.H. Thien Tan), nguyenthithao@dtu.edu.vn (N.T. Thao), haduylinh@dtu.edu.vn (H.T. Duy Linh), tranthanhai@dtu.edu.vn (T.T. Hai), hai.dang@utas.edu.au, ngochai123dc@gmail.com (H.N. Ngoc Dang).

<https://doi.org/10.1016/j.ssaho.2026.103281>

Received 1 January 2026; Received in revised form 15 July 2026; Accepted 16 July 2026

Available online 18 July 2026

2590-2911/© 2026 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

(QWL) as a broader lens for linking organizational conditions to employee attitudes and extra-role behavior.

QWL provides a comprehensive framework for understanding how employees evaluate their occupational environment. As a multidimensional construct, QWL encompasses tangible working conditions, interpersonal relationships, organizational assistance, career advancement opportunities, and work-life balance (Sirgy et al., 2001; Walton, 1975). QWL has been widely studied as a predictor of job attitudes and extra-role behavior. Yet prevailing scholarship treats its dimensions as cumulative predictors, emphasizing average additive effects under a linear assumption (Dewangan & Goswami, 2025; Liang et al., 2026). A structured review of Vietnam-based QWL research reveals three notable limitations. First, existing studies have predominantly focused on single-sector samples, notably healthcare and nursing, leaving multi-industry investigations underrepresented (Van et al., 2020). Second, Vietnam-based QWL studies have largely treated dimensions as independent additive predictors, without examining threshold or necessary-condition effects on employee outcomes. Third, recent Vietnam-based studies have examined selected associations between QWL, OCM, and related employee outcomes (Nguyen et al., 2022; Van et al., 2024). However, no Vietnam-based study has simultaneously examined the integrated QWL-JSS-OCM-OCB pathway using a higher-order formative QWL construct with dual mediators and necessity-based analysis.

Taken together, these limitations point to the need to examine both the average associations of QWL dimensions and the conditions required for high levels of JSS, OCM, and OCB. This distinction is important because conventional regression-based approaches are useful for estimating average associations, but they are less suited to identifying necessary conditions that must be present for an outcome to reach a high level (Dul, 2016). From a necessity perspective, some QWL dimensions may have average positive effects on employee outcomes while also serving as minimum conditions for high satisfaction and commitment, which may in turn enable high levels of OCB. This issue may be especially relevant in Vietnam, where rapid institutional changes and uneven human resource practices may make minimum enabling conditions more consequential (Kniffin et al., 2021; Van et al., 2024). Accordingly, the present study focuses on a multi-sector sample in Da Nang and integrates PLS-SEM with NCA to examine both sufficiency-based net effects and threshold-based necessary conditions along the QWL-JSS/OCM-OCB pathway.

To address these gaps, the current study investigates the association between QWL and OCB in this post-COVID-19 urban workforce. Drawing on social exchange theory (SET) (Blau, 2017) and the stimulus-organism-response (S-O-R) framework (Mehrabian & Russell, 1974), this study examines JSS and OCM as psychological mechanisms linking QWL to OCB, and tests whether JSS moderates the OCM-OCB relationship. SET explains why employees reciprocate favorable organizational conditions with heightened satisfaction, commitment, and citizenship conduct. The S-O-R framework provides structural logic, in which QWL dimensions act as stimuli that shape employees' internal states (JSS and OCM), which are then expressed as behavioral responses (OCB). Importantly, because QWL directly operationalizes the organizational conditions that define satisfaction and commitment, strong associations between QWL and these psychological states are theoretically expected rather than empirically anomalous.

In light of the structural transformations in Vietnam's post-COVID-19 labor market and the identified theoretical and methodological gaps, this study focuses on the following research questions:

RQ1: How is QWL, conceptualized as a higher-order formative construct, associated with OCB among employees in Da Nang, Vietnam, following the COVID-19 pandemic?

RQ2: To what degree do JSS and OCM mediate the association between QWL and OCB?

RQ3: Does JSS strengthen the relationship between OCM and OCB?

RQ4: Which QWL dimensions constitute necessary conditions for high JSS and OCM, and do JSS and OCM constitute necessary conditions for high OCB?

To answer these questions, the study combines PLS-SEM and NCA to examine both sufficiency-based net effects and necessity-based threshold conditions along the QWL-JSS/OCM-OCB chain. The intended contribution is threefold. Theoretically, the study reframes the QWL-OCB relationship from the linear additive logic that dominates prior work to a threshold-based logic, distinguishing QWL dimensions that operate as enabling conditions for JSS and OCM from those that function only as average-effect correlates. Empirically, to the best of our knowledge, this study provides the first simultaneous test of the integrated QWL-JSS-OCM-OCB pathway using a higher-order formative QWL construct with dual mediators in a multi-sector Da Nang sample. Methodologically, the two-stage NCA specification aligns necessity testing with the mediation structure of the S-O-R framework rather than treating NCA as a stand-alone supplement to net-effect modeling.

2. Literature review

2.1. Social exchange theory

SET explains OCB as a voluntary response arising from reciprocal workplace relationships (Blau, 2017). From this standpoint, employees engage in OCB when they perceive favorable treatment from the organization and its representatives. Such treatment, reflected in equity, socioemotional support, ethical conduct, and authentic concern for employee welfare, signifies a high-quality exchange relationship and builds trust and relational commitment (Cropanzano & Mitchell, 2005). In accordance with the norm of reciprocity, employees react by voluntarily surpassing formal job obligations. Empirical evidence consistently illustrates that when employees feel supported and treated fairly by their organization, they are more likely to go beyond their formal role requirements, a pattern that SET frames as reciprocal discretionary conduct (Cropanzano & Mitchell, 2005). This reciprocal dynamic has been particularly pronounced in post-pandemic workplaces, where disruptions to job security, work arrangements, and organizational fairness severely tested and reconfigured employees' exchange expectations and citizenship responses (Kniffin et al., 2021). This context is directly relevant to the post-COVID-19 labor market of Da Nang, Vietnam, examined in the present study. Overall, SET provides a robust theoretical foundation for understanding how supportive and equitable workplace conditions translate into voluntary behaviors that enhance organizational effectiveness, thereby justifying the examination of contextual factors as important drivers of OCB.

Evidence from Vietnamese service sector employees further confirms that internal organizational support conditions enhance JSS and organizational engagement through social exchange mechanisms, suggesting that SET-based reciprocity dynamics operate distinctly in the Vietnamese labor market (Van et al., 2024).

2.2. Stimulus-organism-response framework

The S-O-R framework offers a useful perspective for explaining how organizational circumstances relate to employees' discretionary behaviors, including OCB. Within this framework, the QWL dimensions act as organizational signals. Prospects for advancement, employment stability, monetary incentives, participation, the working environment, and personal work-life balance each communicate support and fairness, signaling how far the organization values employees' contributions and well-being (Sirgy et al., 2001; Walton, 1975). Upon receiving these signals, employees form cognitive interpretations and emotional responses that take the form of internal psychological states, specifically JSS and OCM. Prior investigations suggest that supportive and empowering work settings enhance these internal states, thereby

strengthening employees' readiness to engage in positive workplace behaviors (Locke, 1976; Meyer & Allen, 1991). At the behavioral response stage, favorable psychological evaluations translate into active citizenship: employees become more willing to assist colleagues, cooperate proactively, and contribute to collective goals beyond what their roles formally demand. Conversely, insufficient stimuli diminish these internal states and lower discretionary effort. In alignment with SET (Blau, 2017), the S-O-R framework explains how favorable work conditions are converted into extra-role behaviors.

2.3. Organizational citizenship behavior

OCB refers to work behaviors that employees choose to perform without being required to do so, and which contribute positively to the broader functioning of the organization. These actions improve the social and psychological work environment, thereby promoting collaboration, effectiveness, and overall performance (Lepine et al., 2002; Tang et al., 2023). OCB is intrinsically nonmandatory, as it is motivated by individual initiative rather than formal duties or immediate incentives (Organ et al., 2006). Anchored in SET and organizational justice frameworks, OCB is frequently perceived as a reciprocal reaction to supportive, equitable, and meaningful treatment by the organization. Employees who show high levels of OCB tend to display greater adaptability, cooperation, and commitment to organizational goals (Cropanzano et al., 2007; Podsakoff et al., 2009). Conceptually, OCB is generally operationalized in five dimensions: altruism, courtesy,

conscientiousness, sportsmanship, and civic virtue, which collectively capture employees' voluntary contributions to organizational effectiveness (Organ, 1997).

2.4. Quality of work life dimensions

QWL represents a complex, multidimensional construct that captures employees' evaluations of the extent to which their work environment fulfills their material, psychological, and social requirements. Initial scholarly contributions emphasized the necessity of humane and secure working conditions (Hackman & Oldham, 1975), whereas subsequent frameworks conceptualized QWL as a cohesive system of practices aimed at improving both employee welfare and organizational effectiveness (Sirgy et al., 2001). Drawing upon Walton's (1975) foundational framework and its subsequent modifications (Dewangan & Goswami, 2025; Sirgy et al., 2001; Zin, 2004), this research operationalizes QWL through six distinct dimensions, as illustrated in Fig. 1.

Collectively, these dimensions capture the extent to which organizations design work systems that are safe, fair, development-oriented, participative, and life-friendly. Prior research has shown that high QWL reduces stress and fatigue and enhances motivation, commitment, and extra-role behavior across sectors such as education, health care, and manufacturing (Dewangan & Goswami, 2025; Hermanto et al., 2024). In this study, QWL is defined as the set of organizational and environmental conditions that promote employee satisfaction, psychological investment, and willingness to contribute beyond formal role



Fig. 1. Dimensions of quality of work life. Created by the authors using BioRender.com.

requirements.

2.5. Conceptual framework

The posited model is theoretically grounded in the integration of SET (Blau, 2017) and the S-O-R framework (Mehrabian & Russell, 1974) (Fig. 2). From this standpoint, QWL comprises a collection of organizational stimuli that convey equity, support, and reciprocity (Sirgy et al., 2001; Walton, 1975). These stimuli inform employees' internal psychological conditions, namely, JSS and OCM, which function as fundamental organismic mechanisms (Locke, 1976; Meyer & Allen, 1991). QWL is positively associated with these states, which are in turn associated with OCB (Hermanto et al., 2024; Organ, 1997). SET further explains OCB as a reciprocal response to favorable treatment (Cropanzano et al., 2007). In addition, JSS is theorized to moderate the OCM-OCB relationship, such that higher satisfaction may strengthen the degree to which commitment translates into citizenship behavior (Gautam et al., 2005; Ilies et al., 2015; Tang et al., 2023). By integrating direct, mediating, and moderating pathways, the model goes beyond linear explanations and provides a more comprehensive representation of the psychological processes underlying discretionary behavior. This theoretically anchored configuration provides a robust framework for examining OCB in contemporary organizational settings.

On this theoretical foundation, the study examines eight core hypotheses (H1-H8), which capture the direct, mediating, and moderating relationships among QWL, JSS, OCM, and OCB. These hypotheses are organized into three theoretically coherent groups. The first group covers direct effects (H1-H5), testing the core S-O-R pathways in which QWL is positively associated with JSS and OCM, which in turn are positively associated with OCB, alongside the direct QWL-OCB path. The second group addresses mediation (H7, H8), examining the indirect mechanisms through which QWL is associated with OCB via JSS and OCM at the overall construct level. The third group concerns moderation (H6), testing whether JSS strengthens the positive relationship between OCM and OCB, such that higher levels of JSS increase the degree to which OCM translates into citizenship behavior. In addition, four supplementary diagnostic analyses examine the dimension-level effects of individual QWL components and are presented in **Supplementary Document S1**. Viewed in this structure, the hypotheses reflect a theoretically integrated and multilevel research program rather than a fragmented one.

From a measurement standpoint, it is essential to distinguish the strength of a structural relationship from the distinctiveness of the constructs involved. A large path coefficient quantifies how strongly one construct is associated with another. It does not, by itself, indicate that the two constructs are redundant. Construct redundancy is a property of the measurement model and is evaluated through discriminant validity criteria rather than through the magnitude of structural paths. Three considerations support the distinctiveness of QWL from JSS and OCM despite their strong expected associations. Conceptually, QWL captures the organizational conditions that employees experience, such as remuneration, participation, and working conditions, whereas JSS and OCM capture the internal affective and attitudinal states those conditions evoke. Within the S-O-R framework, QWL represents the stimulus, whereas JSS and OCM represent organismic states. Therefore, a close stimulus-organism relationship is consistent with the theoretical model. Operationally, QWL is specified as a higher-order formative composite defined by its six dimensions, whereas JSS and OCM are reflective constructs. The three therefore do not share a common latent cause and are not constrained to covary through a shared reflective measurement model. Empirical evidence from discriminant validity assessment, collinearity diagnostics, and split-sample robustness checks further supports the distinctiveness of the constructs. The large associations from QWL to JSS and OCM are thus theoretically expected and consistent with prior higher-order formative QWL research. Consequently, large structural coefficients should be interpreted as reflecting the broad conceptual coverage of the higher-order formative QWL construct rather than evidence of measurement redundancy. Detailed theoretical arguments, hypothesis justifications, and supporting references are provided in **Supplementary Document S1**.

3. Methods

3.1. Data collection process

A purposive sampling design was adopted to target participants aligned with the research aims. NCA requires respondents with genuine exposure to the focal conditions in order to identify meaningful ceiling lines (Dul, 2016). Selecting employees with adequate organizational experience was therefore preferred over probability sampling from a general population frame. This approach is particularly suitable for obtaining a relatively homogeneous sample when evaluating theoretical

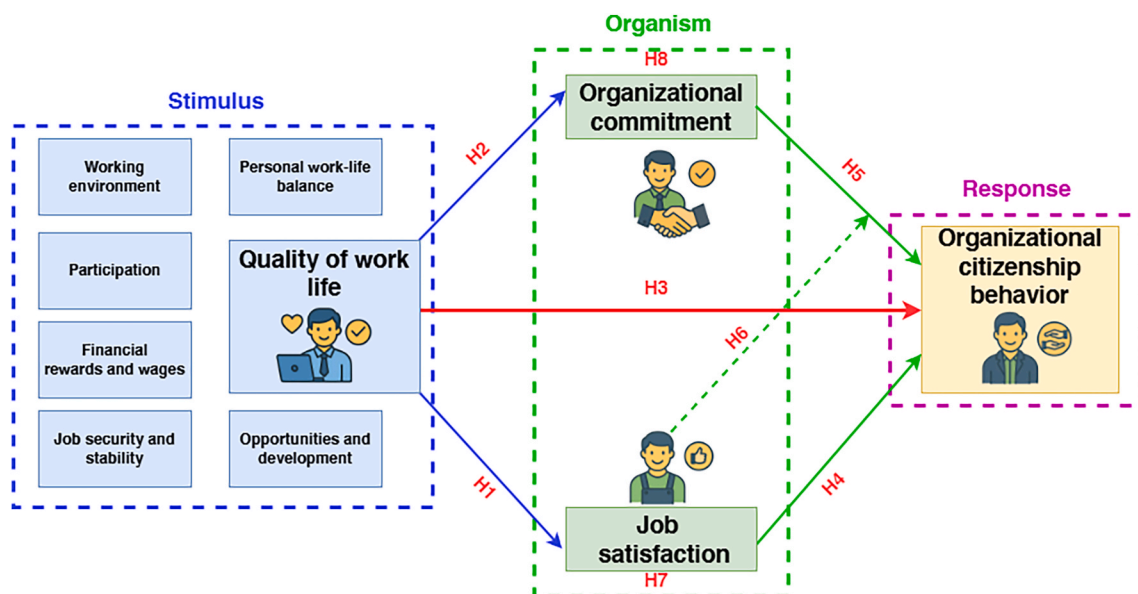


Fig. 2. The proposed research model. The model illustrates the direct, indirect, and moderating pathways linking quality of work life, job satisfaction, organizational commitment, and organizational citizenship behavior within the stimulus-organism-response framework. Created by the authors using BioRender.com.

constructs and moderating influences (Campbell et al., 2020). To enhance transparency, participants were selected according to the following criteria: (1) they were full-time employees working in organizations or industrial zones in Da Nang; (2) they had sufficient organizational experience to evaluate their work environment; (3) they were aged 18 years or older; and (4) they voluntarily agreed to participate. Part-time workers, temporary workers, interns, and respondents who did not complete the questionnaire or showed invalid response patterns were excluded from the final sample. These criteria were applied to ensure that participants had adequate exposure to their work environment and could provide meaningful evaluations of QWL, JSS, OCM, and OCB. The recruitment procedure comprised three stages. First, 15 organizations across ten industry sectors in Da Nang were identified through the directories of industrial zone management boards, the research team's professional contact network, and local business associations. This sectoral coverage was intended to enhance the heterogeneity of work contexts within the single-city setting. Second, potential participants were approached directly at industrial zones and through the human resource departments of the participating organizations. Questionnaires were administered primarily through an online survey link, with a smaller proportion distributed in paper form during direct on-site recruitment. Third, eligibility was verified using screening questions concerning full-time employment status and organizational tenure. Ineligible, incomplete, or invalid responses were removed during data screening, as described below. No incentives were offered for participation. The research protocol was reviewed and approved by the Research Ethics Committee of Duy Tan University (DTU/R-EC2025/NHH06). All participants provided informed consent prior to participation. Data were collected between August and October 2025 from full-time employees working in organizations and industrial zones in Da Nang via a self-administered structured questionnaire. The participating organizations reported an approximate questionnaire return rate of 85%. Among the 830 responses acquired, 88 were discarded because of straight-lining and missing data. Given the application of NCA, which is sensitive to extreme values (Dul, 2016), multivariate outliers were identified using the Mahalanobis distance in IBM SPSS Statistics (version 27.0; United States) at a significance threshold of $p < 0.001$. Seven outliers were eliminated, resulting in a final sample of 735 valid responses. The sample was predominantly female (54.15%), with 46.94% holding a college-level education and 34.83% aged over 35 years. In terms of average monthly income, the majority of participants earned from 10 to under 20 million VND (41.77%), followed by those earning less than 10 million VND (33.88%). The survey covered respondents from ten different industry sectors, reflecting diverse occupational backgrounds. The detailed demographic characteristics of the sample are presented in [Supplementary Table S1](#).

3.2. Sample size

Sample size adequacy was assessed following Kock and Hadaya (2018) via the inverse square root method, which indicated a minimum sample of 618 cases based on the smallest anticipated path coefficient of 0.10. The retained sample of 735 valid responses exceeds this threshold. A post hoc power analysis confirmed a power value of 1.0, indicating sufficient statistical power for all planned analyses.

3.3. Measurement procedure

All measurement items were adapted from validated scales to ensure content validity. QWL was measured using Walton's (1975) multidimensional framework, which is widely used in organizational research (Liang et al., 2026; Sirgy et al., 2001). Six dimensions were assessed: opportunities and development (OD), job security and stability (JST), financial rewards and wages (FRW), participation (Pa), working environment (WE), and personal work-life balance (PWB), with items predominantly modified from Zin (2004).

JSS was measured using six items adapted from Brayfield and Rothe (1951) and Locke (1976). OCM was evaluated using Meyer & Allen's (1991) three-component model of affective, continuance, and normative commitment with two items per facet. OCB was measured using the scale based on Organ's (1997) framework.

All the items were assessed on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The questionnaire was translated into Vietnamese and reviewed by the research team to ensure semantic consistency with the original scales. A pretest with 30 participants confirmed item clarity, followed by a pilot study involving 95 individuals, in accordance with Hertzog (2008). The pilot confirmed no ambiguity in item wording (Hair et al., 2021). Comprehensive measurement constructs, items, and sources are documented in [Supplementary Table S2](#). Two complementary PLS-SEMs were estimated: a dimension-level QWL model for diagnostic examination and a higher-order formative QWL model to evaluate mediation and moderation effects, which is consistent with the integrated conceptualization of QWL. The higher-order formative construct of QWL was modeled via the disjoint two-stage approach. In the first stage, the lower-order constructs were estimated, and their latent variable scores were obtained. In the second stage, these scores were used as formative indicators to construct the higher-order QWL construct. Alongside PLS-SEM, NCA was specified a priori as a two-stage analysis matching the mediation logic of the S-O-R framework. At the first stage, the six QWL dimensions were tested as necessary conditions for high JSS and high OCM. At the second stage, JSS and OCM were tested as necessary conditions for high OCB. Individual QWL dimensions were not tested as direct necessary conditions for OCB, because they are theorized to relate to OCB only indirectly through JSS and OCM. Necessity was assessed using the nonparametric ceiling envelopment with free disposal hull (CE-FDH) ceiling line applied to the PLS-SEM construct scores. CE-FDH was used to allow for a nonlinear, stepwise ceiling without imposing a linear boundary (Dul, 2016). Necessity effect sizes were benchmarked following Dul (2016), and their statistical significance was assessed using the NCA permutation procedure with 5000 permutations.

4. Results

A multianalytic methodology was employed. The measurement and structural frameworks were evaluated via PLS-SEM in SmartPLS software (version 4.1.0.9; Germany). Mardia's skewness and kurtosis assessments indicated significant multivariate nonnormality ($p < 0.001$), thereby justifying the use of PLS-SEM owing to its robustness (Hair et al., 2021). To complement the net-effect estimation, NCA was conducted using latent variable scores derived from the PLS-SEM procedure. Comprehensive descriptions of the measurement item data are provided in [Supplementary Table S3](#).

4.1. Common method variance

To address potential common method variance (CMV), both procedural and statistical remedies were applied. Procedurally, respondent anonymity and confidentiality were assured, participation was voluntary, and the questionnaire used clear and concise wording refined through pretesting and pilot testing to reduce item ambiguity. Statistically, the full collinearity test (Kock, 2015) was conducted using latent variable scores. The resulting variance inflation factor (VIF) values were 3.485 (OCB), 4.015 (JSS), 4.620 (OCM), and 6.989 (QWL), all above the conservative 3.3 benchmark ([Supplementary Table S4A](#)). In a model whose constructs are theoretically proximal by design, elevated full collinearity VIFs follow mathematically from the hypothesized structure, because QWL alone accounts for approximately 75% of the variance in JSS and OCM. In this setting, the test cannot separate genuine construct interrelations from method variance. Two further pieces of evidence argue against pervasive CMV. First, the correlational pattern is strongly differentiated. Although PWB and JST were measured with the

same method and source, they show near-zero associations with the remaining constructs (HTMT = 0.036–0.204). Such a pattern is inconsistent with a common method factor that uniformly inflates responses. Second, a statistically significant interaction effect was detected (H6). Because method variance attenuates rather than inflates interaction effects, this detection is difficult to reconcile with substantial CMV (Siemsen et al., 2010). Inner collinearity diagnostics were also performed for the structural model. Five of the six inner VIF values fell below 5.0 (Hair et al., 2021). The elevated value on the QWL → OCB path (6.828) is inherent to the higher-order mediation specification and remains below the more lenient threshold of 10.0 (Supplementary Table S4B). Nevertheless, because all variables including self-rated OCB were collected from the same respondents at a single point in time, CMV cannot be completely ruled out.

4.2. Assessment of the measurement model

The measurement framework was examined to verify that all indicators met reliability and validity criteria preceding structural analysis. The preliminary outer model evaluation identified several indicators with low or directionally inconsistent loadings. Following refinement in the subsequent iteration, all retained indicators showed satisfactory loadings ranging from 0.702 to 0.935, confirming adequate indicator reliability (Hair et al., 2021). Furthermore, multicollinearity diagnostics of the reflective indicators using the VIF yielded values ranging from 1.410 to 4.548, all remaining below the threshold of 5.0 (Hair et al., 2021), confirming the absence of multicollinearity among the outer measurement indicators. Reliability and convergent validity were established through composite reliability and average variance extracted. As shown in Table 1, the composite reliability values ranged from 0.872 to 0.962, well above the 0.70 benchmark, whereas the average variance extracted values ranged from 0.630 to 0.859, surpassing the 0.50 threshold (Fornell & Larcker, 1981). These outcomes illustrate strong internal consistency and adequate convergent validity across all the constructs. Preliminary item loadings are presented in Supplementary Table S5, whereas the retained-item loadings, reliability coefficients, and validity statistics are reported in Supplementary Table S6 for transparency and replication.

Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and HTMT ratio (Henseler et al., 2015). As shown in Supplementary Table S7, the Fornell-Larcker results generally supported discriminant validity, although selected correlations involving JSS slightly exceeded the square root of the average variance extracted for JSS, indicating close conceptual proximity among several work-related constructs. The HTMT criterion, which provides a more reliable basis for inference among conceptually related constructs, was therefore treated as primary. All HTMT values fell below the 0.90 threshold, and none of the 95% bootstrap confidence intervals included 1, satisfying the HTMT inference criterion (Henseler et al., 2015).

Because the coefficients from QWL to JSS ($\beta = 0.864$) and OCM ($\beta = 0.852$) are large, their bearing on construct distinctiveness warrants direct comment. Path magnitude does not indicate redundancy. Because QWL is a formative composite whereas JSS and OCM are reflective, reflective-sense redundancy is assessed among the reflective sub-constructs (the six QWL dimensions, JSS, and OCM). The HTMT evidence supports distinctiveness. The two highest values arose among the

QWL dimensions themselves (0.894) and between WE and JSS (0.891), not between the QWL dimensions and the attitudinal constructs more broadly. For both pairs, the 95% bootstrap confidence intervals excluded 1 (Supplementary Table S7B). At the indicator level, every retained item loaded most strongly on its intended construct, with a single marginal altruism-item exception (Supplementary Table S7C). These associations therefore reflect theoretically expected construct proximity rather than empirical redundancy.

The higher-order formative construct of QWL was evaluated following the criteria recommended by Hair et al. (2021). Regarding collinearity among the formative indicators of the higher-order QWL construct, outer VIF values were as follows: PWB = 1.002, JST = 1.045, OD = 2.690, Pa = 4.425, WE = 4.865, and FRW = 4.973. All values remained below the commonly accepted threshold of 5.0, indicating no severe multicollinearity among the formative indicators. Regarding the significance and relevance of outer weights, FRW ($w = 0.271$, $p < 0.001$), OD ($w = 0.254$, $p < 0.001$), Pa ($w = 0.272$, $p < 0.001$), and WE ($w = 0.277$, $p < 0.001$) demonstrated substantial and statistically significant contributions to the QWL construct. JST also yielded a statistically significant weight ($w = 0.052$, $p < 0.001$), confirming its relevance despite a modest magnitude. PWB returned a non-significant weight ($w = 0.016$, $p = 0.150$). However, it was retained on theoretical grounds, as work-life balance is considered a core dimension of QWL across established frameworks. Following Hair et al. (2021), indicators with non-significant weights may be retained when strong conceptual justification exists, provided their removal does not substantially alter the structural estimates. Overall, the formative measurement specification of QWL is considered adequate. Outer weights, significance tests, and collinearity statistics are reported in Supplementary Table S6.

Table 2 reports model-fit indices for the higher-order model. The estimated-model SRMR value of 0.054 was below the 0.08 benchmark (Hu & Bentler, 1999). The NFI value of 0.853 was below the conventional threshold of 0.90 and should therefore be interpreted cautiously (Henseler et al., 2015). The d_{ULS} and d_G values are reported descriptively because their inferential assessment requires comparison with bootstrap-based reference values.

4.3. Assessment of the structural model

Structural model assessment revealed no severe collinearity issues, as all VIF values were within acceptable limits. As part of the supplementary diagnostic analyses, the dimension-level results showed that OD, FRW, Pa, and WE were significantly and positively associated with JSS, whereas JST and PWB were nonsignificant. The model explained a substantial proportion of the variance in JSS ($R^2 = 0.752$; $Q^2_{predict} = 0.746$).

Similarly, the dimension-level diagnostic results showed that JST, FRW, Pa, and WE significantly predicted OCM, whereas OD and PWB were nonsignificant. This model accounted for 74.7% of the variance in OCM ($R^2 = 0.747$; $Q^2_{predict} = 0.742$).

The supplementary mediation diagnostic analyses further indicated that OD, FRW, Pa, and WE showed significant positive indirect associations with OCB through JSS, whereas JST and PWB did not show significant indirect effects through JSS. In contrast, JST, FRW, Pa, and WE demonstrated significant indirect effects on OCB through OCM, whereas

Table 1
Assessment of the reliability and convergent validity.

Assessment measure	Criterion	Threshold	Result
Indicator reliability	Factor loadings	>0.70	0.702 - 0.935
Multicollinearity	Variance inflation	<5.00	1.410 - 4.548
Composite reliability	Internal consistency	>0.70	0.872 - 0.962
Average variance extracted	Convergent validity	>0.50	0.630 - 0.859
Heterotrait-monotrait ratio	Discriminant validity	<0.90	0.036 - 0.894

Table 2
Model fit.

Index	Saturated model	Estimated model
SRMR	0.053	0.054
d_{ULS}	3.018	3.177
d_G	1.113	1.128
NFI	0.855	0.853

Abbreviations: SRMR, standardized root mean square residual; d_{ULS} , squared Euclidean distance; d_G , geodesic distance; NFI, normed fit index.

OD and PWB did not show significant indirect effects through OCM.

Overall, the supplementary diagnostic analyses confirm that selected QWL dimensions are associated with OCB through distinct psychological mechanisms, highlighting the differentiated mediating roles of JSS and OCM. These dimension-level findings are reported as supplementary diagnostic evidence, while the main manuscript focuses on the eight core hypotheses related to the higher-order QWL construct. The detailed path coefficients, bootstrap confidence intervals, and predictive accuracy indices are reported in [Supplementary Table S8](#).

To further assess the model's out-of-sample predictive performance, the PLSpredict procedure was conducted. As shown in [Supplementary Table S9](#), all Q^2_{predict} values were greater than zero, indicating that the model has predictive relevance for all endogenous indicators. However, the comparison between the PLS-SEM prediction errors and the linear model (LM) benchmark showed mixed results. The LM benchmark produced slightly lower RMSE values for most indicators, whereas the PLS-SEM model produced lower MAE values for selected indicators, such as JSS3, JSS5, OCB3, and OCB5. Therefore, the model demonstrates predictive relevance, but its out-of-sample predictive performance should be interpreted cautiously.

To assess the robustness of the structural estimates, a split-sample validation was conducted by randomly dividing the full sample ($n = 735$) into two approximately equal subsamples (Sub1: $n = 367$; Sub2: $n = 368$) and re-estimating the structural model for each subsample. All main direct and indirect relationships remained consistent in direction and broadly comparable in magnitude across both subsamples, supporting the stability of the proposed model. The moderation effect of JSS on the OCM-OCB relationship (H6) remained positive but was significant only in Subsample 1, consistent with its very small effect size in the full-sample model. This result should therefore be interpreted with caution. Detailed split-sample results are reported in [Supplementary Table S10](#).

As reported in [Table 3](#), the structural model provides strong empirical support for the proposed higher-order formative QWL framework. The estimated model, annotated with standardized path coefficients and R^2 values, is presented graphically in [Supplementary Fig. S1](#). QWL showed strong positive associations with both JSS (H1: $\beta = 0.864$, $t = 77.89$, $f^2 = 2.930$) and OCM (H2: $\beta = 0.852$, $t = 67.92$, $f^2 = 2.655$), indicating very large effect sizes. Given the magnitude of these coefficients, the findings were interpreted cautiously alongside the collinearity diagnostics and CMV assessments. Although the diagnostics did not indicate critical collinearity, the full-collinearity VIF results suggested that CMV could not be completely ruled out. Furthermore, QWL showed a direct positive association with OCB (H3: $\beta = 0.222$, $t = 3.75$), although the corresponding effect size was relatively modest.

Concerning the organism-response relationships, both JSS (H4: $\beta = 0.149$, $t = 3.78$, $f^2 = 0.020$) and OCM (H5: $\beta = 0.532$, $t = 10.43$, $f^2 = 0.270$) were positively associated with OCB. The association between OCM and OCB was substantially stronger than the association of JSS with OCB and the direct association between QWL and OCB (H3:

$\beta = 0.222$, $f^2 = 0.026$). These results indicate that OCM is the dominant proximal correlate of OCB in the model, with a medium effect size, whereas QWL and JSS show comparatively small direct effect sizes. Collectively, the predictors explained 72.0% of the variance in OCB ($R^2 = 0.720$), and the model exhibited predictive relevance ($Q^2_{\text{predict}} = 0.639$).

The f^2 values for H1 (2.930) and H2 (2.655) were very large and should be interpreted cautiously. Their magnitude partly reflects the high R^2 values for JSS and OCM and the theoretical proximity between QWL and these attitudinal constructs. By contrast, the association between OCM and OCB showed a medium effect size (H5: $f^2 = 0.270$). Because all constructs were measured from the same source at a single point in time, the effect sizes for H1 and H2 may represent upper-bound estimates rather than unusually large substantive effects.

The results of the mediation analyses additionally revealed that QWL was indirectly associated with OCB through JSS (H7: $\beta = 0.129$, $t = 3.76$) and OCM (H8: $\beta = 0.453$, $t = 10.990$), confirming the presence of parallel mediating mechanisms.

The moderating effect of JSS on the OCM-OCB relationship (H6) was examined using the two-stage approach ([Becker et al., 2018](#)). The interaction term was statistically significant but negligible in magnitude ($\beta = 0.056$, $t = 2.734$, $p = 0.006$; BCaCI [0.019, 0.100]; $f^2 = 0.016$) and was significant in only one of the two split-half subsamples ([Supplementary Table S10](#)). H6 therefore receives statistical but not practical support, and the moderation is treated as a weak, exploratory boundary condition rather than a substantive result. The interaction plot is provided in [Fig. 3](#).

Overall, the hypothesized direct and mediating relationships (H1-H5, H7, and H8) in the higher-order formative QWL model were supported, yielding results consistent with the integrated S-O-R and SET framework, whereas H6 is retained only as an exploratory boundary condition.

4.4. Necessary condition analysis

Consistent with the two-stage specification declared a priori, NCA examined the six QWL dimensions as necessary conditions for high JSS and high OCM, and JSS and OCM as necessary conditions for high OCB. Direct necessity paths from individual QWL dimensions to OCB were not estimated. The dimension-level findings should therefore be interpreted only within the theorized two-stage sequence through JSS and OCM, not as evidence that any QWL dimension is directly necessary for OCB. In each NCA scatterplot, an empty region in the upper-left corner signals a potential necessary-but-not-sufficient condition, in which the outcome cannot reach a high level unless the condition first attains a minimum level.

The interpretation of each ceiling line rests on three parameters: the necessity effect size (d), the condition inefficiency (CI), and the outcome inefficiency (OI). The NCA findings reported in [Table 4](#) then translate these parameters into threshold conditions: QWL dimensions necessary

Table 3
Assessment of the structural model.

Hypothesis and Path	Coefficient	t-stat	BCaCI	f^2	P-value	Remarks
H ₁ : QWL → JSS	0.864	77.890***	[0.840 - 0.880]	2.930	<0.001	Supported
H ₂ : QWL → OCM	0.852	67.920***	[0.820 - 0.870]	2.655	<0.001	Supported
H ₃ : QWL → OCB	0.222	3.750***	[0.106 - 0.336]	0.026	<0.001	Supported
H ₄ : JSS → OCB	0.149	3.783***	[0.074 - 0.228]	0.020	<0.001	Supported
H ₅ : OCM → OCB	0.532	10.430***	[0.429 - 0.627]	0.270	<0.001	Supported
OCB; $R^2 = 0.720$; $Q^2_{\text{predict}} = 0.639$						
H ₆ : JSS x OCM → OCB	0.056	2.734**	[0.019 - 0.100]	0.016	0.006	Supported; negligible effect size
H ₇ : QWL → JSS → OCB	0.129	3.761***	[0.064 - 0.198]	-	<0.001	Supported
H ₈ : QWL → OCM → OCB	0.453	10.990***	[0.368 - 0.530]	-	<0.001	Supported

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. BCaCI: bias-corrected and accelerated 95% confidence interval. Abbreviations: QWL, quality of work life; JSS, job satisfaction; OCM, organizational commitment; OCB, organizational citizenship behavior; BCaCI, bias-corrected and accelerated confidence interval; f^2 , effect size; R^2 , coefficient of determination; Q^2_{predict} , predictive relevance.

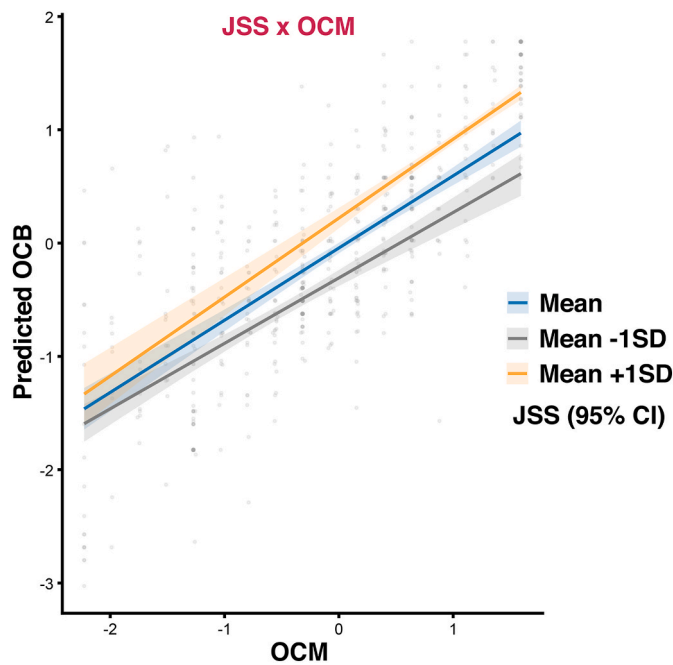


Fig. 3. Interaction effects of job satisfaction on the relationship between organizational commitment and organizational citizenship behavior. Abbreviations: OCB, organizational citizenship behavior; OCM, organizational commitment; JSS, job satisfaction; SD, standard deviation; CI, confidence interval. The shaded bands represent 95% confidence intervals. Created by the authors using SmartPLS 4.1.0.9.

for high JSS and OCM, and JSS and OCM as conditions necessary for high OCB. Concerning JSS, several QWL dimensions emerge as statistically significant necessary conditions. Among these factors, OD represents a particularly important threshold condition, with a comparatively substantial necessity effect size ($d = 0.171$). Its condition inefficiency is high ($CI = 75\%$), whereas its outcome inefficiency is zero ($OI = 0\%$). The high CI indicates that the necessity constraint is concentrated at lower levels of OD, so that once a relatively low threshold of OD is reached, higher OD imposes no further constraint and OD need not be exceptionally high to satisfy the necessity threshold. The zero OI indicates that OD remains a necessary condition across the full range of JSS, including its highest levels. Elevated JSS is therefore unlikely to emerge unless a minimum level of OD is present, and this necessity persists even at the highest levels of JSS.

FRW ($d = 0.126$), WE ($d = 0.182$), and Pa ($d = 0.082$) also serve as essential prerequisites for JSS, though their necessity effects show

saturation beyond particular thresholds, indicating diminishing returns once minimum levels are reached. PWB shows a negligible necessity effect ($d = 0.003$), implying that it does not function as a necessary condition for JSS within this framework.

With respect to OCM, the NCA results similarly highlight OD as a core necessary condition ($d = 0.152$, $CI = 75\%$, $OI = 0.00\%$). As with JSS, the high CI shows that necessity is concentrated at lower levels of OD, so a modest threshold suffices and higher OD is not required. Unlike FRW, Pa, and WE, however, OD has zero outcome inefficiency, which means its necessity extends across the entire range of OCM, including the highest levels, rather than weakening at high OCM. FRW ($d = 0.186$), Pa ($d = 0.137$), and WE ($d = 0.166$) also exhibit significant necessity effects, with CI and OI values suggesting that moderate levels of these conditions may be sufficient to clear the necessary threshold for high OCM. Conversely, PWB and JST do not emerge as necessary conditions for OCM within this model. The CI and OI indices further demonstrate that many QWL dimensions operate as threshold conditions: once a minimum level is achieved, additional investments may contribute less. Detailed visualizations of the NCA results, including ceiling lines and bottleneck patterns for the relationships between QWL dimensions and JSS and OCM, are provided in [Supplementary Fig. S2](#).

At this second stage, the CE-FDH effect sizes reported in [Table 4](#) and plotted in [Fig. 4](#) show that JSS and OCM themselves function as necessary conditions for high OCB. JSS has a necessity effect size of $d = 0.145$ with $CI = 50\%$ and $OI = 54.74\%$, indicating that JSS is a necessary yet insufficient condition for high levels of OCB. OCM has a lesser necessity effect ($d = 0.119$, $CI = 25\%$), implying that although OCM is a significant prerequisite, it is not the only driver of citizenship behavior. [Fig. 4](#) displays the observed data, OLS lines, and CE-FDH ceilings for JSS and OCM in relation to OCB. The OLS lines summarize the average associations and are shown as descriptive benchmarks, whereas the upper-left empty spaces bounded by the CE-FDH ceilings correspond to the necessity constraints quantified in [Table 4](#). Because CE-FDH is a stepwise boundary estimator rather than a regression function, the plots are interpreted in terms of constraints and thresholds rather than marginal slopes.

Overall, the NCA results complement the PLS-SEM findings by identifying threshold conditions that constrain high JSS, OCM, and OCB. OD emerged as the most stable necessity condition for JSS and OCM, whereas FRW, Pa, and WE were mainly relevant at medium-to-high thresholds. JSS and OCM were also necessary conditions for high self-reported OCB, supporting the two-stage necessity logic of the proposed model. Detailed NCA effect sizes, CI, and OI values are reported in [Table 4](#), and the corresponding bottleneck table is provided in [Supplementary Table S11](#).

Table 4
Necessary condition analysis results (Method: CE-FDH).

Construct	Job satisfaction (JSS)			Organizational commitment (OCM)			Organizational citizenship behavior (OCB)		
	Effect size	CI (%)	OI (%)	Effect size	CI (%)	OI (%)	Effect size	CI (%)	OI (%)
OD	0.171***	75.00	0.00	0.152***	75.00	0.00	Not estimated		
JST	0.000	N/A	N/A	0.000	N/A	N/A			
FRW	0.126***	41.54	60.54	0.186***	50.00	50.00			
Pa	0.082***	50.00	64.82	0.137***	50.00	50.00			
WE	0.182***	50.00	50.00	0.166***	50.00	50.00			
PWB	0.003	93.66	95.14	0.000	N/A	N/A			
JSS							0.145***	50.00	54.74
OCM							0.119***	25.00	72.63

Note: (1) The CE-FDH effect sizes are significant at the *** $p < 0.001$ level (see effect size column). (2) The accuracy of the CE-FDH line is not mentioned in the table, as it is always 100% by design. Effect-size benchmarks follow [Dul \(2016\)](#): $d < 0.10$ = small; 0.10 – 0.30 = medium; > 0.30 = large. (3) p-values were obtained using the NCA permutation procedure with 5000 permutations. Abbreviations: JSS, job satisfaction; OCM, organizational commitment; OCB, organizational citizenship behavior; OD, opportunities and development; JST, job security and stability; FRW, financial rewards and wages; Pa, participation; WE, working environment; PWB, personal work-life balance; CI, condition inefficiency; OI, outcome inefficiency. Direct NCA paths from individual QWL dimensions to OCB were not estimated because QWL dimensions were theorized to relate to OCB indirectly through JSS and OCM.

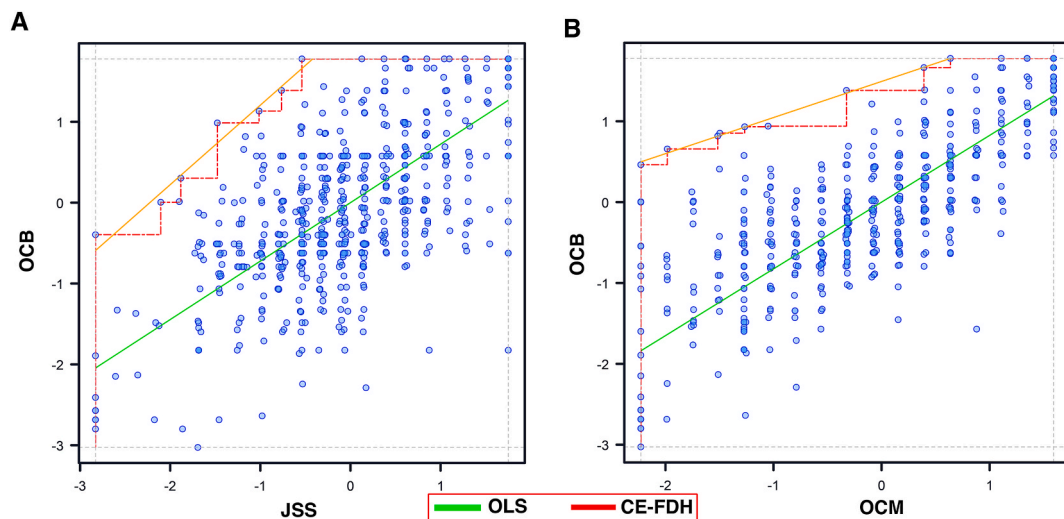


Fig. 4. Necessary condition analysis plots of the relationships of job satisfaction and organizational commitment with organizational citizenship behavior. Abbreviations: OCB, organizational citizenship behavior; JSS, job satisfaction; OCM, organizational commitment; OLS, ordinary least squares; CE-FDH, ceiling envelopment with free disposal hull. Created by the authors using SmartPLS 4.1.0.9.

5. Discussion

5.1. Discussion of the results

Methodologically, the integration of PLS-SEM and NCA provides a more comprehensive analytical approach. PLS-SEM reveals whether and how strongly QWL is associated with JSS, OCM, and OCB, whereas NCA identifies which QWL dimensions function as necessary conditions for achieving high levels of these outcomes. This dual approach extends beyond conventional SEM by combining net-effect and necessity-based explanations.

Beyond the dimension-level outcomes, the pronounced and statistically significant association between the overall QWL and JSS provides a critical theoretical perspective. Although JST and PWB did not show significant direct associations, the higher-order QWL construct showed a strong and consistent association with JSS. This finding supports a systemic perspective of QWL, suggesting that employees assess their work environment holistically rather than as a set of separate attributes (Dewangan & Goswami, 2025; Hermanto et al., 2024). Importantly, this holistic evaluation appears to be especially relevant in the present sample, where organizational practices may be perceived as interdependent and mutually reinforcing rather than modular. Earlier work has focused on specific QWL related factors, such as job security in public-sector contexts (Van et al., 2024) and work-life balance across cultures (Haar et al., 2014). The present findings suggest a different pattern. In this setting, satisfaction appears more contingent on the overall quality of the work environment than on any single sub-dimension. When employees perceive developmental, financial, participatory, and environmental support as interrelated, the aggregate experience becomes more consequential than any single subdimension. This pattern is consistent with modeling QWL as a higher-order formative construct whose total configuration retains motivational significance even when individual components are weak predictors. It also suggests that reductionist, dimension-by-dimension conceptualizations may understate the role of QWL, pointing to the value of multilevel, integrative approaches in future research.

The findings underscore QWL's role as a foundational condition associated with OCM, with the higher-order construct exerting a particularly strong association with OCM. This suggests that employees' commitment is shaped not by discrete job features in isolation but by their aggregate assessment of how equitably and dependably the organization treats them (Thien Tam et al., 2026). Consistent with Meyer and

Allen's (1991) three-component framework, all facets of commitment, including affective, continuance, and normative commitment, appear to strengthen when employees perceive their organization as genuinely supportive and stable. Dimension-level results further support this pattern, with JST, FRW, Pa, and WE each positively predicting OCM, consistent with the view that conditions of fairness, security, and participatory governance are associated with stronger employee attachment (Hermanto et al., 2024; Van et al., 2024). These findings suggest that, in this sample, commitment is anchored primarily in tangible and immediately observable organizational provisions rather than in aspirational or long-term promises, a pattern consistent with prior Vietnam-based evidence (Nguyen et al., 2022). In contrast, OD and PWB do not show significant associations with OCM, a pattern that may reflect institutional features documented in prior Vietnamese labor market research (Nguyen et al., 2022; Van et al., 2024). In seniority-oriented and hierarchical workplaces, career advancement may be perceived as structurally constrained, making OD initiatives appear symbolic rather than substantive. Likewise, work-life policies remain inadequately institutionalized, with employees frequently relying on familial networks rather than formal organizational support to manage nonwork responsibilities. Consequently, commitment appears to be linked primarily to immediate and tangible conditions such as security, remuneration, participation, and the day-to-day work environment rather than to longer-term developmental or balance-oriented provisions. Nevertheless, given the same-source and cross-sectional design, these associations should be validated using longitudinal or multisource data.

The significant QWL-OCB association indicates that employees operating within equitable and enriching work conditions report higher levels of discretionary prosocial conduct beyond their contractual obligations, aligning with the reciprocity logic of SET. This finding aligns with Organ's (1997) conceptualization of OCB as a reciprocal reaction to favorable organizational treatment. The results align with prior evidence across various contexts, indicating that better work conditions are associated with greater readiness to assist colleagues and contribute constructively to organizational effectiveness (Dewangan & Goswami, 2025; Hermanto et al., 2024). Developmental opportunities, equitable remuneration, secure and supportive environments, and participatory practices may foster trust, appreciation, and identification, which are in turn associated with higher self-reported OCB. The findings also speak to context. Even in this resource-constrained and relatively hierarchical setting, higher QWL is associated with higher self-reported citizenship

behavior. This positions QWL as both an attitudinal correlate and a potential strategic lever for organizational effectiveness.

Importantly, the relative effect sizes indicate that OCM is the primary proximal correlate of OCB in the model. Although QWL and JSS were significantly associated with OCB, their direct effect sizes were small. The pattern indicates that supportive work conditions and satisfaction are linked to citizenship behavior, but employees' OCM plays a more central role in translating positive workplace experiences into discretionary behavior.

The mediation analysis provides additional evidence consistent with JSS and OCM acting as psychological mechanisms through which QWL is associated with OCB (Hermanto et al., 2024; Organ, 1997). FRW, Pa, and WE showed significant indirect associations with OCB through both JSS and OCM, consistent with evidence that equitable and supportive working conditions are linked to discretionary effort. The remaining dimensions showed more differentiated pathways: OD was indirectly associated with OCB through JSS but not OCM, whereas JST was indirectly associated with OCB through OCM but not JSS. PWB showed no significant indirect association through either mediator. This pattern suggests that individual QWL dimensions may relate to OCB through different psychological mechanisms in this sample. In Da Nang's post-COVID labor market, employees may place greater emphasis on immediate financial stability, employment security, and supportive workplace conditions, whereas development and work-life provisions may be implemented unevenly across organizations and sectors (Kniffin et al., 2021; Van et al., 2024). Accordingly, development opportunities appear to operate primarily through satisfaction, while job security appears to operate primarily through commitment. These findings support the proposed mediation pathways while highlighting that the relevant psychological mechanism varies across QWL dimensions.

Regarding H6, the interaction between JSS and OCM was statistically significant but negligible in effect size, and it is therefore interpreted only as a weak, exploratory boundary condition. Descriptively, higher JSS was associated with a slightly stronger OCM-OCB relationship, although OCM remained the dominant proximal correlate of OCB. This result concerns only the OCM-OCB path and does not imply that JSS moderates the direct QWL-OCB relationship. The direction of the interaction is consistent with SET (Blau, 2017) and with prior evidence that satisfied employees report more pronounced prosocial conduct (Ilie et al., 2015; Tang et al., 2023). Given its negligible magnitude and its instability across split-half subsamples, this boundary condition warrants replication before any substantive or cross-context interpretation is drawn.

The NCA results provide additional insights by showing that several QWL dimensions operate as necessary conditions for JSS and OCM, while JSS and OCM serve as necessary conditions for elevated OCB. OD consistently emerged as a core constraint with a medium necessity effect, supporting the view that growth needs constitute a baseline requirement for positive work attitudes (Hackman & Oldham, 1975). FRW, Pa, and WE also function as critical enabling conditions: FRW and WE have medium necessity effects, whereas Pa has small-to-medium necessity effects, especially at moderate-to-high levels of JSS and OCM (Dewangan & Goswami, 2025; Hackman & Oldham, 1975). These threshold dynamics suggest that the influence of these dimensions may become less pronounced once minimum levels have been achieved. These findings complement SET by suggesting that minimum levels of fairness, Pa, and supportive working conditions may function as enabling conditions for the emergence of positive psychological states and discretionary behaviors. The absence of necessity effects for job security and work-life balance suggests that stability and balance may be viewed as baseline expectations rather than as differentiating resources in this sample. Finally, both JSS and OCM emerged as necessary conditions for high levels of OCB, reinforcing their mediating roles and implying that OCB cannot be generated solely through structural human resource practices without first establishing core psychological states. Together, integrating PLS-SEM with NCA indicates that QWL is not only

associated with self-reported citizenship behavior but also helps identify the psychological conditions (JSS and OCM) that are necessary for high levels of such behavior.

5.2. Theoretical implications

A key strength of this study lies in its multi-analytic design. By combining PLS-SEM and NCA, the study moves beyond conventional net-effect modeling and identifies both net-effect predictors and necessary conditions for high JSS and OCM, as well as the necessary roles of JSS and OCM for high OCB. This approach provides a more nuanced explanation of how supportive work environments are associated with discretionary employee behavior. First, the study extends the S-O-R and SET frameworks with a necessity logic. SET theorizes reciprocity as a response to favorable treatment, but it does not specify whether reciprocity requires minimum levels of specific conditions before it is activated. The NCA results suggest such thresholds: developmental opportunities, FRW, Pa, and WE appear to function as enabling preconditions for JSS and OCM, indicating that exchange-based reciprocity may become more likely once baseline organizational assurances are established. This distinction between necessary and complementary conditions extends conventional additive net-effect models by introducing a necessity perspective. Second, prior QWL research treats dimensions as interchangeable additive predictors. The higher-order formative specification with dual mediators shows otherwise: in this sample, it is the configuration of QWL, not any single dimension, that relates to satisfaction, commitment, and self-reported citizenship behavior. Third, the two-stage necessity design maps the necessity analysis onto the stimulus-organism and organism-response links of the S-O-R chain, offering a template for aligning necessity testing with mediation-based theory rather than appending it atheoretically. However, because the data were drawn from a single urban labor market in Vietnam, these theoretical contributions should be interpreted as context-specific and require replication across other cities, sectors, and national settings before broader conclusions can be drawn.

5.3. Managerial implications

The results have several important managerial implications for organizations seeking to improve employee attitudes and discretionary conduct. The two-stage structure of the NCA results implies a correspondingly two-stage managerial logic. At the first stage, OD, FRW, Pa, and WE emerged as necessary conditions for high JSS and OCM. Administrators should therefore treat clear career development paths, competitive and timely remuneration, participatory decision-making, and psychologically secure work environments as minimum thresholds, below which high satisfaction and commitment were not observed in this sample. At the second stage, JSS and OCM themselves emerged as necessary conditions for high self-reported OCB, so initiatives aimed at citizenship behavior should operate through these psychological states rather than bypassing them. It should be emphasized that the QWL dimensions were not tested as direct necessary conditions for OCB. The chain of necessity conditions is suggestive of an indirect pathway but does not establish that any individual dimension is itself necessary for OCB. The absence of necessity effects for job security and work-life balance implies that these items may operate as foundational expectations rather than distinguishing human resource practices in the study context. As these implications are based on self-reported measures, they should be viewed as guidance for improving employees' perceived work experience and reported citizenship behavior and confirmed with behavioral or multisource indicators before firm prescriptions are drawn.

5.4. Limitations and future research directions

This study has several limitations. First, the cross-sectional

framework limits causal inference. Longitudinal studies are therefore required to capture dynamic transformations in QWL, JSS, OCM, and OCB, particularly in post-COVID-19 scenarios. Accordingly, all relational claims in this study should be interpreted as associations rather than causal effects. The directional language used throughout reflects the theoretical predictions of the S-O-R framework and SET rather than empirically established causal mechanisms. Longitudinal or experimental designs are needed to confirm the directionality of these relationships. Second, the sample was drawn from employees working in Da Nang and covered multiple industry sectors. Although this diversity provides useful cross-sectoral insight into a single urban labor market (Da Nang, Vietnam), it also limits the extent to which the findings can be generalized to other sectors, regions, or countries. Future research should replicate the study using sector-specific samples, multi-city data, and cross-national comparisons to assess the robustness and generalizability of the findings. In addition, because purposive sampling is a nonprobability method, the sample does not permit statistical generalization to the Da Nang workforce and may overrepresent organizations that granted research access. Third, all constructs, including OCB, were self-reported by the same respondents at a single point in time. OCB was self-rated rather than supervisor- or peer-rated, thus capturing perceptions of citizenship behavior rather than observed conduct and remaining susceptible to social-desirability bias. Because the predictors (QWL, JSS, OCM) and the outcome share a common source and occasion, the observed associations may be partly inflated by common-method variance. Procedural remedies and the pattern-based evidence suggest that method variance is unlikely to be pervasive. In a model with theoretically proximal constructs, however, the full collinearity statistics cannot conclusively separate method variance from genuine construct interrelations, so this bias cannot be fully ruled out. Relatedly, although the discriminant validity criteria were satisfied, the very high correlations between QWL dimensions and the job attitudes mean that some degree of conceptual overlap cannot be conclusively excluded with single-source, cross-sectional data. Accordingly, the large QWL→JSS and QWL→OCM coefficients should be interpreted as potentially upper-bound estimates, reflecting both genuine theoretical proximity among the constructs and the possibility of same-source measurement effects. Future research could strengthen the case for distinctiveness by measuring QWL and the attitudinal constructs at temporally separated occasions or from different informants, for example through multitrait-multimethod designs. The findings thus represent associations among self-reported perceptions rather than observed behavior. Future studies should use multisource designs (supervisor- or peer-rated OCB, objective human resource records) with temporally separated or longitudinal measurement to obtain more conservative estimates. Fourth, while NCA identifies critical thresholds, configurational methodologies such as fsQCA could unveil alternative combinations of QWL dimensions leading to higher OCB. Finally, subsequent research should adopt industry-specific frameworks and extend the S-O-R framework by incorporating supplementary psychological mechanisms such as psychological safety, meaningful work, and resilience.

6. Conclusion

This study examined how QWL, conceptualized as a higher-order formative construct, is associated with self-reported OCB among employees in Da Nang, Vietnam. Drawing on the S-O-R framework and SET, the findings show that QWL is linked to OCB mainly through JSS and OCM. The moderation of the OCM-OCB relationship by JSS was statistically significant but negligible and should therefore be interpreted only as a weak boundary condition. The integrated PLS-SEM and NCA results further indicate that OD, FRW, Pa, and WE are necessary conditions for high JSS and OCM, while JSS and OCM are necessary conditions for high self-reported OCB. Overall, the findings provide context-specific evidence from a single-city, cross-sectoral sample. Generalization to other regions, sectors, or countries should therefore be made with caution.

Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

Ethics statement

The research protocol was reviewed and approved by the Research Ethics Committee of Duy Tan University (Approval No. DTU/REC2025/NHH06, June 30, 2025). All participants provided informed consent prior to participation. The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (2024). Participant confidentiality and data privacy were strictly maintained throughout the study.

Declaration of the use of AI

During the preparation of this work, the authors used ChatGPT (OpenAI) for language refinement and spell checking. After using these tools, the authors reviewed and edited the content and accepted only revisions that were appropriate and accurate. The authors take full responsibility for the content of this work.

Funding statement

This research received no external funding.

CRediT authorship contribution statement

Dang Thien Tam: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft. **Mai Xuan Binh:** Investigation, Writing – original draft, Writing – review & editing. **Le Hoang Thien Tan:** Investigation, Writing – original draft, Writing – review & editing. **Nguyen Thi Thao:** Investigation, Writing – original draft, Writing – review & editing. **Ha Thi Duy Linh:** Investigation, Writing – original draft, Writing – review & editing. **Tran Thanh Hai:** Investigation, Writing – original draft, Writing – review & editing. **Hai Nguyen Ngoc Dang:** Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Not applicable.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssaho.2026.103281>.

References

- Becker, J.-M., Ringle, C. M., & Sarstedt, M. (2018). Estimating moderating effects in PLS-SEM and PLS-SEM: Interaction term generation*data treatment. *Journal of Applied Structural Equation Modeling*, 2(2), 1–21. [https://doi.org/10.47263/JASEM.2\(2\)01](https://doi.org/10.47263/JASEM.2(2)01)
- Blau, P. (2017). *Exchange and power in social life* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203792643>
- Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. *Journal of Applied Psychology*, 35(5), 307–311. <https://doi.org/10.1037/h0055617>
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case

- examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/10.1177/1744987120927206>
- Cropanzano, R., Bowen, D. E., & Gilliland, S. W. (2007). The management of organizational justice. *Academy of Management Perspectives*, 21(4), 34–48. <https://doi.org/10.5465/AMP.2007.27895338>
- Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of Management*, 31(6), 874–900. <https://doi.org/10.1177/0149206305279602>
- Dewangan, R. L., & Goswami, T. (2025). Organizational role stress, quality of work life, organizational citizenship behavior, and psychological well-being among university faculty members. *BMC Psychology*, 13(1), 538. <https://doi.org/10.1186/s40359-025-02883-x>
- Dul, J. (2016). Necessary condition analysis (NCA): Logic and methodology of “Necessary but not sufficient” causality. *Organizational Research Methods*, 19(1), 10–52. <https://doi.org/10.1177/1094428115584005>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Gautam, T., Van Dick, R., Wagner, U., Upadhyay, N., & Davis, A. J. (2005). Organizational citizenship behavior and organizational commitment in Nepal. *Asian Journal of Social Psychology*, 8(3), 305–314. <https://doi.org/10.1111/j.1467-839X.2005.00172.x>
- General Statistics Office of Viet Nam. (2025). *Report on socio-economic situation in October and ten months of 2025*. General Statistics Office. <https://www.gso.gov.vn>
- Haar, J. M., Russo, M., Suñe, A., & Ollier-Malaterre, A. (2014). Outcomes of work–life balance on job satisfaction, life satisfaction and mental health: A study across seven cultures. *Journal of Vocational Behavior*, 85(3), 361–373. <https://doi.org/10.1016/j.jvb.2014.08.010>
- Hackman, J. R., & Oldham, G. R. (1975). Development of the job diagnostic survey. *Journal of Applied Psychology*, 60(2), 159–170. <https://doi.org/10.1037/h0076546>
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial least squares structural equation modeling (PLS-SEM) using R: A workbook*. Springer Nature. <https://doi.org/10.1007/978-3-030-80519-7>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hermanto, Y. B., Srimulyani, V. A., & Pitoyo, D. J. (2024). The mediating role of quality of work life and organizational commitment in the link between transformational leadership and organizational citizenship behavior. *Heliyon*, 10(6), Article e27664. <https://doi.org/10.1016/j.heliyon.2024.e27664>
- Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. *Research in Nursing & Health*, 31(2), 180–191. <https://doi.org/10.1002/nur.20247>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Ilies, R., Aw, S. S. Y., & Pluut, H. (2015). Intraindividual models of employee well-being: What have we learned and where do we go from here? *European Journal of Work & Organizational Psychology*, 24(6), 827–838. <https://doi.org/10.1080/1359432X.2015.1071422>
- International Labour Organization. (2025). *Informality in Viet Nam: Trends, drivers and implications*. International Labour Organization. <https://doi.org/10.54394/PEZL2270>
- International Monetary Fund. Asia and Pacific Dept. (2025). Vietnam: Selected issues. *IMF Staff Country Reports*, 2025(284), 1. <https://doi.org/10.5089/9798229027038.002>
- Kniffin, K. M., Narayanan, J., Anseel, F., Antonakis, J., Ashford, S. P., Bakker, A. B., Bamberger, P., Bapuji, H., Bhawe, D. P., Choi, V. K., Creary, S. J., Demerouti, E., Flynn, F. J., Gelfand, M. J., Greer, L. L., Johns, G., Kosebiri, S., Klein, P. G., Lee, S. Y., ... Vugt, M. van (2021). COVID-19 and the workplace: Implications, issues, and insights for future research and action. *American Psychologist*, 76(1), 63–77. <https://doi.org/10.1037/amp0000716>
- Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of E-Collaboration*, 11(4), 1–10. <https://doi.org/10.4018/ijec.2015100101>
- Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information Systems Journal*, 28(1), 227–261. <https://doi.org/10.1111/isj.12131>
- Lepine, J. A., Erez, A., & Johnson, D. E. (2002). The nature and dimensionality of organizational citizenship behavior: A critical review and meta-analysis. *Journal of Applied Psychology*, 87(1), 52–65. <https://doi.org/10.1037/0021-9010.87.1.52>
- Liang, Y., Yang, Z.-J., & Wu, T.-J. (2026). Quality of work life in the workplace: A systematic review and organizational research agenda. *Current Psychology*, 45(3), 254. <https://doi.org/10.1007/s12144-025-08696-w>
- Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1297–1349). Rand McNally.
- Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. The MIT Press.
- Meyer, J. P., & Allen, N. J. (1991). A three-component conceptualization of organizational commitment. *Human Resource Management Review*, 1(1), 61–89. [https://doi.org/10.1016/1053-4822\(91\)90011-Z](https://doi.org/10.1016/1053-4822(91)90011-Z)
- Nguyen, P. N.-D., Tran, V. D., & Le, D. N.-T. (2022). Does organizational citizenship behavior predict organizational commitment of employees in higher educational institutions? *Frontiers in Education*, 7. <https://doi.org/10.3389/educ.2022.909263>
- Organ, D. W. (1997). Organizational citizenship behavior: It's construct Clean-Up time. *Human Performance*, 10(2), 85–97. <https://doi.org/10.1207/s15327043hup1002.2>
- Organ, D. W., Podsakoff, P. M., & MacKenzie, S. B. (2006). *Organizational citizenship behavior its nature, antecedents, and consequences*. SAGE Publications.
- Podsakoff, N. P., Whiting, S. W., Podsakoff, P. M., & Blume, B. D. (2009). Individual- and organizational-level consequences of organizational citizenship behaviors: A meta-analysis. *Journal of Applied Psychology*, 94(1), 122–141. <https://doi.org/10.1037/a0013079>
- Siemsen, E., Roth, A., & Oliveira, P. (2010). Common method bias in regression models with linear, quadratic, and interaction effects. *Organizational Research Methods*, 13(3), 456–476. <https://doi.org/10.1177/1094428109351241>
- Sirgy, M. J., Efraty, D., Siegel, P., & Lee, D.-J. (2001). A new measure of quality of work life (QWL) based on need satisfaction and spillover theories. *Social Indicators Research*, 55(3), 241–302. <https://doi.org/10.1023/A:1010986923468>
- Tang, A. D., Luu, T. T., Chen, W.-K., & Liu, S.-C. (2023). Internal corporate social responsibility and customer-oriented organizational citizenship behavior: The mediating roles of job satisfaction, work-family facilitation, life satisfaction, and the moderating role of organizational tenure. *Journal of Sustainable Tourism*, 32(5), 986–1007. <https://doi.org/10.1080/09669582.2023.2195134>
- Thien Tam, D., Kieu, T. T. P., Huy, L. T. A., Anh, N. T., Oanh, N. T. H., Dung, D. T., Hang, N. T. T., Thao, N. T., & Ngoc Dang, H. N. (2026). Core job characteristics and organizational commitment among Vietnamese educators: Integrating the stimulus-organism-response framework with necessary condition analysis. *Cogent Business & Management*, 13(1), Article 2700805. <https://doi.org/10.1080/23311975.2026.2700805>
- Van, H. L. T., Volrathongchai, K., Vu Quoc Huy, N., Nu Minh Duc, T., Van Hung, D., & Thi Mai Lien, T. (2020). Quality of work life among nurses working at a provincial general hospital in Vietnam: A cross-sectional study. *Central European Journal of Nursing and Midwifery*, 11(4), 188–195. <https://doi.org/10.15452/cejnm.2020.11.0030>
- Van, L. T.-H., Lang, L. D., Ngo, T. L.-P., & Ferreira, J. (2024). The impact of internal social responsibility on service employees' job satisfaction and organizational engagement. *Service Business*, 18(1), 101–131. <https://doi.org/10.1007/s11628-024-00555-1>
- Walton, R. E. (1975). Criteria for quality of working life. In L. E. Davis, & A. B. Cherns (Eds.), *The quality of working life* (Vol. 1, pp. 91–104). The Free Press.
- Worku, M. A., & Debela, K. L. (2024). A systematic literature review on organizational citizenship behavior: Conceptualization, antecedents, and future research directions. *Cogent Business & Management*, 11(1), Article 2350804. <https://doi.org/10.1080/23311975.2024.2350804>
- Zin, R. M. (2004). Perception of professional engineers toward quality of worklife and organizational commitment: A case study. *Gadjah Mada International Journal of Business*, 6(3), 323–334.