

Article

Evaluating Performance Appraisal Effects on Employee Motivation and Productivity: Insights from the Turkish Construction Industry via Covariance-Based Structural Equation Modeling

Bayram Ali Temel ¹, İpek Naz Semercioğlu ¹, Hasan Basri Başağa ^{1,2}, Aytaç Aydın ³, Vedat Toğan ¹
and Elif Ağcakoca ^{4,*}

¹ Department of Civil Engineering, Karadeniz Technical University, Trabzon 61080, Türkiye; bayramali.temel@ktu.edu.tr (B.A.T.); ipeknaz@ktu.edu.tr (İ.N.S.); hasanbb@ktu.edu.tr (H.B.B.); togan@ktu.edu.tr (V.T.)

² Earthquake and Structural Health Monitoring Research Center, Karadeniz Technical University, Trabzon 61080, Türkiye

³ Department of Forest Industry Engineering, Karadeniz Technical University, Trabzon 61080, Türkiye; aytac@ktu.edu.tr

⁴ Department of Civil Engineering, Sakarya University, Sakarya 54050, Türkiye

* Correspondence: elifd@sakarya.edu.tr; Tel.: +90-264-295-54-54

Abstract

In the high-pressure environment of the construction industry, employee motivation and productivity are decisive for project success and organizational sustainability. However, performance appraisal (PA) systems tailored to the specific needs of construction workers remain underexplored, particularly in the context of Türkiye. This study aims to evaluate the influence of PA on employee motivation and productivity by employing a quantitative survey of 401 construction workers and analyzing the data through covariance-based structural equation modeling (CB-SEM). A validated questionnaire, adapted from prior studies, was applied to test nine hypotheses concerning the relationships between PA dimensions—purpose of appraisal, appraisal criteria, appraisal practices, and feedback—and workers' motivation and productivity. The results reveal that four hypotheses were supported: the purpose of PA significantly influences both motivation and productivity, feedback has a strong effect on productivity, and motivation is positively correlated with productivity. Conversely, appraisal criteria and practices did not exhibit statistically significant effects. These findings highlight the differentiated role of appraisal components and emphasize that clear appraisal objectives and constructive feedback mechanisms are key drivers of workforce performance. The study contributes to the construction management literature by addressing an overlooked employee group—construction workers—and provides practical implications for managers seeking to improve appraisal frameworks in labor-intensive sectors. Limitations regarding the cross-sectional design and self-reported data are acknowledged, with recommendations for longitudinal and cross-cultural research.

Keywords: performance appraisal; employee motivation; employee productivity; construction industry; covariance-based structural equation modeling



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1. Introduction

Employee performance (EP), in its most basic definition, refers to the extent to which employees effectively carry out their designated tasks and responsibilities within the work-

place [1]. Across all sectors, EP is of critical importance to organizations, as it directly influences both the individual performance of employees and the collective success of the organization, demonstrating a clear interdependence between these factors [2,3]. Thus, maintaining high employee performance levels is essential for ensuring organizational success and efficiency. Therefore, it is necessary to monitor, measure, and evaluate EP at regular intervals [4]. Several established performance measurement methods exist, including Balanced Scorecard [5], Objectives and Key Results [6], Management by Objectives [7], and Key Performance Indicators [8]. In addition to these methods, another widely recognized approach is Performance Appraisal (PA), which specifically focuses on evaluating individual employees. Due to its structured approach and emphasis on individual performance, PA facilitates more efficient implementation and monitoring compared to broader performance measurement frameworks [3,9].

PA involves evaluating employees' ability to meet their job responsibilities based on predefined criteria and subsequently implementing necessary actions to ensure their performance remains aligned with organizational expectations. In essence, PA encompasses activities such as assessing employees' work performance, identifying their strengths and areas for improvement against established organizational benchmarks, and offering constructive feedback to foster growth. PA not only examines an employee's engagement with their role but also evaluates their overall success within the organization. Consequently, it serves as a tool for both individual skill development and organizational performance enhancement [9,10].

An effectively executed PA process enhances EP, productivity, and motivation. When fairness is consistently upheld through an unbiased PA process, it builds trust among employees, leading to improvements in both productivity and motivation. Additionally, elements such as clear and open communication—which are crucial for obtaining honest and actionable feedback during evaluations—various reward systems, including salary increases linked to performance, seniority, and promotions, and strong collaborative relationships among employees all enhance PA's impact on productivity and motivation [11]. Studies in the construction sector further demonstrate that performance-based incentives—such as bonuses, promotions, salary increases, and other compensatory rewards—determined through PA, play a crucial role in boosting employee motivation, ultimately leading to improved productivity and overall performance [12,13].

Despite this significance, PA practices remain underexplored in the context of construction workers. Existing research has largely focused on white-collar employees or organizational settings where structured HR systems are prevalent [14–16]. By contrast, construction workers often face unique challenges such as unstable working conditions, project-based employment, and limited access to formal HR practices. This discrepancy raises critical questions: Are construction workers in Türkiye meeting expected performance levels? Have their motivational dynamics shifted in recent years? To what extent do current PA systems influence their productivity? Addressing these questions is crucial, given the increasing emphasis on labor efficiency and sustainable project outcomes in Türkiye's rapidly growing construction sector [17].

From a theoretical perspective, motivation and productivity have been extensively examined through frameworks such as Herzberg's two-factor theory, Vroom's expectancy theory, and Adams's equity theory [18–20]. However, the empirical application of these theories to blue-collar construction workers within the context of PA remains limited. This gap restricts our understanding of how PA dimensions—such as appraisal purpose, criteria, practices, and feedback—interact with motivation and productivity in a labor-intensive industry. Moreover, previous studies seldom link PA to complex causal relationships among these constructs using advanced statistical methods. Structural Equation Modeling (SEM),

as a multivariate technique, provides a robust framework to test both direct and indirect effects between latent variables, making it particularly suitable for this investigation [21].

The present study addresses these gaps by focusing specifically on construction workers in Türkiye. Using a quantitative survey of 401 participants and analyzing the data through covariance-based SEM (CB-SEM), the study tests nine hypotheses concerning the relationships between PA dimensions, motivation, and productivity. By doing so, this research contributes to the literature in three ways: (i) it extends PA research to an underexplored group of employees in the construction industry, (ii) it integrates theoretical perspectives on motivation with empirical modeling of PA effects, and (iii) it provides practical insights for managers and policymakers aiming to design effective appraisal systems in labor-intensive sectors.

2. Literature Review

Existing studies on performance appraisal (PA) in the construction industry demonstrate that appraisal systems have been examined across multiple stakeholder groups, including construction firms, subcontractors, managers, and workers. Across these contexts, PA has been consistently associated with outcomes such as organizational performance, employee motivation, and productivity [14,17,18]. However, the research emphasis has been uneven, with managerial and professional staff receiving considerable attention, while construction workers—who represent the majority of the workforce—remain relatively underexplored. Moreover, although performance, motivation, and appraisal are interdependent, limited studies have analyzed these factors together using robust analytical techniques such as structural equation modeling (SEM). In addition, despite Türkiye's prominence in the global construction sector, empirical research on PA in this specific context is scarce, indicating a clear gap in the literature.

At the organizational level, PA has been found to strengthen firm performance and employee productivity [14]. Evidence from international joint ventures highlights that sustainability and performance metrics incorporated into appraisal frameworks contribute positively to long-term corporate outcomes [17]. Similarly, in urban development projects, contractor appraisal systems that integrate environmental and social criteria are shown to be more effective in aligning organizational and workforce performance [18].

Studies on subcontractors identify PA as a multidimensional process. Factor analysis has revealed more than a dozen significant criteria that structure performance evaluation [22]. Balanced scorecard approaches confirm that subcontractor performance must be assessed across diverse indicators such as cost, quality, safety, and timeliness [23]. These findings highlight that subcontractor appraisal cannot rely on narrow or single-dimensional criteria but instead requires comprehensive evaluation frameworks.

For managers and site supervisors, appraisal systems have proven to enhance managerial effectiveness through measurable and standardized parameters [24]. Structured indicators clarify expectations, strengthen monitoring, and improve supervisory accuracy in task execution [25]. Furthermore, appraisal mechanisms enriched with constructive feedback and communication have been linked to higher leadership quality and better project team coordination, both of which are critical for successful project delivery.

Research specifically addressing construction workers is more limited, yet the findings underline the central role of motivation and behavioral factors in shaping productivity. Job satisfaction, commitment, and loyalty consistently emerge as key drivers of performance [26]. Skill deficiencies in areas such as product knowledge and data entry have been identified as barriers to productivity [27]. Studies also show that physical abilities are often stronger predictors of performance than cognitive skills, with spatial and clerical aptitudes exerting negative effects on work outcomes [28]. Effective human resource

practices, including fair compensation, training, and transparent recruitment, have been found to enhance both motivation and productivity [29]. Perceptions of occupational risks influence performance outcomes differently depending on age, while occupational health and safety (OHS) measures are consistently associated with improved productivity and employee outcomes [30,31].

Broader examinations of construction employees further confirm the interplay between organizational context and individual performance. Findings show that service climate and internal service quality mediate the relationship between organizational conditions and employee productivity [32–34]. Applications of SEM in related contexts indicate that work–family conflict, organizational commitment, and burnout exert significant influences on job satisfaction and performance [35–37]. These studies suggest that PA should be understood not only as a technical evaluation process but also as a mechanism sensitive to psychosocial and organizational dynamics.

Cross-national evidence provides additional insights. In Nigeria, job satisfaction and performance are positively related in small and medium-sized enterprises [38], and gamification practices have been identified as emerging motivational strategies to enhance productivity [39,40]. In Ghana, organizational citizenship behavior has been positively linked to performance, while work overload shows no significant impact [41]. In the UAE, recruitment, selection, and training strategies have been shown to directly improve employee outcomes [42], and systematic performance monitoring enhances knowledge worker productivity [43]. Flexible work arrangements, paid leave, and remote working are reported to contribute positively to employee performance in Malaysia [44]. In Jordan, high-performance work practices (HPWPs) mediated by trust in management are associated with improvements in employee motivation and productivity [45]. Research in Pakistan and Kuwait further emphasizes that job satisfaction and job security remain the most decisive motivational factors influencing construction employee performance [46,47].

In summary, the literature consistently affirms the positive influence of PA systems on motivation and productivity across construction stakeholders. However, the majority of studies focus on managers and professional staff, with relatively little attention given to construction workers. Moreover, the combined relationships among PA, motivation, and productivity have seldom been modeled together, despite the suitability of SEM for capturing such interdependencies. Finally, the scarcity of empirical studies on Türkiye's construction industry highlights a significant gap, thereby justifying the present study's use of CB-SEM to examine how PA dimensions shape worker motivation and productivity in this context.

3. Research Gap and Motivation

Following the literature review, it became evident that studies evaluating PA, motivation, and EP practices within the construction industry have primarily examined various construction stakeholders and explored relationships based on different parameters. Among these stakeholders, construction workers play a crucial role by directly impacting project execution, quality, and efficiency. However, unlike civil engineers, managers, or contractors, construction workers often have limited involvement in PA processes due to organizational hierarchies, communication barriers, and the nature of their job responsibilities. These factors can affect their perception of fairness, motivation, and overall productivity. Given their critical role in on-site operations and the physically demanding nature of their work, understanding how PA influences their motivation and productivity is essential. A review of existing studies from the perspective of construction workers reveals a notable gap in research addressing the direct impact of PA on their motivation

and productivity. To bridge this gap, Structural Equation Modeling (SEM) was identified as the most appropriate methodological approach.

SEM is a statistical methodology frequently utilized by researchers to examine theoretical frameworks. This method, which efficiently analyzes both observable and latent variables simultaneously, is inherently multidimensional and multivariate. By integrating techniques such as regression analysis, path analysis, correlation analysis, and factor analysis, SEM enables comprehensive evaluations and generates highly precise outcomes [48,49]. A key advantage of SEM is its capacity to incorporate measurement errors when estimating relationships between variables and to evaluate overall model fit by interpreting the complex interconnections within the data [49,50]. Recent studies in the construction sector have also highlighted the effectiveness of SEM in modeling productivity-related factors [51], mapping digital transformation maturity [52], and analyzing unsafe worker behaviors [53]. Moreover, SEM has been increasingly adopted as a methodological benchmark for understanding technology adoption and behavioral dynamics in construction management research [54]. These contributions demonstrate the methodological robustness and sectoral relevance of SEM.

Given the absence of prior studies specifically addressing construction workers' perspectives using this approach, the present study contributes to the literature by applying SEM to provide a more in-depth analysis of the relationships between PA, employee motivation, and productivity in the construction sector.

4. Objectives and Hypotheses

This study aims to examine the impact of performance appraisal (PA) on the motivation and productivity of construction workers in Türkiye, with a particular focus on analyzing how appraisal-related factors interconnect to shape these outcomes. The primary objective is to develop a comprehensive CB-SEM model that considers both the direct and indirect effects of appraisal components on employee motivation and productivity. This approach enables the testing of theoretically grounded relationships and offers a holistic understanding of workforce dynamics in the construction sector.

The additional research objectives are as follows:

- To identify the specific appraisal-related factors that enhance employee motivation and productivity.
- To analyze the correlation between employee motivation and productivity within the construction workforce.
- To assess the influence of PA dimensions on motivation and productivity using CB-SEM.

Based on these objectives and supported by prior studies, the following hypotheses were formulated:

H₁ 1–4. *There is a relationship between employee motivation and the purpose of PA (PPA), PA criteria (PAC), PA practices (PAPs), and feedback in PA (FPA). Motivation is expected to be influenced by clear objectives, transparent evaluation standards, effective practices, and constructive feedback, as suggested by research showing that appraisal systems can directly affect employee attitudes [53,54].*

H₁ 5–8. *There is a relationship between employee productivity and the purpose of PA (PPA), PA criteria (PAC), PA practices (PAP), and feedback in PA (FPA). Previous studies indicate that productivity is particularly sensitive to structured evaluation mechanisms and appraisal-related feedback, which can clarify expectations and improve performance outcomes [51,52].*

H₁ 9. *There is a relationship between employee motivation and employee productivity. This hypothesis is grounded in evidence that motivated employees display higher engagement, efficiency,*

and output in construction projects, thereby linking psychological and behavioral dimensions to overall productivity [51,54].

In line with these hypotheses, a conceptual model has been developed and is depicted in Figure 1. This model integrates all nine hypotheses into a unified framework, positioning the purpose of PA (PPA), PA criteria (PAC), PA practices (PAP), and feedback in PA (FPA) as independent variables, while employee motivation and productivity represent dependent variables.

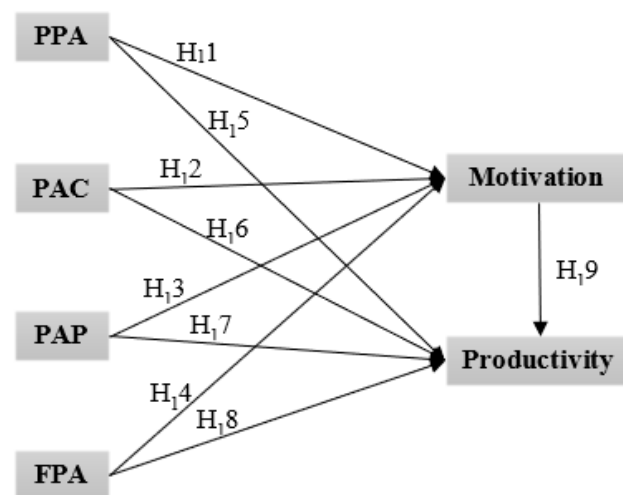


Figure 1. Conceptual model.

5. Materials and Methods

The purpose of this study was to investigate the influence of performance appraisal (PA) systems on the motivation and productivity of construction workers in Türkiye. A quantitative research approach was adopted. This approach enables the systematic analysis of data obtained from large samples and allows for testing causal relationships among variables. For this purpose, covariance-based structural equation modeling (CB-SEM) was employed. CB-SEM is particularly suitable for testing theoretically developed hypotheses, conducting reliability and validity analyses of measurement models, and simultaneously examining complex relationships among constructs [52,54]. Moreover, previous studies in the construction industry show that SEM is widely applied in modeling worker behavior and performance indicators [52,53].

As a data collection tool, a questionnaire adapted from previously validated and reliable instruments was used [50,55,56]. The adoption of established questionnaires enhanced methodological consistency and ensured comparability with prior studies. The survey consisted of two sections. The first section included demographic information of the respondents, which was essential to detect heterogeneity across subgroups such as age, education, and experience. These data contributed to analyzing how perceptions of performance appraisal differ across demographic profiles and enhanced the interpretability of the findings. The second section contained 30 statements measured on a 3-point Likert scale, designed to assess the effects of PA dimensions (purpose, criteria, practices, and feedback) on workers' motivation and productivity. The Likert scale, originally developed by Rensis Likert in 1932 [57], is widely used to measure the degree of agreement with specific statements, and its simple structure facilitated responses from construction workers in field conditions [58].

The conceptual model tested in the study is presented in Figure 1. This model assumes direct effects of PA dimensions on motivation and productivity, as well as an indirect effect

of motivation on productivity. Accordingly, the hypotheses of the study were tested using CB-SEM within the theoretical framework shown in Figure 1.

The population of the study comprised construction workers registered with social security in Türkiye. According to official statistics of the Social Security Institution, the total number of insured construction workers was 1,828,864 as of 31 January 2024 [59]. The sample size was calculated using Equation (1) [60], based on a 95% confidence level and a 5% margin of error, resulting in a minimum of 384 participants.

$$n = z^2 \cdot N \cdot p \cdot q / (N \cdot D^2 + z^2 \cdot p \cdot q) \quad (1)$$

In Equation (1), n represents the sample size, N the population size, D the allowable sampling error, z the confidence level coefficient, p the proportion of the sample expected to possess a certain characteristic, and q the proportion expected not to possess that characteristic, calculated as $(1 - p)$.

Data collection was carried out in İstanbul, which hosts the largest share of the construction workforce and is the most active hub of construction activities in Türkiye. The city was chosen as the research site due to its dominant position in both population size and construction sector intensity. The survey was administered online via Google Forms and distributed to construction workers employed in the private sector. A total of 401 valid responses were collected. Since this number exceeded the calculated sample size, it further strengthened the reliability of the analyses.

The collected data were processed using SPSS version 29.0 for preliminary descriptive and statistical analyses. Subsequently, AMOS version 29.0 was used to conduct CB-SEM analyses. The analysis procedure began with reliability and validity tests, followed by confirmatory factor analysis (CFA) of the measurement model, and finally the evaluation of the structural model. This process allowed for testing both the direct and indirect effects of PA dimensions on motivation and productivity, as well as the relationship between motivation and productivity. CB-SEM was chosen because of its compatibility with the theoretical framework, its ability to model error terms, and its capacity to simultaneously estimate direct and indirect effects.

Ethical principles were strictly observed throughout the research process. Respondents' answers were kept anonymous, participation was voluntary, and the purpose and confidentiality of the study were explicitly stated in the introduction to the questionnaire.

6. Results

6.1. Demographic Characteristics

The demographic profiles of the surveyed construction workers were examined to provide a comprehensive overview. Key factors such as age, education level, marital status, income, and years of professional experience were considered. Table 1 presents the demographic data of the construction workers who participated in the survey, covering a range of variables. Participants' ages range from 18 to over 59, with the largest group being 39–45 years old, comprising 23.4% of the sample. The marital status distribution shows that 76.1% of the respondents are married, while 23.9% are single. Regarding educational level, the majority of participants have a high school education (56.6%), followed by primary education (29.4%), literate (9.7%), and university education (4.3%).

On 27 December 2023, an announcement was made that the minimum wage for 2024 would be set at 17,002 Turkish Liras [61]. The income distribution data indicates that 63.8% of the participants earn between 17.002 and 40.000 Turkish Liras per month, 23.9% earn between 40.001 and 50.000 TL, and 12.3% earn between 50.001 and 75.000 TL, with none earning above 75.000 TL. In terms of professional experience, 65.3% have more than 10 years of experience, 20.0% have 6–10 years, and 14.7% have 1–5 years of experience.

These findings reflect a broad demographic base and a diverse range of experiences among the surveyed construction workers.

Table 1. Demographic characteristics and distribution of construction workers.

Demographic Characteristic	Category	N	Percentage (%)
Age	18–24	33	8.2
	25–31	72	18.0
	32–38	71	17.7
	39–45	94	23.4
	46–52	70	17.5
	53–59	37	9.2
	59<	24	6.0
Marital status	Married	305	76.1
	Single	56	23.9
Educational level	Literate	39	9.7
	Primary education	118	29.4
	High school	227	56.6
	University	17	4.3
Income level (Türkiye’s Liras, ₺)	17.002–40.000	256	63.8
	40.001–50.000	96	23.9
	50.001–75.000	49	12.3
	75.000<	0	0
Working experience (years)	1–5	59	14.7
	6–10	80	20.0
	10<	262	65.3

6.2. Validity and Reliability

To evaluate the questionnaire’s reliability in the present study, the Cronbach’s Alpha test [62] was utilized. The Cronbach’s Alpha coefficient, ranging from 0 to 1, was employed to determine the internal consistency of the questionnaire, with a score above 0.90 indicating excellent reliability [63]. The obtained Cronbach’s Alpha coefficient for the administered questionnaire was 0.898, which signifies a high level of reliability for the survey.

To ensure the construct validity of the survey instrument and to identify its underlying factor structure, an exploratory factor analysis (EFA) was applied. Before performing the analysis, the appropriateness of the dataset for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. A threshold value above 0.50 is generally required to confirm the suitability of the data [64]. In the present study, the overall KMO score was found to be 0.875, accompanied by a statistically significant Bartlett’s Test of Sphericity ($p = 0.001$), which demonstrated that the sample was suitable for EFA. According to Field [65], KMO values greater than 0.50 are acceptable, and scores between 0.80 and 0.90 indicate a level of sampling adequacy classified as “excellent.” Additionally, the item-specific KMO values, with the lowest value recorded as 0.618, further validated the adequacy of the data for conducting the analysis.

In conducting the factor analysis, principal component analysis was utilized in combination with varimax orthogonal rotation. The criterion for factor retention was determined through eigenvalue statistics, whereby factors with eigenvalues greater than 1 are regarded as meaningful, as suggested by Dunteman [66]. Based on this approach, the analysis produced a six-factor solution, each with eigenvalues exceeding the threshold of 1. Collectively, these six factors explained 67.612% of the total variance. A comprehensive summary of the factor loadings and related statistics is presented in Table 2.

Table 2. Results of scale’s exploratory factor analysis.

Q. No.	Variables	Factor Load	Eigen Value	Announced Variance	Cronbach’s Alpha
Purpose of Performance Appraisal (PPA)			5.481	18.269	0.925
Q1	In PA studies, the employees’ job information is measured.	0.638			
Q2	In PA studies, the employees’ ability to make decisions are measured.	0.801			
Q3	In PA studies, the employees’ ability for own business regulation and planning is measured.	0.844			
Q4	In PA studies, the employees’ labor, and the ability to use correctly the resources are measured.	0.817			
Q5	In PA studies, the employees’ ability to communicate effectively is measured.	0.832			
Q6	In PA studies, the employees’ cooperation understanding is measured.	0.760			
Q7	In PA studies, the employees’ harmony with the environment and respectful behavior are measured.	0.761			
Q8	In PA studies, the employee’s “openness to innovation and quick adaptation” are measured.	0.745			
Performance Appraisal Criteria (PAC)			2.638	8.795	0.865
Q9	PAC include necessary factors for me to succeed in my work.	0.824			
Q10	PA system used in our business is generally sufficient.	0.718			
Q11	Obtaining high or low scores from PA is actually related to being successful or unsuccessful.	0.818			
Q12	My manager gives me a full score if I obtain an outstanding achievement in my work.	0.667			
Performance Appraisal Practices (PAPs)			1.958	6.528	0.723
Q13	My manager uses PA as an element of threat.	0.886			
Q14	I think my manager evaluates my personality, not my performance.	0.747			
Q15	I think that my manager uses PA to punish persons he dislikes.	0.760			
Feedback in Performance Appraisal (FPA)			4.323	14.408	0.904
Q16	In PA interview, my manager clearly points to what I am missing.	0.755			
Q17	In PA meeting, my manager tells me in what I am good.	0.765			
Q18	In PA interview, my manager gives me the opportunity to Express my ideas clearly.	0.726			
Q19	In PA interview, my manager tells me my mistakes and failures	0.854			
Q20	In PA interview, my manager discusses with me about my mistakes I cannot correct.	0.760			
Q21	In PA interview, I identify common goals with my manager determining what I should do in future.	0.798			
Motivation			3.087	10.291	0.831
Q22	There is a positive effect of PA on motivation in terms of employees’ self-expression, their regular communication, and sharing their problems.	0.618			
Q23	Motivation of a high-performance person will be higher.	0.792			
Q24	Performance of a high motivation person will be higher.	0.860			
Q25	Material (bonus, gift, wage increase, unpaid leave, etc.) or intangible (acknowledgment, plaque-packet, etc.) applications made as a result of performance evaluation in our business increase the motivation of the individual.	0.728			
Q26	If feedback is high as a result of PA, it motivates employees and increases success.	0.843			
Productivity			2.796	9.321	0.845
Q27	PA system planned upon reaching a consensus with my superior improves my working efficiency.	0.728			
Q28	Setting realistic goals and achievable targets for my work along with the company’s goals and targets in my PA interview improves my working efficiency.	0.845			
Q29	As a result of PA, eliminating my failures and determining my training needs in according with my deficiencies will improve my business efficiency.	0.863			
Q30	A PA system that can respond to the changing qualifications of employees and is constantly developed increases the productivity of the enterprise.	0.771			
Announced Total Variances, %				67.612	
Kaiser-Meyer-Olkin (KMO) value				0.875	
Bartlett’s Test of Sphericity (Sig.)				0.001	

Table 2 provides the comprehensive outcomes of the exploratory factor analysis, presenting factor loadings, eigenvalues, explained variance ratios, and Cronbach’s Alpha coefficients for each dimension. The results demonstrate a stable factor structure, with each identified factor exhibiting strong internal reliability.

The identified sub-factors are as follows:

Purpose of Performance Appraisal (PPA): This factor has an eigenvalue of 5.481 and an announced variance of 18.269%, with a Cronbach’s Alpha of 0.925. It includes variables such as employees’ job information, decision-making ability, and resource utilization.

Performance Appraisal Criteria (PAC): This factor has an eigenvalue of 2.638 and an announced variance of 8.795%, with a Cronbach's Alpha of 0.865. It encompasses criteria necessary for success and the sufficiency of the PA system.

Performance Appraisal Practices (PAPs): This factor has an eigenvalue of 1.958 and an announced variance of 6.528%, with a Cronbach's Alpha of 0.723. It includes variables related to the managerial use of PA as a threat or evaluative tool.

Feedback in Performance Appraisal (FPA): This factor has an eigenvalue of 4.323 and an announced variance of 14.408%, with a Cronbach's Alpha of 0.904. It includes variables related to feedback provided during PA interviews.

Motivation: This factor has an eigenvalue of 3.087 and an announced variance of 10.291%, with a Cronbach's Alpha of 0.831. It covers the impact of PA on motivation, both materially and intangibly.

Productivity: This factor has an eigenvalue of 2.796 and an announced variance of 9.321%, with a Cronbach's Alpha of 0.845. It involves variables related to efficiency improvements due to PA systems.

Overall, these findings highlight the strong internal consistency and validity of the survey instrument, ensuring that it effectively measures the intended constructs and provides reliable data for the study.

6.3. Measurement Model

The structure of the measurement model derived from the factor analysis was assessed for construct validity using CFA via AMOS. Table 3 provides the standard prediction values, *t*-values, and reliability levels of the variables within the model.

Table 3. Reliability values of the model.

	Variables	Std Loading	<i>t</i> *
Purpose of Performance Appraisal (PPA) CR = 0.93 AVE = 0.62	Q1	0.634	13.139
	Q2	0.779	16.790
	Q3	0.855	18.867
	Q4	0.842	18.510
	Q5	0.827	18.085
	Q6	0.768	16.490
	Q7	0.778	16.761
	Q8	0.777	-
Performance Appraisal Criteria (PAC) CR = 0.87 AVE = 0.62	Q9	0.814	15.955
	Q10	0.828	16.209
	Q11	0.742	14.516
	Q12	0.754	-
Performance Appraisal Practices (PAP) CR = 0.77 AVE = 0.56	Q13	1.054	6.825
	Q14	0.513	9.215
	Q15	0.540	-
Feedback in Performance Appraisal (FPA) CR = 0.90 AVE = 0.61	Q16	0.801	16.475
	Q17	0.825	17.027
	Q18	0.735	14.958
	Q19	0.846	17.535
	Q20	0.728	14.800
	Q21	0.757	-
Motivation CR = 0.84 AVE = 0.52	Q22	0.501	-
	Q23	0.717	9.265
	Q24	0.844	9.768
	Q25	0.647	8.722
	Q26	0.850	9.787
Productivity CR = 0.85 AVE = 0.56	Q27	0.658	-
	Q28	0.798	13.104
	Q29	0.842	13.521
	Q30	0.758	13.104

* *p* values belonging to all *t* values is determined as 0.001.

Upon examining the standard prediction values, it was observed that they ranged from 0.634 to 1.054. Additionally, the *t*-values for these predictions were significant at the 0.05 significance level, thereby confirming the validity of the model.

In the measurement model, two key reliability indicators were employed: the Average Variance Extracted (AVE) and Composite Reliability (CR). The AVE demonstrates the proportion of variance in the observed variables captured by each factor, whereas CR assesses the internal consistency of the constructs. As shown in Tables 3 and 4, all factors recorded AVE values greater than the minimum benchmark of 0.50, and CR values surpassed the commonly accepted cut-off of 0.70.

Table 4. Correlation matrix for the measurement model.

Scales	PPA	PAC	FPA	PAP	Motivation	Productivity
PPA	1					
PAC	0.561	1				
FPA	0.492	0.581	1			
PAP	0.006	0.060	0.008	1		
Motivation	0.110	0.015	−0.035	0.020	1	
Productivity	0.326	0.198	0.289	−0.049	0.241	1

The correlations among the constructs, including the purpose of PA (PPA), PA criteria (PAC), feedback in PA (FPA), PA practices (PAPs), motivation, and productivity are displayed in Table 4. The discriminant validity test results are also presented. The correlation matrix elucidates the relationships between these constructs, supporting the overall robustness and reliability of the measurement model.

6.4. Structural Model

The results of the SEM analysis are summarized in Table 5, where the reported fit indices confirm that the structural model aligns with the commonly accepted standards in the literature [67–69]. In addition, the AMOS output of the tested model is provided in Figure 2 to illustrate the structural relationships.

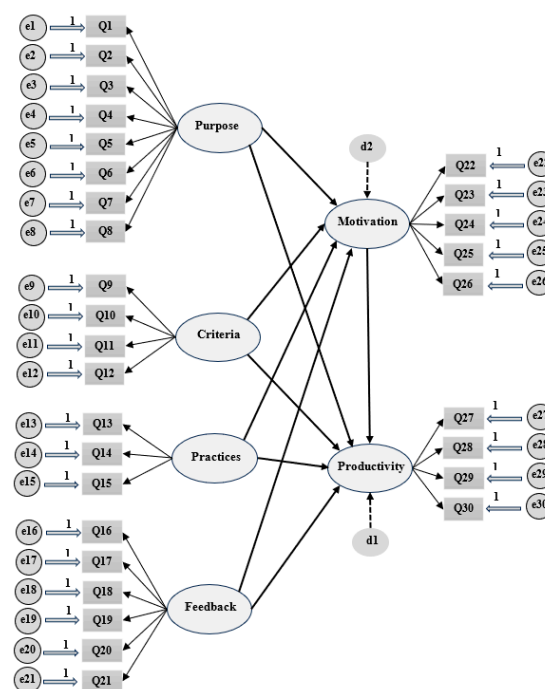


Figure 2. Structural equation model generated using AMOS: relationships between performance appraisal, motivation, and productivity.

Table 5. Fit indexes belonging to the results of the SEM.

Model	χ^2	df	<i>p</i> -Value	χ^2/df	GFI	RMSEA
Default model	1168.026	390	0.001	2.995	0.837	0.071

The hypothesis was examined following the validity of the model. The outcomes of the hypothesis testing are presented in Table 6.

Table 6. Results of hypothesis tests.

	Hypothesis	Estimate (r)	Decision
1	A relationship exists between employee motivation and the purpose of PA (PPA)	0.176 *	Supported
2	A relationship exists between employee motivation and PA criteria (PAC)	−0.022	Rejected
3	A relationship exists between employee motivation and PA practices (PAP)	0.021	Rejected
4	A relationship exists between employee motivation and feedback in PA (FPA)	−0.109	Rejected
5	A relationship exists between employee productivity and the purpose of PA (PPA)	0.225 **	Supported
6	A relationship exists between employee productivity and PA criteria (PAC)	−0.055	Rejected
7	A relationship exists between employee productivity and PA practices (PAP)	−0.053	Rejected
8	A relationship exists between employee productivity and feedback in PA (FPA)	0.218 *	Supported
9	A relationship exists between employee motivation and employee productivity	0.226 **	Supported

* $p < 0.05$, ** $p < 0.01$.

The evaluation of the structural model indicated that four of the nine proposed hypotheses were statistically supported ($p < 0.05$), while five were not confirmed.

In the case of H₁1, which tested the link between the purpose of PA and employee motivation, the results demonstrated a significant and positive association (estimate = 0.176; $p < 0.05$). This outcome validates H₁1, showing that a one-unit increase in the purpose of PA leads to a 0.176 unit increase in employee motivation.

Regarding H₁2, the analysis did not reveal a significant relationship between PA criteria and employee motivation (estimate = −0.022; $p > 0.05$). As a result, H₁2 was not supported.

The test of H₁3, concerning the effect of PA practices on employee motivation, likewise showed no meaningful influence (estimate = 0.021; $p > 0.05$), leading to the rejection of this hypothesis.

For H₁4, which examined the role of feedback in PA on employee motivation, the findings indicated an insignificant and negative effect (estimate = −0.109; $p > 0.05$). Hence, H₁4 was also rejected.

Turning to productivity outcomes, H₁5 identified a significant and positive effect of the purpose of PA on employee productivity (estimate = 0.225; $p < 0.01$). This supported hypothesis shows that a one-unit increase in the purpose of PA contributes to a 0.225 unit rise in productivity.

With respect to H₁6, no statistically significant impact of PA criteria on employee productivity was observed (estimate = −0.055; $p > 0.05$), leading to its rejection.

Similarly, H₁7, which explored the effect of PA practices on productivity, did not yield significant evidence of influence (estimate = −0.053; $p > 0.05$). Consequently, this hypothesis was not accepted.

For H₁8, the results highlighted a significant and positive effect of feedback in PA on productivity (estimate = 0.218; $p < 0.05$). The acceptance of H₁8 indicates that each standard unit increase in PA feedback enhances productivity by 0.218 units.

Lastly, H₁9, which addressed the connection between employee motivation and productivity, confirmed a positive and significant association (estimate = 0.226; $p < 0.01$). This finding supports H₁9, demonstrating that a one-unit increase in employee motivation raises productivity by 0.226 units.

7. Discussion

This study investigates the complex relationship between performance appraisal (PA) practices and their dual impact on the motivation and productivity of construction workers in Türkiye, employing SEM as an analytical framework. The findings enrich the existing body of knowledge by focusing on a workforce segment that has traditionally been underrepresented in PA research, namely construction laborers. Recent evidence also highlights the growing use of SEM in construction-related studies to capture complex interdependencies [54].

The results indicate that PA exerts a stronger effect on productivity than on motivation. This pattern is consistent with previous research emphasizing the role of appraisal systems in enhancing employee productivity within technical and engineering contexts [14]. It also resonates with studies showing that SEM is particularly effective in identifying drivers of productivity in construction environments, such as equipment and operational factors [51]. However, the weaker influence on motivation suggests that appraisal alone may not suffice to foster worker engagement. Instead, complementary mechanisms such as recognition and participatory practices may be necessary, an interpretation that resonates with broader studies highlighting the need to balance motivation and productivity within appraisal systems [29].

Feedback mechanisms emerged as a key determinant of productivity, echoing evidence that structured and constructive feedback can enhance both intrinsic and extrinsic motivation [30]. Yet, in this study, feedback had only a limited effect on motivation, pointing to contextual influences specific to Türkiye's construction industry. The prioritization of job security and stable working conditions over direct performance feedback may explain this discrepancy, which is in line with findings reported in Middle Eastern construction contexts where similar worker preferences are observed [47]. Comparable conclusions are found in studies of frontline construction workers, where behavioral and contextual factors shaped how feedback translated into performance outcomes [53].

Interestingly, appraisal practices and criteria did not show statistically significant impacts on motivation or productivity. While earlier studies emphasized the importance of clearly defined evaluation criteria in boosting performance outcomes [22], the current findings highlight the necessity of tailoring appraisal systems to cultural and sectoral contexts. In the Turkish construction industry, transparent and widely accepted appraisal standards may be a strategic step to enhance both adoption and effectiveness. Similar methodological reflections in the literature stress that SEM is an effective means of disentangling such non-significant relationships to better explain latent constructs [52].

The implications extend beyond the construction sector. Evidence from service industries has confirmed the interdependence of motivation and productivity under structured appraisal systems [69], while studies in small and medium-sized enterprises have demonstrated the mediating role of job satisfaction and appraisal mechanisms in improving employee outcomes [38]. These parallels underscore the universality of certain PA principles while at the same time stressing the importance of contextual adaptation. Furthermore, research across other domains of construction and infrastructure has shown that SEM-based studies contribute significantly to sector-specific recommendations, even in fields as diverse as material performance [70].

From a practical perspective, several recommendations can be drawn. Incorporating monetary and non-monetary incentives into appraisal systems may enhance motivation and overall engagement. Clear articulation of appraisal objectives, refinement of evaluation criteria, and transparent communication can improve perceptions of fairness and utility. Moreover, participatory approaches—where workers contribute to defining performance

goals and evaluation metrics—are likely to strengthen ownership and alignment with organizational objectives.

In conclusion, the study contributes by emphasizing the interplay between productivity and motivation in the Turkish construction workforce. The results call for a contextualized approach to PA, integrating cultural and organizational dynamics unique to the industry. Future research should further explore these intersections, including cross-sectoral comparisons, to assess the wider applicability of these findings within Türkiye and beyond. Methodological insights from SEM-focused studies across the construction field reinforce the potential for applying this framework to understand both technical and behavioral dimensions of performance appraisal more comprehensively [52–54].

8. Conclusions

This study investigates the impact of performance appraisal (PA) systems on the motivation and productivity of construction workers in Türkiye by employing covariance-based structural equation modeling (CB-SEM), thereby addressing an important gap in the literature. The findings clearly reveal the results of the nine hypotheses tested. The purpose of appraisal was found to have a significant and positive effect on both motivation and productivity, underscoring the importance of strategic goal-setting in PA design. In contrast, appraisal criteria and practices did not exhibit significant effects, suggesting a misalignment between worker expectations and the applied frameworks. Feedback was identified as a strong determinant of productivity, while its influence on motivation remained limited. Finally, a positive and significant relationship between motivation and productivity was confirmed, highlighting the crucial role of motivation in enhancing workforce performance.

The theoretical contribution of this study lies in its focus on construction workers, a group traditionally overlooked in PA research, and in its holistic modeling of the interrelationships among appraisal, motivation, and productivity. The results demonstrate that the dimensions of PA exert differentiated effects, challenging the assumption of uniformity in PA–performance relationships. This insight contributes a novel perspective to the literature, emphasizing that the interaction between motivation and productivity is shaped not only by direct appraisal mechanisms but also by cultural and contextual dynamics.

From a practical standpoint, the results provide actionable recommendations for improving PA systems in the Turkish construction industry. Clear articulation of appraisal objectives, reinforcement of feedback mechanisms with both monetary and non-monetary incentives, and greater worker participation in the appraisal process emerge as essential strategies to increase employee engagement and productivity. Additionally, developing transparent and worker-aligned appraisal criteria is vital for strengthening the perceived fairness and effectiveness of PA practices.

The limitations of this study should also be noted. The research was conducted within Türkiye using a cross-sectional design, which restricts the generalizability and causal inference of the findings. Furthermore, reliance on self-reported survey data may involve subjectivity. Future studies are encouraged to adopt longitudinal designs, expand cross-cultural comparisons, and integrate qualitative approaches to enrich the understanding of PA dynamics. Moreover, the incorporation of AI-based performance tracking systems and predictive analytics may enhance both theoretical and practical contributions by providing data-driven appraisal frameworks.

In conclusion, this study demonstrates that the purpose and feedback dimensions of PA are key determinants of motivation and productivity among construction workers, offering meaningful theoretical and practical contributions. The findings highlight the need to redesign PA systems in labor-intensive sectors such as construction to be more

transparent, participatory, and motivation-oriented, not only in Türkiye but also in broader international contexts.

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