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Importance of Autonomous Motivation in Construction Labor Productivity Improvement in Vietnam: A Self-Determination Theory Perspective

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Abstract: Labor productivity is an important aspect of the construction industry, and motivation is believed to be an influential factor that affects it. While previous studies have emphasized the role of controlled motivation (i.e., external factors), the role of autonomous motivation (i.e., internal factors) has been ignored. This knowledge gap hampers further efforts to explore new determinants that increase construction labor productivity (CLP). Accordingly, self-determination theory (SDT) is promising in terms of its ability to bridge this gap and explain how autonomous motivation can be generated by integrating reasonable leadership styles and psychological satisfaction. Therefore, this study develops a novel model for assessing the effects of engaging leadership, three basic psychological satisfaction factors (i.e., autonomy, competence, and relatedness), and work motivation on CLP. Based on the data collection in Vietnam, we found that both autonomous motivation and controlled motivation positively and significantly contributed to CLP. In terms of promoting autonomous motivation and improving CLP, competence and relatedness satisfaction played a key role. Ultimately, these results highlighted two crucial features related to CLP improvement in addition to the conventional view: "negative legacy" and "new light of hope". This study expands and reinforces SDT knowledge by comprehensively illuminating leadership and psychological and motivational indicators in the construction context. It provides substantial practical recommendations for CLP improvement, such as enhancing autonomous motivation, promoting satisfaction with competence and relatedness, and reducing selfish work, which is a novel factor that negatively contributes to CLP. This factor is the first discovered in the construction domain.

Keywords: engaging leadership; basic psychological satisfaction; autonomous motivation; SDT; CLP

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1. Introduction

Construction is an important industry for any country's economy—it contributes significantly to gross domestic product [1,2] and employs a sizable portion of the labor force [3,4]. It is therefore regarded as more labor intensive than other industries [5], with construction activities depending mainly on human resources and considerable workforce costs incurred as a result [6]. On sites, the primary workforce units are construction workers, whose productivity and quality of work can remarkably influence aspects of project performance (e.g., quality, cost, and time) [7–9]. Hence, an enhancement in worker productivity can markedly advance project effectiveness [8] and generate substantial cost savings for construction contractors [10]. Construction labor costs account for 30% to 50% of the total cost of a construction project in many countries; thus, construction labor productivity (CLP) determines the profitability of almost all such endeavors [9,11,12].

Construction industries worldwide, including those in many developing countries, have been confronted with low levels of labor productivity [13,14]. This problem is dangerous because it leads to inflationary pressure and social conflicts in the country [15–17]. By identifying the factors that contribute to low CLP, contractors can address issues early on, reducing time and cost overruns [18–20]. Although much effort has been exerted to improve workers' skills and knowledge through training systems or programs, labor costs are constantly rising, and construction projects suffer noticeable delays owing to low CLP [21,22]. These problems arise in large part because the workforce is the most difficult factor to define, manage, and quantify in construction projects [23]. This challenge highlights the criticality of identifying the determinants of CLP for the effective management of the labor force [24].

Research on CLP is an important domain with which numerous researchers worldwide have been concerned [25]. Many studies have investigated issues related to worker productivity, identifying various motivational factors that affect the productive capacity of construction laborers. While many previous studies have emphasized the role of controlled motivation (i.e., external factors) in CLP enhancement [26–29], only one study [30] has mentioned autonomous motivation (i.e., internal factors) to date, but the auhtors did not explain how autonomous motivation can be generated and maintained. In this regard, construction practitioners and managers in Vietnam claimed that autonomous motivation plays an important role in enhancing work performance [31,32]. Specifically, workers may tend to enthusiastically work when they feel a sense of voluntary action without micromanagement from their managers, which may promote work motivation to achieve the highest work performance. In addition, they perceive that empowering plays a key role in enhancing work motivation and performance; hence, some managers are willing to offer more authority to their workers as long as they ensure desirable work outcomes. However, no study has provided empirical evidence to demonstrate these circumstances. This leads to ambiguity in both the research community and the industry regarding the practical importance of autonomous motivation as well as the role of leadership style in motivation and performance enhancement through the psychological aspect. An essential task, therefore, is to examine the role of the autonomous motivation of construction practitioners in CLP enhancement through empirical evidence. It is also vital to determine how autonomous motivation can be generated and maintained by integrating a reasonable leadership style and psychological satisfaction.

The above-mentioned requirements can be satisfied using self-determination theory (SDT), which offers theoretical support for new leadership approaches (e.g., engaging leadership) through theories on basic psychological needs (BPNs) and organismic integration [33,34]. In accordance with these perspectives, the leadership of an organization should foster a work environment that satisfies employees' essential psychological needs for autonomy, competence, and relatedness. In the SDT framework, the satisfaction of BPNs is assumed to represent the underlying motivational mechanism that energizes and directs people's behaviors (a type of work engagement) [35]. Such satisfaction is regarded as the essential nutrient in individuals' optimal functioning and well-being, similar to how water, minerals, and sunshine are essential for plants to bloom [35,36]. SDT postulates the existence of psychological satisfaction, which is important in individual motivation, growth, and performance [37,38].

Despite the promise of SDT for such investigations, however, there appears to be a gap in extant knowledge because of the aforementioned lack of comprehensive exploration into the simultaneous effects of leadership and psychological and motivational factors on work performance. To fill these voids, we empirically investigated an integrated research model to exhaustively represent the psychological, and motivational determinants of CLP in the leadership context on the basis of SDT. Understanding these factors can support the development of strategies for reducing inefficiencies, effectively managing the construction workforce, and practicing cost-effective construction. These outcomes, in turn, would help contractors to improve project performance and become more competitive, thereby

increasing their chances of survival in this highly competitive industry [39,40]. To achieve the aim of this work, we pursued the following objectives:

- Exploring the relationships between engaging leadership and three pathways to BPN satisfaction among workers: autonomy satisfaction (AS), competence satisfaction (CS), and relatedness satisfaction (RS);
- Exploring the relationships between these satisfaction pathways and worker motivation, as well as the effects of these relationships on productivity;
- Exploring the associations between motivational factors and work engagement and the latter's links to productivity;
- Formulating recommendations for improving CLP.

2. Theoretical Foundation and Hypotheses Development

2.1. Engaging Leadership

Engaging leadership (EL) is a new concept that focuses on SDT's theoretical considerations, especially the BPN theory [41,42]. EL proposes a conceptualization of leadership that seeks to help leaders to create a work environment that satisfies the BPNs of employees [34]. On the basis of SDT and the fulfillment of autonomy, competence, and relatedness needs, EL emphasizes three issues that leaders should pay attention to: empowerment, strengthening, and connection [42]. Empowerment advances the satisfaction of autonomy-related needs and is the component of leadership that enables workers to have a say in how they complete their tasks while also encouraging high standards of accountability [34]. Strengthening refers to supporting workers in their self-development and growth, as well as maximizing the use of their skills in the workplace. Connection emphasizes the value of positive, interpersonal, and in-depth relationships, and it involves encouraging cooperation, team spirit, and collaboration among team members and across functions [34].

2.2. Basic Psychological Needs

Within SDT fall three BPNs: autonomy, competence, and relatedness [37,38]. Autonomy represents the inherent desire of individuals to feel volitional and to experience a sense of choice and psychological freedom when carrying out an activity [35,43]. Competence is defined as the innate yearning of individuals to feel effective in interacting with the environment [35,44]. Relatedness pertains to the intrinsic propensity of individuals to feel connected to others, that is, to be a member of a group, to love and care and to be loved and cared for [45].

With regard to the relationship between leadership and BPNs, researchers [46–49] have consistently emphasized the critical role that leaders play in fostering positive work environments, where employee motivation is nurtured and nourished through BPN fulfillment. A study demonstrated that EL passively contributed to the satisfaction of the three BPNs of employees in technical engineering organizations [34]. Another study explored the positive relationship between AS and EL in the health system of a multinational organization [50].

To date, however, no study has examined the link between EL and the satisfaction of BPNs in the construction sector. We therefore inquired into whether a positive relationship exists between EL and the satisfaction of the three BPNs among workers for the following reasons. First, construction managers/leaders empower their workers by giving them important responsibilities and the freedom to handle situations as they feel best and by actively encouraging them to formulate their own opinions in decision making (i.e., practice empowerment in accordance with EL). Workers are expected to satisfy their autonomy more easily when they are allowed and motivated to take initiative, be creative, learn from mistakes, assume responsibilities, and handle difficult situations that they encounter in their designated tasks in their own ways. Second, construction managers/leaders can support workers in endeavors to improve or strengthen their practical skills and first-hand experiences by providing adequate feedback and encouraging them to question ways of solving problems (i.e., practice strengthening in the manner advocated in the EL concept). This measure can help workers to enhance their competencies, growth,

and development, which in turn advances the satisfaction of their competence. Third, construction managers/leaders can cultivate a positive work environment by building good relationships and communications with their workers, as well as among workers in teams (i.e., establish connections in accordance with the principles of EL). This course of action can enhance interrelationships, collaboration, and support among teammates, thus contributing to a sense of belongingness in teams and satisfying their relatedness needs. Based on this discussion, we propose the following hypotheses:

Hypothesis 1a (H1a). *EL is positively associated with the AS of construction workers on sites.*

Hypothesis 1b (H1b). *EL is positively associated with the CS of construction workers on sites.*

Hypothesis 1c (H1c). *EL is positively associated with the RS of construction workers on sites.*

SDT regards AS as a psychological necessity and a requirement for self-regulation, which determines the extent to which employees are willing to commit themselves to their tasks and work roles [46,51,52]. We expected to find support for the link between the need for AS and the productivity of workers on sites because two psychological components can explain why autonomy predicts work performance [53]. First, researchers [54] found that perceived volition—the perception that behavior is self-initiated and free of coercion—links autonomy to work performance, considering that individuals will not expend effort if they believe that such initiatives will be thwarted or ineffective. Second, the more strongly one's sense of freedom to make work-related decisions is and the more meaningful and correspondent activities are with one's interests, the greater the desire to engage in one's work, take initiative, and be creative [55]. The upshot of all these is increased work performance [55]. When workers perceive that they have freedom of choice regardless of whether they engage in a performance task, their productivity improves. This argument is also applicable to the construction sector.

When an individual's productivity criteria cannot be evaluated, effort and productivity stagnate (presumably, because of a lack of competence-relevant feedback) [56]. In this regard, we anticipated that CS would predict worker productivity on sites because demonstrating and improving one's abilities is fundamentally satisfying. Workers satisfied with their competence work more effectively, thus enhancing their productive capacity. As found in some studies [57,58], a positive association exists between CS and task performance. In a similar vein, a relationship between CS and CLP can be assumed for the following reasons: first, competence perceptions depend on a mix of challenge and skill. Workers must both experience a challenge and possess the skills necessary to meet this challenge. Workers who feel unchallenged are prevented from elevating their sense of proficiency because there is no work involved in satisfying demand, even if a task is self-endorsed. Second, appropriate feedback (and subsequently perceived competence) affects productivity in required tasks on sites. The arguments that CS is cultivated by challenge and appropriate feedback and that it leads to elevated worker productivity are likewise expected to hold with respect to the construction sector.

Concerning RS, numerous researchers have stated that good relationships have a significant effect on CLP [59–65]. Accordingly, we expected to find that when workers' relatedness was satisfied by valuable interpersonal relationships with teammates, the relationships generated positive emotions and increased cognitive processing. These effects naturally induce and augment the will to enact what is required to preserve valuable ties and act in favor of them—that is, being helpful and improving productivity. This argument finds empirical support in [66], which revealed that a good relationship among project stakeholders may affect construction performance by creating a better work environment. These RS and worker productivity-related issues are applicable to the construction sector. Based on the aforementioned rationale and supporting evidence, we put forward the following suppositions:

Hypothesis 2a (H2a). *AS is positively associated with worker productivity on sites (represented by CLP).*

Hypothesis 2b (H2b). *CS is positively associated with CLP.*

Hypothesis 2c (H2c). *RS is positively associated with CLP.*

2.3. Work Motivation Based on Self-Determination Theory

SDT states that motivation is a multidimensional concept that resides along a continuum [37,46]. SDT proposes three types of autonomous motivation (AM): identified regulation, integrated regulation, and intrinsic regulation (intrinsic motivation). Identified regulation is reflected in activity participation prompted by an individual's self-endorsed service outcomes [46]. Integrated regulation is reflected in the attainment of inherently valued and important goals or outcomes, but such an action is fully endorsed by individuals [36]. Intrinsic regulation is a prototypical form and is reflected in activity participation stimulated by the fact that doing so enables individuals to experience ownership over their actions and consistency between behaviors and their authentic sense of self [37,67]. There are two types of controlled motivation (CM): external regulation and introjected regulation. External regulation is a prototypical form and reflects behavioral engagement reinforced by reward or punishment, whereas introjected regulation reflects behavioral participation out of a sense of externally referenced obligation, such as the avoidance of guilt or the promotion of contingent self-worth [37]. Finally, it defines amotivation as a state characterized by a complete lack of intention to act [37,46].

The relationships between work motivation and BPNs are consistent, considering that SDT posits BPN satisfaction as an underlying motivation [36]. These relationships were examined in prior studies on issues such as academic engagement [68], physical exercise [69], and healthcare [70]. Accordingly, we hypothesized favorable relationships between the psychological satisfaction and work motivation of workers on the basis of SDT. To begin with, psychological satisfaction contributes to AM because, as demonstrated in [70,71], the satisfaction of autonomy, competence, and relatedness needs facilitates intrinsic motivation, which is the highest type of AM in SDT. In [72], the authors confirmed that psychological satisfaction advances AM; specifically, among autonomy, competence, and relatedness, the third factor is the greatest contributor to AM. Furthermore, in [72], the authors found that competence positively predicted CM but that the satisfaction of autonomy and relatedness was negatively related to CM. In [73], it was indicated that introjected regulation (a type of CM) was positively correlated with autonomy, competence, and relatedness. Finally, in [34], the authors explained that the satisfaction of autonomy, competence, and relatedness negatively contributes to amotivation. Logically, the nonsatisfaction of individuals' psychological needs exerts unfavorable effects on work motivation, resulting in a lack of drive to participate in activities. Hence, it is reasonable to assume that psychological satisfaction contributes to AM, CM, and amotivation. For this reason, we maintain the following:

Hypothesis 3 (H3). *For construction workers, (H3a) AS is positively associated with AM, (H3b) AS is positively associated with CM and (H3c) AS is negatively associated with amotivation.*

Hypothesis 4 (H4). *For construction workers, (H4a) CS is positively associated with AM, (H4b) CS is positively associated with CM and (H4c) CS is negatively associated with amotivation.*

Hypothesis 5 (H5). *For construction workers, (H5a) RS is positively associated with AM, (H5b) RS is positively associated with CM and (H5c) RS is negatively associated with amotivation.*

The effects of work motivation on CLP according to SDT were discussed in a recent study. Specifically, in [30], the authors demonstrated that identified regulation (a type of

AM) significantly affected worker productivity on sites. In addition, they found that extrinsic regulation and introjected regulation (types of CM) significantly influenced construction workers' productivity. This finding makes sense, as salary, reward, and job security are key factors that encourage workers to make an effort to enhance their productivity [28]. Finally, amotivation negatively affects worker productivity on sites, because when amotivation as work motivation increasingly diminishes, worker productivity starts decreasing [30]. Thus, it is reasonable to suppose the existence of relationships between STD-based motivational factors and worker productivity. In line with this argument, we propose the following hypotheses:

Hypothesis 6 (H6). *AM is positively associated with CLP.*

Hypothesis 7 (H7). *CM is positively associated with CLP.*

Hypothesis 8 (H8). *Amotivation is negatively associated with CLP.*

2.4. Work Engagement

Although work motivation may directly contribute to CLP, the mediating role of work engagement (WE) should be carefully considered. In nature, individuals with high motivation can generate and foster positive cognition, emotion, or behavior when they participate in tasks, resulting in higher work performance [74]. WE was first proposed in [75] as a motivational concept that provides employees with positive energy that they can devote to their jobs. WE refers to "the simultaneous employment and expression of a person's 'preferred self' in task behaviors that promote connections to work and to others, personal presence (physical, cognitive, and emotional), and active, full performances" [75] (p. 700).

Numerous studies have emphasized the significance of motivation in fostering individual engagement. These studies demonstrated that highly autonomously motivated employees exhibit more engagement behaviors than their CM counterparts [76–78]. Certain studies have shown that autonomously motivated employees are more physically, emotionally, and cognitively engaged in challenging and meaningful tasks in the workplace [79] and that they render more productive work and perform better [80]. According to [81,82], AM drives a person toward greater cognitive effort, which is related to absorption—one of the dimensions of WE. As indicated in [74], rewards (which belong to CM) appear to be a factor that fosters employee participation in tasks. In engineering organizations, amotivation is negatively correlated with the WE of employees [34]. In this regard, workers should be encouraged to achieve a higher degree of self-determined motivation to face challenging tasks. Although no study has been directed at the relationship between each type of motivation and WE in the construction sector, the insights above are considered applicable to the construction sector. Therefore, we examined these relationships with the following suppositions as a basis:

Hypothesis 9 (H9). *AM has a positive association with the WE of construction workers.*

Hypothesis 10 (H10). *CM has a positive association with the WE of construction workers.*

Hypothesis 11 (H11). *Amotivation has a negative association with the WE of construction workers.*

Work performance is made up of distinct sets of activities that contribute to an organization in various ways [83]. Considering this attribute, a critical requirement is to consider how various aspects of work performance may be influenced by WE [84]. Theoretical research has linked investment in the three energies of WE to job performance. First, investing physical energy (i.e., behaviors) in work roles moves the realization of organizational goals by allowing employees to perform organizationally valued behaviors

at higher levels of effort over longer periods of time [75,85]. Second, investing cognitive energy in work roles contributes to the achievement of organizational goals by encouraging more vigilant, attentive, and focused behaviors [75]. Finally, emotional investments in work roles contribute to organizational goals in a variety of ways [75]. Those who invest emotional energy in their roles improve performance via the encouraged deeper connection among co-workers in pursuit of organizational goals [86]. Certain research on CLP improvement concentrated on workers' behaviors (i.e., physical engagement) on sites. An example is the work of [87], who found that behavior was positively and directly associated with worker performance; contractors should thus be concerned with enhancing positive worker behaviors to improve CLP. In accordance with these ideas, we postulate that WE is positively associated with CLP (Hypothesis 12 (H12)). Table 1 summarizes the hypotheses tested in this study.

Table 1. The study's hypotheses.

H	Path	References
H1a	Engaging Leadership (EL) → Autonomy Satisfaction (AS)	[34,50]
H1b	Engaging Leadership (EL) → Competence Satisfaction (CS)	[34]
H1c	Engaging Leadership (EL) → Relatedness Satisfaction (RS)	[34]
H2a	Autonomy Satisfaction (AS) → CLP	[49,55,57]
H2b	Competence Satisfaction (CS) → CLP	[49,55,57]
H2c	Relatedness Satisfaction (RS) → CLP	[49,55,57]
H3a	Autonomy Satisfaction (AS) → Autonomous Motivation (AM)	[34,68,72,73]
H3b	Autonomy Satisfaction (AS) → Controlled Motivation (CM)	[34,72,73]
H3c	Autonomy Satisfaction (AS) → Amotivation (Amot)	[34]
H4a	Competence Satisfaction (CS) → Autonomous Motivation (AM)	[34,68,72,73]
H4b	Competence Satisfaction (CS) → Controlled Motivation (CM)	[34,72,73]
H4c	Competence Satisfaction (CS) → Amotivation (Amot)	[34]
H5a	Relatedness Satisfaction (RS) → Autonomous Motivation (AM)	[34,68,72,73]
H5b	Relatedness Satisfaction (RS) → Controlled Motivation (CM)	[34,72,73]
H5c	Relatedness Satisfaction (RS) → Amotivation (Amot)	[34]
H6	Autonomous Motivation (AM) → CLP	[30]
H7	Controlled Motivation (CM) → CLP	[28,30,74]
H8	Amotivation (Amot) → CLP	[30]
H9	Autonomous Motivation (AM) → Work Engagement (WE)	[68,76–78,88,89]
H10	Controlled Motivation (CM) → Work Engagement (WE)	[76,78]
H11	Amotivation (Amot) → Work Engagement (WE)	[34,78]
H12	Work Engagement (WE) → CLP	[74,78,87,90]

Note: Studies [28,30,87] were set in the construction sector.

2.5. Measurement of Worker Productivity

In construction, labor productivity has been defined as the ratio between the units of work accomplished (i.e., output quantity) and the hours of work rendered (i.e., labor input) [91,92].

$$\text{Construction labor productivity} = \frac{\text{Installed quantity}}{\text{Actual work hours}} = \frac{\text{Output}}{\text{Work hours}} \quad (1)$$

The analysis in this research involved two types of construction workers: steel workers and masonry workers. We first calculated their productivity levels in some core tasks

on construction sites with Circular No.10/2019/TT-BXD of the Vietnamese Construction Ministry for the Promulgation of Construction Norms (dated 26 December 2019) as guidance [93]. The derived figures were then discussed in depth with professionals (e.g., managers, site engineers, supervisors, and workers) to finalize reasonable productivity scales. Finally, productivity scales for several tasks were generated. With their practical experiences as a reference, the workers were instructed to assess their productivity in specific tasks following the proposed scales.

The structural model of the research is presented in Figure 1.

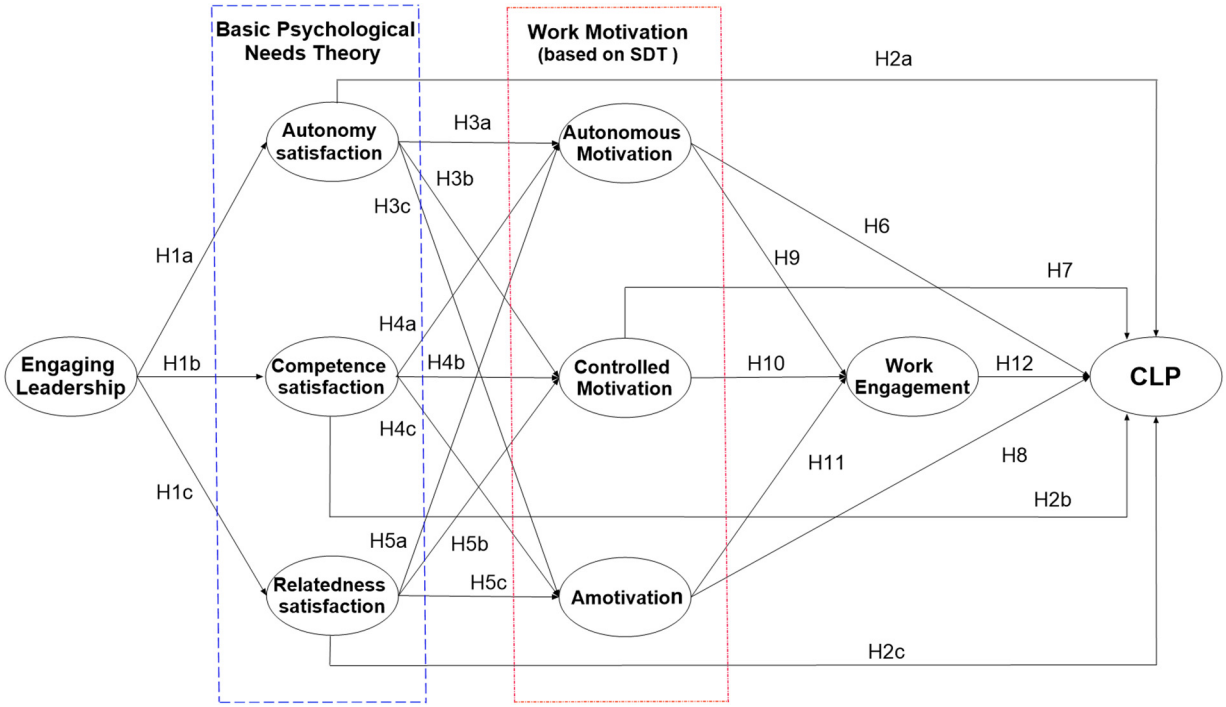

Figure 1. Structural model.

3. Materials and Methods

3.1. Questionnaire Development and Procedure

To collect data, we developed a questionnaire consisting of two main parts. Part I revolved around the general demographic information of the participants, such as gender, age, educational level, experience, marital status, weight, height, and income. Part II comprised statements designed to measure the variables treated in this work.

Before the questionnaire was distributed, we conducted a pilot study, through which a draft questionnaire was sent by email to academic experts, and face-to-face interviews were carried out on construction sites. The pilot involved 21 participants, who were asked to evaluate and provide constructive feedback on the suitability of the language, the content validity of the questionnaire, its structure and sequencing of questions, and its completeness. After receiving their feedback and comments, we revised the questionnaire. For the face-to-face interviews, we carefully trained four research assistants to comprehensively understand the research objectives, the content of the questionnaire survey, and the necessary survey techniques.

After the questionnaire was finalized, a survey was administered to 215 construction workers in Vietnam from April to July 2021. On the sites where the respondents worked, their companies constructed multi-story residential buildings, for which almost similar structural design features and construction methods were used. The participants were recruited via snowball sampling, which is a nonprobability technique [94]. Specifically, interviews were initiated with a small number of workers overseen by a single contractor.

Then, the sample was expanded, with the initially chosen respondents asking for referrals from other contractors.

3.2. Participants

The 215 construction workers participating in this study worked on five construction sites in Vietnam. Of these workers, 122 were engaged in steelwork, accounting for 56.7% of the sample, and 93 were involved in masonry, accounting for 43.3%.

The construction workers were aged between 18 and 61 years, with their mean age being 30.6 years (SD = 7.00). Out of the 215 workers, 187 (87.0%) were male, 28 (13.0%) were female, 50 (23.3%) were single, and 165 (76.7%) were married. Their work experience ranged from 0.5 to 19.0 years, with a mean of 5.56 years. In terms of educational level, 6% (n = 13) had no schooling, 24.3% (n = 52) completed primary education, 43.7% (n = 94) acquired secondary education, and 26% (n = 56) had credentials covering high school or above. They earned an average income of 3811 USD (SD = 520).

3.3. Variables Measured

3.3.1. Engaging Leadership

The EL scale developed by [42] encompassed 12 items intended to measure the three core aspects of the concept: strengthening, connection, and empowerment. Example statements are presented as follows.

- "My supervisors encourage me to develop knowledge and skills as much as possible on my tasks" (strengthening);
- "My supervisors encourage collaboration among team members on sites" (connection);
- "My supervisors listen to how I would like to do things to improve my work efficiency" (empowerment).

The participants were instructed to respond to all statements using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). After the model assessment step, eight items were chosen for the final model: two items on strengthening, two on connection, and four on empowerment (all empowerment-related items were chosen).

3.3.2. Satisfaction with BPNs

The researchers in [95,96] adopted 17 items from the BPN satisfaction scale, which has three psychometrically sound structural components that distinctly measure AS (five items, e.g., "I feel that my decisions reflect what I really want."), CS (six items; e.g., "I feel I can competently achieve my goals and company goals."), and RS (six items; e.g., "I feel close and connected with other people onsite."). After the model assessment step, 13 of the BPN items were incorporated into our final model: five AS items, four CS items, and four RS items.

3.3.3. Work Motivation

Amotivation (Amot) was measured with four items (e.g., "I don't know why I am doing this job; it's pointless work."), AM with eight items (e.g., "I put effort into my current job because it is really important to me."), and CM with nine items (e.g., "Only when I am rewarded financially will I devote enough attempts to my job."). These items were adopted by [30,97,98], and the question stem was "Why do you or would you put effort into your current job on a construction site?". After the model assessment step, we incorporated the following into the final model: three items related to Amot, four related to AM, and four associated with CM.

3.3.4. Work Engagement

The WE variable developed by [84] was measured using 24 items revolving around three WE dimensions: physical, cognitive, and emotional engagement. These items were applied to the context of construction sites. After the model assessment step, four items were included in the final model (e.g., "I work extra hours to smoothen work procedures

and complete my work before the deadline."; "I always follow rules/regulations in the workplace to ensure my work efficiency.").

3.3.5. Worker Productivity (i.e., CLP)

The five main tasks for which the two groups of construction workers exhibited productivity onsite were determined and rated on a five-point scale ranging from 1 (lowest productivity) to 5 (highest productivity). The items were ascertained on the basis of Circular No.10/2019/TT-BXD [93] and in-depth discussions with construction professionals. After the model assessment step, only three items were included in the final model. Example statements are listed below:

- For steel workers: "How many average kilograms of steel can you process (i.e., cutting, bending, and shaping according to drawn specifications) per shift (eight hours)?". The evaluation scales were (1) <150 kg, (2) 150–170 kg, (3) 171–190 kg, (4) 191–210 kg, and (5) >210 kg.
- For masonry workers: "How many average cubic meters of straight walls can you build using baked clay bricks per shift (eight hours)?" The evaluation scales were (1) <0.6 m^3, (2) 0.6–0.7 m^3, (3) 0.71–0.8 m^3, (4) 0.81–0.9 m^3 and (5) >0.9 m^3.

3.3.6. Control Variables

The influence of the construction workers' demographic characteristics (e.g., gender, age, educational level, work experience, marital status, income, and body mass index (BMI]) on their productivity was analyzed.

3.4. Structural Equation Modeling

We conducted structural equation modeling (SEM), which aligned with the aim of the study. SEM is a multivariate statistical technique through which researchers scrutinize hypotheses regarding the relationships between observed and latent variables [99] that are used to simultaneously explore a series of interrelated dependent relationships [100]. This technique has been widely used in numerous studies, particularly in determining links between correlation effects [101,102].

The data collected in this work were analyzed using the Statistical Package for the Social Sciences (25.0, IBM® SPSS®) and Amos software (IBM® SPSS®). All the variables in the questionnaires were examined through an initial exploratory factor analysis (EFA), reliability tests, and confirmatory factor analysis (CFA) to verify the instruments' variable structures. EFA was used to analyze the relationships between correlated variables and reduce the data, which supported the confirmation of the proposed model's structure [103]. Principal axis factoring was frequently rotated to ease the interpretation of the extracted factors, and ProMax was used [104]. Factors with loadings less than 0.50 (the cut-off for significance) were regarded as weak indicators of the constructs and were thus excluded from the components [105]. Then, the empirical data were analyzed using reliability tests, which were developed using the Cronbach's alpha test, the Kaiser–Meyer–Olkin (KMO) test, and Bartlett's test [106,107].

Next, we performed CFA to test the adequacy of each scale employed to investigate the causal relationships among the variables [108]. To evaluate the goodness-of-fit (GoF) of the proposed model, indicators including the composite reliability (CR) for internal consistency reliability, the indicator loading for indicator reliability, and the average variance extracted (AVE) for convergent validity were estimated [109,110]. The adjusted structural equation model was used to test the relationships between the study variables. The items on the various scales served as indicators of the latent variables in the model. In this regard, several indicators were considered, such as the chi-square (χ^2), the chi-square divided by degrees of freedom (χ^2/df), the comparative fit index (CFI), the Tucker–Lewis index (TLI), the GoF index (GFI), the normed fit index (NFI), the Akaike information criterion (AIC), and the root mean square error of approximation (RMSEA) [99,111,112]. The thresholds of the indicators are provided in Table 2.

Table 2. Threshold of goodness-of-fit assessment and model estimates.

Indicator	Recommended Level
Cronbach's Alpha	>0.6 [108]
KMO Measure of Sampling Adequacy	$0.5 \leq$ KMO ≤ 1 [108]
Bartlett's Test of Sphericity	Sig. < 0.05 [106,108]
Average Variance Extracted (AVE)	>0.5 [113]
Composite Reliability (CR)	>0.7 [109,113]
Chi-Square/df (χ^2/df)	from 1 to 2 [114]
GFI	0 (no fit) to 1 (perfect fit) [103,112]
CFI	0 (no fit) to 1 (perfect fit) [103,112]
TFI	0 (no fit) to 1 (perfect fit) [103,112]
NFI	0 (no fit) to 1 (perfect fit) [103,112]
AIC	Smaller value [115]
RMSEA	<0.05, very good fit; 0.05–0.08, fairly good fit; 0.08–0.10, acceptable fit; >0.1, unacceptable fit [116]

4. Results

4.1. Preliminary Analysis

This study tested a measurement model with all nine latent variables related to their respective indicators in the preliminary analysis (Table 3). The skewness and kurtosis values were less than 2.0, which was within the acceptable range [117]. The mean values, standard deviations, and correlations between the variables are listed in Table 3. As theoretically supported and expected, EL was correlated with BPN satisfaction (e.g., EL and AS were correlated, r = 0.334 and $p < 0.01$). As anticipated, the satisfaction of two BPNs was correlated with worker productivity (e.g., CS and CLP were correlated, r = 0.480 and $p < 0.01$; RS and CLP were correlated, r = 0.422 and $p < 0.01$). CS and RS were correlated with work motivation (e.g., CS and AM were correlated, r = 0.382 and $p < 0.01$; CS and CM were correlated, r = 0.447 and $p < 0.01$; RS and AM were correlated, r = 0.322 and $p < 0.01$; RS and CM were correlated, r = 0.269 and $p < 0.01$). As shown in Table 3, work motivation was correlated with WE onsite (e.g., AM and WE were correlated, r = 0.321 and $p < 0.01$; CM and WE were correlated, r = 0.240 and $p < 0.01$). Furthermore, work motivation was correlated with productivity (e.g., AM and CLP were correlated, r = 0.502 and $p < 0.01$; CM and CLP were correlated, r = 0.441 and $p < 0.01$). As anticipated, WE correlated with CLP (r = 0.394, $p < 0.01$). As reflected in Table 3, no correlations were found between any of the demographic variables and CLP; hence, the final structural model was presented without the control variables.

4.2. Measurement Model

With the original version of the scale, this study applied an approach to data analysis similar to EFA [119]. As shown in Table 4, the nine latent variables emerged with initial eigenvalues greater than 1. These variables explained 73.138% of the variance. Their Cronbach's alpha values were above 0.70, indicating the high reliability of the nine dimensions [108]. The KMO test results showed a coefficient value of 0.844, thus >0.5, indicating a strong measure of sampling adequacy [108]. This explains why partial correlations or multicollinearity structures among the factors were sufficient to justify the grouping of the variables into related sets for the extraction of the nine principal components. Additionally, Bartlett's test of sphericity is 6053.051, and the corresponding significance probability is $p = 0.000$, which shows that the correlation matrix is not an identity matrix and that there are relationships among all variables (rejection of null hypothesis). The findings bolstered the dependability and validity of the nine principal components derived from the observed variables [106,108].

Table 3. Means, standard deviations and correlations between variables.

	Mean	SD	Gender	Age	Edu	Experience	Marital	BMI	Income	EL	AS	CS	RS	Amot	AM	CM	WE	CLP
Gender [1]	1.130	0.337	1.000															
Age	30.605	6.995	0.123	1.000														
Edu [2]	2.893	0.872	–0.217 **	0.018	1.000													
Experience	5.616	3.593	–0.156 *	0.620 **	0.186 **	1.000												
Marital [3]	1.767	0.423	0.115	0.634 **	0.015	0.474 **	1.000											
BMI [4]	22.260	2.013	–0.307 **	0.148 *	0.101	0.052	0.074	1.000										
Income [5]	3.811	0.520	–0.088	0.434 **	0.353 **	0.468 **	0.249 **	0.145 *	1.000									
EL	3.389	0.663	–0.041	0.035	0.025	–0.007	–0.007	0.053	0.066	1.000								
AS	3.467	0.855	–0.030	0.168 *	0.087	0.154 *	0.157 *	0.210 **	0.068	0.334 **	1.000							
CS	3.487	0.809	–0.027	0.044	0.020	–0.020	–0.066	0.015	0.002	0.011	–0.054	1.000						
RS	3.349	0.997	–0.042	–0.009	0.026	–0.119	0.017	0.074	0.016	0.042	0.022	0.363 **	1.000					
Amot	1.825	0.367	0.118	0.022	–0.186 **	–0.107	0.104	0.038	–0.089	–0.048	–0.074	0.033	–0.012	1.000				
AM	3.384	1.034	–0.131	–0.022	0.004	–0.092	–0.031	0.108	0.008	0.052	–0.091	0.382 **	0.322 **	–0.005	1.000			
CM	3.624	0.870	0.085	0.014	0.005	–0.114	0.029	0.029	–0.075	–0.057	–0.061	0.447 **	0.269 **	0.053	0.408 **	1.000		
WE	3.526	1.094	–0.093	–0.072	–0.015	–0.098	–0.011	–0.006	–0.160 *	0.037	0.071	0.371 **	0.315 **	–0.027	0.321 **	0.240 **	1.000	
CLP	3.428	0.970	–0.082	0.000	0.028	–0.127	0.112	0.077	–0.051	–0.016	–0.058	0.480 **	0.422 **	0.026	0.502 **	0.441 **	0.394 **	1.000

[1] Gender is a dummy variable that takes the value of 1 when the subject is male and 2 when female. [2] Education level is a dummy variable that takes the value of 1 for no education, 2 for primary school, 3 for secondary school, and 4 for high school and above. [3] Marital status is a dummy variable that takes the value of 1 when the subject is single and 2 when married. [4] BMI is the body mass index, which is calculated by weight in kilograms divided by the square of height in meters [118]. [5] Yearly average income = 1000 USD (1 USD = 22,952.5 VND). SD = standard deviation; * $p < 0.05$; ** $p < 0.01$.

Table 4. Evaluation of constructs in the measurement model.

Code	Component								
	EL	**AS**	**WE**	**AM**	**CM**	**RS**	**CS**	**Amot**	**CLP**
EL3	0.914								
EL12	0.893								
EL1	0.889								
EL9	0.883								
EL11	0.846								
EL8	0.846								
EL10	0.836								
EL6	0.833								
AS4		0.934							
AS2		0.932							
AS3		0.912							
AS1		0.907							
AS5		0.882							
WE3			0.905						
WE7			0.840						
WE9			0.619						
WE8			0.609						
Intri1				0.782					
Intri6				0.781					
Intri4				0.714					
Intri5				0.672					
Exter7					0.801				
Exter2					0.699				
Exter8					0.644				
Exter9					0.636				
RS1						0.752			
RS5						0.746			
RS3						0.695			
RS6						0.664			
CS5							0.805		
CS6							0.724		
CS4							0.671		
CS2							0.571		
Amot3								0.894	
Amot4								0.745	
Amot1								0.577	
LP3									0.817
LP1									0.761
LP5									0.712

Table 4. *Cont.*

Code	Component								
	EL	**AS**	**WE**	**AM**	**CM**	**RS**	**CS**	**Amot**	**CLP**
Initial Eigenvalues	7.686	7.350	3.435	2.151	1.913	1.832	1.666	1.329	1.163
% of Variance	19.707	18.845	8.807	5.514	4.906	4.696	4.271	3.408	2.983
Cumulative %	19.707	38.553	47.360	52.874	57.780	62.477	66.747	70.155	73.138
Cronbach's Alpha	0.960	0.962	0.839	0.841	0.806	0.813	0.804	0.774	0.844
Kaiser–Meyer–Olkin Measure of Sampling Adequacy	0.844								
Bartlett's Test of Sphericity									
Approx. Chi-Square	6053.051								
df	741								
Sig.	0.000								
Composite Reliability (CR)	0.959	0.959	0.839	0.831	0.756	0.813	0.805	0.785	0.831
Average Variance Extracted (AVE)	0.743	0.825	0.572	0.552	0.508	0.521	0.508	0.559	0.622

Note: All factor loadings below 0.50 were excluded.

CFA was conducted to evaluate the measurement model, which encompassed the nine correlated latent variables. As shown in Table 4, the CR values of the variables were 0.959, 0.959, 0.839, 0.831, 0.756, 0.813, 0.805, 0.785, and 0.831. These are greater than the measurement model's threshold of 0.7, indicating the acceptable consistency and reliability of the model [109,113]. The AVE values of the variables were 0.743, 0.825, 0.572, 0.552, 0.508, 0.521, 0.508, 0.559, and 0.622, indicating a high degree of convergent validity, considering they all exceed 0.5 [113].

Before we tested the hypotheses, we performed a series of CFAs to ensure the adequacy of each scale, obtaining various reliability indices and calculating descriptive statistics and correlations [120]. Maximum likelihood estimation methods were adopted, and each model's GoF was measured using absolute and relative indices [121]. The fit of the structural model with respect to the data was examined with χ^2/df, CFI, TLI, GFI and RMSEA. The CFA shows the following results: χ^2/df = 1.790, CFI = 0.908; TLI = 0.898, GFI = 0.789, NFI = 0.816, AIC = 1419.83, RMSEA = 0.061. These findings verified that the measurement model, which included covariances among all the constructs, fitted the data satisfactorily [103,112,114,116].

4.3. Measurement Model

Because the proposed structural model was hypothetically represented on the basis of previous research findings and/or theoretical expectations, it should meet the standard indices of model fit [122]. As shown in Table 5, the final structural model acceptably fit the data, and it overall performed better than the initial model, as evidenced by the following values: χ^2/df =1.850, CFI = 0.899; TFI = 0.890; GFI = 0.778; NFI = 0.806; AIC = 1.458.08, RMSEA = 0.063. These results demonstrated that all the fit indices satisfied the criteria; thus, the values of the final fit indices in the final structural model suggested that the improved version was interpretable. These findings also confirmed the validity and reliability of the measurement model. Figure 2 and Table 6 provide the regression weights for the final structural model, which solidly supported the hypothesized model.

Table 5. Goodness-of-fit.

Indicator	Recommended Level	Initial Model	Final Model
χ^2/df	from 1 to 2 [114]	1.823	1.850
CFI	0 (no fit) to 1 (perfect fit) [103,112]	0.673	0.899
TFI	0 (no fit) to 1 (perfect fit) [103,112]	0.662	0.890
GFI	0 (no fit) to 1 (perfect fit) [103,112]	0.553	0.778
NFI	0 (no fit) to 1 (perfect fit) [103,112]	0.486	0.806
AIC	Smaller value [115]	5938.987	1.458.08
RMSEA	<0.05, very good fit; 0.05–0.08, fairly good fit 0.08–0.10, acceptable fit; >0.1, unacceptable fit [116]	0.062	0.063

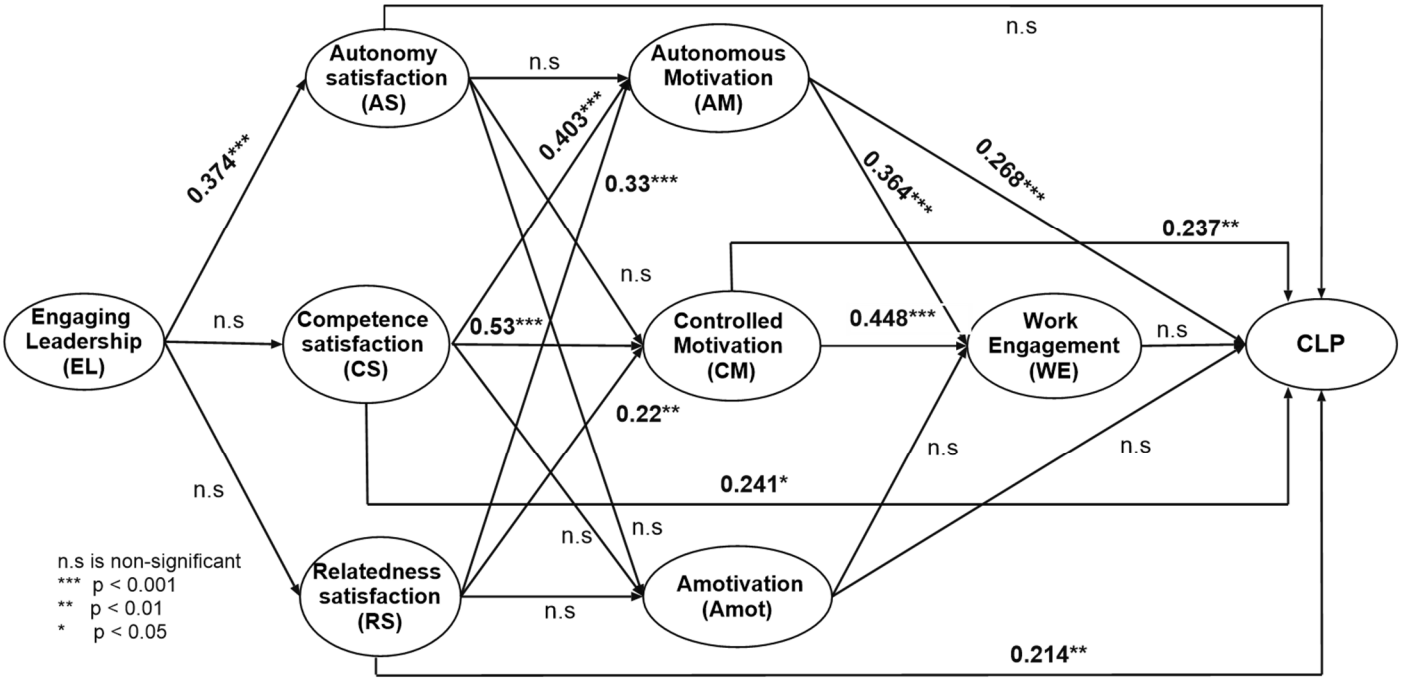

Figure 2. Regression weights for the final structural model.

Table 6. Regression weights for the final structural model.

H	Path	β	*p*	Remark	Comparison with Other Findings	
					Construction Field	Non-Construction Fields
H4b	CS → CM	0.530	***	The first feature	-	(+) E.O. [34]; (n.s.) Edu. [72]; (n.s.) Edu. [73]
H5b	RS → CM	0.220	0.001		-	(n.s.) E.O. [34]; (–) Edu. [72]; (n.s.) Edu. [73]
H7	CM → CLP	0.237	0.020		(+) [30]; (+) [28]	(+) H.C. [74]
H10	CM → WE	0.448	***		-	(–) V.W. [76]; (+) S.C. [78]
H3c	AS → Amot	–0.029	0.469		-	(–) E.O. [34]
H4c	CS → Amot	0.047	0.319		-	(–) E.O. [34]
H5c	RS → Amot	0.013	0.742		-	(–) E.O. [34]
H8	Amot → CLP	0.002	0.987		(–) [30]	-
H11	Amot → WE	–0.262	0.186		-	(–) E.O. [34]; (n.s.) S.C. [78]
H2b	CS → CLP	0.241	0.023	The second feature	-	(+) T.O. [55]; (+) Edu. [57]; (+) F.O. [49]
H2c	RS → CLP	0.214	0.005		-	(+) T.O. [55]; (+) Edu. [57]; (+) F.O. [49]
H4a	CS → AM	0.403	***		-	(+) E.O. [34]; (+) Edu. [72]; (+) Edu. [68]; (+) Edu. [73]
H5a	RS → AM	0.330	***			(n.s.) E.O. [34]; (+) Edu. [72]; (+) Edu. [68]; (+) Edu. [73]
H6	AM → CLP	0.268	***		(+) [30]	-
H9	AM → WE	0.364	***		-	(+) Edu. [68]; (+) S. [77]; (+) S.C. [78]; (+) V.W. [76]; (+) M. [88]; (+) Edu. [89]
H1a	EL → AS	0.374	***	The third feature	-	(+) E.O. [34]; (+) H.O. [50]
H1b	EL → CS	–0.051	0.533		-	(+) E.O. [34]
H1c	EL → RS	0.046	0.653		-	(+) E.O. [34]
H2a	AS → CLP	–0.044	0.512		-	(+) T.O. [55]; (+) Edu. [57]; (+) F.O. [49]
H3a	AS → AM	–0.134	0.090		-	(+) E.O. [34]; (n.s.) Edu. [72]; (+) Edu. [68]; (+) Edu. [73]
H3b	AS → CM	–0.043	0.526		-	(–) E.O. [34]; (–) Edu. [72]; (n.s.) Edu. [73]
H12	WE → CLP	0.069	0.195	The fourth feature	(+) [87]	(+) H.C. [74]; (+) S.C. [78]; (+) Su.C. [90]

Notes: (+) denotes a positive impact, (–) indicates a negative impact, and (n.s.) denotes a non-significant impact. E.O. pertains to engineering organizations. H.O. stands for healthcare organizations. T.O. represents technological organizations. Edu. stands for the education field, and F.O. denotes financial organizations. H.C. refers to hotel companies, and S. is for the sport field. S.C. refers to service companies, and Su.C. refers to supply companies. M. means multidisciplinary, and V.W. refers to volunteer work. *** $p < 0.001$.

5. Discussions

As highlighted in Table 6, the results of the SEM suggested the existence of several valuable features in CLP improvement, as follows.

5.1. First Feature: The Roles of Controlled Motivation and Amotivation in CLP Improvement (Conventional View)

When aiming to improve CLP, promoting work motivation plays an important role [27]. In this regard, previous studies have emphasized the role of enhancing controlled motivation (i.e., external factors such as salary, reward, or punishment) and reducing amotivation (i.e., lack of motivation) in CLP improvement [26–29]. In this research, as shown in Table 6, CM exerted positive and significant effects on CLP (H7; $\beta = 0.237$, $p < 0.05$), whereas amotivation did not significantly influence this respect (H8). These results reinforce the findings from previous studies, which explained the significant role of CM in enhancing CLP. In addition, the studies of [60,63,123,124] indicated that it was vital to promote and reward construction laborers to enhance motivation and ultimately improve labor productivity. Furthermore, construction practitioners acknowledged that being rewarded was a clear sign that their abilities were recognized [29,125].

In the construction sector in many developing countries, such as Vietnam, the effectiveness of external factors has been regarded as a means of improving CLP. In other words, factors such as on-time payment, amount of salary, or financial reward are significant elements in motivating workers to participate in tasks [22]. A study conducted in the construction sector illustrated that CM enhances worker productivity. Specifically, in [30], it was explained that workers believe they must prove their worth to themselves for them to feel satisfied and proud of themselves. Otherwise, they fear that they will elicit negative and discouraging thoughts and feelings. They tend to carry out their responsibilities in response to extrinsic regulation to gain respect from their peers, teammates, and supervisors. They also worked hard to avoid negative comments and criticism.

In summary, our findings reinforced the conventional view and emphasized the role of CM in CLP enhancement. However, another aspect of work motivation (i.e., AM) should be carefully considered to examine its role in improving CLP. This view is addressed in the next section.

5.2. The Second Feature: The Role of Autonomous Motivation in CLP Improvement

In the current research, we found that AM positively and significantly contributed to CLP (H6; $\beta = 0.268$, $p < 0.001$), as depicted in Table 6. This finding revealed that AM played an important role in CLP enhancement, consistent with [30], which explained that identified regulation, i.e., a type of AM, significantly affected worker productivity. Our finding strengthens the statements of Vietnamese construction practitioners and managers who believed that when aiming to improve CLP, AM is a determinant factor that managers should pay more attention to in addition to the conventional view that focuses on CM. Specifically, in the Vietnamese construction context, workers may perceive the importance of personal goals or the value of their work. In other words, they put effort into tasks because they may feel their job is important and enjoy finding valuable solutions to enhance their abilities or they feel there are many benefits in doing so. They may also acquire a sense of having an opportunity to learn new things or new skills when they participate in tasks. Consequently, they tend to put effort into pursuing their own goals to grow as a professional and to reach new highs.

As anticipated, the WE of the workers was directly and strongly related to their autonomous motivation. As indicated in Table 6, AM (H9; $\beta = 0.364$, $p < 0.001$) positively and significantly predicted WE. Table 6 shows that these findings accord with [88], which indicated positive associations between two kinds of AM (e.g., intrinsic motivation and identified regulation) and the WE of Dutch employees. Likewise, AM has positive effects on teacher engagement [89] and employee engagement in service companies [78].

The authors of [30] mentioned the role of AM in CLP improvement, but they did not explain how AM could be generated and maintained. Hence, it is vital to tackle this issue. In this study, we found that CS and RS positively and significantly predicted AM (H4a: $\beta = 0.403$, $p < 0.001$ and H5a: $\beta = 0.33$, $p < 0.001$, respectively) (Table 6). This revealed that satisfaction with competence and relatedness played a key role in promoting the AM of workers. As can be seen in Table 6, these findings were mostly consistent with those derived by [72], who reported that in the Singaporean academic context, CS ($\beta = 0.4$, $p < 0.05$) and RS ($\beta = 0.6$, $p < 0.01$) positively predict AM. Another study on the link between BPNs and motivation in the education context [68] indicated that both CS ($\beta = 0.228$, $p < 0.01$) and RS ($\beta = 0.192$, $p < 0.01$) had a positive and significant influence on intrinsic motivation (which is the highest type of AM in terms of autonomy level in SDT) for academic engagement among students.

To enhance CLP, it is necessary to explore new determinants that affect this aspect. In this study, we found that CS and RS positively and significantly predicted CLP (H2b: $\beta = 0.241$, $p = 0.023 < 0.05$; H2c: $\beta = 0.214$, $p = 0.005 < 0.01$, respectively) (Table 6). These results are in line with the findings of [55], who found that CS directly predicted ($\beta = 0.18$, $p < 0.01$) the task performance of employees from a Canadian technology design and manufacturing company. The findings of [57] also revealed that CS directly contributed ($\beta = 0.4$, $p < 0.001$) to job performance in a sample of teachers from Quebec, and the findings of [49] determined that RS was significantly related to work performance among employees in a financial company ($\beta = 0.12$, $p < 0.01$). Enhanced CS increases workers' confidence in undertaking and achieving desirable outcomes, thereby enhancing their productivity. Enhanced RS makes workers feel that they belong to and are part of a larger collective entity with valuable interpersonal relationships, thus promoting collaboration/support among team members onsite and directly contributing to productivity improvement.

The analysis of the roles of AM and CM in the current survey showed an interesting result: although both AM (e.g., work value) and CM (e.g., salary and reward) had significant effects on CLP, AM ($\beta = 0.268$) contributed to CLP more significantly or at least as significantly as CM ($\beta = 0.237$). This phenomenon can be explained by several factors. First, in the Vietnamese construction context, both practitioners and managers have emphasized the significant role of AM [31,32]. Our empirical evidence reinforces this viewpoint. The second factor is the high annual average income of the surveyed workers (i.e., 3811 USD per year) (Table 3). This income is considerably higher than the annual average income of Vietnamese citizens, who earned approximately 2700 USD in 2019 [126]. This finding implies that a high income can help Vietnamese workers to ensure good living standards. We can also relate this to Maslow's hierarchy of needs theory [127], which is underlain by the progression principle: people's low-order needs (e.g., food, rest, and safety) must be satisfied before their high-order needs (e.g., self-worth, accomplishment, respect, self-fulfillment, seeking personal growth, and peak experiences). Another view maintains that this progression principle is not rigid but may be flexible depending on external circumstances or individual differences. Most behaviors are multi-motivated: "Any behavior tends to be determined by several or all of the basic needs simultaneously rather than by only one of them" ([128], *p*.71). These reasons could have driven the higher or at least equal impact of AM on CLP in comparison with that of CM.

This feature consisted of the following components: (1) CS, RS $\rightarrow$ CLP (H2b,c); (2) CS, RS $\rightarrow$ AM, (H4a, H5a); (3) AM $\rightarrow$ CLP (H6); and (4) AM $\rightarrow$ WE (H9). As summarized in Table 6, items 1, 2, and 4 have never been studied or identified in the context of construction. Here, two observations were made. First, AM increased CLP and WE. The significance of AM provides a new perspective on research and practice with respect to how CLP and WE can be enhanced. Second, CS and RS play an important role in enhancing AM as well as CLP. This finding provides construction managers with a useful direction to pursue in labor management. Put differently, this finding affords construction practitioners a "new light of hope" with respect to CLP improvement.

5.3. Third Feature: The "Negative Legacy" of the Construction Industry

The discussion of this feature can start from the description of the first three hypotheses (H1a, H1b, and H1c) in the final structural model, which indicated that EL positively affected the three BPNs. With $\beta = 0.374$ ($p < 0.001$), EL positively and significantly influenced AS (H1a) but did not significantly contribute to CS (H1b) and RS (H1c) (Table 6). In the final structural model, eight items were chosen to calculate the EL variable: two items on strengthening (mean = 3.381, SD = 0.724), two on connection (mean = 3.387, SD = 0.659), and four on empowerment (mean = 3.400, SD = 0.704). These findings showed that construction managers more effectively contributed to workers' AS than their CS and RS.

The succeeding results necessitate a reconsideration of the meaning of AS. The ages and experiences of the workers were significantly correlated only with AS (Table 3), which did not significantly contribute to worker productivity (no support for H2a). Moreover, AS did not significantly contribute to the AM or CM of the workers (no support for H3a and H3b). These findings suggested that, among the surveyed respondents, the older and more experienced workers had a stronger sense of choice and freedom to do their tasks on the construction sites, but in a manner different from the assumption pursued in this work. The older and more experienced, but not necessarily skillful, workers perceived the satisfaction of autonomy as achieved through selfish work, which did not enhance the productivity and AM of the workers. Accordingly, selfish work as a novel factor negatively contributes to CLP, which is the first factor explored in the construction domain. Regarding the interpretation of AS as equivalent to working selfishly, some researchers emphasized that the difference in autonomy connotations in AM and autonomy satisfaction should be carefully considered. That is, the autonomy connotation in AS represents individuals' inherent desire to feel volitional and experience a sense of choice and psychological freedom when carrying out an activity [35], whereas the autonomy connotation in AM represents the performance of a task because it is enjoyable, optimally challenging, or self-endorsed [37].

To summarize these results, EL among the surveyed construction workers efficiently cultivated AS, but in a direction different from what we assumed. Many practitioners, including supervisors/site engineers and workers, may misunderstand the meaning of AS, which appears to constitute the "negative legacy" of the construction industry.

In other domains, such as healthcare, the authors of [50] found that EL positively and significantly affected AS, which was consistent with our findings (Table 6). Furthermore, the authors of [34] elucidated the positive relationships between EL and the three BPNs of employees in engineering organizations. Their findings are partially consistent with ours, wherein EL positively and significantly influenced AS only. These differences may be explained by the above analysis.

5.4. Fourth Feature: Work Engagement and Worker Productivity

We expected WE to positively predict CLP (H12) for the following reasons. As illustrated by [129], there are four reasons why work-engaged employees outperform their non-work-engaged counterparts. First, work-engaged employees are more likely to experience positive emotions at work, such as joy or enthusiasm, which may explain why they are more productive. Second, work-engaged employees have more physical resources and are thus healthier, which means they can work more effectively by devoting their resources, energy, and skills to their jobs. Third, work-engaged employees are more productive because they can generate and mobilize their own resources. Fourth, employees who are engaged in work transfer or transmit their engagement to their co-workers. As a result, one employee's engagement is transferrable to another, resulting in improved team performance. However, the analysis demonstrated that the former did not significantly contribute to the latter ($\beta = 0.069$, $p = 0.195 > 0.05$). From a statistical perspective, this result could have been caused by the higher effects of the other variables (e.g., CS, RS, AM, and CM) on the dependent variable (CLP). Table 3 shows that the coefficients of correlation between CLP and the other variables, such as CS (r = 0.480), RS (r = 0.422), AM (r = 0.502), and CM (r = 0.441), were higher than the coefficient of correlation between CLP and WE (r = 0.394).

5.5. Labor Management Implications

To improve workforce management effectiveness and efficiency and labor productivity, construction managers should pay more attention to enhancing the AM of their employees in the workplace in addition to enhancing CM according to the conventional view. Based on the results of this study, to generate and maintain AM at work, construction managers should make their employees feel satisfied with their competence and relatedness. Theoretically, CS and RS can be promoted by introducing a reasonable leadership style. To do so, in this study, we introduced a new leadership concept in the construction domain—EL. Based on the analysis, unfortunately, we could not determine this leadership style directed toward how to satisfy and enhance CS and RS. However, based on observed items measuring the variables in this study, we proposed several tentative recommendations to promote AM as well as improve CLP as follows: to make employees feel confident and effective when performing their tasks onsite, construction managers should encourage them to develop practical skills and accumulate valuable experience as well as use their strengths as much as possible in the task; in addition, promoting collaboration/support and close connection among team members should be paid more attention by construction managers. Moreover, providing a better work environment with a comfortable atmosphere can make workers feel that they truly belong to a crew and feel satisfied with their valuable relationships at work.

6. Conclusions, Implications, and Limitations

This study explored the significant role of AM in CLP improvement and how AM can be generated and maintained by developing a novel model for assessing the effects of EL, three basic psychological satisfaction factors, and work motivation on CLP according to SDT. Relying on data collected from 215 workers in Vietnam, we performed SEM to assess the hypothesized structural model. The validity and reliability of the scales, convergent validity, and the model's GoF were tested through reasonable techniques, such as Cronbach's alpha analysis, EFA, and CFA.

In addition to reinforcing the traditional view, which emphasized the role of CM in CLP improvement, this study reveals several interesting findings. First, the important role of AM in proving CLP was explored. Second, to improve AM and CLP, satisfaction of competence and relatedness needs played a vital role. These findings provide a new perspective on both industry and academics with respect to how CLP can be enhanced, as well as how AM can be generated and maintained. Finally, the "negative legacy" of the construction industry was explored. This feature implied that the older and more experienced, but not necessarily skillful, workers perceived AS as being achieved through selfish work, resulting in an obstacle to productivity improvement and the promotion or maintenance of work motivation. Selfish work is a novel factor that was first discovered in the construction domain.

6.1. Theoretical Implications

This study makes a significant contribution to the SDT literature. Previous studies have determined the relationship between EL and BPNs, between BPNs and performance, and between BPNs and motivation, as well as the impact of motivation on performance or the impact of WE on performance. However, no study has integrated these variables to conduct explorations of the relationships among them. The current work filled this important gap by using the SDT perspective in developing and empirically investigating an integrated model to establish a comprehensive perspective of the leadership, psychological, and motivational factors affecting CLP. Furthermore, this study introduced and developed new scales for novel variables affecting CLP (i.e., EL, AS, CS, and RS), which has never been mentioned before in previous studies in the construction domain.

6.2. Practical Implications

This study also presents significant contributions to the construction domain. To enhance productivity, one must determine and recognize the key factors that influence it. We derived exhaustive knowledge to understand the psychological and motivational issues confronting construction workers. The results suggest that construction managers should improve CLP by reducing workers' perceptions of selfish work, as well as promoting the satisfaction of competence and relatedness needs and enhancing AM. These strategies encourage workers to dedicate all their energies to more efficiently and effectively engage with their designated tasks and pursue high productivity.

6.3. Limitations and Suggestions for Further Studies

Some limitations are worth noting to highlight directions for further research. First, this study's results were based on interviews with 215 masonry workers and steelworkers at Vietnamese construction sites. Researchers are encouraged to collect data from a wider range of participants with other types of designations and from other construction contexts. We focused on the effects of leadership, psychological, and motivational aspects on worker productivity, but the influences of leadership, psychological, and motivational issues at multiple levels (e.g., team, project, and industry levels) on other project performance issues also play an important role. Cross-level research on projects/other performance variables may provide valuable results. Second, this study explored the role and effectiveness of leadership in CLP improvement by introducing a new leadership concept (i.e., EL) in the construction domain. Unfortunately, however, we could not determine an effective leadership style directed toward how to satisfy and enhance BPNs. Therefore, inquiring into relationships among other leadership styles (e.g., servant leadership, effective leadership, transformational leadership, leadership intelligence, or leader–member exchange), psychological factors, work motivation, and work performance in a holistic manner may open up new avenues for further studies.

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