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Review Article

Motivating Workers in Construction

Jason E. Barg, Rajeev Ruparathna, Daylath Mendis, and Kasun N. Hewage

Faculty of Applied Science, School of Engineering, University of British Columbia, 1137 Alumni Avenue, Kelowna, BC, Canada V1V 1V7

Correspondence should be addressed to Kasun N. Hewage; kasun.hewage@ubc.ca

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The study of the motivation of construction workers is limited to a relatively small body of knowledge. Although there is considerable research available regarding motivation and productivity, few researchers have provided a comprehensive analysis on the motivation of construction workers. The research stated that productivity in construction has not improved compared to other industry sectors such as manufacturing. This trend has been echoed in publications throughout the past five decades, and suggested that motivation is one of the key factors impacting productivity. This paper offers a comprehensive review of the published work that directly links the key words—construction and motivation. The findings have been presented in five themes, that is, motivation models, environment and culture, incentives and empowerment, and worker management. This paper concludes with two methods suggested by previous researchers to improve motivation of construction workers: (1) relevant worker incentives (intrinsic or extrinsic) and (2) improved management practices, specifically regarding communication with workers.

1. Introduction

During the past five decades, construction productivity has remained low and has lagged behind other industries [1–5]. Hazeltine [6] offered research from a 1963 study, which noted that an average Canadian construction worker occupied only 55% of his/her work day. Hewage and Ruwanpura [1] echoed this figure based upon a three-year research study with 101 Canadian construction workers. This research reported the actual working time (tool time) of a Canadian construction worker as 51%. These numbers suggested that construction operations may be fundamentally flawed and require significant action for improvement of productivity. Motivation of workers has been suggested as one of the major factors that can stimulate the productivity in the construction industry [1, 7–10]. Thus, the objective of this paper is to review and summarize all the possible literatures related to construction worker motivation in the past four decades.

This paper discusses and reviews in depth analysis on worker motivation in the construction industry. It summarizes information under four main areas, that is, (1) definitions of motivation, (2) theories of motivation, and (3) motivational themes in construction. The motivational themes in construction were further discussed under motivational models, work environment/culture, incentives and empowerment, and worker management.

2. Methodology

A literature review was initiated to collect peer-reviewed English articles from the last four decades regarding worker motivation in construction. The literature selected originated from peer-reviewed articles from the following journals and conference proceedings: (1) Building and Environment; (2) Cost Engineering; (3) 5th Post Graduate Conference on Construction Industry Development; (4) Canadian Journal of Civil Engineering; (5) Engineering Management Journal; (6) International Journal of Project Management; (7) Journal of Construction Engineering and Management; (8) Journal of Engineering, Design, and Technology; (9) Journal of Geospatial Engineering; (10) Journal of Labor Economics; (11) Journal of Management in Engineering; (12) Leadership and Management in Engineering; (13) Applied Mechanics and Materials (14) Project Management Journal; and (15) Journal of the Construction Division. Additionally, two of the articles are the result of theses.

Literature was chosen based upon its relevance to chosen key words: motivation and construction. The titles and

Table 1: Summary of the literature review according to relevance/classification.

Theme	Total
Motivation model	9
Environment and culture	7
Incentive and empowerment	9
Worker management	9
Total	34

abstracts of the articles were scanned for the keywords. Altogether, 56 articles were found; 22 articles were separated since those did not directly link motivation and construction. The remaining 34 articles were on worker motivation within the context of construction. These articles were then further analyzed under motivational themes and were separated into four major categories: (1) motivation models; (2) environment and culture; (3) incentives and empowerment; and (4) worker management. Each of these categories was defined and discussed in this paper. Table 1 highlights the findings according to defined categories.

3. Motivation Defined

Motivation has been defined as "providing a drive to act to satisfy needs or desires" [11]. Within the context of work, Pinder [12] stated that work motivation is a set of energetic forces that originate both within as well as beyond an individual's being, to initiate work-related behavior and to determine its form, direction, intensity, and duration. According to Jenkins et al. [13], motivation is intangible, a hypothetical construct that is used to explain human behaviour. Motivation is commonly sourced from intrinsic or extrinsic motives [14]. Intrinsic motivation involves people doing an activity because they find it interesting and derive spontaneous satisfaction from the activity itself. Extrinsic motivation, in contrast, requires an instrumentality between the activity and some separable consequences such as tangible or verbal rewards; hence, satisfaction comes not from the activity itself but rather from the extrinsic consequences to which the activity leads [15].

4. Theories of Motivation

Theories of motivation are not discussed in detail, in this paper, as such information is already available in the literature. Hewage [16] provided one such review, which clearly outlined the origins of motivation theories as applied to construction workers. They are listed and briefly explained as follows.

(1) Maslow's hierarchy of needs theory [17] suggests that humans have needs that can be prioritized in a hierarchy. The lowest-order needs must be fulfilled before people become concerned with higher-order needs.

(2) Herzberg motivational theory [18] shows that an individual's satisfaction with the work is attributed to the job itself, while dissatisfaction is attributed to the work environment.

(3) Adams' equity theory [19] explains that people are motivated based upon whether or not they believe they are being treated equitably. This belief is derived from a comparison of friends and/or colleagues.

(4) Vroom's expectancy theory [20] explains that behavior is a result from conscious choices among alternatives whose purpose it is to maximize pleasure and minimize pain.

(5) Reinforcement theory [21] discusses that reinforced behavior will lead to repeated performance. Reinforcements are factors that motivate.

(6) Alderfer's ERG theory [22] categorizes Maslow's hierarchy into existence needs, relatedness needs, and growth needs. It also suggests that the hierarchical order of needs will differ per individual, and multiple levels of need can be fulfilled simultaneously.

5. Motivational Themes

As mentioned, literature review found thirty five articles directly related to worker motivation within construction context. Table 2 shows these journal articles categorized according to their relevance/classification, as defined by the authors.

5.1. Motivational Models. Motivational models provide an arrangement and structure for developing, communicating, and managing worker motivation. The following paragraphs discuss some of the motivational models available in the literature.

In 1968, Porter and Lawler developed a motivational model based on Vroom's expectancy model. Porter and Lawler developed a motivational model considering interrelated variables. The variables considered in Porter and Lawler's model included a motivational force predictor comprised on effort reward expectancies and reward prediction, job effort and performance, intrinsic and extrinsic rewards, and job satisfaction [23].

Maloney [24] conducted a literature review in construction worker motivation. At that time, he found no published work on construction worker motivation and encouraged that rigorous program be undertaken to enhance knowledge in this area. Maloney [25] stated that specific theories for construction worker motivation had not been developed. Subsequently, the same researcher suggested 5 areas for further research: (1) expectancy issues—data needed to be collected based upon a "worker's perceived probability that his expenditure of effort will result in his attaining the desired level of performance;" (2) instrumentality issues—these are issues defined by a worker's understanding of the relationship between performance and reward or punishment; (3) valence issues—the anticipated satisfaction that an individual associates with the receipt of specific outcomes; (4) organizational constraints—management faults which negatively affect worker motivation; and (5) satisfaction—the

Table 2: Literature review results: motivation of workers in construction.

Number	Journal name	Writer(s)	Relevance/classification	Field/application
1	JCEM	Maloney and McFillen [8]	Worker environment/culture	Job structure to motivate workers
2	CME	Smithers and Walker [21]	Worker environment/culture	Creating an attractive workplace environment
3	JCEM	Abdelhamid and Everett [26]	Worker environment/culture	Reducing fatigue
4	CJCE	Hewage and Ruwanpura [1]	Worker environment/culture	Inadequacy of communication, incentives, and work conditions
5	JCEM	Nepal et al. [27]	Worker environment/culture	Worker expectations, basic needs, and goal setting
6	JCEM	Brockman [28]	Worker environment/culture	Interpersonal conflicts in construction environment
7	AMM	Ou [29]	Worker environment/culture	Cultivating hygiene factors in construction projects
8	JCD	Borcherding [7]	Incentive and empowerment	Feeling accomplishment/impact
9	JCEM	Maloney and McFillen [8]	Incentive and empowerment	Discipline versus reward
10	JGE	Lam and Tang [30]	Incentive and empowerment	Short-term and long-term motivation schemes
11	LME	Price et al. [31]	Incentive and empowerment	Incentives and physical/basic needs
12	JCEM	Cox et al. [32]	Incentive and empowerment	Workforce needs: praise
13	EMJ	Doloi [33]	Incentive and empowerment	Motivational factor survey
14	CID	Thwala Monese [34]	Incentive and empowerment	Motivational drivers
15	JEDT	Chileshe and Haupt [35]	Incentive and empowerment	Motivational factors
16	IJPM	Dwivedula and Bredillet [36]	Incentive and empowerment/motivational model	Influencing motivation
17	JCEM	Maloney [24]	Motivation model	Need for model
18	JCEM	Maloney and McFillen [37]	Motivation model	Research needs
19	JCEM	Maloney [25]	Motivation model	Positive/negative factors that influence motivation
20	JCEM	Maloney and McFillen [38]	Motivation model	Link employee and employer goals
21	JCEM	Maloney [39]	Motivation model	Causes and how motivation is channeled
22	BE	Olomolaiye and Price [40]	Motivation model	Application and modeling
23	JCEM	Maloney [41]	Motivation model	Motivation influences performance
24	JCEM	Thomas et al. [42]	Motivation model	Motivation theory
25	Thesis	Hewage [16]	Motivational model	Communication to workers
26	JCD	Hazeltine [6]	Worker management	Discover, learn, and apply motivational basics
27	JCEM	Maloney and McFillen [8]	Worker management	Areas of influence that motivate
28	PICE	Mansfield and Odeh [43]	Worker management	Principles to follow based on two decades of review
29	Thesis	Gonzalez [44]	Worker management	Motivation programs
30	IJPM	Mansfield and Odeh [43]	Worker management	Key areas managers must pay attention to, to motivate
31	JME	Rojas and Aramvareekul [45]	Worker management	Improving productivity is a management issue
32	JCEM	Cox et al. [11]	Worker management	KBI-Key behavioral indicators usage
33	IJPM	Tabassi and Bakar [46]	Worker management	Training, motivation, and performance
34	IJPM	Tabassi et al. [47]	Worker management	Training and motivation on teamwork

BE = Building and Environment; CE = Cost Engineering; CID = 5th Post Graduate Conference on Construction Industry Development; CJCE = Canadian Journal of Civil Engineering; EMJ = Engineering Management Journal; IJPM = International Journal of Project Management; JCEM = Journal of Construction Engineering and Management; JCD = Journal of the Construction Division; JEDT = Journal of Engineering, Design and Technology; JGE = Journal of Geospatial Engineering; JLE = Journal of Labor Economics; JME = Journal of Management in Engineering; LME = Leadership and Management in Engineering; AMM = Applied Mechanics and Materials; PICE = Proceedings of the Institution of Civil Engineers; PMJ = Project Management Journal.

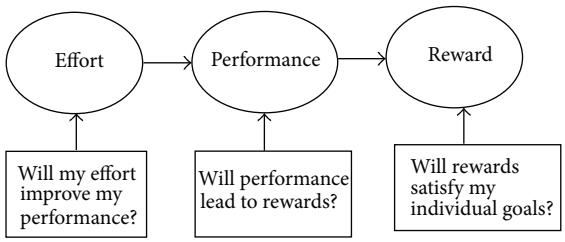

Figure 1: Vroom's expectancy model of motivation.

level to which a worker's needs are met, by their job. Maloney [25] believed that these areas are the starting points for the development of motivational theories/frameworks for the construction industry. The same researcher linked Vroom's expectancy theory (Figure 1) to construction worker motivation, suggesting that Vroom's model could be a possible tool for future evaluation of construction worker motivation. Maloney [25] also suggested that worker's level of motivation is influenced by either positive or negative factors. Increase of positive factors and the decrease of negative factors will ultimately increase productivity.

Maloney and McFillen [38] presented an article that stressed contractors to make factors with high valences contingent upon performance in order to make the work experience more rewarding and satisfying to workers. In a later article, Maloney [49] expanded by providing a simple principle to be followed by construction managers; that is, link what is desired by the organization (specific behavior) to what is desired by the employees (specific rewards).

Olomolaiye and Price [40] agreed with Maloney [25] and noted the unavailability of a serious attempt to formulate a theory for construction operative (worker) motivation. Olomolaiye and Price [40] presented a review of construction worker motivation by addressing previous conceptual and empirical studies. The same author suggested that further study is required to establish the relationship between worker motivation and productivity in order to build theories for construction worker motivation. Maloney [41] presented a five-part framework from which performance can be analyzed. Worker motivation was addressed to be one of the major factors in this framework. The same researcher defined individual motivation level to perform a task as a function of three variables: (1) likelihood that if an individual exerts the effort, he will be able to perform the task; (2) likelihood that if an individual performs the task, he will receive a specific reward or outcome for that performance; and (3) anticipated satisfaction that an individual associates with the reward or outcome. Maloney [41] used this definition to link motivation to performance. The flow chart proposed by Maloney [41] enables to assess the performance of an organization considering multiple criteria. If the worker performance is unsatisfactory, the proposed flowchart enables identifying organizational issues based on available data and taking sequential actions. As an example, if the work environment is not free from organizationally imposed constraints, the flow chart is proposed to improve the job management. Additionally, this method assesses work environment considering whether the workers possess necessary skills, ability, and knowledge, whether the workers possess the necessary motivation, and whether current estimates for the performance levels are realistic to determine which actions are necessary.

Thomas [42] analyzed Vroom's expectancy theory model in the context of construction. Expectancy theory explains variations in performance, in terms of the effort, which a worker is willing to exert to complete a task. Therefore, if a worker is willing to exert a determined attempt, has the capability, receives correct direction, and removes all obstacles, the work will be accomplished well. Furthermore, according to Thomas [42], the resulting performance could be observed based on effectiveness, efficiency, productivity, profitability, innovation, and quality of work.

The expectancy theory model for motivation introduced by Hewage and Ruwanpura [1] was developed based upon the theories of Maslow [17], Adams [19], Vroom [20], and Smithers and Walker [21]. The model was later validated with 101 construction workers. This model is represented graphically in Figure 2.

Hewage's [16] theoretical model for motivation (Figure 2) considers 23 factors (Table 3) that affect the motivation level of a construction worker. Motivation level according to each factor is assessed based on effort to performance expectancy, performance to outcome expectancy, and valence, using a 7-point scale. Consequently, motivation level for each factor can range from 1–343. For simplicity, the cubic root of the motivation level value was considered for comparison purposes. The summation of the motivation level of each factor would give the final motivation level. Hewage [16] used the aforementioned model to investigate the motivation level of construction workers in Calgary. Data collection for this study was done through a series of questionnaire surveys and interviews involving more than 100 construction workers. The most important factors for motivation were safety procedures in the site, tools and equipment, and the respect received from their coworkers and supervisors.

According to Hewage and Ruwanpura [1], 45% of these workers expressed lack of communication as one of the main issues affecting worker motivation. In view of this issue, the researchers offered the "Information Booth" as a possible communication aid [50]. The Information Booth allows the user to retrieve almost all the real-time information and audio-visual information needed for construction site operations. The pilot test of the Information Booth proved successful where worker satisfaction and productivity increased after the use [50].

Dwivedula and Bredillet [36] proposed a model for worker motivation in a project environment. The model considers five major categories, namely, employee development, work climate, perceived equity, work objectivity, and job security. The subcriteria under the five main categories are listed below. These criteria are vital in improving the motivation in the project environment.

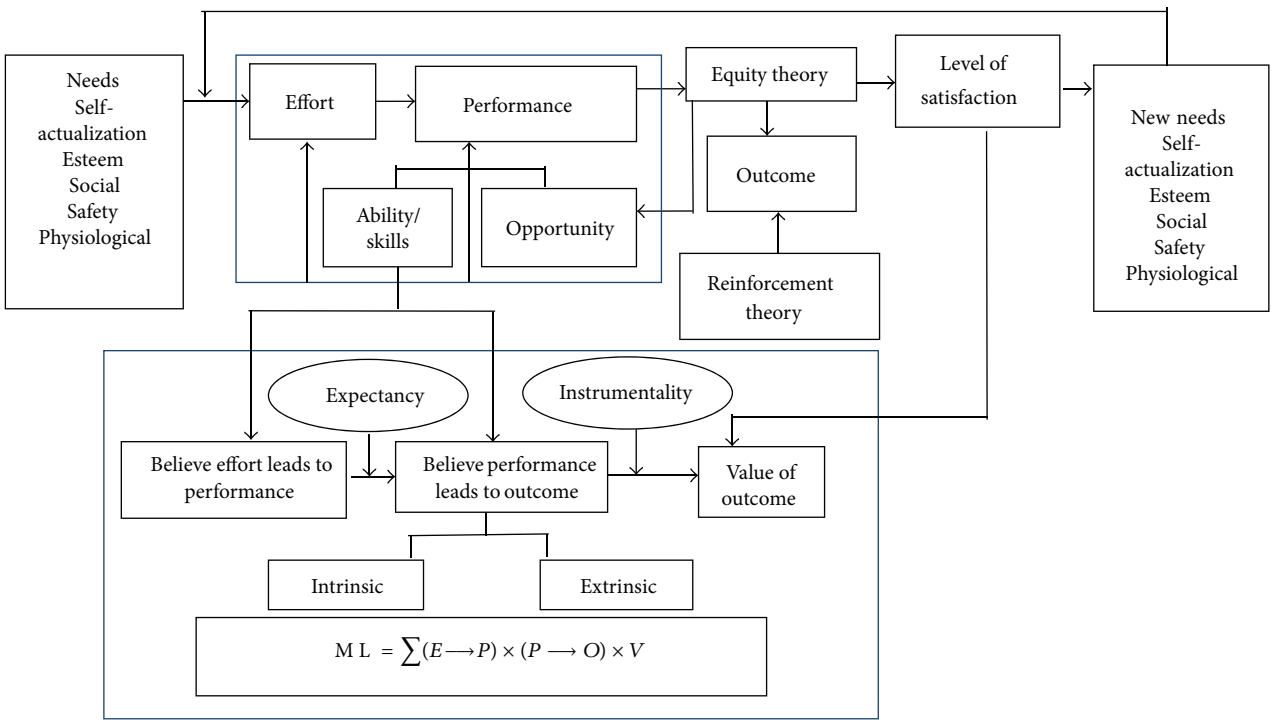

Figure 2: Hewage's expectancy theory of motivation [16].

Table 3: Prioritized motivational factors (data obtained from Hewage [16]).

	Motivational factors	Applicable theory
1	Bonus or rewards	ET, HT, RT
2	Amount of salary	ET, EQT, RT
3	Friendliness and helpfulness of the coworkers	ET, HT, MT, AT
4	Amount of freedom in your work	ET, MT, AT
5	Chance for getting a promotion	ET, RT, HT
6	Chances to learn new things	ET, HT
7	Respect receive from the coworkers & supervisors	ET, MT, AT
8	Opportunity for challenging work	ET, EQT, HT
9	Tools and equipment	ET, EQT
10	Chances to accomplish something worth	ET, MT, RT, HT, AT
11	Chances to do the things which you do best and like most	ET, RT, HT
12	Type of physical surroundings (washrooms, lunch rooms, etc.)	ET, EQT, HT
13	Team to work with	ET, MT, EQT, AT
14	Supervisor's understanding of the quality and technical details	ET, EQT, HT
15	Supervisor's direction and support	ET, EQT, HT
16	Safety procedures in site	ET, MT, EQT, HT, AT
17	Chances to take part in decision making	ET, MT, HT, AT
18	Opportunities to develop skills and abilities	ET, HT
19	Job security	ET, MT, EQT, HT, AT
20	Opportunity to work entire period in site before moving to a new one	ET, EQT, RT
21	Seeing the ultimate results of work	ET, MT, HT, AT
22	Supervisor's positive feedback after successfully completing a task	ET, MT, RT, HT, AT
23	Holidays and free time (lunch and coffee breaks) during work	ET, RT, HT, EQT

Where Maslow Theory (MT), Alderfer's Theory (AT), Ex-pectancy Theory (ET), Reinforcement Theory (RT), Equity Theory (EQT), Herzberg's Theory (HT).

(1) Employee development:

(a) job advancement;
(b) variety of knowledge;
(c) participative decision making;
(d) high level of knowledge;
(e) developing competencies;
(f) sense of achievement.

(2) Work climate:

(a) variety of tasks;
(b) social interaction;
(c) feedback from work;
(d) significant job;
(e) communication flow.

(3) Perceived equity:

(a) adequate pay;
(b) adequate recognition;
(c) freedom at work;
(d) feedback from colleagues.

(4) Work objectivity:

(a) complete piece of work;
(b) clarity of goal.

(5) Job security:

(a) job security.

The above discussion highlights that motivational models reviewed were developed considering various attributes. Table 4 summarizes the motivational models found in the published literature.

5.2. Work Environment/Culture. This section addresses worker motivation in the context of the construction environment and culture. Maloney [39] discussed the working environment in the perspective of job content and context. Contextual factors include supervision, material resources, compensation practices, and work environment, while job content refers to variety of activities involved, the skills demanded, and the challenge provided. The same author found that one-third of workers have the growth needs related to the profession and therefore would be motivated by enriched jobs or change of job content. Maloney [39] also suggested that contractors should be aware of workers that are concerned with contextual factors and would therefore be motivated by factors that improve the work environment.

Smithers and Walker [21] further expanded the effect of contextual factors on motivation. The same author conducted a study in Melbourne, Australia, and found that long hours, chaos, nonrecognition for work completed, and colleagues' aggressive management style contributed to demotivation in construction worksite. Smithers [21] concluded by suggesting construction companies to choose more profitable projects and improve management style, in order to reduce worker stress and increase motivation. Further study has suggested that fatigue may also be a catalyst for demotivation. Abdelhamid and Everett [26] presented their study on the physiological demands of construction work. They found that 20–40% of craft workers routinely exceeded published guidelines for acceptable levels of physical performance in industrial settings. The same researchers suggested that fatigue may lead to lack of motivation but did not provide validation for this suggestion, as this was beyond the scope of their article.

Hewage and Ruwanpura [1] demonstrated a comprehensive study of 101 construction workers that led to a greater understanding of various factors that influence worker motivation: (1) incentives—bonus, rewards, and salary; (2) working team—relationship and respect with/from coworkers and supervisors; (3) working conditions—freedom, physical surroundings, and opportunities to learn new things; (4) management and supervision—positive reinforcement and job security; (5) intrinsic motives—chances to accomplish worthwhile things, do things you like, make decisions, and build skill. These factors were rated by construction workers, which supplied substance for Hewage and Ruwanpura [1] "expectancy model" of Motivation, as displayed in Figure 2.

Nepal et al. [27] demonstrated that schedule pressure leads workers to lose the motivation towards work. Their study indicated that while a moderate degree of schedule pressure may help to increase productivity—possibly by increasing worker alertness and attention—schedule pressure above a certain level leads workers to cut corners, increases the amount of out-of-sequence work and the number of defects, and causes workers to lose their motivation to work.

Ou [29] studied methods to cultivate hygiene factors in a construction project setup. Ou [29] identified improvement of the ability of self-protection, improvement of the working environment, establishment of stable working relationship methods, and improvement of the salary management as a method to upgrade hygiene factors in the construction work environment.

Brockman [28] studied consequences of interpersonal conflicts in construction project environment. The same author stated that interpersonal conflicts reduce motivation of the construction workers.

5.3. Incentive and Empowerment. This paper defines incentives as any factor, action, position, result, or communication that influences a worker to perform a set task in a desired manner. Borcherding [7] published research that stressed the importance of workers feeling a sense of accomplishment and personal impact on the project. Borcherding [7] argued that these are motivational factors which, when felt by workers, increase motivation and thus productivity.

Maloney and McFillen [49] conducted a study that provided two conclusions: (1) expectancy theory provides a workable conceptual base for understanding the motivation of construction workers and (2) application of expectancy theory principles to construction work pinpoints significant

Table 4: Summary of motivational models.

Motivational models	Attributes
Porter and Lawler's Model [48]	Effort, performance, satisfaction
Maloney [41]	Efforts, performance, rewards
Thomas et al. [42]	Job content, incentives, efforts, performance, satisfaction
Hewage and Ruwanpura [1]	Expectancy, performance, valence
Cox et al. [32]	Confidence, incentives, quality of work, safety performance, praise, a feeling of being a member, job security
Dwivedula and Bredillet [36]	Employee development, work climate, perceived equity, work objectivity, and job security

areas for action if construction workers are to be motivated towards higher productivity. This article stated that expectancy theory can be divided into three areas:

(1) performance definition;

(2) performance facilitation;

(3) performance encouragement.

Maloney and McFillen [49] suggested that performance definition and encouragement are the major factors that contractors need to focus on to improve performance. Both these areas focus on worker incentive. If workers have defined precise and manageable goals along with a likely, well-timed, equitable, and worthwhile reward, they will have adequate incentive to motivate them to perform well.

Lam and Tang [30] published on the motivation of employees in construction. The authors offered a viewpoint with both short-term and long-term motivation schemes. Short-term motivation schemes address the worker's physiological needs, safety needs, and belongingness needs, while long-term motivation schemes consider the worker's needs of esteem and self-realization. Price et al. [31] presented empowerment as the key tool to motivate the workforce. The researchers suggested that culture, training, and knowledge management lead to worker empowerment through incentive, thus motivating the workforce and ultimately improving construction performance.

Incentives for individual workers are manifested in various forms. One of the primary forms is money, as stated by Cox et al. [32]. The researchers' most noted point refers to workforce needs. Cox et al. [32] found that a worker must first receive praise before he feels as if he is a member of the team/crew and once he feels like a member of the team, he then begins to acquire feelings of job security. By understanding this point, contractors can adequately adjust the worksite culture and introduce monetary incentives to motivate the workforce. It is also found that job security and work appreciation and reward ranked as top incentives among workers, in the Australian construction industry, according to Doloi [33]. Table 5 presents entire ranking of attributes that affect worker motivation.

These findings represent an important resource for employers in increasing employees output. Thwala and Monese [34] stressed the importance of incentives in order to meet employer goals and employee needs. They referred to two types of incentives, that is, extrinsic and intrinsic, which are explained in the "Motivation Defined" section of this paper. The same authors also emphasized the power of incentives which is immense and pervasive and the importance of managing incentive programs closely to ensure effectiveness. Chileshe [35] conducted a study in the South African construction industry and found that two specific incentives, personal health and quality of life, were the key motivational factors for workers. Dwivedula and Bredillet [36] briefly referred to motivation in construction and stated that employee empowerment is the key to a greater client focus.

Table 5: Project attributes ranking (data obtained from Doloi [33]).

Project attributes	Rank
Job security	1
Work appreciation and reward	2
Work environment	3
Employer's recognition	4
Prospect of promotion	5
Geographical position	6
Contract of employment	7
Incentivized scheme	8
Financial security	9
Obligation to family support	10
Social status	11
Superannuation	12
Dependence	13
Management pressure	14
Marital status	15
Opportunity for advancement	16
Fringe benefit	17
Employer's profile	18
Gender	19
Challenging occupation	20
Penalty clause	21
Level of education	22
Car	23
Age group	24
Split income	25

5.4. Worker Management. One of the prominent themes in construction worker motivation research is the need for

construction managers to change their approach on motivating their workforce. Many managers do not understand motivational concepts and therefore lack the appropriate approach to increasing productivity. Hazeltine [6] stated that construction work appears to need little enrichment and it is one of the few satisfying types of work left in the automated world today. The same researcher suggested that the satisfactions are already found within construction and need further development by management. Specifically, management should be developed towards healthy worker attitudes, administering praise, and building respect and for the satisfaction of self-fulfilled needs.

Over a decade later, Maloney and McFillen [8] echoed this theme by stressing the importance of the role of managing work-crew variables. In order to motivate construction crews, Maloney and McFillen [8] suggested that contractors need to positively manage five issues: (1) stability of employment, (2) work-crew staffing, (3) team building, (4) goal setting, and (5) incentives. By doing this, worker performance and satisfaction can be increased [8]. Mansfield and Odeh [51] conducted a review that brought together some of the motivational studies from the US construction industry. From this study, the researchers concluded that better handling of "people" is always a key factor in any project success. The same researchers also pointed out that managers should adhere to early human relations ideas, combined with motivational theories, in order to create a motivating work environment.

Hancock [52] stated that the authoritarian approach to management is outdated and ineffective. In conclusion, Hancock [52] clearly provided the groundwork for the role of managers in motivating the workforce. Hancock [52] proposed that managers must understand (1) some element of human behavior and motivation theory; (2) factors that influence behavior, (3) motivators and demotivators, (4) uniqueness of the industry/project when designing motivation programs, and (5) needs of construction workers. Mansfield and Odeh [43] addressed twenty points that the authors believed are necessary for managers to achieve better motivation among their subordinates. The same authors categorized these points into industry characteristics, types of individuals, and significant motivators. These points are listed below.

Industry characteristics:

(1) short-term employment reduces chances of employee/company identification;
(2) construction environments can make performance outcomes unpredictable;
(3) unusual problems act as a spur to ingenuity;
(4) construction contracts (and their types) have to be matched to project risk situations;
(5) labor availability (in short supply) can limit initiatives;
(6) management effectiveness can diminish on multicontract and complex projects.

Types of individuals:

(1) rational-economic man: motivated by economic incentives;
(2) social man: motivated by social needs and interaction with fellows;
(3) self-actualized man: motivated by autonomy and independence;
(4) complex man: motivated by economic, social, and autonomous needs;
(5) psychological man: motivated by a mixture of complicated factors.

Significant motivators:

(1) employee attitudes can be positively influenced through staff-orientation programs and an overall atmosphere of trust;
(2) achievement challenges are easily built into project work;
(3) appreciation for effort should be clearly expressed through a variety of means;
(4) responsibility reduces boredom and frustration, if work is properly allocated;
(5) money acts as a strong or weak motivator, according to economic circumstances;
(6) advancement possibilities are reduced for employees where work is short-term or overspecialized;
(7) participation in decision making can generate a strong commitment from employees;
(8) competition stimulates innovation and affects greater output;
(9) social relationships at work are improved by company-sponsored events and courses.

Rojas and Aramvareekul [45] stated that construction workers considered that labor productivity is under their control rather than at the mercy of the construction environment or external conditions. The survey respondents related to the abovementioned research also suggested that management could influence positively improving productivity. This information suggested that workers at all levels have taken responsibility for productivity. Thus, managers can take influential steps to motivate the workforce.

Cox et al. [11] provided KBI's (key behavioral indicators) where managers can determine whether or not their employees are motivated, satisfied, committed, and loyal. Cox et al. [11] found that the employees who perform more work than expected, respond promptly to problems, solve problems, complete task at hand on schedule, and plan their own work can be judged as motivated.

Tabassi and Bakar, [46] identified the lack of motivation as a barrier to the worker training in construction. Tabassi et al. [47] studied the effect of training and motivation on teamwork improvement and task efficiency within construction firms. They stated that the motivation influences workers to undertake training programs.

6. Discussion

This study provides a comprehensive review of worker motivation in the construction industry. Published journal articles are the main source of information used in this study. Three categories, definitions for motivation, theories for motivation, and motivational themes, are used as the basis for the review. Motivational themes are further discussed under motivational models, work environment/culture, incentives and empowerment, and worker management. There is a strong history of researchers who explored motivational theories in a wide variety of formats, including case studies. Yet, too few have focused their work specifically on the construction worker. There are currently no Canadian studies looking at construction worker motivation. Similarly, there is no validated and published research work in Canada devoted to examining construction worker efficiencies, productivity, and communication needs. Canadian construction industry is referring to outdated and irrelevant publications of USA for productivity, working efficiencies, and overtime calculations.

The first step to measure and evaluate worker motivation on construction projects was to develop a theoretical framework with the use of Vroom's expectancy theory [20], Maslow's hierarchy of needs theory [17], equity theory [19], and reinforcement theory [21].

As per Cox et al. [11], motivation has been defined as providing a drive to act to satisfy needs or desires. It is one of the key factors that influence productivity. Many researchers provided models and theories which can be applied to motivate workers in the construction industry. Construction performance has lagged behind other industries for few decades, yet no significant fundamental management or attitude shift has occurred for a change. Motivational theories and models have been suggested as a primary factor to be studied and applied in order to influence better performance. For some reason, this suggestion has not been materialized in the construction industry, and many managers ignored the fundamentals of worker motivation. Management's ability to implement a method of motivation to avoid the actual cause of demotivation should be developed. This statement was validated by many research studies which showed no significant improvement in tool time of construction workers in the previous four decades [1, 5, 6, 50].

Jarkas et al. [53] studied factors affecting the productivity and motivational factors of master craftsmen in Kuwait. Through an industry wide survey, they ranked the critical motivational factors that affect the productivity. Out of the 10 most critical factors they identified that 2 factors were related to incentives (i.e., payment delay and lack of a financial incentive scheme), 5 were factors related to work environment and culture (i.e., rework, the extent of change orders during execution, delays in response to RFI, overcrowding and operatives interface, and quality level of drawings) and 4 were factors related to management (i.e., incompetent supervisors, unrealistic scheduling and performance, and shortage of materials on site). However, Shin et al. [54] revealed that economic motivators are more important than other criteria.

Furthermore, Alarcón et al. [55] conducted a survey to identify factors affecting the productivity of the Chilean construction industry. They identified 19 demotivators and 22 motivators that are affecting the direct and indirect employees. Therefore, when improving the motivation of the construction workers, it is important to reinforce the motivators and reduce the demotivators.

Finally, previous researchers have suggested that changing the management style (primarily regarding communication) and providing relevant incentives have the greatest potential to initiate a shift towards better performance and productivity in the industry. The opportunity awaits a champion.

7. Conclusion

Although there are multiple studies on motivational theories and human behaviour, very few are focused specifically on construction worker motivation. There are no works in the published literature, which focus solely on the motivation of the Canadian construction workers. There are very limited validated studies examining worker efficiencies, productivity, and the skills of the commercial construction workers in Canada.

This review found fifty two published articles that addressed worker productivity in close context to construction. Twenty two of these works were not presented in this paper because they did not directly relate to construction worker motivation. The thirty articles that did address this topic were tabulated, categorized, and reviewed. Of these articles, nine addressed motivation models, five addressed worker environment/culture, nine addressed worker incentive and empowerment, and seven addressed worker management. The findings show that the body of work regarding construction worker motivation is limited and that no motivational model has been widely used, in the construction industry. After reviewing the literature, this paper concludes that the previous work suggests two primary methods for improving the motivation of construction workers: (1) relevant worker incentives (intrinsic or extrinsic) and (2) improved management practices, specifically regarding communication with workers. The first of these points is directly linked to the second. The majority of key factors that influence motivation can be directed, controlled, or delivered by management.

Finally, future research should address the ability of management to implement motivational programs in the construction industry. Worker motivation models have been previously presented but lack widespread adoption and implementation by management. Subsequent research should show that practical application of motivation models will not come from the construction worker but from those with authority to set project definition and direction.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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