JAES | JOURNAL OF APPLIED ENGINEERING SCIENCE | www.engineeringscience.rs
ISTRAŽIVANJA I PROJEKTOVANJA ZA PRIVREDU

Indexed by

MOTIVATION FACTORS OF ENGINEERS IN PRIVATE SECTOR CONSTRUCTION INDUSTRY

P.T.Ranil S. Sugathadasa
University of Moratuwa, Department of Transport and Logistics Management, Katubedda, Sri Lanka

Mavin Lakshitha
University of Moratuwa, Department of Transport and Logistics Management, Katubedda, Sri Lanka

Amila Thibbotuwawa
University of Moratuwa, Department of Transport and Logistics Management, Katubedda, Sri Lanka

K.A.C.P. Bandara
Access Projects (Pvt) Ltd, Colombo 2, Sri Lanka

Key words: *construction industry, private sector engineers, motivational factors, relative importance, variation with age and gender, productivity improvement*
doi:10.5937/jaes0-29201

Cite article:
Dugathadasa, P. T. R. S., Lakshitha, M., Thibbotuwawa, A., Bandara, K. A. C. P. (2021) MOTIVATION FACTORS OF ENGINEERS IN PRIVATE SECTOR CONSTRUCTION INDUSTRY, *Journal of Applied Engineering Science*, 19(3), 794-805, DOI:10.5937/jaes0-29201

Online aceess *of full paper is available at: www.engineeringscience.rs/browse-issues*

Istraživanja i projektovanja za privredu
Journal of Applied Engineering Science

Original Scientific Paper

doi:10.5937/jaes0-29201

Paper number: 19(2021)3, 854, 795-806

MOTIVATION FACTORS OF ENGINEERS IN PRIVATE SECTOR CONSTRUCTION INDUSTRY

P.T.Ranil S. Sugathadasa[1], Mavin Lakshitha[1,*], Amila Thibbotuwawa[1], K.A.C.P. Bandara[2]

[1]University of Moratuwa, Department of Transport and Logistics Management, Katubedda, Sri Lanka
[2]Access Projects (Pvt) Ltd, Colombo 2, Sri Lanka

Human resource in today's world is recognized as a strategic asset which drives organizations to superior in the industrial competition. With the effective identification of employee attributes, all the determinants of productivity can be obtained. This research assesses engineers' motivation factors in the construction industry's private sector and further examined their response to various attributes, including age and gender. A structured and self-administrated systematic qualitative approach was utilized to collect data from 120 engineers. Twenty-six motivational factors were grouped according to Maslow's need theory, and the paper presents a comprehensive analysis based on the relative importance and response percentages of the identified factors. The most influential need level among them was statically determined as the esteem needs to be followed by basic needs, belonging needs, safety needs, and self-actualization needs. Out of the twenty-six factors, good work discipline is the most influential motivational factor for female engineers, whereas company name and stability have become the most important factor for male engineers. A variation of those factors' relative importance is also determined for various age groups. These results would help senior management to formulate effective policies to improve employee retention in the construction industry.

Key words: construction industry, private sector engineers, motivational factors, relative importance, variation with age and gender, productivity improvement

INTRODUCTION

The construction industry plays a strategic role in a country's economy. 7% of the European employment workforce is attached to the construction sector, and it is the largest industrial employer on the continent [1]. Based on the literature, the construction industry's contribution to gross domestic product is in the range of 7% to 10% for highly developed countries and around 3% to 6% for underdeveloped countries [2]. The motivation level of construction engineers has been suggested as one of the prime factors that can stimulate project productivity in the construction industry [3]. One of the issues confronting constructors and owners of a construction project is how to improve construction productivity and cost-efficiency. Besides, a study by Kazaz [1] highlights that the relationship between motivation and productivity could be summarized as such productivity is directly linked to motivation and conversely. Similarly, the exploration of the construction engineer's needs and their satisfaction with the corresponding needs illustrates the less satisfied engineers and further provides the opportunity to facilitate effective motivation policies. The positive impact of employee motivation generates maximum efforts due to self-fulfilment [4]. However, an inadequate understanding of engineers' expectation is strongly associated with career dissatisfaction and poor performances.

The need for productivity improvement of inputs in the construction industry is felt more than ever in developing countries. Firstly, this type of workers' productivity depends on a broad spectrum of socio-cultural needs and perspectives. Besides, there is a different level of importance among motivation problems, and thus strategies to solutions are likely to be different. Therefore, recognition and subsequent arrangement of the factors affecting workforce motivation in today's context is essential to any organization. Secondly, several research types have been carried to identify the engineers' motivation factors and their satisfaction in the construction industry. However, the focus given to determine the relative significant level of such motivation factors for an organisation's best practice is minimal. It highlights the need for identifying the importance of such motivation factors and capitalize on them for future endeavours. It can be seen that work motivation among public sector employees and managers is very different from that of their private-sector counterparts [5]. However, most research on the subject devotes limited attention to the relative importance of the causes of these differences [6].

This paper assesses the engineers' motivation factors in the construction industry's private sector and reports on the engineers' response to distinct motivational factors. It further tries to identify each factor's significant level and the changes in relative importance for different age groups and gender. This study reports on the motivation factors collected through a survey conducted via emails and online platforms. Data analysis was carried out statistically to draw both the results of the availability and importance level. Percentage analysis is carried out for the availability, and the Relative Important Index (RII) was used to analyze the level of importance. Overall, this study investigates the importance of various motivation factors to the private sector construction industry and the vulnerability of those factors according to different

*mavinds@uom.lk

age and gender groups. The structure of the paper is as follows. Section 2 discusses the literature on three motivational theories and their application in the construction industry. Section 3 builds on the current context in elaborating the survey methodology and target respondents. Section 4 elaborates on the most influential motivational factors and their relative importance. The paper winds up with a discussion under section 5, which interprets key findings followed by a conclusion in section 6.

LITERATURE REVIEW

The construction industry plays a significant and vital role in transforming people's aspirations and needs into reality by physically implementing various construction development projects. According to literature, the construction industry products contribute extensively towards creating wealth and society's quality of life [7]. Due to the growing competition in construction firms, there is a discussion to rethink their construction practices for improving productivity, quality, and efficiency [8]. Besides, the global construction industry accounts for 16% of employment, making up one of the most prominent professionals [9]. Accordingly, this includes all four categories of employees viz: professional; technical; crafts; and machine operators. However, the female contribution to the construction industry is only 4.5% in 2015, and it is the most negligible contribution compares to other industries [2]. Therefore, there is a requirement of discussing challenges in human resource management in the construction industry. Based on the literature, the most successful organizations possess a delicate balance between the company's interests and employees' welfare [10]. Accordingly, finding ways to motivate workers is the key to making the philosophies of human resource management work. Motivation being the inner power of human resource development, it has become an interest of managers to seek more significant profits. Work motivation is described as an energetic process coming from internal or external individuals, leading to the management of a job to improve productivity [11]. It involves the biological, emotional, social, and cognitive forces that activate behaviour. Motivation has proven its importance in influencing worker's productivity, and various theories have evolved to explain this relationship. The following part summarizes various theories to explain motivation and the implications associated with several groups of theories.

Motivational theories and labour productivity

Researchers have developed several various theories to explain motivation. In general, each theory contains a limited scope, but collectively each theory brings a better understanding. This part discusses the three most commonly used theories in this research context. An attempt to integrate a large body of research related to individual motivation is discussed by Maslow [12]. Before this, most of the research was used to observe biology's implications, achievements on energizing and sustaining human behaviour. However, *Maslow's need theory* was developed as a hierarchical based structure supporting physiological needs, safety needs, belonging needs, self-esteem needs, and self-actualization. An international comparative study concerning the first few levels of the needs pyramid for Indonesian construction individuals is reported by Kaming [13]. Accordingly, there are high motivational needs for workers in developed countries compared to developing countries. It further confirms that workers in developed and developing countries could not meet esteem and self-actualization values, which are the last two needs. Besides, German workers are expected to be highly motivated compared to English and French workers resulting in more productive reinforcement [14]. It concludes the fact that the physiological and esteem needs of German workers are fulfilled comparatively.

Herzberg [15] introduces *Herzberg's motivation-hygiene theory* by distinguishing between motivators and hygiene factors. According to the theory, these two factors stand independently and one shifting from dissatisfied to neutral and the other from satisfied to neutral. On the other hand, a close relationship between Maslow's need theory and Herzberg's motivation-hygiene theory is studied by Tan [16]. Herzberg's hygiene factors are considered equivalent to Maslow's lower-level needs and the motivators of Maslow's higher-level needs [1]. Relevant literature on this theory is connected with Borcherding [17], who has studied the association between job satisfaction and improvement in construction productivity, and Proverbs [14], who has studied the relationship between bricklayers' motivation factors and productivity.

Based on the literature, *the expectancy theory of motivation* explains individual behaviour as an outcome of conscious selections among choices whose objective is to maximize pleasure and minimize grief [18]. Maloney [19] discusses the expectancy theory's conceptual application in the construction field by investigating the value of construction quantity and satisfaction level of controlled craftsmen. On the other hand, individuals are motivated based upon whether they believe they are given equal opportunities [20]. This theory specifically tries to recognize the variable factors that can influence employee's appraisal.

Motivation as stimulation for the construction industry

Most of the research has failed to prove that the human factor itself carries an influence on productivity. However, the significance of motivation of Hong Kong construction workers to deliver consistent results is examined by Ng [21]. Out of that, engineers' role in the construction industry has been more vital to delivering high-quality projects at lower costs in shorter times. Besides, the influence of various motivator factors, including individual growth, recognition, and respect from top management towards improving construction engineers' labour productivity [22]. Several research types have been carried out to identify motivational factors' influence on the construction industry's engineers. The motivation level of en-

Table 1: Breakdown of the sample population by age group and gender

	Age Groups				Gender		Total
	25-30	30-40	40-50	50+	Male	Female	
Breakdown percentage of the sample population	28%	30%	25%	17%	87%	13%	100%
Number of respondents	33	37	30	20	104	16	120

gineers and any construction organisation workers can be determined based on performance measuring indices [23]. Accordingly, these performance measuring indices are referred to as project completion on schedule, profitability, and maintenance cost index whilst employee retaining power is observed through labour turnover ratio. On the other hand, Naff [24] argues whether public sector employees have different values and respond to various incentives than private-sector employees. Further, there is a substantial relationship between what motivates the two sectors at the supervisory level, with extreme disparities evident at the nonsupervisory level [25]. Similarly, each employee's hierarchical level drives the motivational level, and a strong relationship between work motivation and management level is observed in public sector organizations compared to the private sector [26].

METHODOLOGY

Initial discussion about different paradigms on choosing the suitable methodology contains a strategic path for research. Positivist and phenomenological paradigms are two widely used intermediaries in the context [27]. Accordingly, the positivist paradigm is heavily used in natural and social science studies focusing more on social phenomena, with little regard to the individual's subjective state. On the other hand, a phenomenological or quantitative paradigm understands each behaviour's measurability and investigates objectively [28]. Considering the facts, Heale [29] argues that each approach should be evaluated in terms of its particular merits and limitations in the light of the particular research question under each study. In this study of motivation, a phenomenological or qualitative paradigm with combined techniques is used to study the significance level of numerical variables and interrelation to the social sciences.

Identification of the knowledge gap in the research proposition is a methodological approach to answer research questions. Therefore, this part of the study describes the research approach, research strategy, and data collection methods to find the answers. Saunders [30] explores different research approaches, strategies, and data collection methods across the research philosophy continuum and decides on the most suitable research project. Accordingly, five-layer research philosophy is proposed to develop the research process viz: positivism; critical realism; interpretivism; postmodernism; and pragmatism. This study adopts a positivistic research philosophy where an inductive research approach is used to collect data through a qualitative survey strategy. As the first stage of the survey study, twenty-six motivational factors in the construction industry have been identified through background research. Secondly, an interview-based survey has been carried out to represent the snapshot or the cross-sectional view of the systemic reality. Due to the tight schedules prevailing in the engineers' profession in the construction field, a well-structured and self-administered type questionnaire was commissioned among 120 individuals. Two separate sections were included to identify general information and engineers' opinion of motivation factors. There are three random sampling strategies viz: simple random sample; systematic sample; and stratified sample [31]. Accordingly, stratified sampling was used in this study to analyze the contribution of age and gender factors towards the motivational level of construction engineers. Similarly, 90% of the construction industry professionals are male, while 10% are females [32]. Therefore, stratified sampling is developed considering the possibilities, and Table 1 describes the composition of the sample.

A three-step statistical model is incorporated to analyze the data provided by the questionnaire. In the first step, the percentage value by frequencies of the answers obtained is acquired. Secondly, the calculation of the RII & ranking of the motivation factors is undertaken. In the third step, the variation of each motivation factor's importance is analyzed with the age and gender groups. Trochim [33] proposes to use dichotomous questions to acquire the percentage value by frequency of the answers. Accordingly, it is proposed to get how many percentages of engineers enjoy each motivation factor through a simple dichotomy question where respondents' answers are either categorized to Yes or No. The RII is used to evaluate and rank down the list of motivational factors [1]. A rating scale of 1 to 5 is used to analyse the relative importance, with 1 being the lowest effect and 5 being the highest. The following equation (1) represents the proposed algorithm:

$$RII = \sum_{i=1}^{5} WiXi \Big/ \sum_{i=1}^{5} Xi, \left(1 \le RII \le 5\right) \quad (1)$$

Based on the literature, "*Wi*" is the score given for each factor by the respondents varying from 1 to 5, with 1 being "Not Important" and five being " Extremely Important" [1]. Accordingly, "*Xi*" is the percentage of respondents scoring and "*I*" represents the respondents' order number. Further, a single point or number changing from a 1-5 scale does not represent each verbal expression in the evaluation phase. Therefore, each expression is defined by the intervals of 0.8. in Table 2.

Table 2. Evaluation scale

Level of Significance	RII Value
Not Significant (NS)	1.00 - 1.80
Somewhat Significant (SS)	1.80 - 2.60
Significant (S)	2.60 - 3.40
Very Significant (VS)	3.40 - 4.20
Extremely Significant (ES)	4.20 - 5.00

In Table 2, the evaluation of each factor is carried out considering percentages of respondents scoring 2 or fewer, 3, and 4 or more on the scale. Thus, this is used to categorize the factors with the same relative importance and finally derive each factor's rankings.

ASSESSMENT OF MOTIVATIONAL FACTORS

This chapter describes the availability and significance level of the listed motivation factors through collected survey responses. The variation of these factors' importance level is analyzed based on the age group and gender basis. Out of the twenty-six motivational factors listed as a simple-dichotomy question of "Yes or No", 95% of the private sector engineers experience friendly management within their organisations. Similarly, freedom to carry out their duties (91%), receiving on-time payments (82%), getting a good salary (78%), and company vehicles or vehicle allowance at 73% are the remaining most common factors supported by the respondents with the said numbers agreeing on the availability. On the other hand, there are 91% who are not having a retirement plan provided by their organizations, 67% who are not provided with a path for career development, and 65% who are not paid for overtime from the private sector engineers. The level of importance of the listed motivational factors was calculated using equation (1), and the results are grouped according to the Maslow hierarchy need levels. The effect level is given for each of the factors referring to the evaluation scale. The results are tabulated in Table 3 to Table 7.

Table 3: Statistical results of physical needs

Rank in group:	Physical needs - Level 1	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	On-time payments	4.317	ES	81%	16%	3%	3	82%
2	Workplace environment	4.308	ES	85%	15%	0%	4	78%
3	Good salary	4.050	VS	76%	23%	1%	9	78%
4	Annual increment	3.950	VS	68%	32%	0%	12	71%
5	Vehicle/ vehicle allowance	3.875	VS	67%	34%	3%	14	73%
6	Bonus/ profit shares	3.575	VS	56%	28%	16%	16	68%
7	Overtime/ incentive	3.417	VS	50%	25%	25%	19	36%
	Average	3.927	VS					70%

Table 4: Statistical results of safety needs

Rank in group:	Safety needs - Level 2	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Company name stability	4.417	ES	88%	10%	2%	1	69%
2	Promotion	4.017	VS	73%	21%	6%	10	64%
3	Training and development	3.925	VS	69%	27%	4%	13	57%
4	Medical/ other insurance	3.425	VS	50%	30%	20%	18	61%
5	Retirement plans	3.417	VS	49%	31%	20%	19	9%
6	Permanent employment	3.317	S	47%	26%	27%	21	53%
	Average	3.753	VS					52%

Table 5: Statistical results of belongings needs

Rank in group:	Belongings needs - Level 3	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Good workplace discipline	4.333	ES	84%	16%	0%	2	72%
2	Friendly management	4.117	VS	76%	23%	1%	7	95%
3	Promote postgraduate studies	3.667	VS	56%	34%	10%	15	48%
4	Social events	3.275	S	36%	45%	19%	22	60%
5	Assistance in special needs	3.192	S	35%	41%	24%	23	54%
	Average	3.717	VS					66%

Table 6: Statistical results of esteem needs

Rank in group:	Esteem needs - Level 4	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Freedom to carry out the job	4.292	ES	79%	19%	2%	5	91%
2	Path for career development	4.125	VS	82%	12%	6%	6	33%
3	Feedback/ say well done	4.117	VS	73%	23%	4%	8	68%
4	Performance appraisal system	3.983	VS	77%	23%	0%	11	51%
5	Care about self-development	3.500	VS	50%	41%	9%	17	35%
	Average	4.003	VS					56%

Table 7: Statistical results of self-actualization

Rank in group:	Self-actualization - Level 5	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Opportunity for advisory role	3.133	S	33%	49%	18%	24	55%
2	Promote business proposal	3.108	S	35%	40%	25%	25	44%
3	Opportunity for ownership	2.150	SS	14%	16%	70%	26	10%
	Average	2.797	S					36%

According to Maslow's hierarchy of need levels, the top ten motivation factors are summarized in Table 8. However, none of the self-actualization needs contributes as a top ten factor to the private sector engineers. A comparison between these factors is presented in the last column. Additionally, the resulted factors are investigated according to the variation with age and gender basis in the latter part of this chapter.

Table 8: Summary of top 10 factors

Hierarchy need levels Physical needs (Level 1)	Rank in Total	Percentage Available	Result
On-time payments	3	82%	Extremely significant
Workplace environment	4	78%	Extremely significant
Good salary	9	78%	Very significant
Safety needs (Level 2)			
Company name stability	1	69%	Extremely significant
Promotion	10	64%	Very significant
Belongings needs (Level 3)			
Good workplace discipline	2	72%	Extremely significant
Friendly management	7	95%	Very significant
Esteem needs (Level 4)			
Freedom to carry out the job	5	91%	Extremely significant
Path for career development	6	33%	Very significant
Feedback/ say well done	8	68%	Very significant

Among Maslow's hierarchy need levels, esteem needs (4th need level) have the highest mean RII of 4.003 and is a very significant variable. However, it was observed that only 56% of the private sector engineers are getting the expected esteem to need level factors from their organizations. On the other hand, self-actualization needs (5th need level) consist of the lowest index as 2.797, which is only a significant variable. Accordingly, only 36% of the private sector engineers are getting the motivation factors of self-actualization needs from their organization. Figure 1 describes the variation of significance level with need levels and motivation factors among respective organizations. Therefore, the assessment of these available motivation factors can give particular care opportunities for improving labour productivity.

Variation of the importance level with age

This section describes how the response percentages and importance levels vary with the age of the engineers. There have been only a few discussions on the measurement of this concept. Cleveland [34] reports four main age measurements, including the employee's chronological age, the employee's subjective age (self-perception), the employee's social age (others' perception), and the employees' relative age (compared with the employee's workgroup). However, the chronological age of engineers is considered to seek the variation of the importance level. Before adopting a one-size-fits-all approach to motivation, the differences in age-specific motivators are considered [35]. Accordingly, five levels of Maslow's need hierarchy are assessed by considering four age categories: age between 25-30; age between 30-40; age between 40-50; and above 50. The same calculation for the percentage available and the relative important index was carried out independently for each age group. The percentage of engineers and the RII is tabulated for the top 10 motivation factors in Table 9.

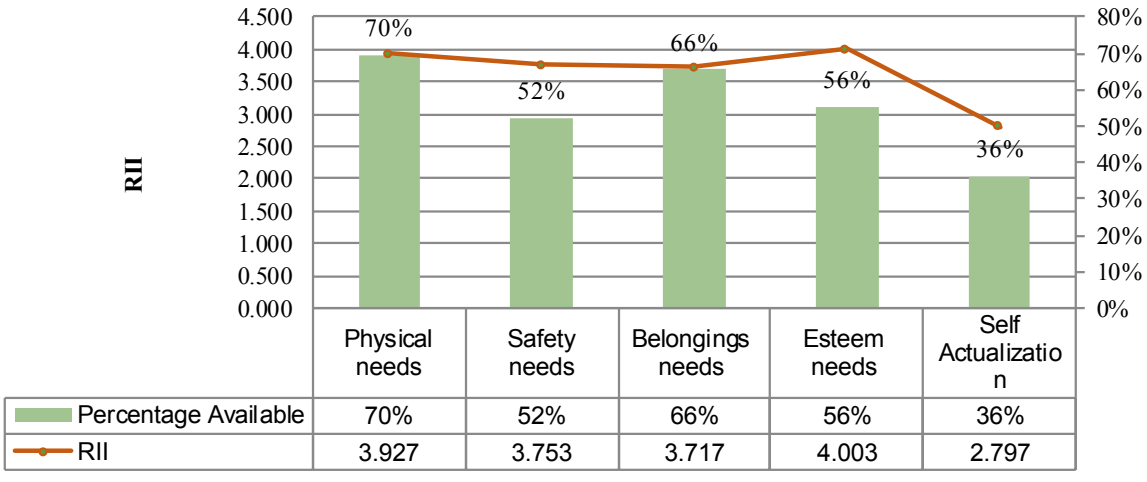

Figure 1: Variation of significance level with need levels

Table 9: Statistic results of age groups

Rank given for top 10 factors	Factor	Age group 25-30	Age group 30-40	Age group 40-50	Age group more than 50
		Rank	Rank	Rank	Rank
1	Company name stability	2	3	2	2
2	Good workplace discipline	3	4	4	1
3	On-time payments	4	2	1	8
4	Workplace environment	1	6	5	3
5	Freedom to carry out the job	4	1	8	3
6	Path for career development	9	4	3	15
7	Friendly management	7	7	10	7
8	Feedback/ say well done	4	8	9	9
9	Good salary	11	9	11	6
10	Promotion	7	10	7	17

This study's main spotlight includes the fact that there is a significant variation of the importance level with age groups. For example, the top-ranked motivation factor for the age group 25-30 is the workplace environment, which is about the workplace's physical conditions and suitable equipment. However, this factor's importance has varied for 30-40, 40-50, and above 50 age groups with a ranking between 6th, 5th, and 3rd, respectively. As technology advances, young engineers are trained to use the latest technology & equipment for their jobs. It was also observed that 56% of the young engineers are not satisfied with the company's equipment. This dissatisfaction may cause the workplace environment to become top important for the age group 25-30.

Variation of the importance level with gender

The top ten factors which primarily impact construction labour productivity are further analyzed on a gender basis. Based on the literature, the implications of various construction workers' attributes, including gender-based variation, drives labour productivity [36]. Therefore, this part of the study aims at characterizing the respondents based on gender to seek the variation of the importance level on the listed motivational factors.

According to Table 10, the most important factor for female engineers is the workplace discipline (ES-4.688), and the second important factor is the physical workplace environment (ES-4.563). Controversially, the two most important factors for male engineers are company name stability (ES-4.433) and on-time payment (ES-4.317).

Table 10: Statistic results of gender group

Rank given for top 10 factors	Factor	Female		Male	
		Rank	Importance Level	Rank	Importance Level
1	Company name stability	6	ES	1	ES
2	Good workplace discipline	1	ES	3	ES
3	On-time payments	6	ES	2	ES
4	Workplace environment	2	ES	4	ES
5	Freedom to carry out the job	3	ES	5	ES
6	Path for career development	3	ES	8	VS
7	Friendly management	6	ES	7	VS
8	Feedback/ say well done	11	VS	6	VS
9	Good salary	9	VS	9	VS
10	Promotion	9	VS	10	VS

DISCUSSION

Among the five need levels affecting construction labour productivity, esteem needs (4th need level) account for the highest average RII of 4.003, with five factors were investigated (Table 6) from this group. Accordingly, freedom to carry out the job (ES-4.292), the path for career development (VS-4.125), and feedback/ say well done (VS-4.117) were graded by the participants as the three most compelling factors. The second most influential need in the construction industry is physical needs (1st need level) with an average RII of 3.927. Seven factors were investigated (Table 3), and on-time payments (ES-4.317) were graded as the most influential motivation factor. However, overtime incentive (VS-3.417) was recognized as the least important factor in this group. After the physical needs, six factors of safety needs (VS-3.753) became the most influential need, as shown in Table 4. Company name stability (ES-4.417), promotion (VS-4.017), and training and development (VS-3.925) were graded as the most significant motivators within the level. Belongings need (VS-3.717) is the next most influential, including five factors, as shown in Table 5. Good workplace discipline (ES-4.333), friendly management (VS-4.117), and promote postgraduate studies (VS-3.667) were graded by the participants as the three most influential factors. Finally, the least significant need for RII results in Table 7 was recognized as self-actualization needs with a mean index of 2.797 (S). Two of the three factors have a 'significant' influence on productivity, while it is 'somewhat significant' for the remaining factor. None of the self-actualisation needs is available among the top ten factors if all twenty-six factors are considered. The following top ten factors that can influence labour productivity and create demotivation through poor satisfaction were listed in descending order viz: company name stability; on-time payments; good workplace discipline; workplace environment; freedom to carry out the job; path for career development; friendly management; feedback/say well done; good salary; and promotion. The variation of the importance level based on age and gender is further discussed under each factor.

Company name

The company name means the company's stability, reputation among new organizations, and popularity. Firms with good brand names attract better people, which is said to be a perceived value for the employees [37]. Thus, to enhance productivity, employees' perceptions of their respective company should be changed. Being the most extremely significant motivational factor in the study, employees who perceive that they have a voice within their organization will be a stimulant to shine within the organizational structure. Thus, corporate reputation affects how various stakeholders behave towards an organization resulting in employee retention, customer satisfaction, and customer loyalty. Accordingly, 68% of engineers believe that they work in good, reputed, and stable companies. People believe that being in a good company fulfil their physical needs, safety needs, belonging needs, and esteem ego. 91% of young engineers at the age of 25-30 believe that they are working in a good company and prioritize it in the second place. However, this factor's importance level is higher for engineers at age 40-50. Engineers who are above 50 age group give less importance to the company name and rank it at 6th place. Besides, male engineers rank the company name as the 1st motivational factor while females rank it in 6th place. Since the engineers are highly motivated by the company's reputation, private sector organizations are encouraged to maintain their company image at a vital level and not let down. It was further observed that positive reputation, financial stability, and organization behaviours would affect the public perception, and engineers will retain in such companies.

Workplace discipline

Discipline in the workplace methodically drives the employees' behaviour. One of the primary conditions for improving systematic working habits is to have a complete work discipline. Thus, this is applicable in the given study, as 72% of the engineers agree on having a good workplace discipline within their organization. Therefore, this concept becomes more important for the construction industry employees consisting of diverse individuals from the rigid regions of male-controlled society. According to the importance level of workplace discipline variation with age, 82% of the young engineers in age 25-30 believe that they have good workplace discipline in their organization. However, the importance of good workplace discipline goes down with 30-40 and 40-50 age groups. However, engineers over the age of 50 feel more importance of a good workplace discipline than any other age group. On the other hand, good workplace discipline is ranked as the most influential female factor while male engineers rank it as 3rd. 69% of female engineers believe that they have good workplace discipline within the company, and for male engineers, it is a little higher with 72% availability. Therefore, the establishment of company rules, company disciplinary procedures, responsibility matrix should have adhered to the organizational behaviours.

On-time payment

The amount of money and on-time payment is a significant contributor to Maslow's first hierarchy need. An employee, for example, will most likely quit the job if another organization proposes a higher wage. Besides, regardless of Herzberg's argument that money is not a stimulator and thus not a motivator, the current study connected with prior works by Kazaz [1], Gibbons [46], and those seem to indicate the opposite. Besides, timely payment is recognized as a principal motivational component of any work-related agreement [1]. Accordingly, the provision of sufficient working facilities can restrict

some demotivating effects, but a delay in payment will not carry any changes to poor satisfaction. The results of this study confirm the above statement for private-sector engineers in the construction industry. Besides, 82% of construction engineers in the private sector believe that they are paid on time. According to the vulnerability of motivation factors to age groups, the importance level goes high with the age group, and engineers in the 40-50 are highly concerned with an average RII of 4.600. However, engineers with 50 above age show a decline as they indicate less importance to on-time payments. The highest availability of the factor is associated with 91% of the young engineers aged 25-30, believing that their organization pays them on-time. On-time payment is the 2nd crucial factor for male engineers. Interestingly for female, timely payment is the 6th important factor in their ranked list. Therefore, it can be concluded that engineers are extremely motivated to the payment dates and it is recommended to continue a positive cash flow and do the payment on time.

Workplace environment and equipment

This factor is related to the workplace's physical status, good equipment available at work, and comfortableness of the workplace's surroundings. A good working environment is a vital factor that can define performances through improved productivity or, if not satisfied, leading to demotivation [39]. Thus, this has become the most influential motivator for the age group of 25-30, suggesting that young engineers are trained to use the latest technology & equipment for their jobs with technology advances. Besides, 56% of young engineers are not satisfied with the company's equipment. This dissatisfaction may cause the workplace environment to become the top crucial motivational factor for age 25-30. Interestingly more senior engineers with 50 above age also appreciate the excellent workplace environment listing at 2nd rank. Besides, more senior workers seem to enjoy the opportunity to be creative, and they use skills and competencies to sense achievement [40]. On the other hand, female engineers are more concerned about the excellent work environment as they prioritize it as the second most influential while male engineers rank it at 4th place. The study further shows that only 63% of the female engineers in the private sector construction industry are satisfied with the excellent workplace environment, while 81% for male engineers.

Freedom to carry out the job

Kemoh [41] reports that while money is only a hygiene factor, other non-monetary factors such as freedom to carry out the job is valued by the construction engineers. This study highlights that construction engineers in the private sector place job freedom as the 5th most influential factor. 91% of engineers believe that they are allowed to undertake their jobs independently. Interestingly 100% of the young engineers in the age group of 25-30 and 100% of the engineers above 50 age group said that they are given adequate job freedom in their organizations. Therefore, giving the job responsibility and empowering engineers to fulfil the task will suit the organization. Companies should further extend their employees' openness and practice a participative management style compared to the authoritarian management style.

Path for career development

Companies are encouraged to align the career development path for engineers with providing opportunities for training & development and postgraduate studies [42]. It includes developing an individual's competencies in terms of knowledge, skills, empowerment, and status. Further, engineers are likely to explore novel knowledge and feel motivated if there is a growth opportunity in the existing environment [43]. However, it was observed that only 33% of engineers are getting appropriate career development opportunities from their organizations while the majority is not getting. Results reveal a continuous reduction of the availability percentage when age gets older. 45% of the young engineers in the age group 25-30 were facilitated, whereas only 20% of engineers above 50 age got an opportunity for their carrier development.

Friendly management

Improving productivity can be best initiated through development in friendly management. Ramsay [44] identifies family-friendly management as a stimulant for high workplace performance. Since productivity improvement in the construction industry is highly dependent on adequate working conditions, friendly managerial implementation would be beneficial in the given context. Therefore, flexibility in arrangements for days off for sickness, workplace treats, days off for sickness as special paid leave, men are entitled to parental leave, and such arrangements are essential to quantify the impact of work conditions on productivity. According to variation of importance level with age groups, 100% of young engineers in the age group 25-30 and senior engineers of age above 50 believe that their companies are friendly and approachable.

Feedback/say well done

An adequate supply of information and feedback is an unconventional method to increase workplace productivity. That is why performance feedback is becoming an essential part of many organizational interventions in current decision-making processes. Besides, there is a mutual trust between worker-engineer and worker-employer in reaching coordination and improving productivity [45]. 68% of the respondents believe that they are getting feedback, and it is a conflicting situation. Notably, an immediate feedback mechanism should be practised throughout the year, and recognition by the annual performance appraisal system seems interesting.

Good salary

The amount of pay is recognized as one of the prime reasons an individual must engage in work. It further helps to meet both physiological and esteem needs in society [1]. Accordingly, a good remuneration package is a powerful stimulant for construction workers, while low pay levels could lead to a drastic situation in the continuation of operations. However, the importance of having a good remuneration package is ranked as 9th in this study which suggests less importance compares to other factors. Maslow [12] argues the same by stating that an employee, only when lower order needs of physical and emotional wellbeing are satisfied, then concerned with the higher-order needs of influence and personal development. Since 78% of the engineers receive a good salary, they looked to be satisfied with the current remuneration levels. Therefore, it has become less important than the other eight factors which are listed above. On the other hand, the importance of having a good salary is most considerable for the 25-30 age category. Because the importance level seems to go down with the age group and engineers in the 40-50 age feel the lowest importance. However, engineers with an age of more than 50 are pursuing high importance than 40-50. Besides, the more senior engineers with insufficient income are more likely to seek retirement to satisfy needs on 1st and 2nd levels of Maslow's hierarchy [40]. Since 50% of the more senior engineers are not satisfied with their basic needs, they might have ranked it as more influential.

Promotion

More talented workers are usually more productive and capable of ending up higher in organizational hierarchies. It became evident that promotions generate a lucrative environment in the last few decades by assigning workers to jobs better suiting their competencies [46]. Besides, promotions benefit past employee efforts, encourage investments in specific human capital and lower job turnover. It was observed that the importance level is gradually declining with age. Young engineers in the age group 25-30 showed extreme importance, and engineers with age more than 50 are pursuing lesser importance. Older workers may have reached a career peak in their wages might have reduced the interest in seeking promotions as incentives.

CONCLUSION

In this study, twenty-six factors influencing construction engineer productivity in the private sector were examined by bringing them together into five main groups of Maslow's hierarchy needs levels of basic needs, safety needs, belonging needs, esteem needs, and self-actualization needs. The most influential need level among them was statically determined as the esteem needs with a relative importance level of "very significant" (VS -4.003) followed by basic needs (VS-3.927), belonging needs (VS-3.717), safety needs (VS-3.753), and at last the self-actualization needs (S-2.979). Variation of the importance level of the motivation factors was examined concerning four age groups and gender basis in this study. The most influential factor for the young engineers in 25-30 age is the excellent workplace including physical environment and equipment (ES-4.455) followed by job freedom (ES-4.432) for 30-40 age group, on-time payment (ES-4.600) for 40-50 age group, and workplace discipline (ES-4.700) for engineers above 50 age. Similarly, a significant variation of the importance level was observed for male and female engineers. Good work discipline is the most influential motivational factor for female engineers, whereas company name and stability ((ES-4.433) have become the most important factor for male engineers. Basic need level motivational factors, which are listed as good remuneration package, on-time payments, annual increments, overtime incentives, bonuses, profit shares, workplace environment and equipment, and vehicle allowances, are recommended to maintain throughout and shall be further continued. Even though it is the most available group (70%), these factors should not be undermined because engineers will not be motivated by providing other need-levels without the basic needs. Besides, even though various significant motivational factors are observed correspond to age and gender, the top 15 ranking factors are applicable as a group. Therefore, private sector construction organizations are encouraged to diversify their business models by adhering to the above conclusions and continue as a general practice for all the engineering employees. Further studies are encouraged to focus on the problem-solving purpose of retaining craftsmen and other workers in the private sector construction industry. Overall, this paper's findings provide vital learnings to devise effective policies to improve employee retention in the construction industry.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the numerous engineers, architects, owners, and other organisations' technical staff for their substantial cooperation and contributions.

REFERENCES

1. Kazaz, A., Manisali, E., & Ulubeyli, S. (2008). Effect of basic motivational factors on construction workforce productivity in Turkey. Journal of Civil Engineering and Management, vol. 14, no. 2, 95–106, DOI: 10.3846/1392-3730.2008.14.4.
2. Wibowo, M. A. (2009). The Contribution of the Construction Industry to the Economy of Indonesia: A Systemic Approach.
3. Venkatesan, R., Varghese, K., & Ananthanarayanan, K. (2009a). Motivation and demotivation "cause factors" for engineers in construction organisations. Association of Researchers in Construction Management, ARCOM 2009 - Proceedings of the 25th Annual Conference, 145–153.

4. Lam, S., & Tang, C. (2003). Motivation of survey employees in construction projects. Journal of Geospatial Engineering, vol. 5, no. 1, 61–66.
5. Rainey, H. G., & Bozeman, B. (2000). Comparing Public and Private Organizations: Empirical Research and the Power of the A Priori. Journal of Public Administration Research and Theory, vol. 10, no. 2, 447–469, DOI:10.1093/oxford journals.jpart.a024276.
6. Boyne, G. A. (2002). Public and private management: What's the difference? Journal of Management Studies, vol. 39, no. 1, 97–122, DOI: 10.1111/1467-6486.00284.
7. Ibrahim, A. R. Bin, Roy, M. H., Ahmed, Z. U., & Imtiaz, G. (2010). Analyzing the dynamics of the global construction industry: Past, present and future. Benchmarking, vol. 17, no. 2, 232–252, DOI: 10.1108/14635771011036320.
8. Kärnä, S., & Junnonen, J.-M. (2005). (PDF) Project feedback as a tool for learning, from https://www.researchgate.net/publication/252067846_Project_feedback_as_a_tool_for_learning.
9. Anthony, J. (2019). 55 Construction Industry Statistics You Must See: 2020 Market Share & Data Analysis. Finance Online: Reviews for Business, from https://financesonline.com/construction-industry-statistics/.
10. Sugathadasa, P. T. R. S. (2018). Identification and modelling of construction supply chain risk triggers (Doctoral dissertation).
11. Irawan, D., Mochtar, I. B., & Utomo, C. [2019]. The actualization of leadership models adopted by field implementers that influencing the contractor employees' motivation and performance. *Journal of Applied Engineering Science*, 17(4), 555-566.
12. Maslow, A. H. (1954). The Instinctoid Nature of Basic Needs. Journal of Personality, vol. 22, no. 3, 326–347, DOI:10.1111/j.1467-6494.1954.tb01136.x.
13. Kaming, P. F., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1998). What Motivates Construction Craftsmen in Developing Countries? A Case Study of Indonesia. Building and Environment, vol. 33, no. 2-3, 131–141, DOI:10.1016/S0360-1323(97)00041-3.
14. Proverbs, D. G., Holt, G. D., & Olomolaiye, P. O. (1998). A comparative evaluation of reinforcement fixing productivity rates amongst French, German and UK construction contractors. In Engineering, Construction and Architectural Management, vol. 5, no. 4, 350–358, DOI: 10.1108/eb021088.
15. Herzberg, F. (1968). One More Time: How Do You Motivate Employees? Harvard Business Review. Harvard Business Review, 46–57.
16. Tan, S. K., Fauziah, W., Yusoff, W., Kian, T. S., Talha, M., & Idris, M. (2016). Herzberg ' s Two-Factor Theory on Work Motivation : Does it Works for Todays Environment? GJCMP, 2(September 2013), 0–5, from https://www.researchgate.net/publication/262639924.
17. Borcherding, J., & Oglesby, C. (1974). Construction Productivity and Job Satisfaction. Journal of the Construction Division, vol. 100, no. 3, 413–431.
18. Vroom, V. (1964). Work and Motivation. In Wiley and Sons.
19. Maloney, W. F., & McFillen, J. M. (1986). Motivation in unionized construction. Journal of Construction Engineering and Management, vol. 112, no. 1, 122–136, DOI: 10.1061/(ASCE)0733-9364(1986)112:1(122).
20. Adams, J. S. (1965). Inequity In Social Exchange. Advances in Experimental Social Psychology, vol. 2, no. C, 267–299, DOI: 10.1016/S0065-2601(08)60108-2.
21. Ng, S. T., Skitmore, R. M., Lam, K. C., & Poon, A. W. C. (2004). Demotivating factors influencing the productivity of civil engineering projects. International Journal of Project Management, vol. 22, no. 2, 139–146, DOI: 10.1016/S0263-7863(03)00061-9.
22. Ghoddousi, P., Bahrami, N., Chileshe, N., & Hosseini, M. R. (2014). Mapping Site-based Construction Workers' Motivation: Expectancy Theory Approach.
23. Leong, T. K., Zakuan, N., Mat Saman, M. Z., Ariff, M. S. M., & Tan, C. S. (2014). Using project performance to measure effectiveness of quality management system maintenance and practices in construction industry. The Scientific World Journal, 2014, DOI: 10.1155/2014/591361.
24. Naff, K. C., & Crum, J. (1999). Working for America: Does public service motivation make a difference? Review of Public Personnel Administration, vol. 19, no. 4, 5–16, DOI: 10.1177/0734371X9901900402.
25. Jurkiewicz, C. L., Massey, T. K., & Brown, R. G. (1998). Motivation in Public and Private Organizations: A Comparative Study. Public Productivity & Management Review, vol. 21, no. 3, 230, DOI: 10.2307/3380856.
26. Buelens, M., & Van Den Broeck, H. (2007). An analysis of differences in work motivation between public and private sector organizations. Public Administration Review, vol. 67, no. 1, 65–74. DOI: 10.1111/j.1540-6210.2006.00697.x.
27. Collis, J., & Hussey, R. (1997). A Practical Guide for Undergraduate and Postgraduate Students. Enlarge Business Research (4th Edition), from https://www.macmillanihe.com/page/detail/Business-Research/?K=9780230301832.
28. Marshall, C., & Rossman, G. B. (1999). Designing qualitative research (3rd ed.). Sage Publications, Inc, from https://psycnet.apa.org/record/1999-02689-000.

29. Heale, R., & Forbes, D. (2013). Understanding triangulation in research. In Evidence-Based Nursing, vol. 16, no. 4, 98, DOI: 10.1136/eb-2013-101494.
30. Saunders, M., Lewis, P., & Thornhill, A. (2012). Research Methods for Business Students. www.pearsoned.co.uk.
31. Powell, E. T. (1998). Adapted from Sampling in Extension.
32. Slowey, K. (2019). By the numbers: Women in construction. Construction Dive, from https://www.constructiondive.com/news/by-the-numbers-women-in-construction/549359/.
33. Trochim, W. M. (2013). Research Methods Knowledge Base, from http://trochim.human.cornell.edu/kb/index.htm.
34. Cleveland, J. N., & Shore, L. M. F. (1992). Self- and Supervisory Perspectives on Age and Work Attitudes and Performance. Journal of Applied Psychology, vol. 77, no. 4, 469–484, DOI: 10.1037/0021-9010.77.4.469.
35. Kooij, D. T. A. M., De Lange, A. H., Jansen, P. G. W., Kanfer, R., & Dikkers, J. S. E. (2011). Age and work-related motives: Results of a meta-analysis. Journal of Organizational Behavior, vol. 32, no. 2, 197–225, DOI: 10.1002/job.665.
36. Cardoso, P., Dominguez, C., & Paiva, A. (2015). Hints to Improve Motivation in Construction Companies. Procedia Computer Science, vol. 64, no. 1, 1200–1207, DOI: 10.1016/j.procs.2015.08.513.
37. Eccles, R. G., Newquist, S. C., & Schatz, R. (2007). Reputation and its risks. Harvard Business Review, from https://www.researchgate.net/publication/6460600_Reputation_and_its_risks.
38. Ogunlana, S. O., & Chang, W. P. (1998). Worker motivation on selected construction sites in Bangkok, Thailand. Engineering Construction and Architectural Management, vol. 5, no. 1, 68–81, DOI: 10.1046/j.1365-232x.1998.00008.x.
39. Ruthankoon, R., & Ogunlana, S. O. (2003). Testing Herzberg's two-factor theory in the Thai construction industry. Engineering, Construction and Architectural Management, vol. 10, no. 5, 333–341, DOI: 10.1108/09699980310502946.
40. Lord, R. L. (2004). Empirical evaluation of classical behavioral theories with respect to the motivation of older knowledge workers.
41. Kemoh, L. M. (2016). The Impact of Motivation on Employees' Performance and Satisfaction.
42. Kumar, R. U., & Karthikeyan, P. (2016). Career Advancement of Civil Graduates in Construction Projects: Learning Beyond Institutions. Asian Journal of Research in Social Sciences and Humanities, vol. 6, no. 7, 1017, DOI: 10.5958/2249-7315.2016.00485.8.
43. Anthony, P. J. (2015). Motivation and Career-Development Training Programs: Use of Regulatory Focus to Determine Program Effectiveness. In Higher Learning Research Communications, vol. 5, no. 2.
44. Ramsay, H., Scholarios, D., & Harley, B. (2000). Employees and high-performance work systems: Testing inside the black box. British Journal of Industrial Relations, vol. 38, no. 4, 501–531, DOI: 10.1111/1467-8543.00178.
45. DeNisi, A. S., & Kluger, A. N. (2000). Feedback effectiveness: Can 360-degree appraisals be improved? Academy of Management Executive, vol. 14, no. 1, 129–138, DOI: 10.5465/ame.2000.2909845.
46. Gibbons, R., & Waldman, M. (1999). A Theory of Wage and Promotion Dynamics inside Firms. The Quarterly Journal of Economics, vol. 114, no. 4, 1321-1358.

Paper submitted: 02.11.2020.
Paper accepted: 27.02.2021.