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Sensitivity Analysis of Motivation Factors of Engineers in Government Sector Construction Industry: A Case Study of Sri Lanka

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Abstract: Motivation is a widely reviewed and studied concept in any industry despite the plethora of diversity that exists among different industries. The relationship between the guaranteed increase in performance, given the availability of a motivated workforce, could be the key underlying reason for this. This research study assesses motivation factors of engineers in the Sri Lankan government sector construction industry and further examines their sensitivity to various attributes, including age and gender. The research design follows a sequential mixed methodology of qualitative and quantitative data gathering and analysis. A structured and self-administrated systematic qualitative approach was utilised to collect data from 161 engineers. Twenty-six motivational factors were grouped according to Maslow's need theory, and the paper presents a comprehensive analysis based on relative importance. After finding the ranking priorities, sensitivity analysis is carried out for the top five contributing factors by the Spearman rank-order technique for better discussion about the results. The findings contribute to the body of knowledge by providing recommendations on how the authorities could incorporate the most influential factors in creating a productive and cheering environment for engineers in the government sector construction industry.

Keywords: Government sector engineer, Sensitivity analysis, Motivational factor, Relative importance, Variation with age and gender, Productivity improvement.

1. Introduction

1.1 Background

Construction Industry has been an emerging industry in Sri Lanka over the recent decade, given the increased number of investments that have been employed in Sri Lanka. However, despite the boom in the industry, it is also a notable fact that a significant number of professionals left the country giving a plethora of reasons. This situation was worse in the government sector, where the engineers shifted either towards private employers or abroad.

In line with the Central Bank Reports, the contribution to Sri Lanka's GDP from the construction industry in 2019 was Rs. 2457 billion, emphasising the importance of the construction sector in the country. The construction industry contribution to Sri Lanka's GDP is 7.5% in 2019, whereas the figures stood at 7.2% by end of 2018 ([1], [2]). The construction industry constitutes multiple stakeholders who, as a team, has performed to achieve the statistics. Among them, engineers play a key role by providing cost-effective and innovative solutions for sustainable construction outputs. Retaining quality personnel is becoming quite difficult day by day in the construction sector, particularly engineering professionals. Despite being a middle-income country, Sri Lanka invests a considerable amount of money in tertiary education, expecting the beneficiaries to pay back towards the development of the country. Accordingly, Government of Sri Lanka (GoSL) has declared its intention to transform Sri Lanka into a naval, commercial, energy, and knowledge hub and develop the country into a strategically important economic centre in the region.

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However, as an industry that deals with large amounts of investments that are expected to deliver productive and durable outputs, the involvement of quality professionals focused on quality delivery is essential [3]. That is why motivation level of construction engineers has been suggested as one of the prime factors that can stimulate project productivity in the construction industry.

Political influence, job satisfaction, better living standards, better pay packages, etc., are some of the reasons that trigger engineers' migration. For the engineers who stay in Sri Lanka, three major categories can be identified in the construction-related engineering industry: the government, semi-government, and private sector. It is usually recognised in the private and semi-government sectors that the employees enjoy better pay and benefits than the government employees. This filtering again questions whether the government attracts or retains quality employees in the construction sector and is the remaining cadre in the state sector productive enough to perform at their best level. Though the government recruits engineers regularly, they tend to leave within a short period after gathering adequate experience to shift toward a better opportunity outside the government sector. Hence, it is important to identify these factors and build up a mechanism to retain state sector engineers and improve their productivity. Highly motivated workers tend to input maximum effort because of self-fulfilment from doing so and resulting in high productivity [4] ,[5]. Many research addressed such problems in the private and semi-government sectors. However, such research has not been carried out on the government sector.

1.2 Importance of the Study

The government sector accounts for around 60% of the construction work in Sri Lanka. Thus, having a satisfying quality workforce is important and imperative where there is competition with the private sector and opportunities occur outside the government sector. This research aims to ascertain information on the importance of motivation factors that are practised in the government sector of the Sri Lankan construction industry and analyse the variation of the importance of motivation factors for different age groups and gender. This is one of the few available pieces of research which uses sensitivity analysis in the context of motivation factors of the construction industry. Additionally, this paper is a novel study that examines the correlation between the selected motivation factors and their corresponding prevalence in the government sector organizations.

2. Literature Review

2.1 Construction Industry of Sri Lanka

Construction is the process of constructing a building or infrastructure. Construction starts with planning, design, and financing; it continues until the project is built and ready for use. In developing countries, the construction industry is a significant industry towards socio-economic development. The construction industry is usually taken as infrastructure developments, irrigation related structures such as dams, weirs, etc., government and private buildings such as schools, houses, hospitals, factories, etc., and interior landscaping, etc., which will provide types of assistance to upgrade the standards of living of the countrymen. Its contributions are more than just economic; the products of construction mentioned above contribute extensively to creating wealth and the population's quality of life [6]. Many professionals contribute to the sector, while construction site engineers' play a supervisor role who is implanted with the technical and intellectual skills to control work productivity [7]. The site engineer's role is extremely important and will be one of the major factors of project success or failure. The site staff person's role is unique and will not be the same even for similar projects. Hence self-satisfaction of the staff and the managers is extremely important. Due to these developments in the literature, finding ways to motivate workers is the key to making human resource management work philosophies.

During the past few years, many road developments, commercial buildings, port developments, aviation developments, hotels, and other infrastructure development initiatives took place. However, the total contribution to GDP from the construction industry in Sri Lanka fluctuated drastically since 2015 mainly due to the unstable policies that change with the government in power [2]. Central and Northern expressways, suburban monorail project, expressways on piers from Kelaniya to Port City, Megapolis project, etc., are some of the major development steps executed by the Sri Lankan government and funding agencies [8].

Amid these contextual characteristics, motivation plays a vital role in retaining employees in this dynamic industry. Thus, motivation could be mainly categorised into two stages, viz., extrinsic and intrinsic. Factors that are out of one's control, such as appreciation, promotions, money or social acceptance, are extrinsic motivations. Intrinsic motivations are the facts deriving from within an individual, such as work through a game that completely offers him or her satisfaction. Accordingly, motivated people are always well clear with the goals they need to act on and always work to achieve those explained by the process of motivation.

2.2 Motivational Theories and Labour Productivity

Motivation is explained through several different theories conducted by many researchers. Researchers focused instinct theories of motivation on individuals who are being programmed to act in a particular way due to motivation despite the reward due to personal satisfaction. It was further extended by the modern evolutionary psychologists stating that people are intrinsically motivated for some activities and not others, and not everyone is intrinsically motivated for any particular task. The incentive theory suggests that external rewards influenced people to be motivated, and that leads to actions.

The drive theory of motivation states that a decrease of drives would be the main influencing factor for motivation [9]. To minimise the internal tension caused by unmet needs, people are directed to act in a particular way as per this theory. However, these behaviours will always not be driven only by physiological needs, which is an issue with this theory. For example, even when people are not hungry, they would tend to eat. Arousal theory suggests that people behave in a given way to lessen or advance their level of arousal. As per this theory, arousal level should prevail at their best point. However, it can be diverse as per the condition or the individual [10]. The humanistic theory assumes that people are good by default. However, to be better, one would have to walk through stages of life with many experiences. This was the basis for Maslow's need theory, widely recognised even in the present context. Maslow suggested that man is a wanting animal who has needs and wants [11]. Consequently, he perfected a theory called Maslow's need theory [12]. Accordingly, this was developed as a hierarchical based structure supporting physiological needs, safety needs, belonging needs, self-esteem needs, and self-actualisation. Thus, this states that a person would think of the next level of needs only upon fulfilling the needs of the lower layer.

In Fredric Herzberg's studies, it was attempted to define the factors affecting employee satisfaction and dissatisfaction, categorising those as motivating and hygiene factors [13]. According to Herzberg's motivation-hygiene theory, these two factors stand independently with one shifting from dissatisfied to neutral and the other from satisfied to neutral. Similarities are seen between Herzberg's and Maslow's, with both agreeing for an employee to be motivated, it is important that they are satisfied with their needs [14]. Similarly, the absence of hygiene will result negatively, causing health decline, and presence of hygiene will not make one healthier. Based on the literature, the expectancy theory of motivation explains how individuals make their decisions on their different behaviours, so depending on the highest motivational strength, an individual will select one option of behaviour among many [15].

2.3 Motivation as Stimulation for the Construction Industry

Due to the complexity, dynamism, and uncertainty of the construction industry, highly motivated individuals must deliver high-quality projects at lower costs in shorter times [16]. Given the volatility, uncertainty, complexity, and ambiguity (VUCA) conditions in the construction industry, it is important to study the motivation factors in the construction industry. Kazaz et al. [3] stated the relationship between motivation factors and productivity in their study of the effect of basic motivational factors on construction in Turkey in 2008. It is explained that motivation is mostly dependent on productivity; hence, the productivity is directly linked clearly to motivation.

By engaging with the personal construction site management staff through a series of focus group interviews, four key areas – planning, teamwork, welfare, job security – have been highlighted as aspects leading to productivity improvements [17]. Widespread reworks, congested work areas, issues in crew interfacing, availability of tools, inspection delays, material availability, and site foremen incompetancies have been identified as the key demotivating factors. Given the nature of the industry, it is believed that removing certain

demotivators will increase motivation without necessitating the addition of motivators [18]. Oyedele [19] found four reasons that motivate engineers and architects, namely, working condition of the workplace/site, support from the organisation, design with efficacy and recognition of efforts.

Several types of research have been carried out in the area of engineers' motivation factors in Sri Lankan Construction Industry. Pinidiya and Lanka [20] discussed the level of motivation of engineers and the employees of any construction organisation based on performance measurements, such as the output performance measuring index and the ability to retain employees in any organisation. Sugathadasa et al. [5] revealed that the engineer's motivation is aligned with Maslow's hierarchy of needs, and the government sector did about 70% of the construction investment. Hence, focus should be given to identify the most effective motivation factors for the best practice of government institutions. Thus, finding such motivation factors would be vital for a government organisation and other professionals in the government sector.

3. Methodology

Motivational factors of engineers in the construction industry have already been identified by researchers both locally and internationally, though there is a notable difference in priority levels. According to Saunders et al. [21], exploring different research approaches, strategies, and data collection methods across the research philosophy continuum decide on the most suitable research project. Accordingly, a five-layer research philosophy is proposed to develop the research process, viz, positivism, critical realism, interpretivism, postmodernism, and pragmatism. Thus, this study adopts a positivistic research philosophy where an inductive research approach collects data through a qualitative survey strategy. At the first stage of the survey study, twenty-six motivational factors in the construction industry have been identified to be considered in this study. Given the recognition and coverage, Maslow's hierarchical need-based model was used to categorise factors identified. Secondly, an interview-based survey has been carried out to represent the snapshot or the cross-sectional view of the systemic reality. The total population was considered as 2,500 to 3,000. The sample size was determined by using Taylor's guidance [22]. In line with this study, the sampling size for the 10% precision level is 97. Simple, random sampling techniques were followed, considering the limitations to receive feedback. Thus, the questionnaire was sent to 250 professionals, out of which 141 responded. The questionnaire developed consisted of 3 main parts with the inputs received from senior engineers through face-to-face interviews. Section 1 consists of basic details focusing more on the experience of the applicant in the construction field. Section 2 is based on the identified motivation factors designed in a dichotomy manner to grasp an age-based impact of the factors. In Section 3, stratified sampling is used to analyse the contribution of age and gender factors towards the motivational level of construction engineers. Table 1 describes the composition of the sample.

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	39	43	35	24	122	19	141

A three-step statistical model is incorporated to analyse the data provided by the questionnaire. Firstly, the percentage value by frequencies of the answers obtained is acquired. Secondly, the Relative Importance Index (RII) calculation & ranking of the motivation factors is undertaken. Thirdly, the variation of each motivation factor's importance is analysed with the age and gender groups. According to Trochim [23], dichotomous questions to acquire the percentage value by frequency of the answers have prevailed. Therefore, it is proposed to get the percentages of engineers who appreciate each motivation factor through an uncomplicated dichotomy question where the answers are either categorised to Yes or No. The RII is used to evaluate and rank down the list of motivational factors [3]. A rating scale of 1 to 5 is used to examine the relative importance, with 1 being the smallest effect and 5 being the largest. Equation (1) represents the proposed algorithm:

$$RII = \sum_{i=1}^{5} W_i X_i \Big/ \sum_{i=1}^{5} X_i \;,\; (1 \leq RII \leq 5) \qquad \ldots(1)$$

Wi is the given marking to every issue by the respondents starting from 1 to 5, with 1 encoded for "Not Important" and 5 encoded for "Extremely Important"; *Xi* is the share of respondent scoring, and *i* is noted as the formal arrangement of the number of respondents. Since the results obtained from the above are decimals, the scale depicted in Table 2 is established to evaluate the results. Based on the evaluation scale, the variation of the importance of the motivational factors, based on age group and gender, was also calculated.

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

4. Assessment of Motivational Factors

This part of the report contains the availability and significance level of the recorded motivation factors through collected survey responses. The variation of these factors' importance level is analysed based on the age group and gender basis. Out of the 26 motivational factors listed as a simple dichotomy question of "Yes or No", notable features include the opportunity given for admin positions, which is most probably 100% because all engineers are usually enrolled in admin positions. Similarly, self-satisfaction on work done (94%), further assistance on medical/ other insurances (88%), provision of a vehicle permit at 80%, are the remaining most common factors supported by the respondents with the said numbers agreeing on the availability. On the other hand, professional allowances are at 0%, indicating that the provision of such benefit is almost non-existent. Only 4% is pleased about the current age limit which provides eligibility for a pension scheme, and only 8% is pleased about the current salary levels. Lack of feedback and appreciation are also highlighted by 13% in the present context. 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	Reasonable salary	4.227	ES	7%	24%	69%	4	53%
2	Financial benefit after retirement	3.454	VS	15%	35%	50%	18	28%
3	Know-how on retirement plan	3.184	S	27%	23%	50%	21	56%
	Average	3.622	VS					46%

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	Promotions	4.255	ES	7%	21%	72%	2	33%
2	Working within non engineering firms	3.638	VS	10%	47%	43%	13	49%
3	Payment for professional qualification	3.631	VS	17%	33%	50%	14	19%
4	Assistance on financial requirements	3.574	VS	11%	38%	51%	15	39%
5	Professional allowance	3.128	S	25%	39%	36%	22	0%
6	Ease on financial assistance	2.993	S	44%	19%	37%	23	44%
7	Political influences	2.809	S	33%	35%	32%	25	28%
	Average	3.433	VS					30%

Table 5 - Statistical Results of Belongings Needs

Rank in group:	Belonging needs - Level 3	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Further assistance on medical/ other insurances	4.035	ES	1%	29%	70%	6	88%
2	Medical/ other insurances	3.461	S	21%	30%	49%	17	56%
3	Support on personal life	3.440	S	22%	20%	58%	19	67%
	Average	3.645	VS					70%

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	Opportunity for administrative position	4.241	ES	13%	7%	80%	3	42%
2	Self-satisfaction on work done	3.979	VS	5%	28%	67%	7	94%
3	Feedback /Say well done	3.943	VS	17%	13%	70%	8	13%
4	Provision on vehicle permit	3.894	VS	9%	22%	69%	9	80%
5	Status of life	3.851	VS	8%	32%	60%	10	41%
6	Salary against responsibility	3.213	S	35%	15%	50%	20	16%
7	Value for professional knowledge extended years	2.376	SS	59%	26%	15%	26	4%
	Average	3.642	VS					41%

Table 7 - Statistical Results of Self-Actualization

Rank in group:	Self-actualisation - Level 5	RII	Effect Level	Percentage of respondents scoring			Rank in Total	Percentage Available
				≥ 4	3	≤ 2		
1	Job satisfaction	4.338	ES	0%	11%	89%	1	8%
2	Support from non-engineering superiors	4.226	ES	6%	18%	76%	5	75%
3	Early retirement plan	3.766	VS	14%	25%	61%	11	67%
4	Promote higher education/ training	3.695	VS	34%	0%	66%	12	0%
5	Opportunity for a private practice	3.496	VS	19%	26%	54%	16	51%
6	Career development on other workplace	2.894	S	42%	18%	40%	24	47%
	Average	3.736	VS					41%

Table 8 - Summary of Top 5 Factors

Hierarchy need levels	Rank in Total	Percentage Available	Spearman's Correlation
Physical needs (Level 1)			
Reasonable salary	4 (ES)	53%	-0.697
Safety needs (Level 2)			
Promotions	2 (ES)	33%	-0.856
Esteem needs (Level 3)			
Opportunity for administrative position	3 (ES)	42%	-0.721
Self-actualisation (Level 5)			
Job satisfaction	1 (ES)	8%	-0.921
Support from non-engineering superiors	5 (ES)	75%	-0.546

According to Maslow's hierarchy of need levels, the top five motivation factors are summarised in Table 8. However, none of the belongings' needs contribute top five-factors to the government sector engineers. A comparison between these factors is presented in the last column. This suggests that the construction engineers who work in the Sri Lankan industry either find those factors for granted or don't consider as important motivation factors. Additionally, the selected factors are investigated according to the variation with age and gender basis in the latter part of Section 4.

Among Maslow's hierarchy need levels, self actualisation needs (5th need level) have the highest mean RII of 3.736 and is a very significant variable. However, it was observed that only 42% of the government sector engineers are getting the expected self-actualisation need level factors from their organisations. On the flip side, safety needs (2nd need level) consist of the lowest index as 3.4330. Accordingly, only 32% of the government sector engineers are getting the motivation factors of safety needs from their organisation. Figure 1 depicts the variation of significance level with need levels and motivation factors. Therefore, the assessment of these available motivation factors can give particular care opportunities for enhancing labour output.

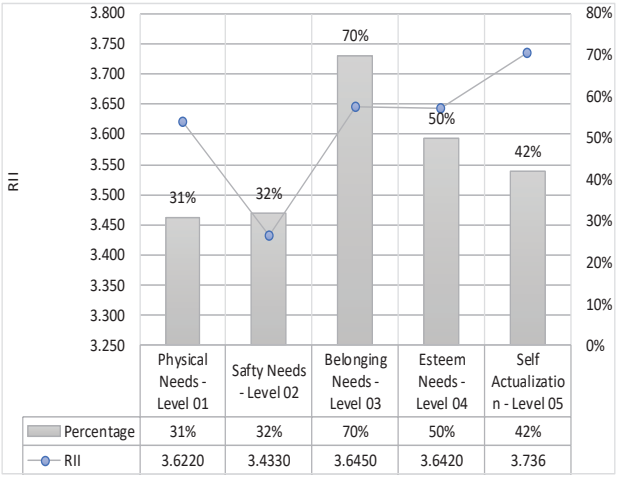

Figure 1 – Variation of Significance Level with Need Levels

4.1 Variation of the Importance Level with Age

This section explains how the response percentages and importance levels vary with the age of the engineers. Based on the literature, only a few discussions on the measurement of this concept have evolved. According to Cleveland and Shore [24], four types of age measurements are adopted in the psychological analysis, viz., the employee's subjective age (self-perception); the employee's chronological age; the employees' relative age (compared with the employee's workgroup); and the employee's social age (perception of others). Nevertheless, the chronological age of engineers is considered in this study. Age parameter was subdivided into four groups: age between 25-30; age between 30-40; age between 40-50; and age above 50. Analysis was conducted following the same pattern categorising according to Maslow's need based on the respective RII. The percentage of engineers and the RII are organised for the top 5 motivation factors in Table 9.

Table 9 - Statistical Results of Age G Groups

Rank given for top 5 factors	Factor	Age group 25-30	Age group 30-40	Age group 40-50	Age group more than 50
		Rank	Rank	Rank	Rank
1	Job satisfaction	8	3	4	1
2	Promotions	7	6	1	10
3	Opportunity for administrative position	8	10	2	3
4	Reasonable salary	2	2	7	6
4	Support from non-engineering superiors	4	1	17	1

This analysis has highlighted an intriguing variation of the importance level with age groups. For example, the top-ranked motivation factor for the age group 25-30 is the reasonable salary, which is about receiving an adequate payment compared to current market standards. However, this factor's importance has varied for 30-40, 40-50, and above 50 age groups with a ranking between 2nd, 7th, and 6th, respectively. Once there is adequate support from non-engineering personnel on higher ranks, young engineers are keen to work in such an environment. It was also observed that there is no such contribution from non-engineering superiors. This dissatisfaction may cause "getting adequate support from non-engineering personnel on higher ranks" to become one of the prioritised aspects for the age group 25-30.

4.2 Variation of the Importance Level with Gender

The top five factors that primarily impact construction labour productivity are further analysed to understand whether there is a pattern between male and female employees. According to Cardoso et al. [25], the repercussions of various construction engineers' attributes, including gender-based variation, lead the labour productivity. Therefore, this part of the study aims at distinguishing the respondents based on gender to seek the variation of the importance level on the listed motivational factors.

Table 10 - Statistical Results of Gender roups

Rank given for top 5 factors	Factor	Female		Male	
		Rank	Importance Level	Rank	Importance Level
1	Job satisfaction	7	VS	7	ES
2	Promotions	10	VS	2	ES
3	Opportunity for administrative position	4	ES	4	ES
4	Reasonable salary	2	ES	6	VS
4	Support from non-engineering superiors	8	VS	3	ES

According to Table 10, the most important factor for female engineers is the reasonable salary levels (ES-4.457), and the second important factor is the opportunities available to enter administrative related positions (ES-4.286). On the flip side, male engineers' two most important factors are promotions (ES-4.396) and available support from non-engineering superiors (ES-4.292).

5. Discussion

Among the five need levels concerning the government sector's construction labour productivity, self-actualisation (5th need level) accounts for the highest average RII of 3.736, with six factors investigated (Table 7) from this group. Accordingly, job satisfaction (ES-4.338), adequate support from non-engineering superiors (ES-4.226), and provision for early retirement plan (VS-3.766) were rated by the participants as the three most influential factors. The second most influential need in the government sector's construction industry is belongings needs (3rd need level) with an average RII of 3.645. Three factors were examined (Table 5), and further assistance on medical/ other insurances (ES-4.035) was rated as the most influential motivation factor. However, adequate support on personal life (VS-3.440) was recognised as the least vital factor in this group. Seven factors of esteem needs (VS-3.642) became the most influential need after the belongings needs, as shown in Table 6. Opportunity for an administrative position (ES-4.241), self-satisfaction on work done (VS-3.979), and giving feedback /say well done (VS-3.943) were graded as the most significant motivators within the level. Physical need (VS-3.622) is the next most influential, including three factors, as shown in Table 3. Reasonable salary (ES-4.333) was rated by the participants as the three most compelling factors. Finally, the least significant need for RII results in Table 4 was recognised safety needs with a mean index of 3.433 (VS). Four of the seven factors have either an "extremely significant or very significant" influence on productivity, while it is 'significant' for the remaining factors. On the flip side, none of the belongings needs is available among the top five factors if all twenty-six factors are considered. The following top five factors that can impact labour productivity and create discouragement through poor satisfaction were listed in descending order, viz., job satisfaction; promotions; opportunity for an administrative position; reasonable salary level; and support from non-engineering superiors. The variation of the importance level based on age and gender is further reviewed under each factor.

5.1 Job Satisfaction

This study highlights that construction engineers in the government sector recognise job satisfaction as the utmost influential factor (ES-4.338). There is a discussion that non-monetary factors such as job satisfaction is valued by the construction engineers while taking money for granted [25]. Accordingly, while salary plays a huge role in one's life, engineers seem to be more focused on job satisfaction. A satisfied workforce will give its maximum to the organisation and be loyal and passionate about their work, which reduce the possibility of turnover in the industry. Only 53% of engineers believe that they are satisfied with the current scope of the projects. Accordingly, engineers in the age group of 30-40 and above 50 have ranked job satisfaction as extremely important, whereas other age groups have only ranked it as an important determinant. Interestingly 100% of the engineers indicate that they should be at administrative positions but not satisfied with the factor. However, the current job satisfaction for the age group 25-30 is mentioned as 0%,

which implies authorities' need to revisit such job descriptions.

5.2 Promotions

The RII for promotions in the overall context is 4.255, and it belongs to the extremely important category. People naturally like achievements and a sense of achievements and tend to climb up the ladder. It was observed that the importance level varies with age, where the need is highest at the age of 40-50, which may be due to the status in life and the lowest in the above 50 age group as they are more tuned to self-actualisation needs. Young engineers in the age group 25-30 showed extreme importance, and engineers with age more than 50 give lesser importance.

5.3 Opportunity for Administrative Positions

All the engineers had indicated that they should be in administrative positions but not satisfied with the opportunities available. RII of this factor is 4.241(ES). The capacity of ministries and authorities was challenged by the comments received stating the lack of knowledge of the personnel in such authorities as most of them are led by non-professionals. If the professionals could handle such positions, respondents believe that it would lead to the betterment of the employees. Besides, advancement in productivity can be observed based on the involvement of knowledgeable people in the decision-making process. It was further observed that the importance given to the admin positions gradually increasing with age.

5.4 Reasonable Salary

According to Kazaz et al. [3], adequate payment plays a vital part in coupling physiological and esteem needs in society. Accordingly, a good salary package is a compelling stimulant for government sector engineers, while low salary levels could lead to a drastic situation in the continuation of operations. 92% of the engineers stated that the salary that they have received up to now is not adequate (ES-4.227). The insufficiency is not for the fulfilment of the basic needs but for the status and lifestyle that the society intends to maintain as an engineer, which was justified by the comments received. However, with age, the importance of salary levels has drastically changed, clearly explained by RII figures. Accordingly, young engineers being in a phase where they need to build up lives could be another reason they perceive high importance on the salary levels.

5.5 Support from Non-engineering Superiors

This factor has received a RII of 4.227 and, with age, support received from non-engineers has increased, which is quite ordinary given that with time the relationships tend to continue smoothly. This could be at a low level in the initial stages since the relationships are still at a progressive level. However, except for the age group 40-50, all other age groups have considered this a vital factor. During the study, it was found that most administrative service officers do not possess the engineering expertise needed to make mandatory and imperative decisions. Proper mentoring and guidance calibrate the motivation of the individuals to a focused platform that seems to be lagging in the sector.

6. Conclusions

Motivation leads to better performance, and the organisation could attract and retain its quality people within the organisation. Especially in the case of engineers, their institutionalised knowledge and experience is important and it will result in quality outputs, and it will impact on organisation's continuous quality existence. Thus, this has led to a plethora of theories and research regarding motivation. This research has identified 26 key motivation factors through the focused interviews with industry experts and literature reviews, categorised based on Maslow's hierarchy of needs. The most influential need level among them was statically determined as the self-actualisation with a relative importance level of "very significant" (VS-3.736) followed by belongings needs (VS-3.645), esteem needs (VS-3.642), physical needs (VS-3.622), and lastly the safety needs (VS-3.433). Variation of the importance level of the motivation factors was explored concerning four age groups and gender basis in this study. The RII was calculated for each factor, and 5 factors that produced the highest RIIs were job satisfaction, promotion, opportunity for an administrative position, reasonable salary, and support from non-engineering superiors.

According to the responses, only the belongings needs of the engineers in the government sector were addressed to a certain extent while other needs were satisfied poorly. Thus, to retain the skilled and competent professionals in the organisation, the lack of areas highlighted in the research should be identified, and necessary actions should be taken to rectify such concerns

in the future. While it is fully impossible to satisfy every person given the individual variety, as per Maslow, if the basic level needs are not satisfied, the individual seeks ways and means that would enable him/her to fulfil the same. This is the major underlying reason behind the high turnover among government engineering sector organisations. The analysis focused on age and gender revealed quite interesting findings on how motivation factors change with those parameters. Job satisfaction became the overall highest RII although different ages have picked different factors as their favourite. Younger aged engineers preferred appreciation and benefits while the engineers in 40-50 age group have ranked promotion as the highest-ranked RII. Supervisors and subordinate staff have been selected as the top factor in both age 30-40 and above 50 groups. In terms of gender, male professionals have selected job satisfaction as their key factor, whereas females preferred health and the security of the job.

In a sector like engineering, establishing good processes and good organisational behaviour to motivate people would support employee morale and the psychological situation given by the government. An entire study should be carried out to identify the requirements, and then categorical data should be analysed. Employer feedback needs to be taken in order to cross-check and validate. Having a proper process of promotion considering educational qualifications, services, or through a competitive process can be suggested. However, the important factor is ensuring the timely functioning of the promotion process. Performance appraisal system can be introduced, and staff should be trained to conduct such systems to improve the system's visibility and trust. The salary and benefits should be increased such that they are comparable with the private sector. It is recommended to establish a process to appoint engineers to administrative positions or establish a consultation process to assist non-engineering personnel in higher positions. Further assistance on medical/ other insurances should be matched as per industry standard. Consideration should be given to female-related medical requirements such as caesarean surgery, etc., as female engineers have ranked this as the top factor among other motivating factors.

Thus, all the above factors should be focused on developing a suitable strategy to improve the employees' motivation level, thereby improving the organisation's productivity by retaining valuable and experienced professionals.

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