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Nayanthara De Silva, Rasika Samanmali, Harsha Lal De Silva,

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## Managing occupational stress of professionals in large construction projects

### Abstract

**Purpose:** Occupational stress among professionals in the construction industry is increasing considerably due to faster economic development projects in many developing countries. Reportedly construction professionals are the third most affected group after miners and police officers. There is a need to explore profession-specific occupational stressors, their impact on professional and the prevention strategies in place at the organizational level. Further, specific prevention strategies need to be identified for implementation at the organizational level.

**Design/methodology/approach:** A questionnaire based survey was performed among construction professionals such as Project Managers, Engineers and Quantity Surveyors involved in large construction projects to identify occupational stress causing factors pertinent to construction professionals, their impact and occupational stress prevention strategies. Stress prevention strategies at primary, secondary and tertiary levels were analyzed to establish the stress prevention framework for large organizations.

**Findings:** Eleven occupational stress causing factors were identified to be significant in creating negative impact at the work. Further thirteen resultant impacts of negative stress too were recognized. Three primary prevention strategies, three secondary prevention strategies and a tertiary prevention approach were identified via a factor analysis to manage these occupational stresses at the organizational level.

**Originality/value:** Impact of occupational stress on construction professionals that may cause poor performance of the industry can be controlled by effectively managing and controlling the negative stresses.

**Keywords-**Occupational stress, construction industry, large construction projects, construction professionals, safety and health

**Paper type-** Research paper

### 1. Introduction

The construction industry has long been recognised to be a stressful industry, due to its complexity (Enshassi and Al.Swaity, 2015). Further, continuous increase in complexity of work and growing demand for higher productivity have become common features of the construction industry and thereby creating a challenging environment towards achieving time, cost and quality targets of construction projects (Ibem *et al.*, 2011; Jang *et al.*, 2003). Under such circumstances, many professionals including Project Managers, Architects, Engineers and Quantity Surveyors have to work under pressure (Ng *et al.*, 2005). Thus to a certain extent, occupational stress has become a general phenomenon for construction professionals, where 68% of the construction professionals are reported to suffer from stress, anxiety or depression

(Chartered Institute of Building (CIOB), 2006 as cited in Enshassi and Al.Swaity, 2015).

Occupational stress is defined as “the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker” (The National Institute for Occupational Safety and Health (NIOSH), 1999). Generally it is considered that prolonged negative stress is harmful to physical, mental and emotional health of professionals under various circumstances (Bowen *et al.*, 2014; Strutton and Tran, 2014). As a result, excessive stress interferes with their performance and productivity and thus the efficiency of the overall project delivery (Amankwah *et al.*, 2015; Ng *et al.*, 2005). As highlighted by Ilbem *et al.* (2011), recent studies show that construction workers experienced more negative stress at their workplace and this had undesirable effects on their health and productivity at work. Therefore occupational stress is recognized as a growing problem worldwide and has significant impacts on both the employees and organizations. These impacts include low motivation and morale, decrease in performance, high turnover and sick leave, accidents, low job satisfaction, low quality products and services, poor internal communication and conflicts etc. (Strutton & Tran, 2014; Leung, *et al.*, 2011; Cotton & Hart, 2003; Schabracq and Cooper, 2000). Further, study by Lingard (2003) revealed that burnout arises among engineering profession in Australia as a result of a complex interaction of individual, work-related and situational factors. Similarly, in Sri Lanka too, a considerable level of stress that construction project managers are suffering is almost at a burnout level (Senaratne and Rasagopalasingam, 2017).

However, this problem has been overlooked at the industry level and hence professionals in their individual capacity have to find ways of managing their stress to meet delivery of the projects within time, costs and at the required quality (Leung *et al.*, 2004). Therefore, this study aims at establishing a management framework that could be implemented at the organizational level to safeguard construction professionals. In this regard, the research was designed to achieve following objectives;

- Examine occupational stress causing factors,
- Analyse the extent of the occupational stresses among professionals in large construction projects,
- Identify appropriate strategies to develop a stress management framework.

## 1.1 Types of Stresses

Han Selye, (1976), who is often referred as the “father of stress”, was the first to distinguish stress as “good stress” (eustress or positive stress) and “bad stress” (distress or negative stress). Positive stress is generally short term perceived and results in motivation, better focus, improved personnel coping abilities, feeling excited, improve performance etc., whereas negative stress can be either short term (acute) or long terms (chronic) resulting in anxiety, unpleasantness, decreased

performance and mental or physical problems (Bowen *et al.*, 2014; Leung *et al.*, 2004; Jorden *et al.*, 2003; Ornelas & Kleiner, 2003). Among these two, chronic stresses create health problems and thus calls for managing its causative factors. When stress is caused as a result of occupational factors such as mismatch between job requirements and the worker's capabilities, resources or needs of the workers, it is known as occupational stress (NIOSH as cited in Mahajan, 2012). Such "Stress" is not limited to any particular occupation or profession (Ng Skitmore, and Leung, 2005).

Statt, (1994) has noted that construction work is the third most stressful profession after mining and police work, due to its inherent nature of the job. Sutherland & Davidson (1993) (as cited by Oladinrin *et al.*, 2014) found that among professionals who have experienced stress in the UK construction industry, 77% are senior managers and 23% are middle level managers. Further, recent studies reveal that construction workers experienced much more stress at their workplace than at home, which created undesirable effects on their health and productivity at work (Wahab, 2010; Mimura *et al.*, 2013). Similarly, a negative correlation is noted between the occupational stress and the job satisfaction as well as organizational performance (Elovainio *et al.*, 2002; Cotton and Hart, 2003; Kazmi, 2007, cited in Amankwah *et al.*, 2015). Further, Leung *et al.* (2008) studied stress under three types; objective stress, burnouts, and physiological stress and found a negative relationship between stresses and performance of individuals. While there is a reported increase in occupational accidents (Clarke and Cooper, 2004), high absenteeism, alcoholism, and drug abuse too have become major social problems consequent to occupational stress.

## 1.2 Types of Stressors

Stressor is an essential component of stress, and has the potential of eliciting a stress reaction (Enshassi and Al.Swaity, 2015). Stress can manifest as tension or dissatisfaction and could also influence the psychological health and performance (Bowen *et al.*, 2013; Leung *et al.*, 2010). On the contrary, findings of Enshassi *et al.* (2015) revealed that job stresses and job burnout did not affect safety performance of construction industry.

In the published literature, stressors in construction professionals are commonly divided into four categories that include task stressors, organizational stressors, physical stressors and personal stressors (Senaratne and Rasagopalasingam, 2017; Leung *et al.*, 2010; Leung *et al.*, 2008). There are other classifications which define stress categories aligned with the nature of the job at the site level. They include work demand, work environment, job role and organizational related, unspecified employment requirement, extremes of formality, lack of locus of authority, lack of adequate staffing and equipment, poor organizational communication, conflicts, and insufficient remuneration (Ibem *et al.*, 2011; Leung *et al.*, 2010; Chen *et al.*, 2006; Raitano and Kleiner, 2004). Ng *et al.*, (2005) mentioned inadequate room for innovation, unsatisfactory remuneration and ambiguity of job requirement as organizational related stressors. Furtehr, Haynes and Love (2004) revealed that work overload was the highest ranking stressor, followed by working long hours and

conflict between family and work. Similarly Enshassi *et al.* (2015) mentioned that the organizational stressors which include lack of job stability, inadequate training in safety, low salary, lack of proper evaluation and monitoring of safety performance, unfair rewards and treatment for compliance to safety provisions, the concentration on productivity by employers while ignoring their employees' safety and poor communication, is the major contributor to physical stress, behavioral stress and job burnout. According to Cooper (1985) as cited by Ekundayo (2014), these causative factors have been categorized in a broader way by adding several levels including environment, individual and individual differences in addition to organizational level stressors.

The emergence of signs and symptoms of occupational stress caused by factors mentioned above appeared as physical, psychological, behavioral consequences which include (Ekundayo, 2014; Oladinrin, *et al.*, 2014; Gupta, 2013; Melinda *et al.*, 2010 as cited in Amankwah *et al.*, 2015; Ademola, 2005):

- Physical: cardio-bronchial pain, elevated blood pressure, palpitations, weight loss from under-eating and sleeping at unusual times, eating disorders, headaches, hair loss, breathlessness and hyperventilating, muscle aches, dryness of throat and mouth, sweaty palms, diarrhea, indigestion, stomach ulcers, etc.
- Psychological: feeling of being useless and hopeless, lack of concentration, tenseness, sleep disturbances, depression, distrust, anxiety, etc.
- Behavioral or emotional: impulsive behavior, eating excessively or inadequately, becoming easily distracted, speech problems, sleeping too much or too little, change in personality, irritability or aggressiveness, grinding of teeth, increasing indulgence in smoking, recreational drugs and alcohol, burnout, nervous habits, increased frequency of errors, absenteeism, lack of concentration, etc.

## 1.2 Occupational Stress Management

Individuals' ability to mobilize and successfully or unsuccessfully deal with stress factors is defined as coping with stress, adjusting to stress or stress management self-mobilization (Mihaela, 2010; Haynes and Love, 2004). Instead of taking medicine to reduce stress, there are many other alternatives for diminishing its damaging effects through better control and management (Kavitha, 2009). According to Bowen *et al.* (2014), these include (1) taking physical exercise, (2) engaging in hobbies, (3) socializing with family and friends, (4) engaging in various forms of entertainment, and (5) seeking support (from supervisors, coworkers, and others). Aitken and Crawford (2007) found that project managers apply active coping and planning strategies when dealing with stressful situations. Organizations too, can orient their employees to regular maintaining of well-being and prevention of occupational stress (Treven and Potocan, 2005; Jain *et al.*, 2013). In this regard, a collective effort is required, with the top management's attention and the individual's commitment to battle the occupational stress (Senaratne and Rasagopalasingam (2017). Aitken and Crawford (2007) further mentioned that the organization are no longer able to

consider only the stress that directly affect work, but ensure they are acknowledge other aspects of occupational stress. NIOSH (1999) mentioned that organizations should offer guidelines on the process of stress prevention which involves three distinct steps: problem identification, intervention, and evaluation. In this prevention process, “prevention strategies” for stress management at organizational level can be taken as primary, secondary and tertiary prevention methods (Ratino and Kleiner, 2004; Jordon *et al.*, 2013):

- Primary prevention is the elimination or reduction of the factors that promote distress.
- Secondary methods involve the stress administrative responses: relaxation training and physical exercise are examples
- Tertiary prevention strategies are the attempts to minimize or cope with excessive distress from inadequately controlled stressors and inadequately controlled or moderated stress responses.

Therefore, conceptualizing the literature synthesis on stressors, stresses and their prevention strategies, a stress management framework for organizational level can be illustrated as shown in Figure 1. Types of stressors are classified into ten stress groups (SG) and prevention strategies divided into three types.

<Figure 1>

## 2. Research Methodology

A quantitative research approach was selected for the current study considering the nature of the research problem. Quantitative research is used to quantify the problem by way of generating data on attitudes, opinions, behaviors, etc., in a numerical format that can be transformed into statistics. Therefore, a questionnaire survey was chosen as the research strategy in order to explore facts pertaining to occupational stresses among construction professionals and identify their preventive strategies. This method has been widely adopted in other researchers for previous studies (Senaratne and Rasagopalasingam, 2017; Enshassi and Al.Swaity, 2015; Bowen *et al.*, 2014; Leung *et al.*, 2010; Leung *et al.*, 2009). Further, findings of the statistical analyses were used to establish the stress management framework.

The research protocol was structured to several phases. It initiated with an extensive literature review to identify occupational stressors specific for the construction professionals, impact of occupational stress and occupational stress prevention strategies. Literature findings were used to formulate the pilot questionnaire which reflected the literature findings on (1) occupational stressors, (2) their impact and (3) stress management strategies. The questionnaire was validated through a pilot survey, focusing on the comprehensiveness, reliability, and conciseness. Further, it was used to identify difficulties in answering the questions and to ensure whether the questions were phrased correctly. Three industry experts from each professional categories participated in the pilot survey. These experts were selected based on their experience in handling large construction projects and their experience in both civil engineering and building sectors.

In the second phase, a detailed questionnaire was designed by incorporating the expert feedback received for the piolet questionnaire. The questionnaire comprised of two separate sections; personnel information and subject information and a cover page. It included both open ended and closed ended questions. Personnel information section gathered data on respondent's demographic information (age, gender, marital status etc.), nature of the profession, experience in large construction projects, and opinion of the respondent on occupational stress as a health and safety problem.

Subject information was designed to achieve all three objectives of the research, and therefore included three main questions to identify significant stressors, impact of such situation and stress prevention strategies. In the first question, 39 stressors were organized into ten headings namely; (SG1) Work load related factors (SG2) Work time related factors (SG3) Organization working environment related factors (SG4) Work (on-site) related factors (SG5) Career development and status related factors (SG6) Interpersonal relationship related factors (SG7) Professional development and training related factors (SG8) Organizational function and culture related factors (SG9) Partaking related factors and (SG10) other problems related factors, These were derived from the published literature. Two additional stressors, namely, "use of mobile phones while working" and "exposure to heavy traffic jam" were added based on expert opinion received during research planning. In the second question, 19 potential health impacts identified through the literature survey were listed under three groups as physical response, behavioral or emotional response and cognitive response. In the final question, respondents were given a set of stress intervention strategies that were commonly used by the organizations to identify how often / how much effectively such strategies are followed in their organizations. A five-point Likert scale was provided for respondents to indicate their level of agreement with each stressor and health impact listed in questions 1 and 2.

## 2.2 Sample selection

The target survey group was the professionals working in large construction projects. Large construction projects were defined as; "Construction projects which are complex in nature and multitasking, contact sum more than LKR 600 million including both Building and Civil engineering construction projects" for the purpose of the current study.

Limited resources make it impossible to conduct a survey on a large population. Hence a representative sample from the target group was drawn in such a way that they can closely represent the total target population as close as p (Kuzma, and Bohnenblust, 2001). The cluster sampling method was used for the study by selecting the registered large scale construction contractors (i.e. grade C1) in Colombo area. Further, it aimed to select the most experienced professionals. A list of C1 grade contractors in Colombo area was taken from the CIDA (Construction Industry and Development Board) website. We found 20 construction firms listed in the C1-category contracting firms in the Colombo area. We visited these firms to obtain details of the large construction projects they completed in preceding 10 years and selected 25 projects for the present study. Most experienced persons from each

professional category who had engaged in these projects were invited to participate in the survey. One hundred and six (106) questionnaires were distributed using two methods; direct handover and via emails. Further, on average 2-3 reminder telephone calls were made to those who failed to return the questionnaire within three weeks of delivery and were also visited personally to collect the completed questionnaire in an attempt to improve the response rate.

### 3. Analysis and Discussion

#### 3.1 Respondent Profile

From 106 questionnaires distributed, a total of 85 were returned to us recording a response rate of 80%. Nine questionnaires were eliminated from the analysis due to their incompleteness. Table 1 shows the composition of the survey sample and Table 2 illustrates the site experience and age. Among the respondents selected nearly two thirds (64%) were males..

<Table 1>

<Table 2>

Nearly 96% of the respondents reported to have experienced occupational stress while 4% respondents denied experiencing occupational stress during their work experience. Further, 90% of respondents recognized occupational stress as a health and safety problem and believed it to impact their productivity while 10% responded thought otherwise.. Majority of the respondents were married (75%) and the study findings indicated that married construction professionals were finding it more difficult to cope with job challenges due to s both family as well as work related stress.

#### 3.2 Significant Stressors and their Impacts

*T*-test (at 5 percent significance level) was performed using Statistical Package for Social Sciences (SPSS) software to identify significant stressors from given 41 stressors in the questionnaire. Following conditions were used to test the null hypothesis;

*H*<sub>0</sub>:  $m=m_0$  against the alternate hypothesis *H*<sub>1</sub>:  $m=m_1$ , where 'm' is the population mean and *m*<sub>0</sub> is the sample mean.

Test value was taken as 3 according to the given scale. Thus, the stressors which obtained critical t- value 1.990 and a p value of less than 0.05 were identified as significant. A total of 11 significant stressors were identified, based on the results obtained from the *t*-test (Table 3).

<Table 3>

Time pressure was identified as the most critical stressor and agrees with findings of Cattell *et al.* (2016) and Haynes and Love (2004). Further, these results closely align

with findings by Enshassi and Al.Swaity in 2015; Leung *et al.* in 2010 and Leung *et al.*, 2009; in which “work overload” was identified as most prominent factor followed by the “job role” specific stressors. Interestingly, “exposure to heavy traffic jam” and “use of mobile phones while working” are unique stressors in Sri Lankan context. “Insufficient time spent with family” or related factors were not found as a stressor among local construction professionals which contradicts with the findings of many authors (Cattell *et al.*, 2016; Haynes and Love, 2004; Leung *et al.*, 2009). This could be due to the local culture in which family members are relationally close and also in many instances receive the support from immediate extended family members such as father, mother, brothers and sisters to cope with day-to-day household issues.

Being a professional in this field, a person should develop skills to cope up with this stressful environment. However, the critical shortfall is the lack of provisions for supportive techniques, approaches and avenues to enhance their competence in this regard. As a result, occupational stress has serious impacts when it is considered as a negative stress. Results of negative stress are shown in Table 4.

#### <Table 4>

One of the senior managers mentioned that he is in this field for sixty years and still work under heavy pressure to achieve project targets. Similarly, Enshassi *et al.* (2015) found that construction professionals suffered from emotional stress and invisible burnout. Thirteen impacts of negative stresses were identified through this study. Heart disease and high blood pressure were identified as the first two critical health impacts of the negative stress. Albeit they were not based on medical evidences are still well known to be caused as a result of stress. Making mistakes by professionals was shown as the third highest rank. This may interrelate with the reduced attention. One mentioned that “*due to this stressful work, I cannot concentrate on my work effectively*” and further added “*people often find temporary relief by taking alcohol*”. Bowen *et al.* in 2013 and 2014 also found increased indulgence in alcohol consumption, tobacco-smoking, and other recreational drugs as a negative coping behavior among construction professionals. As a result of heavy addiction to alcohol and drugs, memory losses, reduced attention and other nerve weaknesses can emerge as secondary impacts. Prolonged mental ill-health can adversely affect the physical fitness of the body and even derange the immunity, making the person susceptible to frequent sickness like headache, stomach problems etc.

If this continues, it may affect the individuals’ family life. For instance, one manager expressed that “*I always hate company of my family members because I felt that they disturb my work*”. Further if this stress continues to be ignored can easily head towards developing depression and other mental health disorders. Experts mention that they have identified many such professionals in the field. One expert s even encountered a suicide attempt in his more than 40 years of job experience. Reduced interest to work can be identified as an early sign of such a situation. Some mentioned that they felt powerless at early stages.

### 3.3 Organizational Level Occupational Stress Management Framework

Stress management framework was developed by integrating organizational level prevention strategies. These stress prevention strategies with potential for implementation at organizational level to provide better management structure are discussed under three categories as primary prevention, secondary prevention and tertiary prevention. Table 5 shows significant stress prevention strategies obtained from the *t*-test where critical *t* value is 2.039.

#### <Table 5>

The identified 24 occupational stress prevention strategies were further grouped using factor analysis to establish stress prevention approaches which were used in forming the framework. The principal component method was used to extract factors (i.e. approaches) with Eigenvalue greater or equal to 1. Factor rotation was carried out to capture maximum data points.

Factors analysis extracted 3, 3, and 1 strategic approaches under primary, secondary and tertiary categories respectively (Tables 6-8).

#### <Table 6>

##### *Primary Strategic Approach 1: Comfort climate in the work environment*

Most of the professionals have to work at the sites without sufficient breaks when meeting project targets of large developments. Therefore, it is important to provide a comfortable climate that can be achieved with several settings such as sufficient breaks, flexibility in work schedules, increased opportunities for career development, clear work description, etc., within the work environment. Our results align with Cattell *et al.* (2016) who identified that volume of work, flow of work and type of work to be most important controlling factors in work environment. Authors further identified high salaries and good career path opportunities as effective “job support” to overcome the situation.

At the same time, it is essential to avoid contradictory demands caused when meeting various needs by individuals. Professionals mentioned that in the local working culture, inability to refuse excess work can be a one of the reasons for contradictory demand and in turn reduce the flexibility in work schedules.

Several variations in the drawings, construction and services installation due to many reasons such as errors and change in the client’s needs create conflicts, leading to anxiety situations at work. This situation should be controlled by maintaining clear work instructions. However, poor communication and coordination due to lack of integration among professional such as Architects, Structural Engineers and Mechanical & Electrical Engineers etc., in the construction industry results in many shortfalls in work instructions.

Professionals are often exposed to a dangerous working environment and thus it is important to provide appropriate safety equipment and instructions. Further if the safety equipment fall below specifications they themselves could become harmful. For example, when a lanyard is given to reduce falls risk and if the anchors that are provided to hook on is not strong enough, the person who use the equipment has a high risk for falls. Leung et al. (2010) identified that inappropriate safety equipment is a significant factor for emotional stress.

More importantly, career development and adequate remuneration should be facilitated to satisfy them through recognizing the value of their work contribution.. Career development is also important for obtaining the maximum utility of the workforce in higher standards. Therefore, these two factors contribute to removing stress through proper gratification.

#### *Primary Strategic Approach 2: Facilities/opportunities in the work environment*

Second strategic approach aims at adequate training on stress management, faithful deadlines, opportunities for social interactions among workers and providing good working conditions. Conducting stress appraisal and stress management workshops are recommended by Leung *et al.* (2008) as a stress coping method for construction project managers.

Most of the professionals in the construction industry possess sound technical knowledge albeit being weak in managing inherent work related stress. Thus, it may help them to cope difficult work situations with no stress if they are trained with stress management techniques that can enhance relevant skills and behaviors. As mentioned by NIOSH (1999), these training programmes can orient towards offering knowledge on nature and sources of stress, the effects of stress on health, and personal skills to reduce stress-for example, time management or relaxation exercises. Treven and Potocan (2005) also stated that causes of stress, its consequences, and management methods are important features in stress management programmes. Hede (2009) has introduced mindfulness-based emotions management techniques to improve emotional reactions. Such stress management practices should be integrated into existing work practices. However, local experts mentioned that industry has paid very little attention on stress management programmes. Stress still existed as a covert matter in people due its affection to their dignity.

Additionally, social interaction among others enable them to relieve stress (Adamson, 2011).Therefore many organizations arrange various social activities in line with different festivals in the country, aiming to establish and maintain the social support to their workforce. Further, organizing annual trips and other social activities has become the culture in many private sector organizations.

Assigning faithful deadlines is another point highlighted by the professionals to avoid building occupational stress. As mentioned by Strutton and Tran (2014) assigning the same person for various activities could be a causing factors for unrealistic deadlines. According to local experts, this has come a common practice in the construction industry in Sri Lanka.

Adamson (2011) stated that providing a good working condition is a primary factor towards eliminating stress. Respondents in the present study showed the necessity for comfortable working conditions with a well-organized working environment. They added that it will be rewarded with increased efficiency and effectiveness of the work as they will be always ready to work with more dedication and enthusiasm in comfortable working environments.

#### *Primary Strategic Approach 3: Hazard free work environment*

The third primary stress prevention approach includes access to information required to perform the work, a workplace process free from safety hazards and a workplace free from excessive noise, excessive temperature etc.

It obviously challenging in the construction industry to provide a working environment totally free of hazards because it is well known that most construction sites are hazardous (Fryer, 1997). Yet, attempts could be made to achieve a better safety level than the prevailing conditions. Industry used good safety practices and technology to eliminate and control unsafe conditions. These include engineering controls and administrative controls. Although it may be not be possible to totally eliminate excessive noise, dust, temperature, etc., from construction sites, the situation can be controlled with the use of advanced technologies. Additionally, employees could be provided with appropriate personal protective equipment.

Formal information sharing can create a supportive working environment that in turn reduce incidence of work induced stresses. In this regard professionals are facilitated to access the required information as soon as possible. However, experts showed that there are many lapses in the flow of information as modes of communication are not well established within the project management phase. Heavily used traditional procurement processes where lack of collaboration between project team members, provide little room for efficient information flow. Further, advanced systems such as Building Information Management (BIM) applications, global positioning systems, and internet technology are still at a very early stage in the local industry.

#### *Secondary Strategic Approach 1: Organization communication network*

##### <Table 7>

Secondary strategic approach 1 includes opportunity to participate in decision making, proper communication, and opportunities to meet superiors on work related matters. Flexibility in knowledge sharing on the variations or any other related matter

in construction should be encouraged. Instead of an exclusive, monopolistic environment, professionals should be facilitated with opportunities to participate in decision making as a strategy for stress response. This could reduce distress and increase moral of professionals (Raitano and Kleiner, 2004). Most of the private sector organizations in the local industry are open for this set-up when compared to government sector which is still hampered with bureaucracy.

The efficient “vertical” and “horizontal” organizational communication system is absolutely essential to establish appropriate working relationships during decision making. Chen *et al.* (2006) has shown the relationship between organizational communication and stress. Meetings with superiors to obtain advises on various work related matters should be available in order to eliminate building frustration.

#### *Secondary Strategic Approach 2: Organization administration support*

Second strategic approach extracted from factor analysis includes three strategies such as support from organization to control over work, holding regular team meetings and developing effective feedback systems.

Organization’s support can be given in various ways to establish and maintain control over the work. Providing clear scope of work, on time information and approvals, dispute management are few to name. Experts showed several examples for problems pertaining to receiving required approvals on time. Political interference and disputes in several government projects may cause building stress on professionals. Experts further mentioned “*in some situations, organization might be helpless when the local government changes their policies, standards and scope of the work*”.

Regular team meetings can be held to mitigate the above scenario where professionals can share their own ideas and efficiently apply them into construction. Moreover, these ideas can be verified and wetted with previous experiences to ultimately achieve high quality products..

#### *Secondary Strategic Approach 3: Well-disciplined culture at workplace*

Third strategy observed from the factor analysis is (having 1.136 Eigenvalue) Importance to take necessary actions to reduce physical violence, verbal abuse and harassments to establish and maintain well-disciplined workplace culture. Similarly Bowen *et al.* (2013) found that harassment is linked to higher levels of stress among South African construction professionals. This factor can be established by implementing appropriate standards for ethical professional behavior. This can be introduced by relevant professional bodies. Experts further mentioned a “whistle blowing system” which can be established at the organizational level to directly communicate lapses and breaches in ethical behavior to the management hierarchy. Such supportive measures towards eliminating the unethical behavior could easily enhance the job satisfaction of the construction professionals thereby increasing the efficiency and effectiveness of the work output.

### *Tertiary Strategic Approach*

Using the principle component analysis and based on the Eigenvalues, one strategy was extracted from the component matrix and communalities. Results are shown in Table 8. After eliminating the factors which are most difficult to implement limited strategies were available.

#### <Table 8>

#### *Tertiary Strategic Approach: Stress management facilities.*

As a tertiary stress prevention strategy, stress management facilities has obtained 2.122 Eigenvalue. Respondents highlighted the conflict among staff indicating the need for a conflict management system. Introduction of proper counselling programmes are equally important to control the consequences of stress. Health facilities are important for curing both physical and mental illnesses. For physical illness, organizations can provide facilities such as first aid, consultation with doctors, health centre facility at the site premises. Mental illness can be treated by qualified counselors when such issues occur. Moreover, stress assistance programmes can be designed by consultation with suitable qualified personnel to familiarize the issues of workplace stress, its consequences as well as the measures to overcome such issues.

Further, these findings are illustrated in the framework for better interpretation (Figure 2). This proposed framework is recommended for organizations to establish stress free working environment.

#### <Figure 2>

### **Conclusions**

Published research endorse that the occupational negative stress leads to a decline in employees' job performance and excessive stress adversely impacts on construction industry performance. Stress must therefore be appropriately managed. Occupational stress has become an ignored term in the construction industry and the impact has been seldom studied due to the inherent characteristics of the industry. Construction projects are highly committed to achieve time, cost and quality targets. The recent economic growth in Sri Lanka has observed a construction boom with many large projects being initiated. Continuous modification of construction projects, increasing complexity of work and increasing demand for higher productivity have become common features of the industry.

Hence, it was identified that this would be the most appropriate timeframe to commence assessment of occupational stress among professionals involved in construction industry.

A vast majority of the respondents (96%) confirmed experiencing stress at workplace while only a minority (4%) denying being affected by occupational stress. It has become a big issue for the performance of the individuals due to less job satisfaction.

Further 89.93% of respondents linked occupational stress with their personal health and well-being. Only a minority of the respondents (10.07%) were oblivious to this relationship.

This research study identified 11 significant occupational stressors. Further, consequences were studied and 13 were identified as significant. To enable a stress free work environment for construction professionals, Seven occupational stress prevention strategies were identified as primary, secondary and tertiary prevention strategies to help establishing a stress free work environment for construction industry professionals. These findings were then translated into a stress management framework that could potentially be used as a stress prevention tool by safety managers.

The proposed occupational stress management framework will direct the industry practitioners to identify the need for areas to be controlled and monitored for performance improvement of the construction project participants and thereby enhance productivity in construction organizations in the long term. With stress management of construction professionals at the organizational level needs a collective effort featuring top management's attention and the individual's commitment. Further studies are needed to identify deeper in the potential implementation mechanisms to enhance organizational enrolment in developing and establishing protocols for coping with occupational stress.

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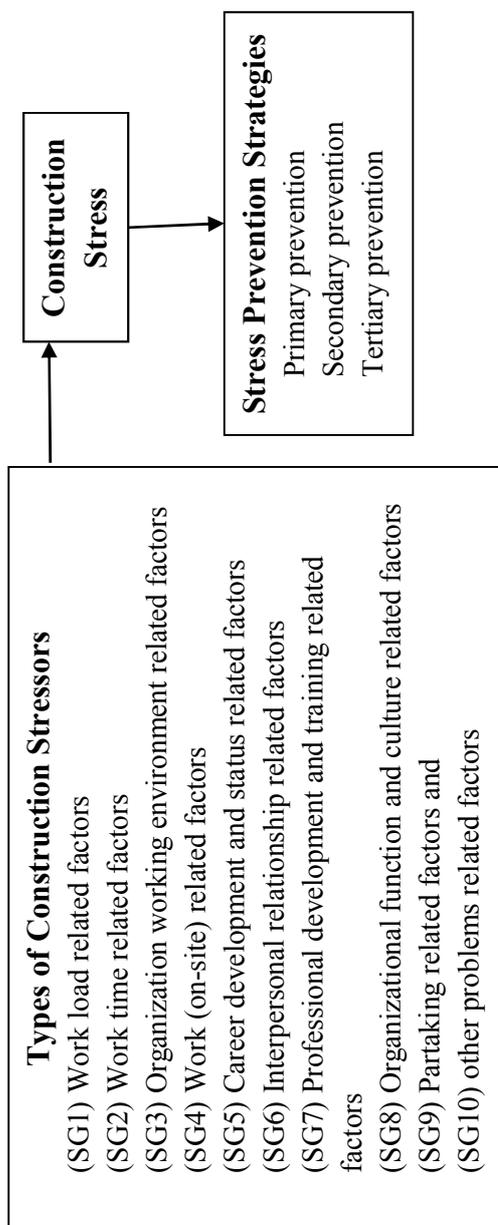


Figure 1: Conceptual stress management framework

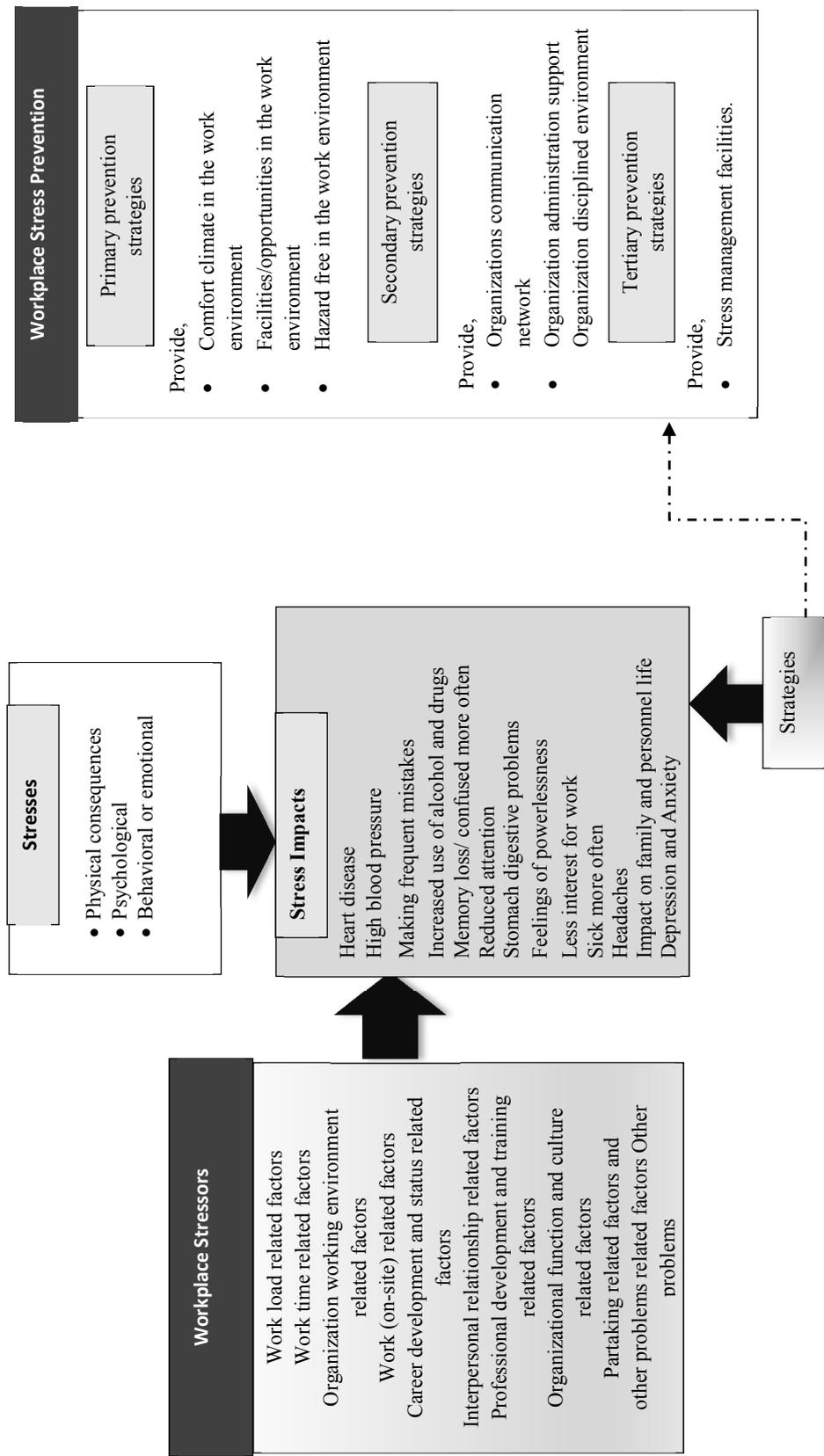


Figure 2: Construction stress management framework

Table 1: Composition of the survey sample

Profession	Distributed questionnaires	Received questionnaires	Response rate	Selected questionnaires
Project Managers	37	26	70.27%	25
Engineers	33	29	87.87%	25
Quantity Surveyors	36	30	83.33%	25

Table 2: Site experience and age of the respondents

Description	Project Managers	Engineers	Quantity Surveyors
Site Experience (years)			
< 5years	-	17	15
5-10 years	16	7	4
10 years <	8	1	6
Age (years)			
25-35 years	14	21	19
35-45 years	7	3	6
over 45 years	4	1	-

Table 3 Significant stressors

Stressor	Mean Rating	Std. Dev.	t-value	Sig.	Rank
Time pressures and deadlines	3.85	0.71	10.40	.000	1
Work overload	3.83	0.80	9.01	.000	2
Lack of control over pacing of work	3.80	0.76	5.47	.000	3
Long hours of work	3.55	0.95	4.99	.000	4
Different views from superiors	3.43	0.81	4.57	.000	5
Unpredictable hours of work	3.35	1.01	2.98	.004	6
Inadequate recess	3.33	0.98	2.95	.004	7
Exposure to heavy traffic jam	3.32	1.09	2.54	.013	8
Inflexible work schedules	3.24	1.00	2.08	.041	9
Lack of resources and staff	3.28	1.19	2.04	.045	10

shortages					
Use of mobile phones while working	3.28	1.23	2.00	.050	11

Table 4: Stress induced impacts

Stress Impacts	Mean	Std. Dev.	t-value	sig.	Rank
Heart disease (PR5)	1.59	0.887	13.803	.000	1
High blood pressure (PR4)	1.84	1.014	9.908	.000	2
Making frequent mistakes (CR1)	2.23	0.764	8.771	.000	3
Increased use of alcohol and drugs (BR3)	1.77	1.247	8.516	.000	4
Memory loss/ confused more often (CR3)	2.19	0.940	7.493	.000	5
Reduced attention (CR2)	2.37	0.749	7.243	.000	6
Stomach digestive problems (PR6)	2.13	1.044	7.189	.000	7
Feelings of powerlessness (ER4)	2.36	0.895	6.193	.000	8
Less interest for work (BR4)	2.29	1.171	5.224	.000	9
Sick more often (PR2)	2.4	1.053	4.936	.000	10
Headaches (PR3)	2.52	1.018	4.083	.000	11
Impact on family and personnel life (BR2)	2.55	0.963	4.078	.000	12
Depression and Anxiety (ER1)	2.76	0.956	2.173	.033	13

Table 5: Significant stress prevention strategies

Stress prevention strategy	Mean rating	Std. Dev.	Sig.	t-value
<i>Primary Prevention</i>				
Regular sufficient breaks	2.37	1.06	.003	3.04
Adequate training	2.84	0.92	.000	7.94
Faithfull deadlines	2.81	0.85	.000	8.29
Flexibility in work schedules	2.61	0.99	.000	5.39
Increased opportunities for career development	3.16	0.93	.000	10.80
Clear work description	3.01	1.13	.000	7.75
Opportunities for social interactions among	2.91	1.18	.000	6.68

workers				
Good working conditions at workplace	3.32	0.95	.000	12.08
Access to information required to perform the work	3.49	1.07	.000	12.09
Avoid contradictory demands on work	3.08	0.87	.000	10.80
Safety equipment and proper instructions	3.44	1.02	.000	12.27
Adequate payments	3.48	0.84	.000	15.19
Workplace free from health hazards	3.71	0.80	.000	18.44
Workplace free from excessive noise, excessive temperature	3.79	0.95	.000	16.31
<b><i>Secondary Prevention</i></b>				
Support from organization to control over the work	3.16	0.92	.000	10.97
Hold regular team meetings	3.13	0.94	.000	10.50
Effective feedback system	2.84	1.07	.000	6.83
Take necessary actions to reduce physical violence, verbal abuse and harassments	3.31	0.87	.000	13.01
Opportunity to participate in decision Making	3.15	1.00	.000	9.97
Proper communication	3.19	0.80	.000	12.84
Opportunities to meet superiors on any work related matters	3.61	0.87	.000	16.09
<b><i>Tertiary Prevention</i></b>				
Proper conflict management system	2.65	0.91	.000	6.23
Stress assistance programmes	2.53	1.06	.000	4.37
Better health facilities	2.81	1.14	.000	6.20

Table 6: Primary stress prevention strategic approaches

No	Approach	Associated strategies	factor loading	$h^2$
1	Comfort climate in the work environment (6.820)	Regular sufficient breaks	.733	.722
		Flexibility in work schedules	.612	.750
		Increased opportunities for career development	.752	.714
		Clear work description	.635	.713
		Avoid contradictory demands on work	.656	.672
		Safety equipment and proper instructions	.695	.647

		Adequate payments	.785	.661
2	Facilities/opportunities in the work environment (1.621)	Adequate training on stress management	.629	.527
		Faithfull deadlines	.799	.752
		Opportunities for social interactions among workers	.836	.758
		Good working conditions at workplace	.703	.660
3		Hazard free in the work environment (1.115)	Access to information required to perform the work	.565
	Work-process free from safety hazards		.819	.680
	Workplace free from health hazards (e.g. excessive noise, excessive temperature, etc.)		.663	.710

Table7: Significant secondary stress prevention approaches

No.	Approach	Associated strategies	Eigenv alue	h <sup>2</sup>
1	Organizations communication network (2.201)	Opportunity to participate in decision making	.807	.693
		Proper communication	.815	.744
		Opportunities to meet superiors on any work related matters	.754	.685
2	Organization administration support (1.655).	Support from organization to control over the work	.831	.702
		Hold Regular team meetings	.776	.603
		Effective feedback system	.693	.684
3	Organization disciplined environment (1.136).	Take necessary actions to reduce physical violence, verbal abuse and harassments	.938	.880

Table8: Significant tertiary stress prevention strategies

No	Strategy	Associated strategies	Eigenvalue	$h^2$
1	Stress management facilities (2.122)	Proper conflict management system	.784	.614
		Counselling programmes	.918	.843
		Better health facilities	.815	.665