STRENGTHENING THE SAFETY CULTURE IN RAW RUBBER PROCESSING STAGE THROUGH HUMAN CAPACITY BUILDING: A CONCEPTUAL FRAMEWORK

D.M.P.P. Dissanayake* and Nirodha Gayani Fernando
Department of Building Economics, University of Moratuwa, Sri Lanka

ABSTRACT

Safety and health in the raw rubber processing stage has been a neglected subject, though this sector is still a major foreign exchange contributor to the national economy in Sri Lanka. Occupational safety and health concerns in raw rubber processing organisations have always been and continue to be of the utmost importance. Thus, establishing and strengthening of the safety culture is most critical in raw rubber processing environments with a high risk of health and safety concerns. The cause analysis for failings related to safety culture in raw rubber processing sector are varied and far reaching; with each issue coming into play at one critical point in time. However, most of the weaknesses are related with 'Human factors: How people feel (Heart and Mind)', 'What people do (Daily Action)'. Thus, developing of human capacities such as attitudes, behaviours, skills and knowledge etc. on this perspective will be an effective tool in addressing those failures and strengthening the safety culture in raw rubber processing sector. This paper therefore aims to develop a conceptual framework for strengthening the safety culture in raw rubber processing stage through human capacity building. A comprehensive literature review was used as the research methodology for this paper. Research findings illustrated that yet, like in any other employment sector, workers involved in raw rubber processing activity run an equal if not higher risk of being injured as a result of the type of work they do. Due to management and worker ignorance and rubber products manufacturing chemicals and bad work practices in some factories, serious hazards have been created and many accidents have occurred. Strengthening the safety culture is about more than removing hazards and establishing safety procedures. It is about working with people of the organisation to change their attitudes, behaviours and thoughts, and improve their situational awareness. The finding of this research incorporated into a conceptual framework which proposes a better working condition so that the safety culture can be strengthen.

Keywords: Human Capacity Building; Human Factors; Raw Rubber Processing Stage; Safety Culture.

1. INTRODUCTION

Safe and healthy workplaces help businesses and organisations to succeed and prosper, and also benefit wider society (Sukadarin *et al.*, 2012). Safety and health at work have traditionally been approached mainly by means of legislation and enforcement measures. Effective safety management in the twenty-first century involves paying attention to human factors as system components with as much potential to cause, or save, dangerous system states as technical components. By paying attention to human factors, highly reliable organisations can identify and capture potential hazards before they manifest as accidents. One method of achieving this is by measuring the state of safety through so-called 'leading' indicators such as safety culture (Yule, 2003).Therefore, companies are being encouraged to adopt a positive organisational safety culture in order to safeguard their operations against accidents and it is accepted as the number one priority (Clarke, 2003; Sukadarin *et al.*, 2012). In industries, like aviation, nuclear power, manufacturing and rubber processing this makes sense. Since safety and health in the raw rubber processing stage has been a neglected subject, strengthening a positive safety culture through paying attention on human factors is important.

---

* Corresponding Author: E-mail - piumi2d@gmail.com

For a good safety culture, involvement of human of the organisation together with their positive attitudes and beliefs, behaviours, knowledge and skills, past experiences etc. is indispensable. This is due to the fact that strengthening a strong safety culture is about more than removing hazards and establishing safety procedures. It is about working with human of the organisation to change their attitudes, behaviours and thoughts, and improve their situational awareness within the dynamics of today's world. Also, human resource as one of the most valuable resources in the organisation brings whatever the planned procedures, systems etc into reality. Therefore, capacitating the human to strengthen the safety culture in raw rubber processing stage is a timely requirement which will ensure the long term business continuity together with protection of employees and properties. Thus, in this study, capacity building is aimed towards capacitating the human for strengthening the safety culture in raw rubber processing stage.

2.   RESEARCH METHOD

A comprehensive literature review was used as research methodology for this research paper. Literature review was carried out on a broader perspective with the purpose of getting familiarised with the subject areas of the research study while holding the focus on research problem. The background study took the attention of journal articles, online journals, e-books, web sites, electronic library data base and other publications. A conceptual framework for strengthening the safety culture in raw rubber processing stage through human capacity building was developed at the end by bringing in literal arguments.

3.   SAFETY CULTURE

The concept of safety culture came into international usage following a report by the International Atomic Energy Agency (IAEA) in 1991, after the Chernobyl nuclear disaster in 1986 (Flin *et al.*, 2000). The investigation report by the International Nuclear Safety Advisory Group (INSAG) of the International Atomic Energy Agency (IAEA) identified that poor safety culture as one of the contributing factors to this worst nuclear power plant accident in history (INSAG, 1986 cited in European Agency for Safety and Health at Work, 2010) and which led to safety culture being defined as an organisational atmosphere where safety and health is understood to be, and is accepted as, the number one priority. From then on the concept of safety culture has been used more and more in safety research, particularly in high-risk industries. Safety culture is an abstract concept, giving researchers a large degree of freedom on how they understand these concepts and put them into practice (Havold, 2005). This implies that there is a lack of consensus on how the safety culture concept is understood, and now ideally accepted definition of the concept either (Guldenmund, 2010). In this context, following sub Sections 3.1 and 3.2 explore the relevant literature in the research arena with major focus is given on two areas: defining the safety culture and elements of safety culture.

3.1.   DEFINING SAFETY CULTURE

Over the past years, the concept of safety culture has been studied by many researchers from different scientific backgrounds and disciplines. A distinction can be made between the approach taken by psychology-oriented research and the engineering-based approach (Antonsen, 2009). The psychological approach is interested specifically on how workers feel about and distinguish safety and safety management, and on their attitudes and behaviour regarding risks and safety. This psychological research refers more to the term 'safety climate' than to 'safety culture'. When it comes to the engineering approach, it is more focused and interested in the formal and managerial aspects and systems that have an influence on safety such as management systems, procedures, policies, control systems, etc.

Apart from this deviation between the psychological versus engineering perspective, safety culture can also be analysed from the viewpoint of organisational (culture) theory. For an example, Guldenmund (2010) considers safety culture as that part of organisational culture that is related to safety and risks. This is further emphersised by many researchers and they stated that safety culture is a subset of the corporate organisational culture that comprises workforce beliefs, attitudes, behaviours, norms and values, personal responsibilities as well as human resources features such as training and development with regard to safety (Sukadarin *et al.*, 2012; Clarke, 1999; Glendon and Stanton, 2000). Numerous

definitions of safety culture exist in the academic literature, and examples of selected definitions are shown in Table 1.

Table 1: Definitions of Safety Culture

Reference	Definition
Cox and Cox (1991)	Safety culture is the ways in which safety is managed in the workplace, and often reflects the attitudes, beliefs, perceptions and values that employees share in relation to safety
Kennedy and Kirwan (1998)	An abstract concept, which is underpinned by the amalgamation of individual and group perceptions, thought processes, feelings and behaviours, which in turn gives rise to the particular way of doing things in the organisation. It is a sub-element of the overall organisational culture
Hale (2000)	Refers to the attitudes, beliefs and perceptions shared by natural groups as defining norms and values, which determine how they act and react in relation to risks and risk control systems
Glendon and Stanton (2000)	Comprises attitudes, behaviours, norms and values, personal responsibilities as well as human resources features such as training and development
Guldenmund (2000)	Aspects of the organisational culture which will impact on attitudes and behaviour related to increasing or decreasing risk
Cooper (2000)	The product of multiple goal-directed interactions between people (psychological), jobs (behavioural) and the organisation (situational); while safety culture is 'that observable degree of effort by which all organisational members directs their attention and actions toward improving safety on a daily basis
Mohamed (2003)	A sub facet of organisational culture, which affects workers' attitudes and behaviour in relation to an organisation's on-going safety performance
Richter and Koch (2004)	Shared and learned meanings, experiences and interpretations of work and safety - expressed partially symbolically – which guide people's actions towards risk, accidents and prevention
Fang *et al.* (2006)	A set of prevailing indicators, beliefs and values that the organisation owns in safety
National Institute for Occupational Safety and Health (NIOSH) (2008)	Underlying organisational principles, norms, commitments and values related to the operation of safety and health, as well as its importance compared with other workplace goals.

Most of the definitions are relatively similar in the beliefs perspective, with each focusing, to varying degrees, on the way people think and behave in relation to safety. The definitions (see Table 1) adopted by Hale (2000), Glendon and Stanton (2000) and Cooper (2000) are the most practical, as they clearly outline the contents of safety culture. As explained in above, safety culture is about the way of managing the safety in the workplace and it is a combination of safety attitudes, beliefs, perceptions and values that employees share in relation to safety, safety behaviours and organisational environment, systems and procedures in relation to safety. Many researchers have been illustrated key elements to be considered when strengthening the safety culture. In this context, next section explores the elements of safety culture.

3.2. ELEMENTS OF SAFETY CULTURE

The concept of safety culture has been studied by many researchers from different perspectives. These perspectives include psychology-oriented approach and the engineering-based approach (Antonsen, 2009). The researchers who have defined the safety culture from *psychological approach*, mentioned that safety culture consist with psychological elements such as values, beliefs and perception and attitudes towards safety. For an example, the definition by Cox and Cox (1991) stated that safety culture reflects attitudes, beliefs, perceptions and values that employees share in relation to safety. The psychological aspects state how employees think and feel about safety and it is usually about winning over people's

heart and minds.In *engineering approach*, researchers highlights the formal and managerial aspects such as management systems (Dissanayake and Fernando, 2014); procedures such as external and internal reporting procedures (Piers *et al.*, 2009; Gilbert *et al.*, 2012); policies (MacDonald *et al.*, 2000 cited Sukadarin *et al.*, 2012) and control systems safety evaluation, safety communication (Piers *et al.*, 2009; Dissanayake and Fernando, 2014) etc. as key elements of the safety culture.

When it comes to the study by Cooper (2000), he divided the safety culture into three elements which includes behavioural aspects in addition to the psychological and managerial aspects explained in above. Behavioural aspects discuss about what employees do in regards to safety and it includes their day-today activities towards safety in their working environment. This includes aspects such as Leadership (Reason, 1998); Supervisor subordinate relationship (Dissanayake and Fernando, 2014); Job satisfaction, Adequate equipments and its condition (Sawach *et al.*, 1999); Workmate's influence, Awareness - Safety training, Safety knowledge and Competency (Nishgaki, 1994; Garza, 1988; Davies and Tomasin, 1999; Sukadarin *et al.*, 2012); Personal responsibilities and Adaptability (Piers *et al.*, 2009). Psychological and Behavioural aspects directly link with human factors. The organisational/ managerial aspects cover the safety management systems that a company uses to set the guidelines for what people should do in various circumstances. Though organisational aspects directly discuss about 'what the organisation has', it indirectly links with human factors as organisational aspects guide people on what they 'should' do in relation to safety. Figure 1 depicts the all psychological, behavioural and organisational aspects discussed in above.
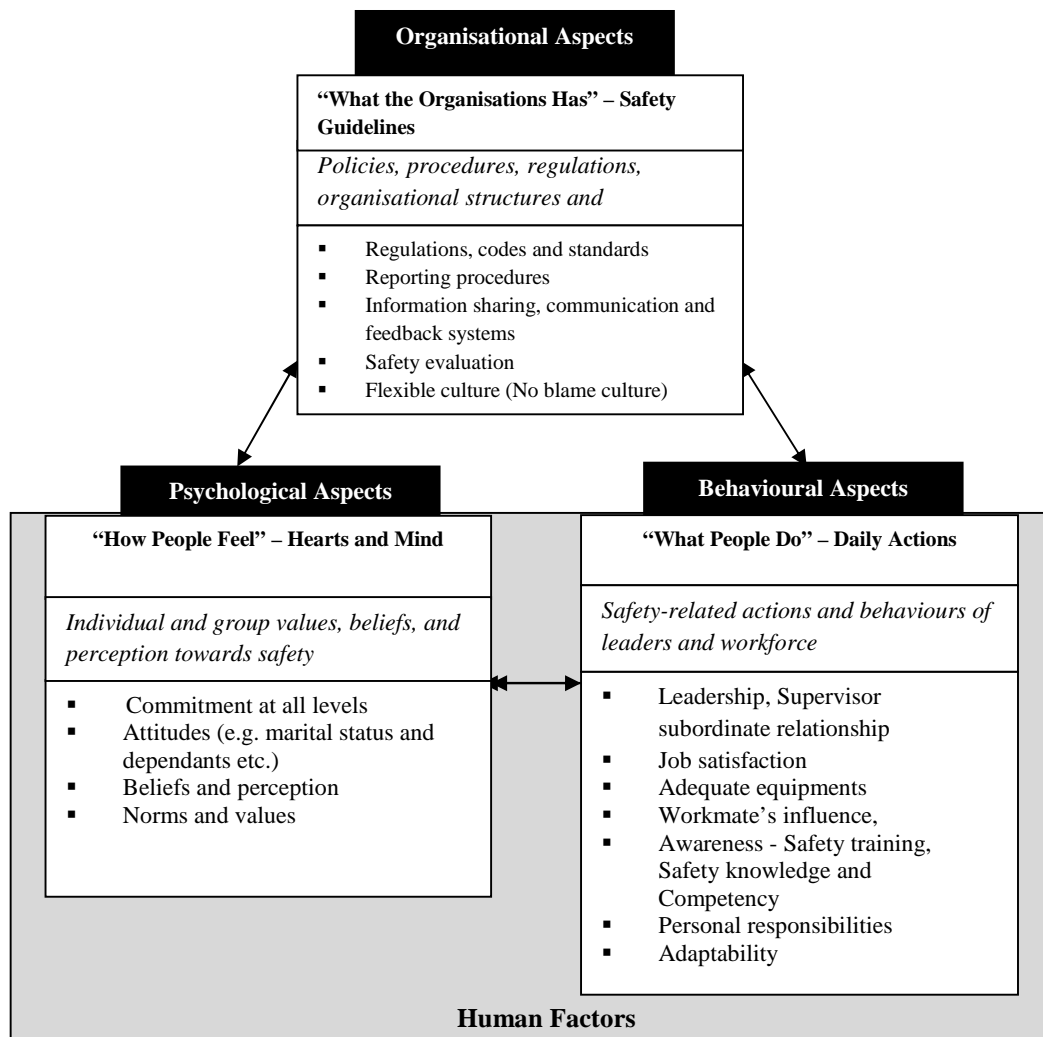

Figure 1: Elements of Safety Culture

4.   IMPORTANCE OF STUDYING SAFETY CULTURE IN RAW RUBBER PROCESSING STAGE

The raw rubber processing sector as a heavy industry, it poses a number of health and safety risks to workers employed in that stage (Department of Census and Statistics, 2013). As an overall, the cause analysis for failings related to safety culture in raw rubber processing stage are varied and far reaching; with each issue coming into play at one critical point in time. As stated by Yogaratnam (2010), since a large number of unskilled and semi-skilled workers are employed in the raw rubber processing, many mechanical and chemical hazards exist. Not only that but also management and worker ignorance, negligent use of chemicals and pest and weed controlling and rubber products manufacturing chemicals, bad work practices, communication issues, prioritising cost-cutting and production above safety and poor competency of managers in risk/hazard management lead to create many serious accidents and hazards where about 15 percent of the total poisonings and deaths in Sri Lanka reported due to occupational accidents (Yogaratnam, 2010). Further, it causes a number of health and safety risks to workers employed in that stage. The main risks posed are from unguarded machinery in the factory and also many mechanical (i.e., rolls and centrifuges) and chemical hazards are exist in raw rubber processing which require strict safety controls and appropriate safety precautions during installation, use and maintenance, including attention to machine guarding (Alan, 2011). Since large quantities of chemicals are used as fertilizers and pesticides, many accidents have taken place among the workers, who are mainly estate labourers (Yogaratnam, 2010). Alan (2011) further highlights that proper concentration should be paid to the working area to slips, trips and falls. Employees should receive training in safe work practices and above findings highlight the lack of training on safe work practices. Generally, raw rubber processing involves mixtures of various chemicals which use to heat, pressure, and catalytic action during a variety of manufacturing processes. As a result, the work environment may be contaminated with dusts, gases, vapours, fumes, and chemical by products present (Centre for Disease Control and Prevention, 1993; Thompsons Solicitors, 2013). Therefore, workers may be exposed to these hazards through inhalation and skin absorption during rubber processing and product manufacturing.

The critical analysis of causes for failings related to safety culture in raw rubber processing stage show that said stage has been highlighted as having a higher rate of accidents than other similar industries. Simply, workers in this stage also having a high risk of being injured as a result of the type of work they do. Most of the weaknesses mentioned in above are related with '***Human factors: How people feel (Heart and Mind)', 'What people do (Daily Action)'.*** Thus, developing of human capacities such as attitudes, behaviours, skills and knowledge etc. on this perspective will be an effective tool in addressing those failures and strengthening the safety culture in manufacturing environment. This is further emphasized by Vecchio-Sudus and Griffiths (2004) as changing attitudes and behaviours of management and employees, ensuring their involvement and providing required training and seminars for them help to strengthen and further promote a safety culture. The next Section discusses about human capacity building and its importance in relation to strengthen safety culture in raw rubber processing stage.

5.   HUMAN CAPACITY BUILDING AND ITS IMPORTANCE TO STRENGTHEN THE SAFETY CULTURE IN RAW RUBBER PROCESSING STAGE

Viewing human resources as human capital and beyond, the study argues that without human resources nothing can be accomplished, and without well-trained, well-developed, well-appreciated, and well-managed human resources, organisations can not establish the strong safety culture within it. As discussed in previous section, strengthening of the safety culture is about working with human of the organisation to change their attitudes, behaviours etc to improve to improve their situational awareness. Simply, it is to build their capacity towards strengthening the safety culture. The key words or concepts of capacity building with respect to the human aspects used in this section require some explanations.

According to Chapagain (2004, p.15), "capacity building is an approach to develop one's own potentiality in order to enhance his/her performance or output". He further stated that it is a response to the multi-dimensional such as organisational, intellectual, social, political, cultural, physical, financial etc. processes of change to bring intended outcome. The study by Farazmand, (2004) views capacity buildings mainly as an internal, local or domestic matter, where it directly relates to sustainable development and enhancement. Therefore, it is clear that the concept of capacity building is an essential component in

development theory and practice, especially among various global, international and national originations such as World Bank, international donor agencies and civil societies (Pieterse and Donk, 2002). UNESCO (2006, p1), defines capacity building as 'process by which individuals, groups, organisations, institutions and societies increase their ability to perform (a) core functions, solve problems, define and achieve objectives and (b) understand and deal with development needs in a broad context and in a sustainable manner', adding that the focus of capacity building has changed from individual training to integration of individual capacities to institutions and systems. All these definitions and views on capacity building emphasise that capacity building is not a separate entity isolated from organisation's vision and mission. Chapagain (2004) further stated that it is always associated with day to day action to fulfil organisation's vision and mission. It provides an opportunity to understand strengths, weaknesses, threats and opportunities towards a resilient future through identification of broader issues around sustainable development of a particular programme, project or process, including unique cultural, social and ecological characteristics (Boyd and Juhola, 2009). Thus, levels of capacity building vary based on discipline and on the context within which it is applied, whilst activities and interventions may occur within and across capacity building levels/ dimensions.

Human resource development (individual and team), organisational development (organisations and relationships) and institutional and legal framework development are the three most important, linked levels or components of capacity building (Franks, 1999; Low *et al.*, 2001; UNESCO, 2006). Organisational development addresses elaboration of management structures, processes and procedures within organisations and maintaining relationships with other organisations and sectors, such as public, private and community (Low *et al.,* 2001; LaFord *et al.,* 2002; UNESCO 2006). Aspects related to institutional and legal framework development include legal and regulatory changes to enable organisations, institutions and agencies at all levels, in all sectors, to enhance their capacities (Low *et al.,* 2001; UNESCO, 2006). Considering about the human resource development, it is the process of equipping individuals with understanding, skills and access to information, knowledge and training, enabling effective performance (Low *et al.,* 2001; LaFord *et al.,* 2002; UNESCO 2006).

In this study, capacity building is aimed towards capacitating the human resources (Human resource development) to become reflective practitioners where they able to strengthen the safety culture of raw rubber processing stage. Human capacity building in this study is therefore, refers to building and enhancing a cadre of highly qualified, highly able, and highly motivated human resources at all levels with required skills, knowledge and capabilities to strengthen the safety culture raw rubber processing stage. Such a capability enables organisation to not only cope with and manage ongoing current challenges of safety culture but also to act well beyond by performing through anticipation, effective visions, proactive knowledge and skills, and self-corrective organisational behaviour. As stated by Eade and Williams (1995 cited Eade, 1997, p.23), "strengthening the human capacity to determine their own values, and priorities and to organise themselves to act on these, is the basis of development". Having identified the human capacity building as an important approach to strengthen the safety culture in raw rubber processing stage, next sections discuss how human capacity would be developed.

5.1. *EXPECTED CAPACITY LEVELS: ASSESSING SAFETY CULTURE*

Capacity gaps in this study show the differences between expected capacity levels and current level or else areas to be improved in order to move from its current safety culture maturity level to its desired future state or next safety culture maturity levels. Identification of desired capacity levels in terms of safety is an important task to be done at the early stage of the study. Accordingly, expected capacity levels in terms of safety culture was developed based on the literature discussed in Section 3.2 as elements of safety culture describe how the safety culture is comprised of and what sort of characteristics should be there to be a strong safety culture. Also, Fleming (2001) argues that an organisation's or installation's level of maturity is determined on the basis of their maturity on these elements. However, these elements (refer Figure 1) are at a fairly high level where they need to be expressed in more measurable terms. These are called as benchmark or indicators of expected capacity level in terms of safety. Each of these elements of safety culture is expressed in several safety culture indicators or as expected capacity levels in terms of safety as shown in Table 2.

Table 2: Expected Capacity Levels: Safety Culture Assessment

Element	Expected Capacity Levels	Author/ Year
Psychological Aspects		
Management concern	▪ Management's decision making with respect to safety ▪ Management's provision of adequate resources ▪ Developing safety policies ▪ Assigning safety responsibilities to personnel ▪ Importance of safety meeting	Cooper (2000) Piers *et al.* (2009) Sukadarin *et al.* (2012) Piyadarshani *et al.* (2013)
Perception of importance of safety (Values/ beliefs/ perceptions)	▪ Importance of safety issues ▪ Employees' concern for safety ▪ Importance of safety for business continuity	Piers *et al.* (2009) Sukadarin *et al.* (2012) Piyadarshani *et al.* (2013)
Prioritization of safety (Values/ beliefs/ perceptions)	▪ Priority of safety over profit and performance ▪ Investment of money and effort to improve safety	Sukadarin *et al.* (2012) Mills and Huberman (1994)
Behavioural Aspects		
Employee behaviour with respect to safety	▪ Prevention of accidents and incidents by employees/ Attention to safety protection by workers ▪ Unnecessary risk taking ▪ Maintaining close supervision of workers	Cheng *et al.* (2004) Jannadi (1996)
Job satisfaction	▪ Appreciation of work ▪ Acquirement of colleagues' respect by safe record	Molenaar *et al.* (2009).
Adequate equipment	▪ Access to equipment ▪ Condition of equipment	Sawacha *et al.* (1999)

Safety training	Awareness of job induced risk
	  ▪ Awareness by management and employees of own risk on the job
	  ▪ Awareness by management and employees of others' risk induced by the job
	Educating workers and supervisors in developing good safety habits
	Emergency training
		Garza (1988)
		Nishgaki (1994)
		Jannadi (1996)
		Davies and Tomasin (1999)

Adaptability	Pro-activity to prevent occurrences
	  ▪ Occurrences not the only input for safety improvement
	  ▪ Autonomous searching of safety issues by employees
	Actions with respect to occurrences
	  ▪ Actions upon reporting safety issues, incidents or accidents
	  ▪ Follow-up of the improvements implemented
	Employee input
	  ▪ Encouragement of employees to suggest improvements
	  ▪ Assignment of right persons to solve problems
		Piers *et al.* (2009)

Organisational Aspects		
Regulations, codes and standards	Establishing safety management system with adherence to legislation codes and standard	Piyadarshani *et al.* (2013)

Reporting procedures	Safety issues reporting system
	  ▪ Perception of importance of safety issues reporting system
	  ▪ Encouragement to report safety issues
	Willingness to use the reporting system
	  ▪ Willingness to report minor incidents
	  ▪ Possibility for anonymous reporting
	Consequences of safety reports
		Piers *et al.* (2009)
		Gilbert *et al.* (2012)

Element	Expected Capacity Levels	Author/ Year
	▪ Appreciation of employees reporting safety issues ▪ Satisfaction with the way safety reports are dealt with	
Safety evaluation	Perception of evaluation ▪ Fair judgment after safety occurrences ▪ Clarity of evaluation system Evaluation of safety related behaviours ▪ Clear distinction between acceptable and unacceptable behaviour ▪ Consequences of reporting safety issue Passing of responsibility ▪ Acknowledgement of own errors by management ▪ Looking for scapegoat after safety occurrences	Piers *et al.* (2009)
Information sharing, communication and feedback systems	Availability of information ▪ Availability of work related information ▪ Clarity of instructions Communication of work related information ▪ Communication between different teams/ units ▪ Clarity about who shall communicate which work related information to whom Communication of safety related information ▪ Communication of safety issues to all employees ▪ Information of employees of changes affecting safety ▪ Conducting safety meetings for supervisors Information exchange about safety issues ▪ Talking about safety issues amongst employees ▪ Review of events	Piers *et al.* (2009) Molenaar *et al.* (2009) Hinze and Rabound (1998)

6. CAPACITY BUILDING APPROACHES TO SAFETY

Crisp *et al.* (2000), discuss two approaches of a top-down organisational approach and bottom-up organisational approach to capacity building. Emphasis in a top-down organisational approach is placed on policies or practices. Generally, senior management develops a top-down driven strategy on safety as part of an organisation's overall strategy for business or other mission. Safety management system is one of the key aspects, which includes safety performance measurement - both proactive and reactive, risk assessment and control, Human Resource Management (HRM) and safety culture (Glendon and Stanton, 2000). Safety culture comprises attitudes, behaviours, norms and values, personal responsibilities as well as such HR features as training and development. These factors contribute to human interventions.

This is common approach used by many of the organisations to establish safety within their workplace. However, safety and health in the raw rubber processing stage has been a neglected subject, though this sector is still a major foreign exchange contributor to the national economy in Sri Lanka. The literature findings further revealed that majority of health and safety issues have arisen due to human aspect (refer Section 4.2). Therefore, it requires analysis of these human behaviours to identify human development areas and develops their capacities accordingly to tackle this problem. Simply, it requires an operational approach. A bottom-up organisational approach can be used on this perspective as it is an operational approach where it addresses provision of skills, knowledge to staff and capacity building of workers and managers to proactively remediate issues (David, 2013). Further, as stated by Crisp *et al.* (2000), a bottom-up organisational approach is mainly focused on organisational and human capacity building. In this context, the bottom-up approach is used as an overall human capacity building approach with its immense scope (refer Section 7).

7.   DEVELOPING THE CONCEPTUAL FRAMEWORK

By incorporating the main concepts discussed in above sections; elements of safety culture, human capacity building approaches and their relationships, the conceptual framework pertaining to this study is drafted as shown in Figure 2.
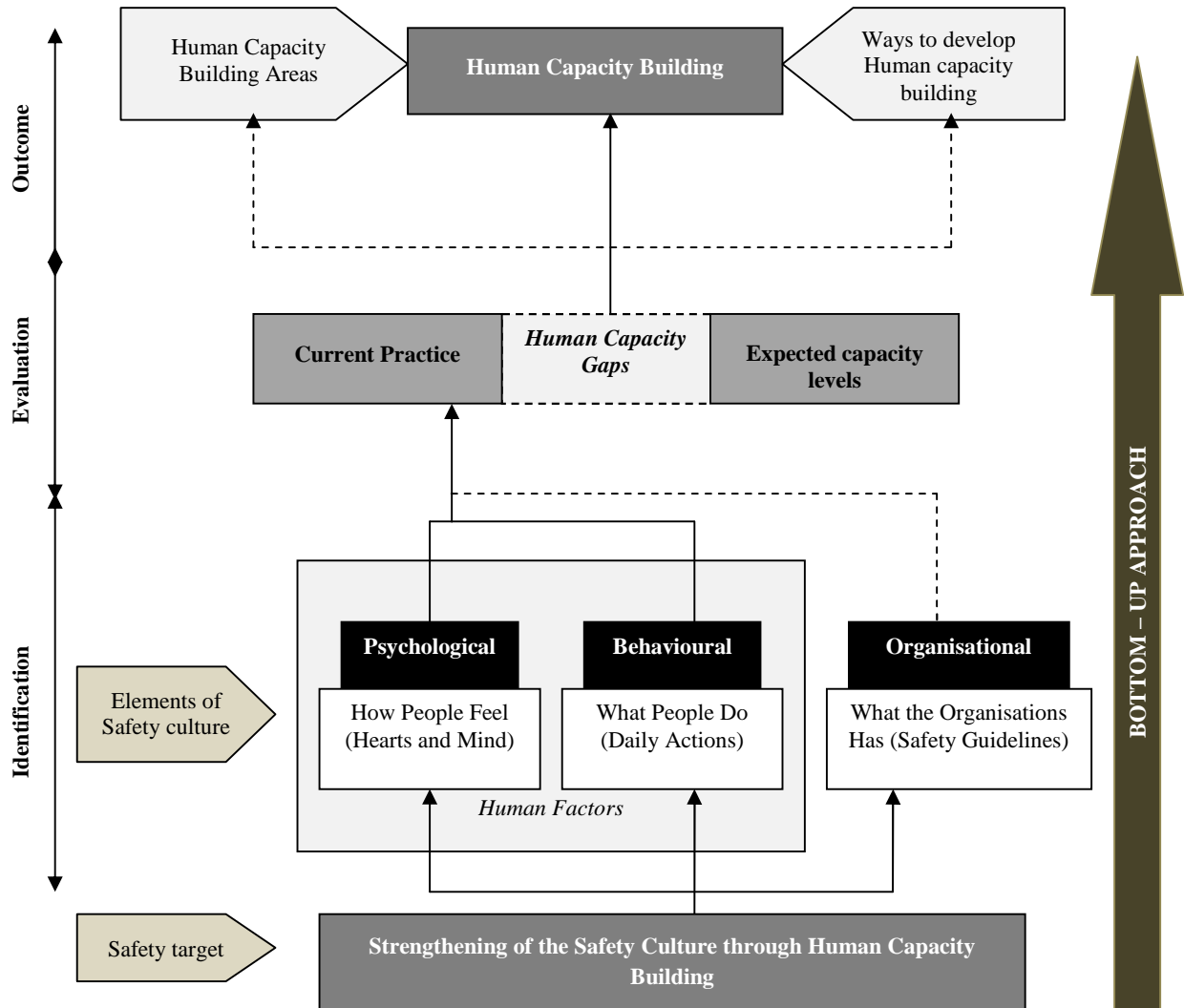

Figure 2: Conceptual Framework

Building and sustaining capacity requires organisational capacity as well as the expertise of individuals (Grisso *et al.*, 1995; Rist, 1995). As stated by Glendon and Stanton (2000), in a bottom up approach the driver may be a safety target or specific objective, such as accident prevention. In this study, it would be the 'strengthening the safety culture through human capacity building'. Safety culture comprises with three elements namely; organisational, behavioural and psychological factors as discussed in Section 3.2. In order to understand better how human interaction with tasks might lead to failings related to safety culture, both behavioural and psychological aspects should be analysed with compared to expected capacity levels. However, organisational aspects cannot be neglected at this level as it influence on human aspects and it guides human on what they 'should' do in relation to safety. The analysis of human failings will also help to identify human capacity gaps. Then, respective personnel should identify human capacity building areas that might have prevented the human error, or which could be implemented to prevent or reduce the likelihood of that error, are indicated. Simply, they should identify steps need to be taken in order to move from its current safety culture maturity level to its desired, future state or next safety culture maturity levels. These could be further training or changes to existing training, changes in procedures, changes in management or organisational policy**.**

8.   CONCLUSIONS AND WAY FORWARD

This literature review aimed at developing a conceptual framework for strengthening the safety culture in raw rubber processing stage through human capacity building by bringing in literal arguments. Since health and safety concerns in raw rubber processing environment have always been and continue to be of the utmost importance, creating a positive safety culture is very important. Research findings revealed that creating a strong safety culture is about more than removing hazards and establishing safety procedures. It is about working with people of the organisation to change their attitudes, behaviours and thoughts, and improve their situational awareness within the dynamics of today's world. Also, literature findings disclosed that safety culture is mainly focus on the way people think and behave. Therefore, this highlights the importance of developing of human capacity in strengthening safety culture. A conceptual framework developed at the end of the literature review will be for strengthening the safety culture in raw rubber processing stage through human capacity building (refer Figure 2). Further, research proposed related this work could be developing methodological frameworks to gather empirical findings to test the validity of the conceptual framework.

9.   REFERENCES

Alan, E., 2011. Rubber Tree Cultivation. *ILO Encyclopedia of Occupational Health and Safety* [online]. Available from: http://www.ilo.org/oshenc/part-xii/rubber-industry/item/388-rubber-tree-cultivation [Accessed 15 December 2014].

Antonsen, S., 2009. *Safety Culture: Theory, Method and Improvement*, UK: Ashgate Pub Co.

Centre for Disease Control and Prevention, 1993. *Special NIOSH Hazard Review Rubber Products Manufacturing Industry* [online]. Available from: http://www.cdc.gov/niosh/docs/93-106/ [Accessed 15 March 2014].

Chapagain, C.P., 2004. *Human Resource Capacity Building through Appreciative Inquiry Approach in Achieving Development Goals.* Dissertation (Doctoral). University of Madison.

Cheng, E.W.L., Li, H., Fang, D.P. and Xie, F., 2004. Construction Safety Management: An Exploratory Study from Department Of Building and Real Estate. *Construction Innovation*, 4, 224–229.

Clarke, S., 1999. Perceptions of Organisational Safety: Implications for the Development of Safety Culture. *Journal of Organisational Behaviour*, 20, 185–198.

Clarke, S., 2003. The Contemporary Workforce: Implications for Organisations Safety Culture. *Personnel Review*, 32(1), 40-57.

Cooper, M.D., 2000. Towards a Model of Safety. Culture. *Safety Science*, 36, 111–136.

Cox, S. and Cox, T., 1991. The Structure of Employee Attitudes to Safety - A European Example. *Work and Stress*, 5, 93-106

Crisp, B.R., Swerissen, H. and Duckett, S.J., 2000. Four Approaches to Capacity Building in Health: Consequences for Measurement and Accountability. *Health Promotion International*, 15(2), 99-107.

Davis, V. and Tomasin, K., 1999. *Construction Safety Handbook*. 2nd ed. Thomas Telford: New York.

Department of Census and Statistics, 2013. *Annual Survey of Industries (Final Report).*

Dissanayake, D.M.P.P. and Fernando N.G., 2014. Establishing a Positive Safety Culture in Rubber Manufacturing Sector: Human Factors. *World Construction Symposium 2014*, Colombo 20–22 June 2014.

Eade, D., 1997. *Capacity-Building: An Approach to People-Centred Development*. UK: Oxfam.

European Agency for Safety and Health at Work, 2010. *Mainstreaming OSH into Business, Luxembourg, Office for Official Publications of the European Communities* [online]. Available from http://osha.europa.eu/en/publications/ report s/mainstreaming_osh_business [Accessed 15 March 2014].

Fang, D.P., Chen, Y. and Louisa, W., 2006. Safety Climate in Construction Industry: A Case Study in Hong Kong. *Journal of Construction Engineering and Management,* 132(6), 573–584.

Farazman, A. 2000. Innovation in Strategic Human Resource Management: Building Capacity in the Age of Globalization. *Public Organisation Review: A Global Journal*, 4, 3–24.

Fleming, M. and Lardner, R., 1999. Safety Culture – the Way Forward. *The Chemical Engineer*, 6-18.

Flin, R., Mearns, K., O'conner, P. and Bryden, R., 2000. Measuring Safety Climate: Identifying the Common Features. *Safety Science,* 34, 177-192.

Franks, T., 1999. Capacity Building and Institutional Development: Reflections on Water. *Public Administration and Development*, 19(1), 51-61.

Garza, J., 1988. Analysis of Safety Indicators in Construction. *Journal of Construction Engineering and Management*, 124(4), 312-314.

Gilbert, Y.J.A., Ahonen L.M.W. and Lähde, A., 2012. *The Role of Safety Reports in Preventing Accidents: Key Points and Conclusions.* 4th ed. European Commission's Joint Research Centre and the Finnish Safety and Chemicals Agency (TUKES).

Glendon, A.I. and Stanton, N.A., 2000. Perspectives on Safety Culture. *Safety Science*, 34, 193–214.

Grisso, J.A., Christakis, E. and Berlin, M., 1995. Development of a Clinical Research Program in Women's Health. *Journal of Women's Health*, 4, 169–178.

Guldenmund, F.W., 2000. The Nature of Safety Culture: A Review of Theory and Research. *Safety Science*, 34, 215–257.

Hale, A.R., 2000. Editorial: Culture's Confusions. *Safety Science*, 34, 1–14.

Havold, J.I., 2005. Measuring Occupational Safety: From Safety Culture to Safety Orientation? *IOSH, Policy and Practice in Health and Safety*, 2005(1), 85-105.

Hinze, J. and Rabound, P., 1988. Safety on Large Building Construction Projects. *Journal of Construction Engineering and Management*, 114(2), 286–293.

Jannadi, M.O., 1996. Factors Affecting the Safety of the Construction Industry. *Building Research and Information*, 24(2), 108–111.

Kennedy, R. and Kirwan, B., 1998. Development of a Hazard and Operability-Based Method for Identifying Safety Management Vulnerabilities in High Risk Systems. *Safety Science,* 30, 249–274.

LaFord, A.K., Brown, L.B. and Macintyre, K., 2002. Mapping Capacity in the Health Sector: A Conceptual Framework. *International Journal of Health Planning and Development*, 17, 3-22.

Low, A., Tjongarero, A., Low, A. and Nambundunga, B., 2001. Donor Support to Human Resource Capacity Building in Nambia: Experience of Residential Technical Assistants Support for Workplace Learning and Assessment of Alternative Options. *Journal of International Development*, 13, 269-285.

Miles, M.B. and Huberman, A.M., 1994. *An Expanded Sourcebook – Qualitative Data Analysis*. 2nd ed. California: Sage publications Inc.

Mohamed, S., 2003. Scorecard Approach to Benchmarking Organisational Safety Culture in Construction. *Journal of Construction Engineering and Management*, 129(1), 80–88.

Molenaar, K.R., Park, J.I. and Washington, S., 2009. Framework for Measuring Coperate Safety Culture and Its Impact on Construction Safety Performance. *Journal of Construction Engineering and Management*, 135, 488-496.

National Institute for Occupational Safety and Health (NIOSH), 2008. *National Occupational Research Agenda: National Construction Agenda for Occupational Safety and Health Research and Practice in the U.S. Construction Sector* [online]. Available from: www.cdc.gov/niosh/nora/comment/agendas/construction /pdfs/ConstOct2008.pdf [Accessed 17 March 2014].

Nishgaki, S., 1994. Humanware, Human Error and Hiyari-Hat: A Template of Unsafe Symptoms. *Journal of Construction Engineering and Management*, 120(2), 421-441.

Piers, M., Montijn, C. and Balk. A., 2009. *Safety Management System and Safety Culture Working Group*. Netherlands: Dutch National Aerospace Laborator.

Pieterse, E. and Donk, M.V., 2002. *Capacity Building for Poverty Reduction*. South Africa: Isandla Institute.

Priyadarshani, K., Karunasena, G. and Jayasuriya, S., 2013. Construction Safety Assessment Framework for Developing Countries: A Case Study of Sri Lanka. *Journal of Construction in Developing Countries*, 18(1), 33-5.

Reason, J., 2000. Safety Paradoxes and Safety Culture. *Journal of Injury Control and Safety Promotion,* 7, 3–14.

Richter, A. and Koch, C., 2004. Integration, Differentiation and Ambiguity in Safety Cultures. *Safety Science,* 42, 703–722.

Rist, R. C., 1995. Postscript: Development Questions and Evaluation Answers. *New Directions for Evaluation*, 67, 167–174.

Sawacha, E., Naoum, S. and Fong, D., 1999. Factors Affecting Safety Performance on Construction Sites. *International Journal of Project Management*, 17(5), 309–315.

Sukadarin, E.H., Suhaimi, N.H. and Abdull, N., 2012. Preliminary Study of the Safety Culture in a Manufacturing Industry. *International Journal of Humanities and Social Science*, 2(4), 176-183.

Thompsons Solicitors, 2013. *Rubber Industry Health and Safety* [online]. Available from: http://www.thompsons.law.co.uk/workplace-illnesses-and-diseases/rubber-industry-health-and-safety.htm [Accessed 15 March 2014].

United Nations Educational, Scientific and Cultural Organisation, 2006. *Guide for Planning Education in Emergency and Reconstruction: Chapter 03-Capacity Building.* Paris: International Institute for Education planning.

Vecchio-Sudus, A.M. and Griffiths, S., 2004. Marketing Strategies for Enhancing Safety Culture. *Safety Science*, 42, 601– 619.

Yogaratnam, N., 2010. Safety, Health Issues in Rubber Sector. *Daily News,* 21 September.

Yule, S., 2003. *Senior Management Influence on Safety Performance in the UK and US Energy Sectors.*Thesis (PhD). University of Aberdeen.