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A LITERATURE REVIEW ON GLOBAL OCCUPATIONAL SAFETY AND HEALTH PRACTICE & ACCIDENTS SEVERITY

Abstract: This literature review focuses on researches undertaken since 1980s onwards. The purpose of the study is to identify existing gaps on workplace safety and health management and propose future research areas. The review adds value to existing electronic database through integration of researches' results. To identify existing gaps, a systematic literature review approach has been used. The reviews were undertaken through keywords and safety related topics. In the literature, various characteristics of workplace safety and health problems were found emanating from the lack of operational activities of the employees, internal working environment and external environment those impose hazards on employee temporarily, permanently and on working environments. The integration of multidisciplinary approaches and collaborative model of hub and peripheral industries to protect workplace safety hazards to develop multilevel model has been undermined in many researches. The other face of finding is that knowledge transfer mechanism and industrial topology factors are left. Some researches finding showed that they have focused on single problems related to health and health factors leaving universal improving workplace safety. In general, this literature reviews compare various studies output based on their research method and findings to fills gap and add value to a body of knowledge.

Keywords: Occupational safety and health, safety culture, safety climate, safety management systems, manufacturing industries, collaboration, Ethiopia

1. Introduction

Occupational health and safety is the concern of human wellbeing that, this day, industrialization and service giving sectors development is accelerating resulting in workplace health problem booming. Workplace safety and health hazards nowadays considered as a driving force to ward finding solutions how to prevent it from the manufacturing industries employee negative consequence. In recent years, the quality, health, knowledge and safety requirements in many countries have been more stringent than was the case previously seen. Some research finding concluded that pressures from communities have led to the enactment of various safety legislations and safety standards in different countries and

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regions for different industries (Dejoy and Southern, 1993). Ahonen *et al.* (2002) argue that different international and national safety standards provide guidance to help organizations develop their safety management systems (SMS) with respect to varied business needs and requirements. Despite the fact that people are working and spend most of their working hours at the workplace, little attention and resources are accorded to health and safety at work (Michaels *et al.*, 1985). In emerging economies, workplace safety and health has been overlooked in their industrial development policy and strategies. They are mostly focused on the production volume or profit undermining the latent effect of dissatisfactory working environment. For instance, in Ethiopia, there was no workplace safety and health related stringent policy standing alone for the manufacturing industries. When it is focused on the workplace safety and health it is to mean that there should be both rules of effective resource utilization and safe workplace environment for employees where their health is considered and insured. Safe workplaces are profitable workplaces, whether measured in a company's bottom line, its market share, its broader consumer reputation, or its ability to attract and retain workers, managers, or investors. Healthy people are expected to contribute more to productivity and innovation. However, absenteeism from workplace site causes productivity loss (Michaels *et al.*, 1985).

This literature review study helps in finding gaps in previous researches on workplace safety and health management system from a variety of disciplines. The purpose of gap identification is to propose the area which needs further study toward the improvement of workplace safety and health. Some of the gaps were undeveloped multilevel model that affects individual, organizational and national safety performance and safety and health outcomes. In addition to these, absence of cross-level linkages among national, organizational, and individual-level variables in relation to the exhibition of safe work behavior and occurrence of individual-level accidents, injuries, illnesses, and diseases. In order to understand the inadequacies of previous review works, this research attempts to provide systematic literature review on OSH focusing manufacturing industries operation perspective. Specifically, the objectives of this literature review are to describe the nature of OSH depending on year of publication, research contexts, and suggest future research opportunities for each research domain of OSH. It also gives information to any researchers who need to conduct further studies by refereeing to the identified gaps. Besides this, it adds data to the scientific electronic database. This study contains the following remaining sections: second section material & methodology, third section literature review, fourth section results and discussions and last section deals with conclusion.

2. Material and methodology

Search strategy: Electronic databases searched included in MEDLINE (through PUBMED) EMBASE, Sociological abstracts, LILACS, EconLit and CINAHL. The search was limited to publication dates from 1980s to 2015s. However, the major consideration falls in this range of durations, the other which is basic for this desertion has been also included beyond this interval rage. But they are limited in number as there was no more consideration for OSH before 1980s. Searching mechanism used keywords were used in terms of reflecting OSH practice in the global condition. The terms reflecting OSH included like workplace safety, safety management system, relationship between safety and quality, quality and safety, workplace health, industrial health, industrial safety, occupational safety, employee health, safety, work, health, manufacturing safety, working environment, safety committee, and workplace. More than these key terms were

utilized in different approaches in line with expected methodologies that any researchers can use.

The literature reviewed has attempted to identify related article with occupational safety and health hazards identification or hazards controlling mechanisms. The obtained materials more of them were from electronic database. More than 1500 journal articles, reports, policies, standards and manuals were obtained from these selected databases. Depending on the relevance of the material, through abstract and keyword screening operation were made and the collected data were further reduced. The screened and reduced materials also again

brought down to the most important data considering recent publications and reading methodology and results of the papers. Finally, it has been filtered out to for this literature purpose write up. It was difficult to include all documents that made contribution to the field. At last, 116 articles were collected as the samples area. The objective is to focus on how the workplace safety and health hazards are happening, to see current state of the art of the researches summit and to identify the drawback from previously conducted researches. The gaps that exist can be filled by the overall research works considering further research areas.
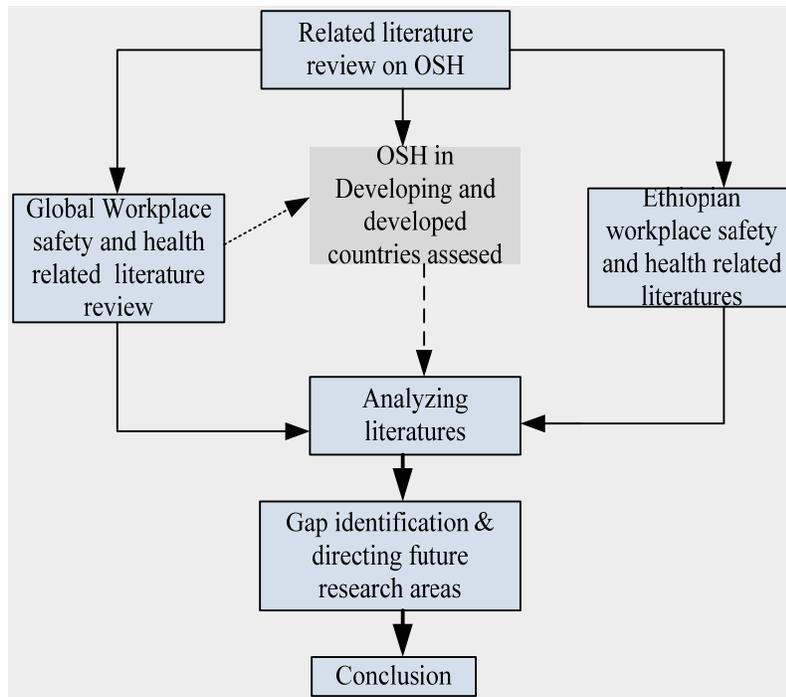

Figure 1. Research methodology how data organized

Figure 2 indicates that categorical distribution of research domain (areas) related to safety & health based on research areas. The major areas of previous research works focus on assessment and model development of safety (25.00%) takes the maximum share and the second, third and

fourth are lean and innovation, knowledge transfer related studies with technology diffusion (11.52%), safety management system and safety culture (climate) models related (10.53%) and others like cost related researches are the major areas under which most studies were conducted.
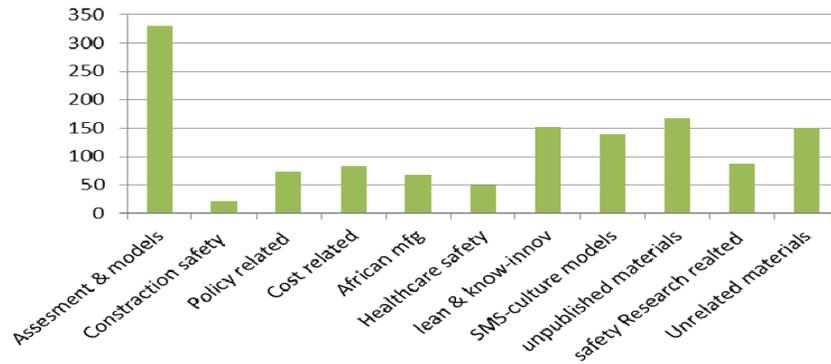
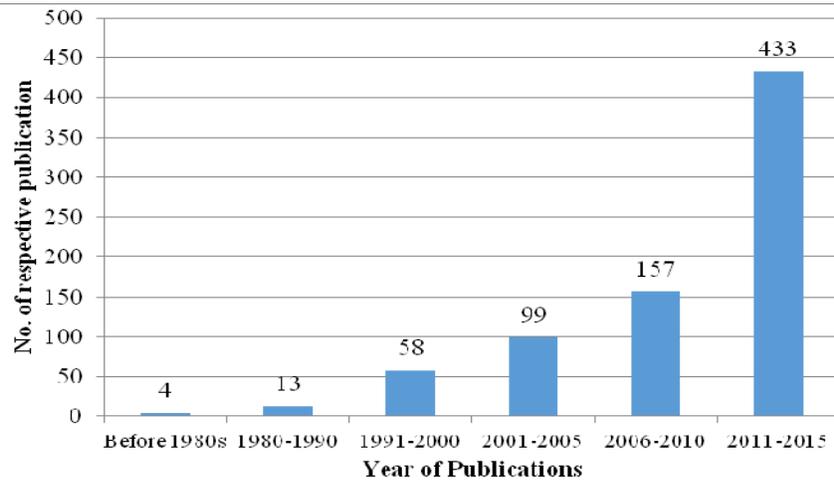**Figure 2.** Distribution of Researches Based on research areas

Figure 3. Based on publication Years

This study also considered year of publication as shown in Figure 3. The publication rate on occupational safety and health related hazards is increasing from 1980s to 2015s period. This is an indication that OSH related researches are considered as every individual issues. Previously, workplace safety and health was not given consideration and called as Pathological where people have no interest on OSH hazards control. But now it is considered as every bodies issue as more understandings are created through researches to the society. The literature review used to look into the previous researchers objective of the researches, methodology they followed, and findings/conclusions (see Appendix 1 & 2).

3. Literature review

3.1. Global status of workplace safety and health

Nowadays, work place safety is considered by World Health Organization (WHO) a priority setting for health promotion in the 21st century (Takala, 1999; WHO, 2010). International Labour Organization (ILO) and WHO reports indicated that in manufacturing industries many employees suffer from workplace injuries and property damage resulted in economic crisis (ILO, 2010; WHO, 2010). Every 15 seconds, a worker dies from a work-related accident or disease. Every 15 seconds, 153 workers have

a work-related accident. Every day, 6,300 people die as a result of occupational accidents or work-related diseases – more than 2.3 million deaths per year. Annually, 317 million accidents occur on the job; many of these resulting in extended absences from work. As a result of the ever-increasing pace of worldwide liberalization of trade and economies, as well technological progress, the problem of occupational accidents and diseases are becoming more and more global concern, particularly in developing countries (Soehod and Laxman, 2007). In recent years, occupational health and safety of the workers has improved and is relatively satisfactory in developed countries, whereas in developing countries, occupational health receives little attention and comes at low level in the list of national priorities (Perrow, 1984). Studies showed that there are baskets of measures providing information on a range of health and safety performances (HSE 2001; Yessuf *et al.*, 2014). Most business sectors prefer a single OSH performance measurement. It would be optimal if such a measure were to be found, but in occupational health and safety no such single measure can be completely adequate to measure occupational health and safety (Gallagher *et al*., 2001a) in solving the challenges.

Many studies indicated that where there are people and complex technologies, there are always safety problem and accidents where these systems are operating (Perrow, 1984). This researcher finding concludes that the risk never be eliminated but minimized. However, it is difficult to minimize OSH, its practices focus is less than 1% of organizational and national researches issues (Barling *et al*., 2002). Promoting occupational health and safety practices such as OSH promotion, OSH awareness, OSH research and OSH education requires a broader platform (Alkilani *et al*., 2013; Goldstein *et al*., 2001; Gyekye, 2010). Although in a survey among International Commission on Occupational Health members from 47 industrialized and industrializing countries, 70% reported OSH being in place and 80% noted the existence of a national institute for OSH, the estimated coverage of workers with OSH services was only 18% (Hamalainen *et al*., 2006; Rantanen, 2013). WHO and ILO have elaborated programs to foster the development of international occupational health, but the real effect of this effort is still not optimal likely due to insufficient funding (LaDou, 2003). This lack of funding is not alone the reason but also globalization and industrialization has a strong impact in development of OSH hazards development. There are many varieties of workplace safety hazards causing factors (Yessuf *et al.,* 2014). Developed countries like North American, European, and Australia are planning and budgeting for workplace safety and health prevention better than the rest of the world. In total, nearly 1million workers will suffer a workplace accident and every year a total of 2.4 million people die as a result of unsafe or unhealthy workplace conditions. Worldwide, this situation causes an economic loss of 4% of global GDP (ILO, 2010; ILO, 2014). Rarely mentioned is the presence in developed countries of a political mechanism that mediates the translation of scientific findings into policies and regulations that are enforced by specialized agencies.

In developing countries including Ethiopia, the risk of having work-related injury is 10 to 20 times higher than that of developed counties. This is because in developing countries, majority of the workforce is employed in small and medium scale industries that do not meet the minimum standards and guidelines set by the WHO and the ILO for occupational health, safety and social protection (Tadesse and Kumie, 2007). Occupational health and safety laws cover only about 10% of the population in developing countries, omitting many major hazardous industries and occupations (LaDou, 2003). Occupational health remains neglected in most developing countries under the pressure of devastating social, economic, and political challenges (Ahasan

and Partanen, 2001; O'Neill, 2000; Christiani *et al.*, 1990). A striking characteristic of occupational health in the industrialized world, and a message frequently disseminated in developing countries, is the contribution of science to progress in occupational health through data collection, ongoing assessment of problems, and innovative technological solutions

(Ashford and Caldart, 1996). The traditional workplace-oriented occupational health has proven to be insufficient in the developing world, and tangible progress in occupational health can be achieved only by linking occupational health to the broader context of social justice and national development (Swuste and Eijkemans, 2002; Joubert, 2002; Michaels *et al.*, 1985; Mendes, 1985).
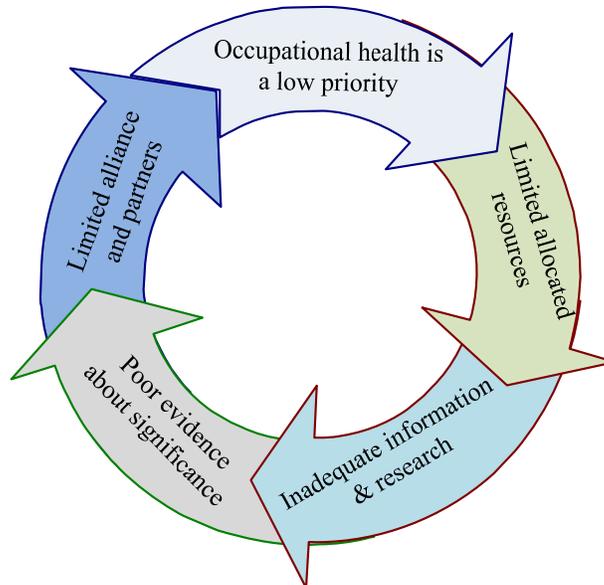

Figure 4. The occupational health "cycle of neglect" in developing countries

The fatality rate in Sub-Saharan African countries is 21/100, 000 workers and the accident rate is 16,000/100,000 workers (Takala, 1999). In Sub-Saharan African countries about 54,000 fatal and approximately 42 million occupational accidents happen annually that results at least 3 days absence from work of every workers. In Ethiopia, the fatal occupational accidents rate is 5,596 per year with a fatality rate of 21.5/100,000 workers and an accident rate of 16,426/100,000 workers (Takala, 1999) regardless of its poor reporting culture and availability of data accuracy. Accordingly, if people are not safety conscious, then no amount of gadgetry, fail safe devices and back up alarms can ensure their safety (Kharbanda

and Stallworthy, 1998). Hence, majority of African countries have poor health and safety culture (RCAR, 2004). The study conducted in Tago (Nigeria) found that the nature of work environment and the experience about work environment has a great share on low productivity and in developing countries safety management and measurement is at its infancy (Alkilani *et al.*, 2013; Goldstein *et al.*, 2001). Although the positive impact of healthy workplaces on growth is well known, some companies, small enterprises and organizations are still facing challenges in adopting preventive measures of the working place hazards. Most of African countries are noted for poor occupational health and safety practices (Gyekye 2010).

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Most of the company's focus is on the external customer satisfaction with their product or service disregarding workers satisfaction and working environment comfort in economic lagging countries. Because of workplace safety and health improvement, it increases the health of the employees and satisfaction of the employees (WHO, 2007). Many researchers said that wealth means health.

The problems emanate from different angles of the workplace environment in industrial sectors. Alli (2008) and WHO listed out some of several problems of occupational safety and health problems as psychological stress of employees, physical body damages, socio economic dissatisfaction, property damage, family disorder, and sever accidents. Figure 4 Shows that the neglects of the developing countries on occupational safety and health problem controls. Occupational health research in the developing world focus on the internal of the organization than on the social and political issues and then move inward to address the particularities of the workplace (i.e., from the "external–contextual domain" to the "internal domain").

OSH for development has been stated that it is heart of health and development. While it had long been recognized that lack of development was responsible for poor health outcomes in low-income countries, it was not until 1990s or so that the reverse process – the impact of health on development – became a key topic for research and policy (ILO, 2012). Developing countries have few assets, little access to credit, and their current income puts them uncomfortably close to the poverty line (ILO, 2012). When there is high accidents, there is high disease and require more economic currency. When a country pays more money to health caring, the country's economy leads to poverty (ILO, 2012). Table 1 shows the two domains of the OSH research.

Table 1. Domain of OSH research

Domain of OSH researches	Sub domains
External contextual domain	• Global, regional and national policies and regulations • vulnerable populations (children, women, disabled, migrant and older workers) • Disability and compensation (economic and social burden) • Occupational mobility (unemployment, retirement) • Movements of hazards and population
Internal domains	Workplace hazards, work organizations, exposures (disease spectrums), occupational health, service and programs

In summery developing and developed countries have commonality and differences in OSH execution philosophy. Developed countries pretense of political mechanisms mediates scientific findings to policies & regulations and economic, technological, and socio-political feasibility of intervention is valid and strong (Verma *et al.*, 2002). Whereas in developing countries without similar parliamentary or democratic political mechanism(s) and risk assessment processes, the industrialized model cannot be imported to developing countries to perform critical OSH improvements. There is also lack of governmental interest in occupational health, poor data and data collection systems, and weak enforcement of health and safety regulations (O'Neill, 2000) improvement system development. It has been considered as a routine job and time consuming as well as liable to cost. However, the authors ask questions like what is the difference between costs occurred for safety control and costs paid for unsafe workplace after hazards? Which is best for companies to be more persistent in the global competitiveness market and economy?

3.2. Safety culture and climate

The terms 'safety culture' and 'safety climate' are often used interchangeably to refer to similar concepts (Bentley and Tappin, 2010). Safety climate is essentially a snapshot of the safety culture, which, unlike safety culture, is relatively unstable and subject to change (Wiegmann *et al.*, 2004; cited in Bentley and Tappin, 2010). Safety climate described as a superficial construct, comprising the attitudes and beliefs of workers, which guide their subsequent behavior (Bentley and Tappin, 20110). Every organization has some common internal, characteristics called as culture. Culture is defined as the ways of thinking, behaving and believing that members of a social unit have in common (Rousseau, 1988; O'Connor *et al.*, 2011; Glendon and Litherland, 2001; Cooper, 2000; Olsen, 2010). Culture can be static (unchanging value held by organization) and dynamic (how the organization operates, type of work process it feels comfortable with). Social and cultural differences between countries in working conditions and employment structure can also affect workers exposure to risk as well as health outcomes.

Table 2. Different characteristic and definition of safety culture and climates by different authors

Definition of Safety culture	Definition of Safety climate
the sub-facet of organizational safety culture that is thought to affect members' attitudes and behavior in relation to an organization's ongoing health and safety performance (Cooper, 2000)	Organizational safety climate as the shared perceptions [among members of an organization] with regard to safety policies, procedures and practices (Zohar, 2008)
the system of shared values and beliefs about health and safety which create behavioral norms which guide health and safety activities in the enterprise' (Kaluza *et al.*, 2012)	Safety climate, on the other hand, can be seen as a temporary 'state' of an organization that is changeable, depending on the prevailing organizational and environmental conditions (Wiegmann *et al.*, 2004)
Safety culture can be viewed as an enduring characteristic of an organization (analogous to trait or personality) that is reflected in its ongoing safety activity and priorities (Wiegmann *et al.*, 2004).	Safety climate is the construct most commonly measured in studies of organizations, with psychometric survey items usually related to perceptions of a range of organizational indicators of safety culture, including management commitment, communications between management and employees and environmental conditions (Zohar, 1980)
Five global components or indicators of safety culture, including: 'organizational commitment', 'management involvement', 'employee empowerment', 'reward Systems' and 'reporting systems' (Wiegmann *et al.*, 2004).	A Safety Climate survey provides a snapshot of the organization's culture in relation to safety (HSE, 2015; Huang *et al.*, 2012)
An organization's culture can have as big an influence on safety outcomes as the safety management system. 'Safety culture' is a subset of the overall organizational or company culture. Many companies talk about 'safety culture' when referring to the inclination of their employees to comply with rules or act safety or unsafely (HSE, 2015).	A safety climate is the sum of employees' shared perceptions of the policies, procedures, and practices relating to safety in their work environment (Huang *et al.*, 2006).

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In order to contribute to the overall reduction of workplace accidents, workplace safety has been studied from divergent points of view (Rousseau, 1988). Table 2 describes the characteristics of safety culture and safety climate that is useful to investigate the coherence and difference between them. This differentiation helps to minimize ambiguity among users in organizations and highlight further research areas.

Although the constructs used to assess safety climate have varied from study to study, measured domains generally include management commitment, supervisor support, safety awareness, safety training, safety policy, safety knowledge, safety communication, and co-worker support (but

not limited).

As shown in Figure 5, the safety culture elements combined and reorganized together results in culture of trust. This culture of trust helps the organization to have confidence and good culture of reporting accidents to the management. When there is absence of culture of trust, the employees are not courageous to report happened accidents, happening, or near miss accidents. Reason (1997) agree in that when there is informed culture, reporting culture, just culture, flexible and learning cultures are cultures of the organization trust will be built and accidents easily controlled. This is a safety-I approach and the model lacks safety-II approaches (Hollnagel, 2014).
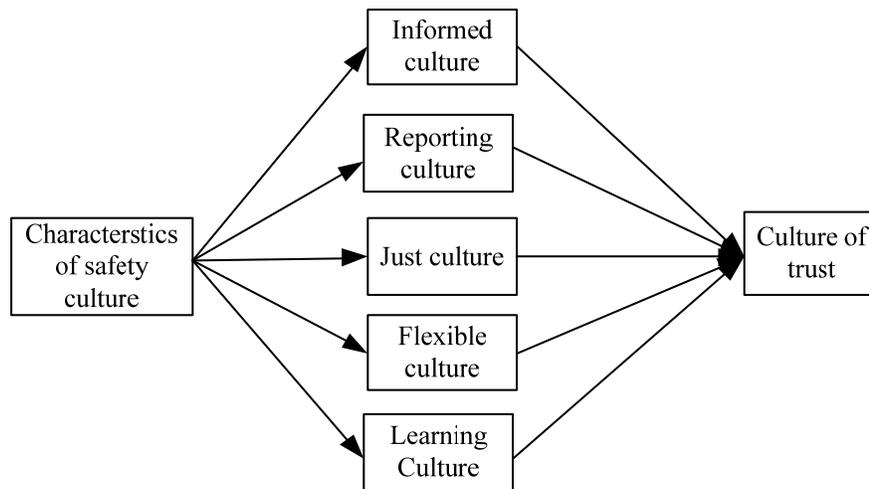

Figure 5. Safety culture Model Characteristics (Reason, 1997)

Safety culture has its own characteristics and indicators. This characteristics and indicators are the elements for workplace safety and health improvements. The researchers identified this safety culture characteristics and indicators as key issues of successful workplace hazards management tools. Their detail characteristics elements and indicators are shown in Table 3.

When researchers come to safety culture, they agree that there is an evolving change in different eras of safety culture development.

The evolution of safety culture recognized as no interest (Pathological), reactive, calculative, preventive (proactive) and generative phase. The author introduced predictive method on the evolutionary safety culture model developed by Hudson (2001). Nowadays, the evolution is considered to be at the stage of human behavior as safety characteristic is dynamic and it varies from time to time depending on the developmental stages of the economy.

Table 3. Safety Culture characteristics and indicators

Characteristic	Indicators
Commitment	Management concern, perception of importance of safety, prioritization of safety, safety procedures and requirements & personal involvement and responsibility for safety
Behaviour	Employee behaviour with respect to safety, mutual expectations and encouragement, job satisfaction & adequate equipment
Awareness	Attitude towards unreported hazards, awareness of job induced risk & concern for safety
Adaptability	Pro-activity to prevent negative happenings, actions with respect to negative happenings & employee input
Information	Availability of information, communication of work related information, training, safety issues reporting system, willingness to use the reporting system, consequences of safety reports, communication of safety related information & information exchange about safety issues
Justness	Evaluation of safety related behaviors, perception of evaluation & Passing of responsibility

In Figure 6 safety characteristics model has been seen. Here Cooper (2000) has developed a safety culture model with three interdependent dimensions (environment, person, and behavior). However, there is such type of safety model development; there is absence of considering the external environment and inter-collaborative bodies' role in the safety improvement culture.
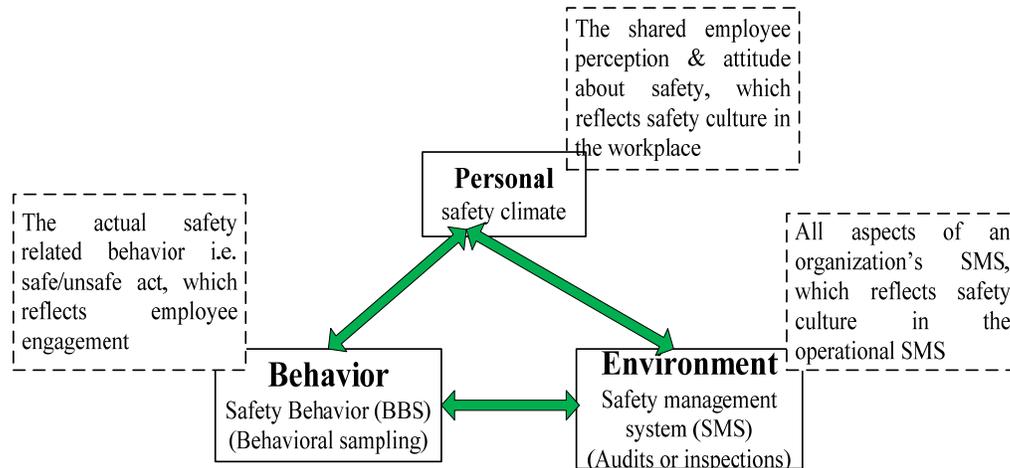

Figure 6. A safety culture model (Cooper, 2000; Choudhry *et al*., 2007a)

Safety climate is the shared employee perceptions and attitudes about safety, reflects safety culture in the workplace and can be measured by a questionnaire. Overall, the integrated model and various measurement tools would allow for a multilevel, holistic analysis of manufacturing industries safety culture.

3.3. Safety management system

Safety Management system (SMS) is one example of a system safety method. ICAO (2009) defines SMS as an organized approach to managing safety, to include the necessary organizational structures, accountabilities, policies, and procedures. The four pillars of SMS are: 1) Safety

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Policy, 2) Risk Management, 3) Safety Assurance, and 4) Safety Promotion (Velazquez and Bier, 2015).

Future studies proposed by Fan *et al*. (2014) "how safety climate moderates the level of integration of environmental and health and safety system?" how to develop a new domain (e.g. top management team's impact) that has been common investigated in other research context (e.g., quality and environmental management system). Research question, such as "Whether the top management team's background and composition affect the adoption of EHS systems, and whether their experience moderates the safety performance?" is interesting for future research (Fan *et al.*, 2014). This agrees that management system integration (e.g. Knowledge management, quality management, safety management, environmental health management) has less consideration. Knowledge management system helps in disseminating and using knowledge regarding workplace safety and health management (Schulte *et al.*, 2003). They added that information dissemination is a mandated, but understudied, requirement of occupational and environmental health laws and voluntary initiatives. Research is

needed on the factors that enhance and limit the development, transfer, and use of occupational safety and health information (OSH). In this study the way how to disseminate knowledge has been discussed but lack how to integrate knowledge management system to management systems related to safety.

As shown in Fig. 7 research domain classification made by Fan *et al.* (2014) indicates that more researches were conducted on safety culture and safety climate during their studies. Only 14 articles were obtained from 128 articles on management system integration. Integrations were the combination of two or three elements.

Despite widespread adoption of OHS-MS by organizations, its effectiveness has been debatable. Goh *et al.* (2012), among others for example, have posited that OHS-MS is beneficial to an organization's overall performance. In contrast, Goh *et al.* (2012) have estimated the failure rate of OHSMS to be at least as high as the failure rate of quality management systems, which is between 67% and 93% (Goh *et al.*, 2012).

Figure 7. Research domain classification (Fan *et al.*, 2014)

In a similar vein Goh *et al.* (2012) have expressed doubts about the effectiveness of OHSMS. Table 4 shows that the commonality and difference between QMS, MS and SMS in any organization trend. Here

it needs further research on the hybridization of quality management system (QMS), environmental management system (EMS), knowledge management system (KMS), and safety management system (SMS).

Table 4. Commonality and difference between Management systems

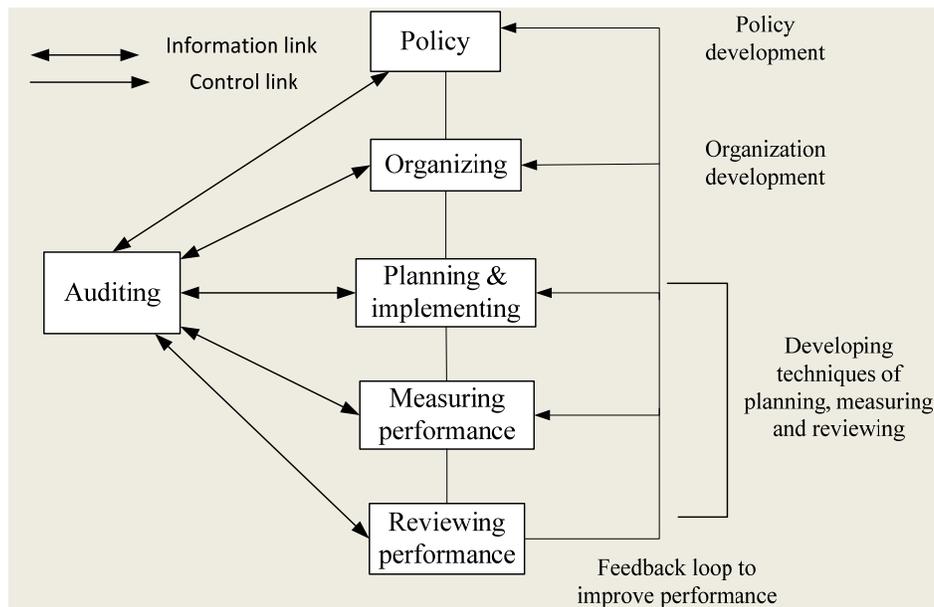| Commonality among QMS, EMS,SMS	Difference among QMS, EMS,SMS

• System requirement
  ▪ System documentation
  ▪ Verification
  ▪ Auditing
  ▪ Conformity
  ▪ Continuous improvements
  ▪ Prevention (Matias and Coelho, 2002)
• Leadership (management responsibility)
• Management of resources
• Management of process
• System implementation
• Monitoring and measuring
• Deming principle (PDCA)
	• Aim
	  o QMS aims toward customer satisfaction
	  o EMS aims toward environmental protection, pollution prevention & promoting social economic harmony
	  o SMS aims toward occupational risks control to improve safety and health related performance
	• EMS focus on environmental protection and energy conservation while SMS focus on creating and maintaining safe environment while protecting and maintaining the good health of the workers
	• They possess different traditional mode of operation (Gallagher *et al.*, 2001b)
	  o Logics of managerial control (QMS)
	  o Logics of accountability and state control (EMS)
	  o Logic of interest representation and bargaining (SMS)
	• In terms of Implementation
	  o QMS applied 100% voluntarily
	  o EMS partly voluntarily and partly obligated by legal demands
	• There is no ISO standards for SMS at present of the two MS. SMS standards are not globally accepted but QMS standards are easily adopted (Matais and Coelho, 2002)

Figure 8. Key elements of successful health and safety management (HSE, 2008)

Research findings focused on the management practice planning in related to safety. Planning for OSH is an integral part of organizations business planning process (Liu *et al.*, 2015). Despite the implementation of many occupational safety

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and health (OSH) management practices, accidents at work still occur. This study also added that many practitioners find management systems to be ineffective due to their high level of formalization and rigidity, which makes them unable to respond to emerging and unexpected challenges and risks.

HSE (2008) has identified key elements of successful health and safety management systems. The primary key element starts at policy existence, and then organizing, planning & implementing, measuring performance, and reviewing (evaluating) performance of the management system (Fig. 8). However, how this is different from other disciplines has not been clearly discussed. As a result of this it needs, little advance in clarification of the SMS through integration of the MS and knowledge transfer system.

3.4. Safety standards, policy and safety training

Until now, only 24 countries have ratified the ILO Employment Injury Benefits Convention (No. 121), adopted in 1964, which lists occupational diseases for which compensation should be paid and only 31 have ratified the Convention on Occupational Health Services (No. 161). The adoption of these conventions should be the first step toward the implementation of an OSH system. OSH regulations cover only about 10% of the population in developing countries. These laws omit many major hazardous sectors like agricultural and domestic work, typically not considered "industries." Only 5% to 10% of workers in developing countries and 20% to 50% of those in industrialized countries have access to adequate occupational health services (LaDou, 2003; WHO, 2004).

Although ILO is an important reference for OSH standards, conventions and recommendations require national ratification and the lack of ratification and subsequent enforcement undermines the

impact of the conventions. Moreover, some have criticized the shift in ILO standards away from specific measures with high levels of accountability toward promoting high-level global labor standards that allow flexibility in application, ostensibly to allow countries with different levels of economic development to adapt standards to their local context. This, in practice, allows greater accommodation of management discretion at the workplace (Hilgert, 2013). Here, it is learned that ILO standards settlement alone is not an efficient goal of OSH problems solving target. Therefore, it requires another supportive method for settlement of workplace hazards and improves workers living standards

Studies agree on the top management level training. Since upper level management can set priorities and have a greater impact on organizational strategy, there is a need for more research on these individuals (Huang *et al.*, 2011). Studies have discovered empirical evidence for the hypothesis that high-quality products and services cannot be produced unless there is a high-quality workforce functioning with a high-quality production process and it is maintained when there is exceptional quality of working life (Carayon *et al.*, 1999). A self-assessment method for OSH management is a useful tool for continuous improvement (Ketola *et al.*, 2002). This improvement maintained whenever there is training opportunities in the organization culture. Training teens about occupational safety is part of an overall strategy to address the negative workplace health consequence (Maki and Winder, 2008).

Training and education in OSH management is disregarded subject area, as one looks at the scientific press (Verbeek and Kroon, 1995). There are few publications related to OSH education and training in higher institutes (Arezes and Swuste, 2012; Gute *et al.*, 1993). Training at all levels should be emphasized as a means of improving working conditions and the work environment. However, in today's

competitive globe, workplace safety training has not been considered yet as essential issue of the development. From this study, it is grasped that developing countries put policies in place in white and black in the office without execution plan. This may also the result of the globe failed to build ISO related to safety like that of quality and environment.

4. Result and discussion

In the previous literature review discussion section, many research gaps were identified. It was found that manufacturing industries have two opposite prospective factors toward the development. One is the economy driver and the other is hazard creators on workers. As studies summarized based on their methodologies, objectives and finding or conclusion, workplace safety has given less consideration being an issue of globe. The summery shows that many studies lack integration of different disciples and management systems (See appendix 1 and 2). For instance, all the studies being conducted in Ethiopia considered case companies at different location with almost the same methodology of the study. Their studies' objectives, data analysis, research finding results, target industries (textile and garment), recommendations and their conclusion more or less similar. Their intention was also on the identification of workplace hazards and accidents causing factors. After the identification of the factors, none of them developed integrated systematic models. Almost all of them concentrated on medical aspects leaving the working physical environments behind. Few of them raised the safety culture elements, management elements and organizational cultures (climates), policy and regulations, knowledge diffusion and workplace innovation characteristics and how to approach the hazards in holistic ways. Most of them had given recommendation saying, "Special attention has to be given to prevent occupational injuries" without answering the

question "how". In general, they only found accidents causing factors on the occupational safety and health conditions. Therefore, it needs to develop holistic improvement approaches that impact the workplace safety and health positively. The overall study of this paper discusses some of the following gaps.

Environmental Management System, Quality Management System, Safety Management System and Knowledge Management System were found to be undermined in the previous studies. The first three mainly considered in few studies referring to quality management system (ISO 9000), environmental management system (ISO 14001) and occupational health and safety management system (OHSAS 18001) (Fan *et al.*, 2014). They also added that OHSAS 18001 is a voluntary OHS management system certification introduced in 1999. The main motivations of integrating management systems are to optimize and unify the audits (both internal and external), reduce documentation and bureaucracy and saving time (Salomone, 2008 cited in Fan *et al.*, 2014). When integrating the management systems firms face difficulties such as lack of human resources, integration guidelines and compatibility among the systems (De Oliveira and Coelho, 2002; Di fan *et al.*, 2014), higher cost of simultaneous systems adoption and change in systems due to operations change (Fan *et al.*, 2014). The level of integration is another key focus in this research domain that needs further studies. Jorgensen *et al.* (2006) conceptually proposed that there are three levels of integration of the systems, namely, the lowest level "corresponding", the medium level "coordinated and coherent" and the highest level "strategic and inherent". Bernardo *et al.* (2010) argued that the characteristics of the three levels of integration through cluster analysis, empirically. The differences of management system goal, documentation, human resources and procedure may determine the levels of integration (Bernardo *et al.*, 2010).

Besides, the auditing of the management systems has been further discussed as a key element representing the integration levels (Bernardo *et al.*, 2010). However, the link between level of integration and firm performance is not clearly established in the previous studies. Several scholars have proposed that management systems integration may improve firms' internal coordination, which can reduce administrative burdens (Jorgensen *et al.*, 2006), duplication of planning and execution (Salomone, 2008) and wastage and operating costs, eventually improving efficiency and productivity. The propositions are purely theoretical and require solid empirical evidence to prove. Moreover, it is interesting to investigate under what contexts the integration can achieve more operational benefits. Finally, OHSAS 18001 is often viewed as the third step of firms to achieve systematic management. However, scholars have questioned the compatibility of OHSAS 18001 with ISO 9000 and ISO 14000 for long (De Oliveira and Coelho, 2002). Firms with only ISO 9000 and ISO 14000 have achieved higher integration than firms with all three certificates (Bernardo *et al.*, 2010). This implies that the compatibility issue of OHSAS 18001 may exist, and further research on the compatibility between the three systems is essential. Boldly writing, management systems models (QMS, EMS, & SMS) integration has not been arrived on consensus for the workplace safety and health improvement approaches (Matias and Coelho, 2002). A limited number of theoretical and empirical studies suggest contradictory evidence for the relationship between these practices and safety performance. It is worth noting that the subject is of great importance, especially if we consider that work-related health problems have greatly increased since 1990s (Pekovic, 2015), and that they could indirectly inhibit firm performance. Further research is required for examination of conditions under which firms adopt quality practices in order to benefit in term of safety

performance & the relationship between quality practices and safety performance may depend on the specific quality practices under consideration (Pekovic, 2015).

External environment and inter-collaboration of external industries workplace safety and health improvement approaches were found loosely. In the literature, external environments loosely considered. Similarly, there is study as the knowledge of the Authors finding that the inter-collaboration of external industries to combat workplace safety and health problems. There were few studies conducted on the impact of workplace safety and health improvement approaches when companies collaboratively work together to bring safe workplace.

In order to confront OSH problems, it also needs to develop integrated models with multidisciplinary level, external and internal organization factors, socio-economic status, technological change, leadership, safety culture, Deming cycle, knowledge transfer, team innovation, workplace innovation, and physical environmental factors. In other words, soft, hard, human and environmental factors consideration are very important to workplace hazard management. There are other factors such as prioritized process improvement & change management, model of knowledge management behavior, the road to excellence (RTE) framework, safety culture and others has been flouted and not interestedly researched in well integrated frameworks with multidisciplinary approaches. Many researches to date have not adopted a multilevel theoretical perspective to the study of workplace safety nor has it attempted to integrate findings from various disciplines. There is lack of integration of workplace safety with human resource management, organizational behavior, safety engineering, and various fields of medicine and public health to focus on cross-level linkages among national, organizational, and individual-level variables in relation to the exhibition of safe work behavior and occurrence of individual-level accidents, injuries, and illnesses. As a result

this ignorance of multidisciplinary researches, nowadays occupational safety and health is getting worst and becoming global issue.

The other gaps identified were on safety culture difference. Studies attempted to identify the largest influential factors on safety culture as management commitment and style; employee involvement; training and competence; communication; compliance with procedures; and organizational learning (Bentley and Tappin, 2010). They also attempted in their study to see the relationship organizational safety culture, OSH-MS and ergonomics intervention. Their relationship is interlocking that each of them imposes influences on each other bilaterally. However, the relationship lacks consideration of knowledge factors, policy effort and final goals (strategic plan) of the workplace safety improvement approaches. It also overlooks the dynamism of culture that affects workplace safety negatively where it fails to meet that model.

In the literature review it has been found that researches results and knowledge diffusion has been considered loosely. Knowledge transfer mechanism to workplace safety has not also been properly stated in literatures. How knowledge diffusion is undertaken among organization in line with horizontally or vertically flows. The workplace safety management system needs to employee information flow peer-to-peer, vertical to vertical, horizontal to horizontal, peripheral to peripheral organization. The study also found that policy development and continual training approaches are challenges. Zohar (2010) pointed out that safety policies, procedures and practices can be interpreted differently at different hierarchical levels in an organization. The perceived safety climate can therefore depend upon an individual's position within a company (Zohar, 2010). Hence, it requires further study.

Researchers conducted studies focusing on

priorities limited to the internal domain of occupational health. Indeed, workplace interventions such as proper occupational hygiene and ergonomic practices have been presented as one of the tools to break the cycle of poverty, because these improve productivity, salaries, and, consequently, living conditions (O'Neill, 2000; Elgstrand, 1985; Khogali, 1982). However, this sequence of positive impacts is not clear to decision makers in most developing countries, who still perceive occupational health as a luxury. Occupational health problems in developing countries require technological innovation (Sass, 2000) plus significant institutional and legal developments (LaDou, 2003). Occupational health researchers in developing countries are not awake up to the potentially negative effect of global trade on the health and safety of poor and marginalized workers (Loewenson, 2001). The study conducted by Jupp (2010) indicated that existence of policy and research priority at workplace safety and health is at its infant stage. There is no relationship between team innovation climate and organizational culture in improving workplace safety. Hence, more researches are required in developing countries than developed countries.

In the previous studies it was also found that smaller businesses differ from their larger counterparts in having higher rates of occupational injuries and illnesses and fewer resources for preventing those losses. These researchers identified that economic constraints are the basic problem of small and medium enterprise. This needs OSH initiators at countrywide or enterprise wise with available resources. The overlooked area of this theme is that how to cope the challenges exist within this shortage of resource in the small business enterprises (manufacturing industries). It is true in the developing countries more of the infancy stage of industries are micro and small enterprises where high accident rate may recorded even though accident recording culture is yet infant. Raymond *et al.*

developed and extended OSH intervention model from diffusion of innovation and social exchange theory that function for only small business than large business organizations. Hence, it is another assignment for the researchers to look into both small and large business organization workplace safety improvement techniques. In the study of Nordlöf *et al.* (2015) survey, the workers reported that there is a constant and ongoing trade-off between productivity, on the one hand, and safety, on the other, and that they are conflicting entities, wanting to produce as well as wanting to work safely, with practical obstacles to working safely sometimes. The workers experienced that the possibility to communicate is very important for safety at the workplace. The trade-off between productivity increase and sometimes safety management are conflicting ideas that need justification in further studies. Studies also concluded that to prevent workplace safety hazards, it is mandatory looking into objectives, strategies, structure, method and people in the organization.

As studies highlighted, integrating safety culture, leadership, and safety management system into manufacturing industries planning system must be target of the researches. In management level, the safety culture should incorporate the resources allocated to production and protection. Studies testified that many companies are not committed to allocate resources to workplace safety and health prevention. More resources are rather allocated to production and the companies used to say accident suddenly happens. Hence, this literature review recommends that companies should consider a holistic approach when designing system improvements (to strengthen company performance jointly with safety and well-being for the workers) (Weiner *et al.*, 2009) than focusing on the productivity (physical look up only). Second lean thinking to workplace safety and health should be a priority of organizations so that waste of

time, money, energy, and related wastes are reduced. There are few studies that reveals about the lean occupational safety and health that helps researchers to consider this area and conduct well organized studies especially for the developing countries.

5. Conclusions

In conclusion, the authors have conducted a literature review on occupational safety and health state of the art in the globe considering previous and recent studies. The research focused on the global condition of safety in manufacturing industries both in developing and developed countries. It has been discussed on safety culture, performance, management systems, and its impact on the employees, working area and safety improvement approaches. Even though, there are quit increasing research trends in the workplace safety and health control, they lack integrated and universal management system studies. Research also finds gaps exist that require extended research areas. These areas identified were safety culture difference (dynamic state of culture) that impacts workplace; research methodologies approached variation which is not holistic, performance measurement of workplace approaches instability, technological innovation dynamism impact on workplace safety, absence of clear distinction between developing and developed countries safety management systems, absence of multidiscipline researches, and lack of impact of management's system integration.

Workplace design and hazard interventions have also been seen as barriers in research findings. Barriers identified in manufacturing industries which need innovation. In this study the barriers identified to intervention of workplace safety and health were negative managements' attitude, negative workers attitudes, ineffective or excessive legal requirements, bureaucracy, lack of time, lack of training, lack of economic resources, lack of

economic results, presence of geographical delocalized activities, and workers participation (Podgorski, 2015). While researches conducted on workplace safety and health spans across disciplines in medicine, public health, engineering, psychology and business, researches to date have not adopted a multilevel theoretical perspective that integrates theoretical issues and findings from various disciplines. Most of the researches finding results spin around health matter by the medical professionals in spite of engineering controls. It is true that integration of multidiscipline (health matter and engineering controls) is the major gap that exists unconsidered in todays' research areas. The study also ratified that improper resource allocation to the workplace, unavailability of hybridized management systems (knowledge, safety, quality, health, and environment) and weak alliances of inter-organizational approaches (external collaboration of the inter firms) are also some challenges those improve the workplace safety and health if they are taken into account.

In general, the authors recommend that identified gaps and research areas are open to further researches to reach on consolidated study's findings. Developing countries should establish safety and health policy while developing industrial expansion strategies at the same time as it has been proved from the studies null. Workplace safety and health improvement and development cannot be achieved by individual researcher but with all organization members, government, in collaboration with universities, research and development institution or top management commitment. Comprehensive and meticulous research areas in different topics are very important questions considering the location, economic level, external environment, employment rate, industrial development trends and social culture for developing countries to create awareness to the people as the developed countries have done and are doing. There should also be research dissemination channels and media (own journals from which researchers or readers easily aces resources playing a big role in disseminating knowledge) in which citizens enrich their knowledge.

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Appendix

Appendix 1. Researches categorization based on their objectives, methodology and finding

Research areas	objectives	Methodology	Finding & conclusion	Authors & years (Ref.no.)
A model of OSH Intervention Diffusion to Small Businesses	Reviewing existing small business intervention model and extending the diffusion of innovation and exchange theory with validating case	Extend previous models of diffusion	intermediary organizations were highly attuned to providing smaller businesses OSH intervention	
Leadership and Occupational Safety and Health (OSH): An Expert analysis	To see leadership and safety culture development how improve workplace health and safety	Case studies and literatures where used	Workplace and health improved when there is commitment system, employees involvement, communication and collaboration, and in innovative approaches	Kaluza *et al.* (2012)
Safety culture and reasons for risk-taking at a large steel-manufacturing company: Investigating the worker perspective	To investigate and describe safety culture and risk-taking at a large steel-manufacturing company in Sweden by exploring workers' experiences and perceptions of safety and risks.	Semi structure interview and analysis by qualitative content analysis	Responsibility and actions for a functioning safety performance was perceived to rest on the individual, whereas the work environment and priority of productivity constitute constant obstacles	Nordlöf *et al.* (2015)
Safety climate, safety behavior, and worker injuries in the Chinese manufacturing industry	This study explored the relationships between four dimensions of safety climate (management commitment, safety supervision, coworker support, and safety training), three dimensions of safety behavior (safety compliance, personal protective equipment, and safety initiatives), and occupational injuries among Chinese manufacturing workers	A cross-sectional survey	The results revealed significant associations between different safety climates, safety behavior, and unintentional injuries, and provided evidence that safety behavior strongly mediates the relationship between safety climate and unintentional injuries.	Liu *et al.* (2015)

Dynamics of safety performance and culture: A group model building approach	A system dynamics group model building (GMB) approach is used to create a causal loop diagram of the underlying factors influencing the OHS performance of a major drilling and mining contractor in Australia.	System dynamics	the causal loop diagram provides a tool for organizations to hypothesize the dynamics influencing effectiveness of OHS management	Goh *et al.* (2012)
Occupational Health and Safety Management in Polish Enterprises Implementing TQMS	to evaluate management methods applied to improve working conditions in Polish enterprises implementing TQM	The investigation was conducted in the form of interviews,	Positive integration of OSHMS and TQM but need more research area to integrate over all MS at the enterprise level	Podgórski (2000)
The Use of Tacit Knowledge in Occupational Safety and Health Management Systems	How knowledge management in OSHMS is useful and integration assessment. to identify and analyses KM applications	reviews literature on KM applications in OSH	OSH management system (OSH MS) is identified, in which knowledge contributes significantly to prevention of occupational injuries and diseases. To date there has not been any conceptual model that would describe and explain holistically the role of KM processes within OSH MS, in particular those related to creating, converting and transferring tacit knowledge	Podgórski (2010)
Different perspectives on management systems integration	to assess the critical success factors (CSFs) during an integrated management system (IMS) implementation and to identify the difficulties and barriers faced by the organizations when they integrate several management subsystems, and the resulting benefits	case studies were carried out based on semi-structured interviews with the management system manager	Results from the current study are highly important for organizations that plan to implement or integrate their management subsystems	Almeida *et al.* (2014)

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Quality and environmental management practices: their linkages with safety performance	investigate the relationship between quality and environmental practices and safety performance measured by employee accidents at work	Employing a multivariate probit model	empirical evidence regarding the relationship between quality and environmental practices and employee safety performance is relatively scarce, findings indicate that the implementation of quality practices by the firm that considers quality as very important for its strategy and provides employee's quality-related training is not associated with safety performance	Pekovic (2015)
Relationship Between Working Condition Quality and Perceived Quality of Society	To analyzes the relationship between working conditions and perceived quality of society, which is measured by the existence of trust in institutions and people and the absence of perceived tensions within society (as an indication of social cohesion)	The relationship is explained using the canonical correlation method	there is very strong significant correlation between working condition quality and the quality of society	Darcın (2015)
Using leading indicators to measure occupational health and safety performance	research aims were to (1) describe the extent to which OHS practitioners understand leading indicators; (2) explore organizational practices pertaining to tracking, analyzing, and applying information provided by leading indicators to improve OHS performance; and (3) identify barriers and factors that enable the use of leading indicators	The study design included an expert panel and a quantitative survey to explore the views and experiences of OHS practitioners in relation to leading indicators	study argues for continued effort to improve access to research and practical knowledge among OHS professionals as well as their executive leaders who seek to demonstrate continuous improvement of performance measurement strategies	Sinelnikov *et al.* (2015)

Performance assessment system of health, safety and environment based on experts' weights and fuzzy comprehensive evaluation	To overcome the shortcomings of conventional HSE performance assessment in practical application, a combination of fuzzy comprehensive and experts' weights	a Fuzzy Comprehensive Evaluation (FCE) method is used in this study by taking experts' weights into account	an HSE operating performance assessment system is designed to simplify manual and complex assessment process and generate charts and analysis reports automatically	Li *et al.* (2015)
Climate Change and Occupational Safety and Health: Establishing a Preliminary Framework	To begin such an effort, it may be useful to develop a framework for identifying how climate change could affect the workplace; workers; and occupational morbidity, mortality, and injury	Literature review	Seven categories of climate-related hazards are identified: (1) increased ambient temperature, (2) air pollution, (3) ultraviolet exposure, (4) extreme weather, (5) vector-borne diseases and expanded habitats, (6) industrial transitions and emerging industries; and (7) changes in the built environment. This review indicates that while climate change may result in increasing the prevalence, distribution, and severity of known occupational hazards, there is no evidence of unique or previously unknown hazards	Schulte and Chun (2009)
The Relationship between innovative work behavior on work role performance: An empirical study	to examine how employees use innovative work behaviour to achieve performance	combined role theory and social cognitive theory with insights from the innovative work behaviour and work role performance literature to study employees in a Malaysian automotive organization	study finds support for a one-factor innovative work behavior and a two-factor work role performance. The results show lack of differences in innovative work behaviour and work role performance based on gender and education	

Assessment of Occupational Health, Safety & Environmental Problems in Chemical Industries of Uttarakhand	paper is an effort to present the various factors governing thesafety and Health of chemical industries with a special focus on air quality, water quality, noise, light intensity monitoring, fire safety and safety audit	Survey, questionnaires,	development of standard checklist and safety training required forthe specific industry	

Appendix 2. Studies conducted in Ethiopia and comparison of their work

The research area	Authors and years	Objectives	Methodologies	Findings
Prevalence and determinants of work related injuries among small and medium scale industry workers in Bahir Dar Town, north west Ethiopia, Annals of Occupational and Environmental Medicine	Molla *et al.* (2015)	assess the prevalence and determinants of work-related injuries	Cross sectional comparative study design, purposive sampling and questioners were used	Sex, monthly salary, age, work experience and use of personal protective equipment were found to be different in the small and medium industries
Determinants of Occupational Injury in Kombolcha Textile Factory, North-East Ethiopia, Int J Occup Environ Med	Yessuf *et al.* (2014)	To assess the major determinants of occupational injury among workers	An institution-based cross-sectional study , random, stratified selection and questionnaires was conducted	working greater than 48 hrs/, handling objects greater than 20 kg, visual concentration, timely maintenance of machine, and sleep disorder
Assessment of occupational injuries in Tendaho Agricultural Development S.C, Afar Regional State, Ethiop. J. Health Dev. 2010	Yiha and Kumie, (2011)	To determine the magnitude of occupational injury (assessment)and describe factors affecting its happening among workers	Cross-sectional study design, questionnaires and physical observation was made	Working more than 48 hours per week, absence of health and safety training, sleeping disorder, alcohol consumption, job dissatisfaction and absence of protective devices were significant factors to injuries
Determinants of Occupational Injury: A Case Control Study among Textile Factory Workers in Amhara Regional State, Ethiopia, Hindawi Publishing Corporation Journal of	Aderaw *et al.* (2011)	identifying determinants of occupational injury among textile factory workers	A case control study and structured questionnaires were utilized	Young age less than 30 years, male gender health and safety training, sleeping disturbance, and job stress were significant predictors of occupation injury

Tropical Medicine Volume 2011,				
Work related injuries and associated risk factors among iron and steel industries workers in Addis Ababa, Ethiopia, Safety Science	Kifle *et al.* (2003)	To assess the prevalence of work related injuries and associated risk factors among production Workers,	Institution based cross-sectional study design, stratified and structured questionnaires were used	common causes of injury were splitting and flying objects, hit by falling objects and machinery, Workers were exposed to preventable workplace hazards such as to excessive noise, fumes and dusts and to old and unguarded machines, splitting materials and sparking of metals. Workers consuming alcohol during working days, without spouse, perceiving their work highly stressful and not using personal protective equipment
Prevalence and factors affecting work-related injury among workers engaged in Small and Medium-scale industries in Gondar wereda, North Gondor zone, Amhara Regional State, Ethiopia, Ethiopian Journal Of Health Development	Tadesse and Kumie (2007)	To assess the magnitude and factors affecting work related injuries	Institution based cross-sectional study design, stratified and structured questionnaires were used	Most causes of workplace safety were Service duration less than 5 years, working more than 48 hrs/week, workplace supervision, sleep disorder, job satisfaction, job categories related to mechanics and welding,
Occupational Exposures And Related Health Effects Among Construction Workers. Ethiop. J. Health Biomed Sci.	Sharma *et al.* (2008)	A questionnaire - based survey was conducted	identifying potential exposures and their effects on construction workers in Gondar town of Amhara region	Workers were suffering from shoulder- aches, back pains, skin related diseases, problems in the eyes, breathing and noise irritations.
Predictors of occupational exposure to neck and shoulder musculoskeletal disorders among sewing machine operators of garment industries in Ethiopia,	Tafese *et al.* (2014)	to assess the prevalence and associated risk factors of work related neck and shoulder musculoskeletal disorders	A cross-sectional study, questionnaires and interview was conducted	neck and shoulder musculoskeletal disorders, age group of less than 30 years, who had greater than 16 years of service were about four times more likely to develop neck and shoulder musculoskeletal disorders than those who had short (1–5 years) year of services, medical history of systemic

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				illness, methods of payment factors significantly associated with disorders.
Magnitude and Factors of Occupational Injury among Workers in Large Scale Metal Manufacturing Industries in Ethiopia, Open Access Library Journal	Habtu *et al.* (2014)	to assess the magnitude and factors affecting occupational injuries among workers	Facility based cross sectional study, structured questionnaires, in-depth-interview, checklist and observation was conducted	Sex of workers, safety and health supervision, hours worked per week, cigarette smoking and presence of functional danger signs/posts were significantly associated factors with magnitude of occupational injury
Magnitude of Occupational Injuries and Associated Factors among Small-Scale Industry Workers in Mekelle City, Northern Ethiopia. Occup Med Health Aff	Berhe *et al.* (2015)	to address the information gaps about the magnitude and associated factors with occupational injuries that could help in designing appropriate prevention and control measures	A cross-sectional study and structured questionnaire were used	Use of personal protective equipment's, age of respondent's, number of years worked in the same job, number of hours worked per week and the job category; metalworkers and wood workers were found to be significantly associated factors with occupational injury
Assessment Of Occupational Skin Diseases And Associated Factors among Tannery Workers, Of Selected Tanneries, Addis Ababa Ethiopia,	Seyoum, (2014)	To assessing prevalence of occupational skin diseases and its associated factor among tannery workers of selected tanneries of Addis Ababa.	institutional based cross sectional Study, structured questionnaire, and observational check lists y was done	Male workers take the majority, dermatological diseases symptoms,

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