

**A STUDY ON THE FACTORS INFLUENCING INDUSTRIAL SAFETY
MANAGEMENT**

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Abstract

In recent times , safety management is becoming an important topic in Indian industry. Effective safety management is necessary to improve safety culture and safety performance. It is important to study the influencing factors on industrial safety management. Influencing factors are identified by different researchers from different countries . In India also this aspect is studied but to a limited extent. After the systematic review of literature about influencing factors on industrial safety management it is observed that there is significant relationship between leadership , communication , compliance , competence development , OHS systems with safety management's effectiveness . Safety management's maturity can be assessed using the implementation of influencing factors through various practices .

Keywords: transformational leadership , transactional leadership , PE – psychological empowerment , safety specific leadership , OHS – occupational health and safety

Key Terms : Industry safety means occupational health & safety aspects related to industry

Introduction :

Rising demand of improved industrial safety management : Industrial safety culture improvements were started in Western part of the world in early 90s and different research studies are undertaken in these countries and used by industries to improve safety. In India , since 2005 focus on industrial safety is improving mainly due increased presence of multi-national companies . There is need do improvement in industrial safety management because, industrial accidents claimed over 6300 lives between 2014 to 2017 in India¹ . It is necessary to improve safety management to ensure compliance with latest legal requirements such as India's Occupational safety , health and working conditions code , 2020². Well- established and proven safety systems , procedures & qualified resources are in place, but still serious industrial accidents are occurring. The missing link is positive safety culture which includes people involvement from all levels & well-defined safety strategy. Safety management effectiveness is influenced by leadership , strategic direction , employee engagement , communication , systems & tools , behavior and condition-based programs. This research paper is focused on study of leadership's influence on safety management .

Need and significance of study :

There is need do improvement in industrial safety culture because industrial accidents claimed over 6300 lives between 2014 to 2017. A strategic approach is needed for safety management and culture improvement . Approaches based on behavior science & also improving safe conditions will be effective in the long term. Research abroad has identified the relationship

between leadership and safety performance . In India , limited research is available in this area hence it is needed to study the influence of leadership on safety management .

Scope: This study is based on selected literature review and author's experience & scope is limited to study of influencing factors on safety management .

Objectives:

- To study the influencing factors on safety management
- To study the maturity assessment approaches with regard to safety management
- To provide suggestions for identification of various influencing factors on safety management .

Research methodology:

Primary & secondary data:

The task of data collection is planned for the identified research problem . Method of data collection is decided by keeping in mind two types of data viz., primary and secondary. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process. The researcher would have to decide which sort of data he would be using (thus collecting) for his study and accordingly he will have to select one or the other method of data collection. The methods of collecting primary and secondary data differ since primary data are to be originally collected, while in case of secondary data the nature of data collection work is merely that of compilation. In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher.

This research primary data is not collected however overall research is based on secondary data . Systematic literature review is conducted with regard to leadership influence on safety management .

Limitations :

Research work identified following limitations:

- 1) The research is based on selected literature review only
- 2) The proposed suggestions are based on the selected literature review

Data analysis & interpretation of data :

After systematic review of literature review following findings are found valuable about leadership influence on safety management .

Learnings from a book named The Zero Index - a path to sustainable safety excellence by Colin Duncan¹ . The book is published by safety in action press an imprint of BST i.e. behavioral science technology incorporation , USA in 2012. This book is relevant with my research topic , objectives . As a part of my research , I'm studying the relationship between maturity of the safety management system and different influencing factors. The concept of maturity of safety management is explained in this book is found very useful for my research work.

Safety as a strategy : This book has explained about the importance of having a strategic approach for safety instead of only focusing on the systems . As per the author , safety is not a program but it needs to be treated similar like other business functions. Comprehensive strategic plan is necessary. Early detection approach needs to be promoted to anticipate the problems regarding safety to prevent injuries. Organization needs to adopt their strategy considering the exposure towards internal and external environment. Safety activity needs to be integrated with other business activities and they need to compliment with business systems and processes. Approach proposed in this book is more focused on the exposures based risk management rather than incident based risk management . This book has explained about the maturity level framework for safety. Various factors are outlined in the form of disciplines. Maturity level is defined with six levels. These six levels are primarily categorized organization as avoidance driven , compliance driven and value driven . Avoidance is the lowest level while value is highest level these three levels are further divided into 6 stage/ levels starting from safety as a burden , safety is a necessity , safety is a priority , safety is a goal , safety is a value & highest level of maturity is safety is who we are.

Avoidance driven organization	Safety is a burden
	Safety is a necessity
Compliance driven organization	Safety is a priority
	Safety is a goal
Value driven organization	Safety is a value
	Safety is who we are

This book has explained the maturity model that organization can use for assessment of their current safety efforts. The assessment is focused on defined factors called as 10 disciplines . These disciplines are nothing but various practices followed in the organization which has an influence on the maturity of their safety systems and efforts. These ten disciplines support the health and safety of employees. the level of implementation of each discipline flows from level 1 to level 6 scale. The overall assessment methodology and criteria are explained with respect to each discipline. Organization can do the initial assessment and identify the gap with respect to vision. Based on current level they make a decision on various strategic actions to improve safety to next level. 10 disciplines are defined as below,

Foundational Disciplines	Vision
	Exposure
	Engagement
Safety Disciplines	Structure
	Expertise
	Scorecard
	Enabling systems
Value driven organization	Leadership
	Culture
	Sustaining systems

The next book studied is *The Values Based Safety Process- Improving your safety culture with behavior based safety* ², 2nd edition , author – Terry E McSWEEN , published by John Wiley and sons incorporation , Hoboken NJ in the year 2003. ISBN 0-471-22049-3.

One of the influencing factor is influence of implementation of behavior based safety on maturity of the safety management . This book has explained the process of behavior based safety . Standard elements of organizational are mission, vision ,process ,values ,behavior and results. As per the Terry E MacSween , there must be balanced approach while using result based approach , process based approach ,values based approach & general management approach. In result oriented companies , when results are not achieved then blame culture is visible. The perception in the mind of employees is gets impacted and they starts thinking that management is only interested in numbers. Result oriented approach also create a possibility hiding the injuries and near misses. In the process based approach promotes standardized work procedures and helps to improve the systems. by using this approach process problems are solved but this does not address the problems associated with relationship between employees and managers. Many times it has been observed that instead of identifying the root causes of relationship problems people tend to bring new process or recommend the changes in the existing process. The general management problems such as some individual managers focus more on relationships and behaviors rather than process improvements. Similar way safety committee members may tend to focus on safety awards, awareness campaigns rather than learning new methodologies like behavior observations.

Behavior based safety process which includes initial safety assessment , executive overview and design team workshop , establishing vision, mission , values and targets , creating safety observation process , developing feedback and involvement procedures , establish safety incentives , plan training and kick off meetings ,conduct management review ,implement the behavior safety process , maintain the behavior safety process. As per the case stories given in this book , implementation of behavior observation programs has helped the companies to reduce their incident rates over a period of time .

The next book studied *SAFE BY ACCIDENT*³ , take the luck out of the safety, leadership practices that build a sustainable safety culture , author – Judy Agnew & Aubrey Daniels , published by performance management publications Atlanta in the year 2010. ISBN 978-0-937100-18-9.

I have selected this book since it is very much relevant with my research topic , objectives and hypothesis. As a part of my research , I'm studying the relationship between maturity of the safety management system and different influencing factors one of the influencing factor is influence of leadership practices on maturity of the safety management. This book has explained the effective safety leadership practices hence I found that this book will be very useful for my research work.

In part 1 of this book science of behavior has been explained using ABC model. ABC model explains how behavior is influenced by using consequences. In ABC model , A is an activator or antecedent , B is behavior and C is consequences. occurrence of a is before the behavior while occurrence of C is during the behavior or after the behavior. As per research , it is indicated that both activator and consequences has an influence on safe behavior. However consequences has higher influence as compared to activator. For an example speed limit (activator) is less effective than the traffic ticket (consequence) while managing over-speeding (behavior). It is important that every leader need to understand this basic theory of behavior and learn to use activators and consequences to improve safety at workplace. In Part 2 , author has explained seven safety practices that waste time and money and not very effective. these practices are focusing on lagging indicators, injury based incentive programs , awareness trainings , safety signages , punishing the people make mistakes , misunderstanding the near misses , thinking that checklist can change behavior. Author has also explained what are the right practices while explaining these seven safety practices. For an example , providing an awareness training will not prove useful when the root cause is associated with resources, antecedents, consequences .

Part three of this book is focused on effective safety leadership. Effective safety leader needs to focus on relationship development , use of science to understand at risk behavior, use of science to understand low probability risks, efforts for maintaining safe physical environment , encouraging safe behavior , integrate safety in total picture. High performance team culture is created when members are engaged voluntarily for improvements. Voluntary contribution it's very important in safety excellence. Various best practices are explained for building effective relationship for safety such as setting clear expectations , listening, acknowledging the contribution, seek to understand by asking questions , seeking for the feedbacks , avoiding blames , empathy etc. Effective safety leadership practice of using behaviour science to understand at risk behavior is focused on understanding the consequences . Consequences analysis helps to identify influencing factor behind the at risk behavior. The rare error it's about low probability risks. Effective safety leadership understand the low probability risks with clarity. Investment in high quality trainings to create consistent behaviors reduces the at-risk behaviors. Positive reinforcement , negative reinforcement techniques are used to improve safe behavior. It is very important that leaders take ownership to create and maintain safe workplace for the employees. Effective safety leadership promotes the reporting of hazards without any barriers & fear . Feedbacks are taken from the employees on the hazard identification and risk management actions. Leadership ensures their own involvement in maintaining physical safe environment. Encouraging safe behavior is another one practice explained as effective safety leadership practice. Leaders use activators and consequences effectively to promote safe behavior . Leaders ensure focus on safety aspects in decision making process. Effective safety leadership ensures that safety is integrated across all business functions.

The next book studied removing obstacles to safety a behavior based approach⁴, author – Judy Agnew & Gail Snyder, published by performance management publications Atlanta in the year 2008. ISBN 10 : 0-937100-07-2 , ISBN 13 : 978-0-937100-07-3.

As a part of my research , I'm studying the relationship between maturity of the safety management system and different influencing factors. There are various influencing factors such as effective safety leadership , behavior based safety , employee engagement on maturity of the safety management . This book has explained the process of behavior based safety , effective safety leadership practices & how to improve employee engagement .

Author has explained the importance of taking behavior based approach for safety . In the BBS the word behavior is not only related to frontline workers but it is related to the behavior of employees at all levels including management. Behavior is defined as an observable action. antecedent or an activator creates a prompt for the behavior while consequences are occurring during or after the behavior. Managing by consequences is the approach used primarily in BBS . Consequences are classified as positive (P) or negative (N). Consequences can occur immediately (I) or in future (F). Consequences occurrence probability can be certain (C) or uncertain (U) . The relative power of consequences has been studied and it is explained that ABC model can help us to analyze the consequences behind at risk behaviors. PIC and NIC are considered as most powerful consequences. PFU / NFU are considered as least powerful.

The consequences can strengthen the behavior or weaken the behavior. The consequences which strengthens the behavior are called as reinforcements . Positive reinforcement & negative reinforcement are two reinforcements . Gifting safety T-shirt for contribution for improving safety is the example of positive reinforcement while following the speed limit to avoid ticket by police is example of negative reinforcement. Positive reinforcement is more effective tool to bring consistency in safe behavior . Two consequences can weaken the behavior are punishment and penalty . In the punishment, a person gets something undesirable e.g. getting hurt while performing at risk behavior. Penalty involves losing something that person have e.g. losing money for paying the fine to police for over-speeding. Absence of reinforcer create extinction and extinction decreases behaviour. It is recommended to use positive reinforcement approach as an effective leadership technique for promoting safe behavior. Negative reinforcement is used when there is consistent violation of safety rules . Once behaviour is established than we can maintain it using positive reinforcement.

The BBS process explained in this book is different than value based safety process of Terry McSWEEN . In this process pinpointing method is used for selection of behaviors. Pinpointing method is used to identify important few behaviors which are used for behavior observation process. Important behaviors are identified from near miss reports and other incident history data. Behaviors which needs to be observed shall be specific , observable and reliable . Conducting behavior observations is not a time consuming task and as such observations are spread across the working time throughout the day. Self- observation methods are also used

and proven effective for working alone. No names are documented or recorded on the behavior checklists and scorecards. During this behavior observation process observer identifies safe behaviors and risk behaviors and barriers which are causing at risk behaviors. Identification of barriers is important part of the process including corrective actions for elimination and reduction of the barriers. Measurement of management behaviors is also possible and such practice provides clear scorecard to management team members about their support actions for safety. higher score creates positive reinforcement. Graphical feedback by using percentage safe scorecard helps the employees to understand the progress of behavior observation program. Leadership can influence safety management by using ABC model at different levels and by creating and maintaining the systems that impact safety at work such as permit to work incentives system etc. It is also mentioned that taking safety beyond workplace will also help to improve safety management inside the company. Various beyond safety aspects are explained such as employee engagement, retention , employee motivation, sustainability , product improvements , quality improvements etc.

Martin, D.K. and Black, A., 2015. Preventing serious injuries and fatalities: Study reveals precursors and paradigms⁵. Professional Safety, 60(09), pp.35-43. Study of this white paper was conducted , this This article originally appeared in Professional Safety magazine (<http://www.asse.org/professional-safety>)

I have selected this white paper since it is very much relevant with my research topic of studying the relationship between maturity of the safety management system and different influencing factors. This white paper has explained the process of how to prevent significant injuries and fatalities also called as SIFs .

In past few decades there is a reduction in the incident rate related to non-serious injuries. However the reduction in serious injuries and fatalities is occurring at much slower rate. The research was conducted to study the SIFs and their causes. The causes behind SIFs are different than causes of non-serious injuries. Based on this research it is indicated that the preconditions of SIFs are present in most of the organizations and it is possible identify & measure such preconditions. The result of this research has helped to improve understanding of causes of SIFs & actions for its prevention. For this research , data of 1028 events was studied from the organizations which represents about 1,000,000 global working employees & contractors. Non-fatal recordable incidents in the United States have declined steadily over the past two decades. The rate of non-fatal recordable injuries declined 51% in the past fifteen years and 34% just in the last ten. While the U.S. rate of fatalities has also exhibited a decline, it has been much less dramatic, just 12.5% in the last ten years and 25.5% in the last fifteen (United States Department of Labor, Bureau of Labor Statistics). This reduced rate of decline between these rates also surfaces upon examination of data pulled from a sampling of countries with data available through the International Labour Organization (2009). The fatality rates in many of these countries have remained fairly stable since 2002 . For the purpose of this research paper SIF cases are limited to fatal injuries / illness , life-threatening injury or illness: one that if not immediately addressed is likely to lead to the death of the

affected individual, and will usually require intervention of internal and/or external emergency response personnel to provide life-sustaining support and life-altering injury/Permanent Disability: an injury that results in permanent or long-term impairment or loss of use of an internal organ, body function, or body part. Ergonomic incidents , process safety incidents like fire , explosion are not considered as the scope of his research.

In this research , 7 global multi-national organizations have participated and shared data about near misses , first aid cases , lost time accidents , medical treatment cases , restricted work cases and data of serious injuries & fatality cases alongwith narratives . Random sampling method was used for selection narratives of 30 SIFs , 30 near misses , 30 non SIF injuries from each organization. Further in total 571 narratives were studied . The result of study validates that less severe injuries occur more frequently than more serious injuries . The reported non-SIF injuries or incident has underlying potential of SIF exposure. The logical conclusion indicates that reducing the frequency of the less severe incidents at the bottom of the triangle does not necessarily reduce the number at the top in a proportional way. This analysis identified seven themes related to injury causes. Three of the themes accounted for 82% of SIFs and 91% of non-SIFs. How to identify as SIF event is also explained this paper . SIF exposures have discoverable precursors. SIF precursors have a central unifying theme – they are conditions, behaviors, practices, exposures, situations, and factors that lead to or contribute to the causation of a serious injury or fatality. From the study, the following conclusions were made ,

- The Heinrich Triangle is accurate descriptively but not accurate predictively.
- A subset of reported safety incidents will have SIF exposure potential.
- The causal factors for SIFs are different in kind than those that underlie non-SIFs.
- It is unlikely that a serious injury event is a “one-off,” considering that the precursors leading to it have been present all along

New paradigm was proposed for understanding & preventing the SIFs. One cannot prevent SIF by working outside the SIF triangle , NON- SIF needs to be evaluated for SIF potential , promote visibility to SIF , educate senior management team on SIF , precursors are discoverable & are key for prevention actions , integrate SIF in existing safety systems , improve quality of incident analysis to identify SIF potential .

Book studied : Strategic safety culture roadmap⁶, Jul 2013. Dominic Cooper & Lucas Finley. B- Safe Management Solutions Inc. 2141 Holiday Lane , Franklin , IN USA

I have selected this book since it is very much relevant with my research topic of studying the relationship between maturity of the safety management and different influencing factors. There are various influencing factors such as strategic approach for safety , leadership for safety , employee engagement , safety systems etc. on maturity of the safety management . This book has explained the different maturity levels of safety culture , different strategies to improve safety & how to conduct safety culture assessment .

As per the author safety culture maturity can be assessment in 5 levels starting from beginning to excelling . The five levels defined are beginning , developing , performing , high performing , excelling . Level 1 indicates reactive approach where individuals just focus on self , involvement of workers is low , production has importance over safety , accidents are seen as a part of work , safety performance not monitored . Level 2 is little better than 1 where safety is more driven by accidents , reactive approach , lagging indicators are used , safety is managed with discipline & fear . Level 3 employee involved is there to some extent , compliance driven by awareness & supervision , focus on accident statistics & serious injuries are reported & analyzed . Level 4 is high performing where visible commitment for safety is seen , HSE is usually takes priority , use of leading & lagging indicators , root cause analysis based corrective actions are focused . Level 5 is excelling indicates high level of proactive approach where safety is seen as value , safe production is priority , lessons learned are used for improvements , HSE is integrated with business .

Ten safety improvement strategies are explained in this book . These strategies are about using strengths & weakness analysis , vision for safety , safety culture , leadership skills , safety competence , communications , partnership for safety (engagement aspect) , sharing of lessons learned , corrective actions , contractor management . Establishing safety indicators is also explained well in the book which can be very useful insights for the research . Further methodology is given to conduct current state assessment and action planning to improve to next level . Incident causation model is explained very well to demonstrate how psychological , behavioral & situational aspects impact incident causation . Strategic change management process is also defined exhaustive and can be useful while driving such changes . Obstacles to changes are identified & these are important influence factors on management of change process.

Book studied : The Psychology of Safety Handbook ⁷ by E. Scott Gellar , 2nd edition 2001, LEWIS PUBLISHERS ,Boca Raton London New York Washington, D.C. , ISBN L 56670-540-L

I have selected this book since it is very much relevant with my research topic . There are various influencing factors such as strategic approach for safety , leadership for safety , employee engagement on the safety management . This book has provides insights about how to use psychological aspects for injury prevention . The basic principles of behavior science provides different tools & procedures to improve safety at workplace. There are various best practices /approaches are available for safety improvements and this book has explained how to choose right approach based on scientific research . Gellar has suggested to make decisions based on scientific knowledge rather than using common sense based approach .

The safety triangle explained in the books indicates three sides one for work environment , one for personal competence & third is behavior. Total safety culture implementation is possible by working on these three pillars or sides . The concept of old 3 E is explained which has brought reduction in injuries 3E includes *engineer* the safest equipment, environmental

settings, and protective devices , *educate* people regarding the use of the engineering interventions & use discipline to *enforce* compliance with recommended safe work practices. Author has explained concept of new 3Es which are *ergonomics , empowerment & evaluation* . It is stated that organizations need to focus on safety above the legal compliance requirements & think of safety as corporate responsibility. Various paradigms shifts are explained like from outcome focused to behavior focused . Concept of accident investigations vs analysis approach is explained and which focuses on root cause analysis & systematic approach . Chapter 4 talks about human barriers to safety . This includes complexity of human behaviors , different type errors , interpersonal factors , peer influence , influence of authority etc. Behavior based safety can help to reduce accidents and increase safe behaviour. DO IT approach is explained well in this book . This approach is used as a part of behavior based safety process . D is for defining crucial behaviors for safety , Observe the people while working for the identified behaviors , after observation how to do intervention and after intervention doing test on how intervention worked out & take further actions to improve the overall process. Overall this book is good guide for Behaviour based safety & aspects related to employee engagement , leadership for safety .

Thesis studied : Study of influence of safety engineering and management practices in selected industries in Kerala⁸ , (2005) , Vinodkumar. Studied also one article by Vinodkumar, M.N. and Bhasi, M., 2011. A study on the impact of management system certification on safety management⁹. *Safety science*, 49(3), pp.498-507.

This research and article found relevant to my topic . Researcher has contributed with practices which has proven influence on safety management in the context of selected industries from State of Kerala. Instrument is also developed to measure the level of safety management practices . These practices includes workers involvement , management commitment , safety trainings , safety communication , safety rules & procedures , safety promotion policies , safe behaviour . The outcome of research shows that level of implementation of identified safety practices & implementation of management system certification has a influence on accident rate.

Article studied : Maturation pyramid of occupational health and safety¹⁰. Perçin, F. and Haydan, E., 2017. *Engineering Sciences*, 12(4), pp.262-270.

This article has explained about Flemings safety maturity model , Dupont Brandley curve . Dupont Brandley curve is well know in industry and as this there are four levels starts from reactive to dependent to independent to interdependent . The highest level as per Dupont's Bradley curve is interdependent where team work plays vital role. The models explained in this research papers will be useful in my research also from the context of study in India .

Conclusion and suggestions: Based on the systematic review of literature there are various influencing factors which can influence the safety management effectiveness of an organization . These factors can be summarized as below ,

1. Foundational practices : vision for safety , exposure , engagement , empowerment
2. Safety practices : structure , expertise (competence) , scorecards , enabling systems .
3. Value driven organizational practices : leadership skills , culture , sustaining systems .
4. Team work & collaboration
5. Implementation of behaviour based safety (BBS) process
6. Implementation of BBS for identified vital few pin pointed behaviour is more effective
7. Actions on barriers behind at risk behaviors
8. Ability of identification of potential SIFs (significant injuries and fatality) and taking proactive actions on the same.
9. Leaders ability of using positive and negative reinforcement for safety
10. Balanced approach while using result based approach , process based approach , values based approach & general management approach has influence on safety management.
11. Communication clarity its simplicity and consistency & promotional activities
12. Safety trainings : relavant and skill focused
13. Sharing of lessons learned & corrective actions
14. Management systems , safety rules & procedures
15. Organization's strengths & weaknesses
16. Contractor management

There various maturity models are explained in the research literature . Maturity is assessed for different influencing factors . Maturity levels helps organization to understand the current level with respect to particular factor and organization can take actions to improve further . The maturity levels are from basic to advance levels . Higher levels are focused on compliance for safety as well as organizational actions for leading safety culture . There is significant relationship between effective management of influencing factors

References :

Sr. No.	Name of the Books/ Research article	Author	Publication
01	Book : The Zero Index 2012	Colin Duncan	Safety in Action Press , an imprint of BST ISBN 978-0-9667569-3- 7
02	Book : Value based safety, by Quality safety edge Ed 2 , 2003	Terry E. MacSween	John Wiley & Sons Inc. Hoboken , New Jersey ISBN 0-471-22049-3
03	Book : Safe by Accident 2010	Judy Agnew & Aubrey Daniels	Performance Management Publications ISBN 13 978-0-937100- 18-9

04	Book : Removing obstacles to safety a behavior based approach, 2008.	Judy Agnew & Gail Snyder	performance management publications Atlanta ISBN 10 : 0-937100-07-2 , ISBN 13 : 978-0-937100-07-3
05	White Paper : Preventing serious injuries and fatalities (SIFs) : Study reveals precursors and paradigms. 2015	Martin, D.K. and Black, A.,	Professional Safety, 60(09), pp.35-43. This article originally appeared in Professional Safety magazine
06	E Book : Strategic safety culture roadmap 2013	Dominic Cooper & Lucas Finley	B- Safe Management Solutions Inc. 2141 Holiday Lane
07	Book : The Psychology of Safety Handbook 2nd edition 2001	Geller, S.	LEWIS PUBLISHERS Boca Raton London New York Washington, D.C. ISBN L 56670-540-L
08	Study of influence of safety engineering and management practices in selected industries in Kerala , (2005)	Vinod Kumar	Shodhganga Thesis
09	Article : A study on the impact of management system certification on safety management.	Vinodkumar, M.N. and Bhasi, M., 2011.	Safety science, 49(3), pp.498-507.
10	Article : Maturation pyramid of occupational health and safety.	Perçin, F. and Haydan, E., 2017.	Engineering Sciences, 12(4), pp.262-270.