

Enterprise Risk Eliminate Withdraw Approach Based Risk Management in Cement Industry

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ABSTRACT: Now-a-days cement industry placed an important role for making development of the country such as infrastructure, building and so on. There are more people involved to work in cement industry for making the efficient growth of the country. Even though industry has faced several risks such as health of the works, safeguard of the works, property damage, safety rehabilitation, and so on. Among the various cement industry risk, employee health and safety is one of the major issues. So, in this paper investigate the different employees by conducting the questionnaires section that includes the fire hazards, gas hazards, corrosion hazards, explosion hazard are examined in cement grinding unit, raw milling section, material handling section. From the collected information, risk has been identified and it has been managed with the help of Enterprise risk eliminate withdraw approach that predict the risk from the works and eliminate before making the serious issue. In addition to this, risk control technique is applied to the industry for maintaining the security to the people with effective manner. Then the efficiency of the system is explained using employee survey in cement industry.

KEY WORDS: Cement industry, risk management, health of the works, safeguard of the works, property damage, fire hazards, gas hazards, corrosion hazards, Enterprise risk eliminate withdraw approach, risk control, system efficiency.

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I. INTRODUCTION

Cement Industry [1] placed a second important role in the modern world construction that is next to the steel manufacturing process. The crucial impact of the cement industry consists of several workers for manufacturing cement that occupies specific place in industry. In 1824, Joseph Aspdin was prepared cement that production is spread in most of the country in 19th century for developing the construction field. Further, the cement industry is placed in the Madras 1904 and 1914 Indian cement company is placed in Gujarat for improving the productivity of cement. Even though the placement of cement industry [2] is increased gradually, cement has been import from England it has several issues such as lack of government support, domestic demand, minimum availability of capital, and so on which leads to increases the cement consumption cost. Therefore, the government has implemented several cement production scheme for increasing the productivity of cement in construction field. Although the productivity of cement is maximized in all over world, it has several risk and hazards [3] in cement production unit that leads to completely reduce the profit of cement industry. The hazards are categorized according to working environment, manual process of load handling, safety behavior and personal productivity equipment. In addition to these categories, several special risks [4] has been involved in the cement industries such as crushing, filtering, process of milling, quarrying, storage, generation units, material transport, fuel storage process and utilization of hazardness material. These hazards are directly affects the worker's health such as Eye contact, toxic consumption, inhalation of chronic that leads to create more health issues [5] such as rheumatoid arthritis, skin infection, auto-immune disorders, kidney disease, tuberculosis and so on. Due to the serious issue of cement industry workers health, it must be considered in the beginning situation for eliminating the worker health related issues. For overcoming these risk different risk management strategies [6] must be followed to minimize the difficulties present in cement industry workers health [7]. The introduced several risk management process must include emergencies issues, vicinity of employer's safeguards, also minimize the property damage, rescue workers from dangerous, also maintains the records about patient for reducing difficulties in emergency condition.

By considering the importance of risk involvement in cement industry, different researchers analyze the risk management techniques for eliminating the issues in earlier stage that used to improve the productivity of the cement industry. Bohan [8] discussing the various workers and energy related issues in the cement industry is examined from first technical industry to 50th technical cement industry. During the analysis process, productivity of industry has been estimated because it used to predict the involvement of laborers in their work. Along with the 56 million ton of productivity energy level also predicted due to the identification of labor issue. If the analyzed energy level is lower than the 2.74 MBTU and 3.5 MTBU than it does not create any affect, also it does not affect the productivity of cement industry effectively. Meo [9] analyzed the various health issues such as chronic lung disease, impairment of lung function, carcinoma of lung, pneumoconiosis of lung, restrictive of lung function due to the dust in cement industry. The cement dust is one of most dangerous it not only affect the function of lung also damage liver, heart, bone, hair, muscles activity and so on. Due to the serious effect of the cement dust health damage, the workers' health situation is continuously examined by performing the spirometry test that effectively predicts the internal organ function without any delay. According to the analysis Meo[9] collects the cement industry workers details and examines their health related issues for minimizing the risk and hazards involved in their future life. Cha et al., [10] investigated the worker health details from 374 residents for determining the various health issues such as dermatitis, asthma and rhinitis. From the resident's different cement dust information, manufacturing details are collected by conducting questionnaire section that used to examine the atomic absorption level. In addition to this, urinary level, mercury, chromium also evaluated to predict the exact health issue of cement industry worker that used to maintain and manage their health status in beginning stage.

Depending on the various author's opinions and research ideas, the cement industry workers are mostly affected by cement dust, toxins and chemicals. Therefore, the health of the employee must be managed also risk factors must be identified in the beginning stage which helps to control the risk in cement industry. This paper is developed in four sections. In the second section, the Enterprise risk eliminate withdraw approach for analysing risk from the workers and eliminate before making the serious issue as well as applying control technique to managing security in cement industry with effective manner is discussed. The next section evaluates the efficiency of Enterprise risk eliminate withdraw approach based cement industry risk management process. Finally, the conclusion of this paper is given.

II. ENTERPRISE RISK ELIMINATE WITHDRAW APPROACH FOR MANAGING RISK IN CEMENT INDUSTRY

In this section discusses about the managing process of risk in cement industries for reducing the workers' health related issues. The cement industry various hazardous information is collected from the employee that is examined in terms of risk and those critical risk are managed by applying the enterprise risk eliminate withdraw approach which helps to minimize the difficulties present in cement industry workers. Initially, various personal and hazardous data [11] has been collected from employee that includes several information such as fire hazards, gas hazards, corrosion hazards, explosion hazard are examined in cement grinding unit, raw milling section, and material handling section details. These mentioned data information is gathered by conducting the questionnaire section that is listed in table 1.

Table I. Questionnaire for Cement Industry Data Collection

S.No	Field	Questions
1	Fire Hazard	<ul style="list-style-type: none"> • Is this Major problem in industry? • Is it is controllable or uncontrollable hazard? • Is give any health related issue to employee? • Whether it is spread via air to damage entire cement industry? • Whether it affects productivity of company
2	Toxic Hazard	<ul style="list-style-type: none"> • Is this Major problem in industry? • Is create any inhalation and adsorption issue to worker? • Whether the health issues are curable or non-curable?
3	Corrosion Hazard	<ul style="list-style-type: none"> • Is this Major problem in industry? • Any chemical reactions are placed in industry? • Is give any health related issue to employee?
4	Explosion Hazard	<ul style="list-style-type: none"> • Is this Major problem in industry? • Is it is controllable or uncontrollable hazard? • Mention level of exposure limits? • Defined amount of energy released during the explosion? • Medical related problems, symptoms, and treatment details are list out.
5	Further safety Measures	<ul style="list-style-type: none"> • Quality of Housekeeping and related ratings? • Availability of emergency arrangement/ first aid box? • Whether industry having adequate lighting and working

		<p>environment?</p> <ul style="list-style-type: none"> • Availability of dust control, ventilation and other basic parameters in industry? • Arrangements at the time of explosion condition? • Employee health and medical examination process in industry? • Employee emergency plan details provided by government as well as company? • Personal protective Equipment details in company? • Number of medical checkup conducted in industry? • Monitoring process of affected employee? • Training details of first aid process?
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According to the Table 1 information, several questions are asked to the cement industry workers for getting enormous details about their working condition, environment and other personal details. From the relevant answers from employee, risk has been identified in the earlier stage for eliminating major issues in industry.

2.1 Risk Identification

The risk is identified [12] by performing continuous monitoring the actual process taking out in the industry without affecting the productivity and functioning of cement industry. During the risk identification process, it utilized several steps such as risk statement (condition or situation of risk in industry), basic identification of risk, detailed analysis of risk, external check, internal check and risk identification [13]. After collecting data from employee’s each person answer should be examined continuously in terms of areas of risk, events happened in particular area, causes of the event in industry, effects of event and impact of risk are evaluated for determining the serious employee health details. These questions are ability to answer the workers’ health related condition because every event and impacts are relevant to their health as well as company productivity. Then the basic risk must be identified from the analyzed data using SWOT and analogy process. First SWOT (strength, weakness, opportunities, threats) process is applied to the industry because it evaluates both internal as well external environment of company without affecting the company profit. The strength part analyze the causal running process, product, employee wealth related details which helps to understand that how the workers are eagerly working in cement industry without getting any worries. With the help of strength, weakness is evaluated for knowing their difficulties, health related issues, working issues are determined. According to the weakness, company provided opportunity for employees within company as well as outside of the company is evaluated to get the better understanding about worker information. In addition to this, threats are monitored to eliminate serious problem occurred in industry. Moreover, the analogy process is applied on the identified answers from employee, which helps to select the similar details that are more relevant to the current employee situation. Further, the detailed risk [14] must be determined with help of interviewing, assumption examination, and review of document, Delphi evaluation and brainstorming process. First the interview process is applied to the collected system whether the gathered data is belongs to the objective (workers’ health management) and defined outcome. During the interview process, various employees are evaluated by conducting interview their personal hygiene, health condition, disorders and other disease relevant information questions are conducted for making detailed risk identification process. From the derived questions, various assumptions such as conscious and unconscious has been handled because it may be belong to wrong risk identification process. Therefore, potential assumptions [15] are taken regarding their interview to predict cement industry workers health information. At the time of assumption process, unconscious assumptions are always visible for identifying the right risk in cement industry. The collected risk, relevant assumptions are documented for examining risk [16] in details because it may leads to false risk identification for this reason the collected risk and assumptions are evaluated with particular constraints of workers’ health. Even though the above process successfully examines cement industry risk, it is sometimes difficult to predict the accurate risk due to the large number of workers and their health status. For overcoming the above issues, Delphi technique [17] is utilized which distributed in the set of workers for analyzing the risk in terms of using particular queries that is mentioned in Table 1. From the summarized documents risk is evaluated in the form of correctness and importance of cement industry workers, then the response from the cement industry worker risks are collected successfully. Once the risk is identified, it has been eliminated from the industry for improving the health condition of cement workers which is discussed as follows.

2.2 Risk Elimination using Enterprise risk eliminate withdraw approach

The next important step is risk elimination process which is done by using enterprise risk eliminate withdraw approach because it successfully analyze hazard, strategies, operational, financial and provides the quality assurance for particular process. During the risk elimination process, workers event or situation are identified to eliminate the risk to reach the objective of cement industry. At the time of risk elimination process [18] which eliminates the risk for creating the value for each participants in industries that including society impacts of cement industry, customers, employees (workers) and owners. The created enterprise value protects industry data, strategic planning and internal control, which successfully eliminate the risk from various analyses. In addition to this, complexity of the industry structure is examined before eliminating risk from industry because it does not affect the entire productivity of the enterprise. The identified risk is eliminated, analyzed, responding and monitoring the worker's health related issues in internal and external cement industry enterprise. During the risk elimination process [19], the framework has been followed some important steps such as avoidance, reduction, alternative, share and acceptance of risk in cement industry. According to the provided enterprise risk management process is shown in Figure 1.



Figure 1: Structure of Enterprise risk eliminate withdraw approach

According to Figure 1 clearly depicted that structure of enterprise risk eliminate withdraw approach processing steps while eliminating risk from the cement industry. First the enterprise risk method examines the previous serious issues related with the worker's health such as disease, occurrence of tumors, skin infection and changes of blood count are analyzed for eliminating the factors relevant with the risk in cement industry. After avoiding the serious issues, impact of the risk and likelihood value of risk is computed that helps to minimize the risk in future direction which is happened in the reduction process. Further the workers' health condition is improved by identifying the alternative actions for particular risk which is identified with feasible manner and relevant share or insure has been provide to the workers also need to provide treatment for affected people. Finally the risk is accepted and decision is handled continuously monitor the control activities, internal structure of industry that has been reported to minimize the risk in future direction. In addition to this, the enterprise risk management [20] process includes establish context that used to understand the current situation of each workers health in cement industry in both internal and external environment. After identifying the current situation, risk must be identified according to the objective of the risk and how the risk is relevant to the worker health condition is evaluated which is more relevant to the avoidance situation. Then the material associated risk, calibration and probability of distribution is examined that used to quantify the risk successfully. Based on the risk distribution, correlation of effects, impact of health, organization performance, formulation of organization profit must be computed to minimize the risk in future direction. According to the risk correlation, risk should prioritize for profile, monitoring and reporting the risk in cement industry. Even though the risk has been eliminated it should be controlled by applying risk control technique which is explained as follows.

2.3 Risk Control in Cement Industry

The last step of this work is to control [21] the risk in cement industry because it helps to manage the risk by applying different actions for controlling risk. Initially, the risk has been avoided if it considered as high damage to workers without taking any operation. After eliminating the risk multiple security systems such as alarm, first aid treatment, checkpoints and preventive maintenance process has been created to completely avoid

the risk [22] using loss prevention process. Then the loss reduction process is applied to the industry, to evaluate and reduce severity present in cement industry workers employ by providing membership for dealing physical injuries. While managing the risk, goal of the cement industry must be considered because the security of the workers' health does not affect the working process of cement industry. In addition to this, legal requirement, workers safety should be analyzed in efficient and effective way for controlling risk in industry. Then the organization geographical location is identified by performing separation risk control process which consists of dispersing key asset. From the separated industrial location, duplication process is applied to create backup plan for each activities involved in the system that completely eliminate and control the disaster happened in the cement industry. According to the above discussion, the risk control [23] process worked in two stages such as to decrease the risk possibility to happen and to decrease the risk effect to happening. The cement industry must be monitored continuously; to examine the possibility of the risk has been occurred by performing the risk rating. During the risk rating process, risk is collected from workers for continuously, that is ranked according to the severity that should be avoided in beginning stage which improves the overall cement industrial working process and security of the industry. Next risk control process [24] is to decrease the effect of happening that utilizes the tools such as insurance which used to dealing remaining 50% of risk happened in the cement industry. According to the above process, risk has been successfully eliminated from cement industry also effectively manage the worker's health related issue and security with effective manner. Then the efficiency of the system is evaluated using experimental results which are discussed in the following section.

III. RESULTS AND DISCUSSIONS

In this section discusses about the performance analysis of Enterprise risk eliminate withdraw approach based risk management process in cement industry. During the data analysis process, cement industry relevant data has been collected from recognized construction industry development board based cement industry. The registry board includes several information about cement industry because it ability to handle the worker's details, background details, construction manager, project manager and quantity surveyors that used to analyze the risk present in the cement industry. According to this, various questionnaires are asked to the employer from lower level to high level employees for collecting the random sampling data that used to measure risk [25] present in cement industry field. In addition to this table 1 questionnaire it includes several details such as detail information about company, respondent, risk present in the cement industry, risk management approaches handled in industry and relevant risk strategies [26] are used to estimate the risk and controlling process. The assessed risk has been quit quantitative which helps to predict the risk and arrange the risk according to the dangerous [27] such as always happened risk, often happened risk, sometimes happened risk, rarely occurred risk and never occurred risk in cement industry. Based on the category data has been collected in terms of mean item score (MIS) [28] of descriptive examination process. Then the MIS is computed for determining risk as follows.

$$MIS = \frac{No.of\ NR + No.of\ RR + No.of\ SR + No.of\ OR + No.of\ AR}{Total\ Number\ of\ Respondents} \quad (1)$$

Where:

NR denoted as the number of respondents belongs to never happened risk,

RR represented as number of respondents of rarely occurred risk

SR represented as number of respondents of sometimes-happened risk.

OR denoted as often occurred risk

AR is always happened risk.

According to the above analysis, the introduced Enterprise risk eliminate withdraw approach effectively examines the risk present in the cement industry which is compared with the several risk identification techniques [17] such as check list, flow chart, brainstorm, expert opinion, Delphi technique, questionnaires, influence diagram, expert system, previous experience, review of document, SWOT examination and cause effect analysis. Then the obtained risk identification technique and relevant MIS score is shown in Table 2.

Table II. MIS Score of Risk Assessment and Identification Technique

Risk Assessment and Identification Technique	Mean Item Score (MIS)	Rank of Assessment and Identification technique
Enterprise risk eliminate withdraw approach	4.78	1
Checklist	4.55	2
Flow Chart	4.52	3
Storming of Brain	3.91	4
Expert Opinion	2.86	5
Delphi Technique	2.52	6
Questionnaire	2.48	7
Influence Diagram	2.02	8
Expert System	1.95	9
Previous Experience	1.68	10
Review of Document	1.25	11
SWOT Examination	1.22	12
Cause Effect Analysis	1.19	13

According to the Table 2 value, Enterprise risk eliminate withdraw approach attains the maximum MIS score (4.78) compared to the other risk assessment identification techniques check list (4.55), flow chart (4.52), brainstorm (3.91), expert opinion(2.86), Delphi technique(2.52), questionnaires(2.48), influence diagram(2.02), expert system(1.95), previous experience (1.68), review of document (1.25), SWOT examination (1.22) and cause effect analysis (1.19). Due to the high MIS score value, Enterprise risk eliminate withdraw approach examines the various risk from cement industry respondents without avoiding any criteria from the health and security of workers. Then the graphical representation is shown in Figure 2.

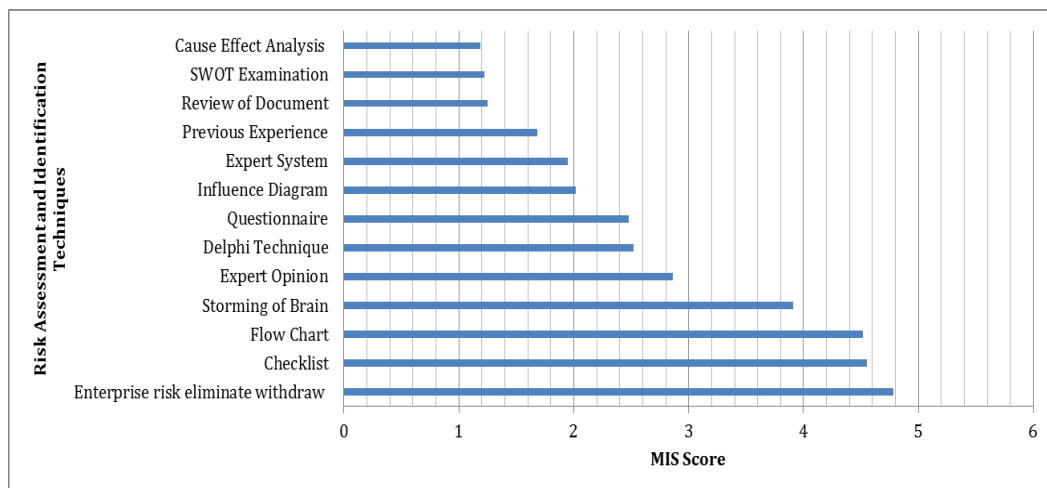


Figure 2: MIS Score of Different Risk Assessment and Identification Techniques

Even though the Enterprise risk eliminate withdraw approach successfully predict the risk in the cement industry, it should not deviate from the risk assessment process. The deviation of the risk is used to measure the quantify the financial risk present in the cement industry because the security and employee health related risk assessment process does not affect the financial factor and profit of the industry. Therefore, the deviation of the risk is mostly measured in terms of using standard deviation and the obtained value is shown in Table 3.

Table III: Deviation risk

Risk Assessment and Identification Technique	Deviation of Risk
Enterprise risk eliminate withdraw approach	0.013
Checklist	0.16
Flow Chart	0.52
Storming of Brain	0.91
Expert Opinion	1.36
Delphi Technique	1.62
Questionnaire	1.98
Influence Diagram	2.3
Expert System	2.695
Previous Experience	2.83

Review of Document	3.025
SWOT Examination	3.32
Cause Effect Analysis	3.68

According to the Table 3 value, Enterprise risk eliminate withdraw approach attains minimum deviation of risk (0.013) compared to the other risk assessment identification techniques check list (0.16), flow chart (0.52), brainstorm (0.91), expert opinion(1.36), Delphi technique(1.62), questionnaires(1.98), influence diagram(2.3), expert system(2.695), previous experience (2.83), review of document (3.025), SWOT examination (3.32) and cause effect analysis (3.68). Due to the minimum deviation risk, Enterprise risk eliminate withdraw approach successfully analyze the cement industry worker health, security and other risk from different respondents with effective manner. Then the graphical representation is shown in Figure 3.

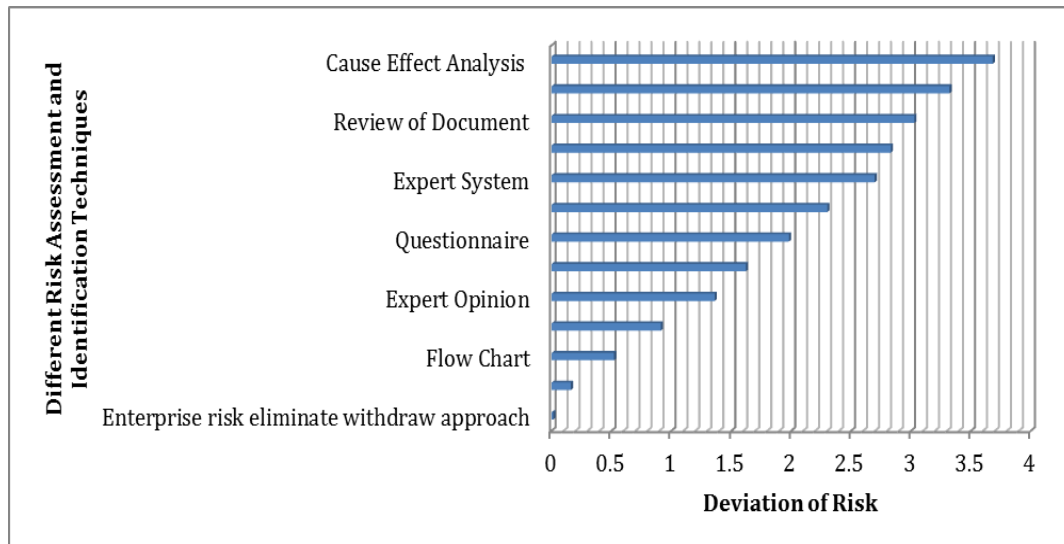


Figure 3: Deviation of Risk

The Enterprise risk eliminate withdraw approach perfectly predicts the risk in cement industry, the identified risk must predicted in future if the risk return in particular time. Then the return of the risk is measured in terms of using ratio of risk return that is computed as follows.

$$\text{Ratio of Risk Return} = \frac{R}{MDD} \tag{2}$$

Where:

R is denoted as percentage of return risk that is estimated as follows

$$R = \frac{(P_{end} - P_{start})}{P_{start}} \tag{3}$$

Where:

P_{start} and P_{end} is denoted as the price of the risk at particular time period.

MDD is represented as percentage of maximum drawdown (historical pick of risk variable) of risk at particular time period.

$$MDD = \text{Max}_{t \in (start, end)}(DD_t) \tag{4}$$

$$DD_t = \begin{cases} 1 - DD_{t-1} \frac{P_t}{P_{t-1}} & \text{if } P_t - P_{t-1} < 0 \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

Where:

$DD_{t-1}, DD_t, P_t, P_{t-1}$ is represented as the drawdone of risk. Based on the analysis, the obtained ratio of risk return has been computed that is shown in Table 4.

Table IV: Ratio of risk return

Risk Assessment and Identification Technique	Ratio of Risk Return
Enterprise risk eliminate withdraw approach	97.8
Checklist	94.32
Flow Chart	92.8
Storming of Brain	89.0
Expert Opinion	87.3
Delphi Technique	85.3
Questionnaire	81.4
Influence Diagram	79.46
Expert System	75.63
Previous Experience	73.1
Review of Document	72.6
SWOT Examination	69.98
Cause Effect Analysis	69.73

According to the Table 4 value, Enterprise risk eliminate withdraw approach successfully predicts the return risk that is measured in terms of using ratio of risk return. Then the enterprise risk eliminate withdraw approach attains maximum return prediction ratio (97.8%) compared to the other risk assessment identification techniques check list (94.32%), flow chart (92.8%), brainstorm (89%), expert opinion(87.3%), Delphi technique(85.3%), questionnaires(81.4%), influence diagram(79.46%), expert system(75.63%), previous experience (73.1%), review of document (72.6%), SWOT examination (69.98%) and cause effect analysis (69.73%). Due to the minimum deviation risk, Enterprise risk eliminate withdraw approach successfully analyze the return risk with effective manner. Then the graphical representation is shown in Figure 4.

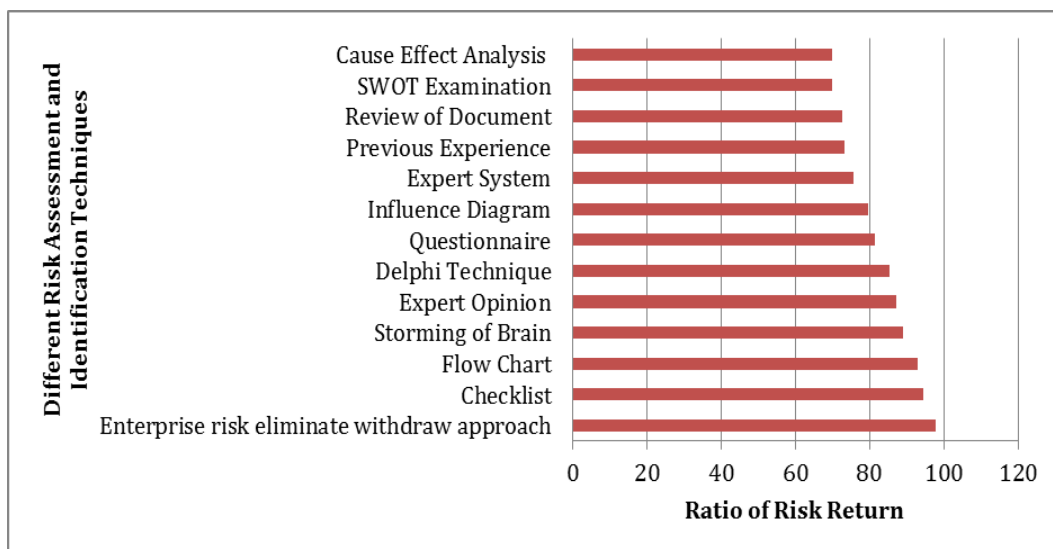


Figure 4: Ration of Risk Return Prediction

Depending on the above process, enterprise risk eliminate withdraw approach successfully predict the risk involved in the cement industry as well as identify the returned same risk with high ratio by using the different step of evaluation process.

IV. CONCLUSIONS AND RECOMMENDATIONS

Thus the paper examines various risks such as fire hazards, gas hazards, corrosion hazards, explosion hazard associated in the cement industry by applying Enterprise risk eliminate withdraw approach. Initially, various questionnaires’ section has been conducted from higher and lower workers present in the industry. The collected worker details are examined according to the strength, weakness, opportunities, threats along with this brainstorming process has been conducted to identify the risk present in cement industry. Based on the analysis, identified risks are documents for eliminating risk from the industry in future direction. The enterprise risk eliminate approach is applied on the document which evaluate the risk according to the avoidance, reduction, alternative, share and acceptance of risk in cement industry. After defining the value of risk and assessment process, they should be controlled according to the loss prevention, separation, duplication and risk rating process. Based on the risk ratings, it has been eliminated further for improving the overall efficiency and

security of the system in cement industry. Finally the efficiency of the system is evaluated with the help of experimental results that successfully evaluates the risk (97.8%) present in the cement industry the developed system improves the customer satisfaction, easily expose the risk, manages the industry productivity also enhance the business opportunities with effective manner. In future, the risk is further evaluated by conducting optimized data analysis process and examination steps.

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