

STUDY ON SAFETY ASSESSMENTS IN CONSTRUCTION PROJECTS BY USING SPSS SOFTWARE

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ABSTRACT

In India, construction industry is the second largest employer when compared to agriculture. Throughout the world, the construction area of civil engineering is one of the most hazardous industries. The number of fatal accidents taking place at the construction sites is quite alarming and the major cause was found to be fall of persons from height and through openings. In the present scenario, the Indian construction industry is quite large and complex involving latest technology as well as man power. On a par with the development of construction industry, drawbacks in terms of safety and health aspects are also witnessed

INTRODUCTION

In the construction industry the possibility of a fatality is five times more likely than in a manufacturing industry, whereas the risk of a major injury is two and a half times higher. The Indian construction labour force is 7.5% of the total world labour force and it contributes to 16.4% of fatal global occupational accidents. India has the world's highest accident rate among construction workers, according to a recent study by the International Labour Organization (ILO) that cited one survey by a local aid group showing that 165 out of every 1,000 workers are injured on the job. Construction workers are not the only sufferers of accidents but also the public including children are affected. These accidents diminish the image of the construction industry, and as a result there is shortage of skilled labour. In the past few decades, need for safety awareness among construction industries was realized. This is due to the high cost associated with work related injuries, workers compensation, insurance premium, indirect costs of injuries, and litigation.

SAFETY CULTURE

Safety culture is the collection of the beliefs, perceptions and values that employees share in relation to risks within an organization, such as a workplace or community. Safety culture is a part of organizational culture, and has been described in a variety of ways; notably the National Academies of Science and the Association of Land Grant and Public Universities have published summaries on this topic in 2014 and 2016.

Studies have found that workplace related disasters are a result of a breakdown in an organization's policies and procedures that were established to deal with safety, and that the breakdown flows from inadequate attention being paid to safety issues.

A good safety culture can be promoted by senior management commitment to safety, realistic practices for handling hazards, continuous organizational learning, and care and concern for hazards shared across the workforce.

CAUSES OF ACCIDENTS

Construction sites are known to be a dangerous place to be – it is where we get the popular notion of putting on a hard hat. Most construction companies are careful to keep their workers safe, but the nature of assembling large buildings lends itself to danger. Tools, girders and large vehicles all present hazards on construction sites. It is estimated that about 8.5 million workers in the country are engaged in building and other construction works. Building and other construction are one of the most numerous and vulnerable segments of the unorganized labor in India. Construction workers work long, hard hours and many are tired while they are on the job, which can lead to accidents. The combination of long hours and heavy machinery can often provedeadly.

Construction workers have a highly dangerous job. According to the Bureau of Labor Statistics, in 2010, there were 774 deaths due to an accident at a construction site, accounting for more than 18 percent of all on-the-job fatalities that year. Additionally, statistics show that four in every 100 construction workers is non-fatally injured on the job annually.

- Lack of fall protection for workers on elevated structures
- Lack of protection for people on the ground from falling objects
- Tripping hazards from construction materials and debris
- Missing guards or protections on power tools
- Unsafe equipment
- Lack of safety precautions when working near power lines
- Lack of protection for workers in trenches
- Unsafe property conditions

The list may be extended so long as there are many causes for accidents that may occur on site during the



construction project.

CONSTRUCTION MIGRANT WORKERS

Construction workers are migrated from state to state for their need for day to day life. Around 10 lakh migrant people are working in Tamil Nadu from different states like Orissa, Bihar, Assam, Nepal, Uttar Pradesh in various construction companies at different zones. Every year nearly 500 migrant workers die in construction accidents due to lack of safety provisions in the construction sites. The reason also extends that there is a lack in communication between the staffs and the migrant workers at sites and not following the safety standards, safety policies of the organizations.

NEED FOR SAFETY STUDY

Construction work is a hazardous land-based job. This work includes many hazardous task and conditions such as working with height, excavation, noise, dust, power tools and equipment. The most common fatalities are caused by the fatal four: falls, being struck by an object, electrocutions, and being caught in between two objects. Construction work has been increasing in developing and undeveloped countries over the past few years. With an increase in this type of work occupational fatalities have increased. Occupational fatalities are individuals who die while on the job or performing work related tasks. Within the field of construction, it is important to have safe construction sites. Health and safety is one of the most important considerations you should take before any construction project gets underway. You should always make sure that all aspects of health and safety have been considered before you step foot on the construction site. Health and safety in construction are particularly important because the industry is prone to hazardous situations and can be dangerous at times.

OBJECTIVES

The objective of the project is given below:

- To ensure safety in small constructions where safety is not given more priority
- To improve the physical working condition of the construction sites
- To ensure and improve the physical working condition of the labors

SCOPE

The scope of this project is to improvise the existing safety culture in small constructions and thereby make way for the labors to work in a safe construction work site. This is made possible by taking forward the existing safety culture or practices that are followed by the

construction builders and suggest them a proper safety culture.

LITRATURE STUDY

GENERAL

The literature study being a major part in identifying the existing projects that have been done already regarding construction safety helps in determining the domain to take up the project in a different proposal which makes the project unique among the other projects.

John Spillane (2018) et al in his project Strategies for effective management of health and safety in confined site construction, Australasian Journal of construction economics and building noted that the construction industry is one of the most hazardous environments with a survey that at least 60000 workplace deaths per year globally. A mixed method approach is used by incorporating qualitative and quantitative methods of data collection and analysis. The analysis method is done manually and the overall methodology is termed as into questions which the author employed in this study.

Sooyoung Choe (2018) et al in his project Construction safety planning; Site-specific temporal and spatial information integration, Volume 84, Issue 1, ELSEVIER. The author says that the main source of accidents is the lack of safety provisions and procedures in the construction work site. The focus should be on improving the safety risk analysis process which is the key element in safety planning. A proactive safety planning is required with integrated micro and macro level safety practices.

Serdar Durdyev (2017) et al in his project Key factors affecting construction safety performance in developing countries, UTS Epress says that the anecdotal evidence is not considered as one of the most important aspect in safety. KMO and Bartlett's tests are carried out in the form of questionnaire. Through the survey the principle factors for safety are identified which explored the principle factors influencing safety- limiting factors.

Bambang Endroyo (2017) et al in his project Model of the maturity of pre- construction safety planning, Volume 171, Issue 1, ELSEVIER, mentioned that the rate of accidents that are fatal in construction industries is higher than that of other industries. Pre-construction safety planning need to be carried out in order to maintain a safety construction work site. It is the responsibility of every individual personnel in the construction project to maintain project safety.

Charles Y.J. Cheah (2017) in his project Construction safety and health factors at the industry level, Volume 12, Issue 2, Journal of construction in development countries said that the issues and critical factors that affect the safety and health need to be examined in order to maintain a safe and healthy work site. The worker's background and



their attitude towards safety is vital to maintain onsite safety and also past accident records have a major impact in on-site safety maintenance. There is a neutral development in the safety and health standards in most of the constructions.

Nongiba A. Kheni (2016) et al Health and safety management practices of small subcontractors, Volume 1, Issue 1, Association of researchers in construction management. As per records 80% of the contracts taken are given to subcontractors in order to complete the projects. Accidents and ill health causes great suffering to both victim and their family, says author. The author followed a research methodology by means of a research paradigm to study the safety. A multiple case study is adopted here which is carried out in five different phases.

S.Kanchana (2015) et al has mentioned in the project Study On Labour Safety In Construction Sites, The Scientific World Journal, that the construction industry has become more dangerous because of the increase in the complexity of construction operations. A comparative study has been made between large construction sites and small construction sites taking various aspects in account. It is comprehensible that there is a lack of safety procedures followed in small construction sites than in large construction sites.

Fatih Yilmaz (2015) in his project Monitoring And Analysis Of Construction Site Accidents By Using Accident Analysis Management System In Turkey, Journal of Sustainable Development stated that the construction accidents on site have their major impact due to human error and negligence. A systematic safety training programmes are recommended to be employed to the labours in order to diminish such human errors which ultimately leads to accidents. Knowledge on upgraded safety procedures need to be fed to all level construction workers in order to avoid such human mishaps.

K.Mohammed Imthathulla Khan (2015) et al in his project A Study On SafetyManagement In Construction Projects, International Journal of Engineering Science and Innovative Technology clearly mentioned that the safety policies are employed in construction industries only on the basis of paper works, but the labour are ignorant of it. This condition can be changed only by improving the worker's knowledge on safety by organizing effective safety training programs. Proper safety knowledge with advances safety equipment and machineries drastically improves the overall safety of labour in worksite.

Ali Bavafa (2015) et al in his project Identifying and assessing the critical factors for effective implementation of safety programs in construction projects, Volume 106, Issue 1, ELSEVIER said that the rate of fatality in the construction industry is extremely high than in the other industries. A successful safety program can significantly decrease the rate of accidents in construction industries

which requires the management to implement safe construction procedure.

Aslam M.M (2015) et al in his project Concept of safety management in construction industry, Volume 5, Issue 4, Journals of Engineering and Technology stated that Human error is a major aspect for accidents. Gathering knowledge on accidents enables to prevent future accidents. In terms of fatal or severe injuries in construction accidents, the cost expenditure seems to be likely hectic. Avoiding accidents in construction site reduced cost expenditure which would be higher than that of the safety implementation cost.

Ophir Rozenfeld (2015) et al in his project Construction job safety analysis, Volume 48, Issue 1, ELSEVIER, said that it is essential to identify and assess the hazards and risks in order to maintain safety in construction. Job Hazard Analysis is the key to Job Safety Analysis. Training programs and seminars regarding safety need to be established and safety awareness need to be fed.

Kunle E. Ogundipe (2014) in his project Survey datasets on categories of factors militating against safety practices on construction sites states that the major cause for accidents is unsafe working conditions and unsafe behaviors on site. The working condition upgradation and feeding safety knowledge increases the safety percentage on site. Proper training programmes and upgraded safety methodology need to be implemented.

A.V. Praveen Kumar (2014) et al has mentioned in the paper Study On Construction Jobsite Safety Management, International Journal of Innovation Research in Science, Engineering and Technology. From this journal, I have understood that SPSS can provide a detailed report regarding the safety aspects in various construction sites. The author takes the safety of labour in site as a major criteria to increase overall construction jobsite safety. My prospective is that the author could have further taken steps to implement safety in realtime.

Romel G. Carrcano (2014) in his project Construction worker's perception of safety practices, Journal of building construction and planning research, states that due to decentralized working manner of the workers in site the working environment becomes hazardous. Workers are frequently assigned to get involved in various works in a construction itself or various constructions, which makes it difficult to train them on a single track. Deriving and analyzing a detailed report of workers, their background, work history, work site enables to maintain safety on site.

Bozena Hola (2014) in his project Methodology of hazards identification in construction work course, Volume 16, Issue 4, Journal of civil engineering and management said that a Safety and Health Protection Plan need to be employed in order to improve the work safety on the building site. The factors that generates hazards need to be identified in order to determine the existing



hazard and to predict possible hazards.

Gregory Carter (2014) et al in his project Safety hazard identification on construction projects, Volume 197, Issue 1, Journal of construction engineering and management, mentioned that Health and safety consideration need to be implemented in construction at the early stage itself. Record keeping of past hazards or accidents greatly influences hazard management in construction sites. Events providing awareness against hazards and a central safety database need to be maintained in order to ensure sound construction worksite.

Husrul Nizam Husin (2008) in his project Management Of Safety For Quality Construction, Journal of Sustainable Development clearly stated that the safety in construction sites in current scenario is poor and below expectation by the author. Accident reports in construction industries have been collected from 1995-2000 and it has been understood that safety and quality are issues associated with each other. This scantiness in construction safety is due to the fact that only a handful of safety rules and laws are being implemented in construction industries.

David D. Woodset al (2010) observed that human error is the cause of incidents and accidents. The authors strongly opine that the label "human error" is prejudicial and unspecific and leads to system failure and in turn leads to accident.

Health and Safety Executive (2002) found that the rate of fatal and non-fatal injuries is higher in men than woman workers.

Kaila (2011) conducted a study covering multi-national organizations such as petroleum, engineering, automobile, cement, power, chemical, pharmaceutical companies etc. The author observes that the managements have started believing that engineering and administrative controls alone do not provide adequate safe workplace unless Behavioral Based Safety (BBS) is practiced and unsafe behavior of the workers is controlled in order to ensure total safety at workplaces.

Khan (2000) investigated on work environment in industries and found that 90 percent of the workers perceived that their work environment was unhygienic causing health risk problems and 70 percent of the workers developed illness after joining their jobs.

Kofi Annan (2009) strongly believes that Safety and Health is not just for specialists and professionals. It should become the concern of all people at workplaces. He emphasizes that Safety and Health should not be compromised in the name of global competition measures like cost cutting, quicker output, better profits etc.,

More & Sawant (2010) Industry environment is characterized by a multitude of concurrently occurring exposures, such as silica dust, various chemicals, noise, heat and radiations, etc. Physiological profile of workers indicates variations in heart rate, blood pressure as well as

body temperature. National Occupational Health and Safety Commission, Australia (2000) reported that percentage of deaths due to fall from height is 12 percent of all fatal accidents and 60 percent of the fall are involved with an height of five metres or less between the period 1989 to 1982 in Australia.

Sandy Smith (2010) conducted safety assessment surveys at the worksites and made four recommendations for the management to prevent accidents at worksites. They are organization commitment towards safety, training on proactive management skills for senior and mid-level managers, motivation of supervisors and active participation of employees in safety which will definitely prevent accidents.

Safety Management (2000) reported that over 25,000 workers leave work every year and 5, 00, 000 workers take time off work each year in England because of work related conditions. National Occupational Health and Safety Commission, Australia (2002) estimated that work-related traumatic death was a major problem in which between 500 and 600 people dying each year in Australia.

Revianty Nurmeyliandari Nurhendi, Muhamad Azry Khoiry & Noraini Hamzah et al (2019) identify the safety and health practices in social environment in construction sites. It is suitable to improve the productivity of labor in construction projects and to examine the society between company and the safety field.

Winge.S, Albrechtsen.E & Mostue B.A et.al (2019) have suggested that the passion should be extended to safe implementation of construction site areas by the construction working people.

Williams, O.S Hamid & Misnan M.S et.al (2018), the identification and understanding of construction accidents should be dealt by confidently addressing them. The elimination of hazards from design parts, valuable safety execution, sufficient planning and service of seasoned employees are vividly suggested. The contractors have to adhere to safety auditing, establishing safety committees, conduction of the training for employees, usage of Latest technology and proper reporting of accident happenings.

Ahmed, Sobuz M.H.R & Haque et.al (2018) reveal that the Bangladesh country is facing accident issues every year in construction work places. The authors suggest 18 crucial phases of occurring accidents in construction work places. The accidental control is main concern in construction and an intensive research is required to identify and take preventive measures to control and minimize accidents.

Carrillo-Castrillo J.A, Trillo-Cabello A.F & Rubio-Romero et.al (2017) suggest the identification of frequent causes in construction accidents among various causes and stages of the construction plan. The most important cause of construction site accidents is lack of safety and hence appropriate preventive actions are



stressed depending on various construction plans.

Couto J.P, Santos F.J.B & Rabbani et.al (2017) the construction companies are presently subjected to pressure to ensure time and budget frame. Hence, this situation leads to unsafe accident zone in construction sites. In Portugal, due to lack of safety and insecure procedures during the constructions of buildings, sequence of problems occurred.

Authors Hola B, Szostak (2017) point out the accidents at Work places in the area of Polish Constructions. The authors represent the impact of employment victim, age and service, performance of employees during the duties and estimate the size of enterprise. In this category, 485 accidental rates are analyzed.

Chiang Y.H, Wong F.K.W & Liang et.al (2017) present the fatal construction accidents in Hong Kong country. In Hong Kong, the fatal ratio was calculated during the year 1995 to 2015. The conclusion present solutions for Hong Kong country to diminish the accidents in the construction sites for future innovative works.

Douglas K E, Goh K C & Goh G H et.al (2016) authors present the accident preventive measures for apartment building constructions. The continuous growth of buildings focuses the need of the valuable safety and health management schemes. Hence this research work helps to identify the accidents and prevention methods in construction sites.

Adeloye F.T (2016) author presents the pattern of accidents in construction sites. The leading cases of building construction site accidents include mostly cascade from unsafe conditions. The author suggests determining the pattern of accidents or hazards in construction sites of Nigeria state.

Yilmaz F (2015) suggests the monitoring and investigation of construction location accidents by means of accidents scrutiny management scheme in Turkey.

Dagan D & Issac S (2015) present the planning of safe and unsafe distances among employees in construction sites. This author suggests the methodology that includes a matrix-based scheme for minimum and maximum safe and unsafe distances between employees. This methodology was implemented in a real case in order to authenticate its likelihood.

Vitharana V H P & De Silva (2015) authors present the occurrence of health hazards, safety and secure practices in construction locations. The authors attempt to investigate the health hazards, safety and secure causes of pitiable practices in building construction locations. The construction sites mainly need to enhance professionals' interests in active safety and secure management and accomplishment of alertness programs to construction workers.

Kanchana S, Sivaprakash P & Joseph S et.al (2015): Authors suggest the studies on labour safety and security

in construction site locations. The Construction industry that employs skilled and unskilled employees has to focus on the construction location accidents, health safety and security. The authors represent the outcome of a construction site survey, which was extracted from several construction workers in Kerala state. The authors examine specifically the total number of working hours, nature of the workers, number of accidents of previous year, and type of injuries and delightful place in construction sites.

Rawlinson S, Jia Y.A (2015) author presents the construction site accident causality. The illness is a special case of incident in both victim and agent. This provides a special event for establishing the factor for affecting the construction site.

Ganson (2014) revealed that a person dies or is injured in every two working days throughout Ghana, and a lot of workers all over the world suffer either permanent or temporary disability, or in the worst case lose their lives due to insufficient provisions made for safety at the workplace.

Zekri (2014), it has been revealed that a safety culture which is constructive and practical aids in regulating and bringing construction costs to a realistic minimum level and increasing worker productivity. It is therefore prudent to have an effective safety management practice in place which must be adhered by everybody in an organisation, since safety is everybody's business to avoid any catastrophic consequences that may occur **Ganson (2014)**.

The construction industry has underperformed in certain critical areas and has been a bother to the sector for a while now since safety is regarded as one of the key performance indicators in this industry (**Abdulateef and Dorothy, 2015**). The hazardous nature of this industry alongside the accident rate leading to cost repercussions, calls for safety to be strictly observed to minimize the rate of incidents.

Muhammad et al. (2015) stated that losses suffered by the industry, which include victim's medical overheads, loss of productivity, investigation time spent, inability to meet deadline, cost of training another individual to fill the position temporarily, disruption of the team, damage to equipment or facility and potential legal costs and penalties.

The top priority of most construction firms is their survival in business, whilst safety often have less significance because of limited resources (**Gray and Sadiqi, 2015**), hence it comes as no surprise when the accident rates of these firms keeps escalating.

Smallwood (1999), Neglecting safety or not making it a priority affects the sustainability of the environment as well, and not only the customary construction project parameters which is cost, quality and scope, therefore, the study offers the need to ensure an effective implementation of safety practices in the construction

industry to ensure optimal cost performance. All construction sites are susceptible to dangers either to the workers or damage of properties, but if safety is practiced, productivity will be increased and accidents occurrence will decrease resulting in the cost involved in the total running of the project to be reduced. Proactive and efficient safety measures put in place can save the project manager a significant amount to run the whole project.

Jha (2014), one in every six work-related fatal accidents occur on a construction site. This track record of accidents in the construction sector has made it quite unpopular when compared to that of other industries.

Muiruri and Mulinge (2014), most construction companies tend to believe that introducing and implementing measures that ensure safety in the construction sector comes with additional cost thereby reducing profitability which has become one of the most common myths that has plagued the industry over the years. This is also backed up by statements from some interviewees stating that adhering to safety practices come as a cost burden to the project. It has however been proven that, investment in construction safety actually lead to an increase in profitability by increasing the rate of production, boosting the morale of employees and reducing attrition

SUMMARY OF THE LITERATURE

- There is a lack of safety policy in almost all small constructions.
- Large constructions adopt safety policy, but not to the fullest range. They adopt safety policy which is convenient for them.
- Human effect is one of the major cause for the safety mishaps.
- Safety aspects in various constructions are need to be collected and analyzed using a software named SPSS in order to have a keen study of safety.

METHODOLOGY

GENERAL

The methodology that has been adopted in a project need to be effective and it has to be keenly planned for selecting suitable methodology in order to get an enhanced output from the project.

WORK PROCESS

Literatures based on safety in construction or appropriate to the selected title need are collected in sufficient numbers. The collected literatures are keenly studied that the content which the author focuses on the paper need to be clearly established. A clear review is prepared for every journal that is collected.

A detailed study has been made regarding the safety aspects and standards that exist in the present

scenario which is framed by the OSHA. The standards encoded by the OSHA are those which are to be employed in every construction which is need to be studied and analyzed in this project Safety inspections are made on site in order to study and understand the existing safety culture in construction sites. Many aspects and criteria regarding safety are inspected on site which enabled gathering more criteria regarding safety on sites.

Questionnaire is prepared which includes details about the construction site, site in-charge or the representative of the construction site, the set of questionnaire which has to be issued to various construction sites. The questionnaire prepared has to be collected back in order to analyze the safety aspect accordingly which has to be done in future.

SAFETY FACTORS

GENERAL

Many workers are injured and killed at the workplace every day. Safety and health can add value to business, job, and life. You can help prevent workplace injuries and illnesses by looking at workplace operations, establishing proper job procedures, and ensuring that all employees are trained properly. One of the best ways to determine and establish proper work procedures is to conduct a job safety assessment. A job safety assessment is one component of the larger commitment of a safety and health management system.

OSHA

Every employee have right to receive training from their employer on a variety of health and safety hazards and standards, such as chemical right to know, fall protection, confined spaces and personal protective equipment. OSHA standards specifically require the employer to train workers in the safety and health aspects of their jobs. Other OSHA standards make it the employer's responsibility to limit certain job assignments to those who are certified, competent, or qualified meaning that they have had special previous training, in or out of the workplace.

For a job hazard analysis to be effective, management must demonstrate its commitment to safety and health and follow through to correct any uncontrolled hazards identified. Otherwise, management will lose credibility and employees may hesitate to go to management when dangerous conditions threaten them.

A job safety assessment can be conducted on many jobs in the workplace. Priority should go to the

following types of jobs:

- Jobs with the highest injury or illness rates
- Jobs with the potential to cause severe or disabling injuries or illness, even if there is no history of previous accidents
- Jobs in which one simple human error could lead to a severe accident or injury
- Jobs that are new to your operation or have undergone changes in processes and procedures
- Jobs complex enough to require written instructions.

A job safety assessment is an exercise in detective work. The goal is to discover the following:

- What can go wrong?
- What are the consequences?
- How accidents / hazards could arise?
- What are other contributing factors?
- How likely is it that the hazard will occur?

After reviewing the list of hazards with the employee, considerations should be made what control methods will eliminate or reduce them. The most effective controls are engineering controls that physically change a machine or work environment to prevent employee exposure to the hazard. The more reliable or less likely a hazard control can be circumvented, the better. If this is not feasible, administrative controls may be appropriate.

This may involve changing how employees do their jobs. Discuss the recommendations with all employees who perform the job and consider their responses carefully. If plan is made to introduce new or modified job procedures, be sure the labours understand what they are required to do and the reasons for the changes. This lead to an effective safety assessment on site.

SPSS SOFTWARE

GENERAL

SPSS is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners and others. The original SPSS manual (Nie, Bent & Hull, 1970) has been described as one of "sociology's most influential books" for allowing ordinary researchers to do their own statistical analysis. In addition to statistical analysis, data management (case selection, file reshaping, creating derived data) and data documentation (a metadata

dictionary is stored in the data file) are features of the base software.

Statistics included in the base software:

- Descriptive statistics: Cross tabulation, Frequencies, Descriptive, Explore, Descriptive Ratio Statistics
- Bivariate statistics: Means, t-test, ANOVA, Nonparametric tests, Bayesian
- Prediction for numerical outcomes: Linear regression
- Prediction for identifying groups: Factor analysis, cluster analysis (two-step, K-means, hierarchical), Discriminant
- Geo spatial analysis, simulation
- R extension (GUI), Python

The many features of SPSS Statistics are accessible via pull-down menus. Command syntax programming has the benefits of reproducible output, simplifying repetitive tasks, and handling complex data manipulations and analyses. Additionally, some complex applications can only be programmed in syntax and are not accessible through the menu structure.

SPSS is used by market researchers, health researchers, survey companies, government entities, education researchers, marketing organizations, data miners, and many more for the processing and analyzing of survey data.

Most top research agencies use SPSS to analyze survey data and mine text data so that they can get the most out of their research projects.

SPSS Statistics can read and write data from text files, other statistics packages, spreadsheets and databases. Statistical output is to a proprietary file format for which, in addition to the in-package viewer, a stand-alone reader can be downloaded. The proprietary output can be exported to text or Microsoft Word, Excel, and other formats. Alternatively, output can be captured as data, as text, tab-delimited text and also graphic image formats.



Figure 5.1 A sample image of a work sheet of SPSS software

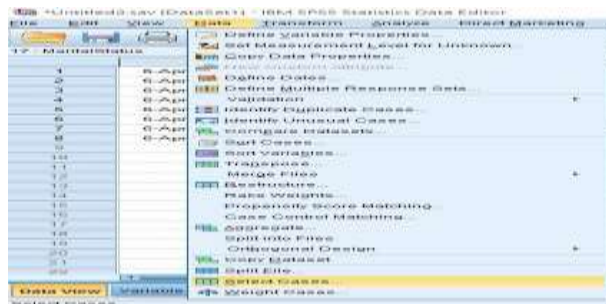


Figure 5.2 A sample of the tools available in SPSS software

CONCLUSION

This chapter summarizes the conclusions of the study. An extensive literature survey was carried out, and the information was used for the questionnaire preparation. The questionnaire was provided to the stakeholders of the construction industry, and their views will be collected and to be used for analysis. Based on the analysis, suitable suggestions are to be provide (Construction companies).

WORKS TO BE CARRY IN PHASE -II PROJECT

- Data Collection from various Construction Companies
- Data Analysis (SPSS Software)
- Ranking the factors
- Results and Discussions
- Suggestions to the Companies and Conclusions

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