Example of research paper on data analysis and validation

The Name of the Class (Course)

The Name of the School (University)

The City and State

Introduction

Literature Review

According to Geopolymer Institute (2014), Joseph Davidovits discovered Geopolymer concrete. Joseph Davidovits is a French National born in 1935. Geopolymer concrete is as a result of a reaction of source materials. Constituents of source materials are alumina, silica, and alkaline liquid. Geopolymer has a 3-dimensional structure. They are manufactured using low amounts of temperature. The manufacture of Geopolymer involves mixing several products. These products are alkali metal hydroxide and aluminosilicate. Aluminosilicate acts as a binder. It is a constituent of aluminum and silicon.

Research shows that Geopolymer concrete is environmentally friendly compared to Portland cement. Research also discloses that manufacture of Portland cement leads to release of the high percentage of carbon dioxide into the environment (Monita and Hamid 2009). Normal quantity of carbon dioxide in the environment is 0. 03%. Portland cement industry releases approximately 7% of carbon dioxide into the environment. Increases carbon dioxide in the lower atmosphere leads to increases temperature. Increasing temperature in the lower atmosphere is called global warming.

Global warming is described as the gradual increase of temperature in the lower atmosphere. Global warming is caused by increased carbon dioxide in the atmosphere. Large quantities of carbon dioxide create insulation. Carbon

dioxide insulation allows rays from the sun to pass through to the earth. However, it prevents reflected rays from the earth from penetrating to the upper atmosphere. Prevention of these rays from moving to the upper atmosphere leads to increase in temperature hence global warming (Monita and Hamid 2009).

According to Monita and Hamid (2009), Global warming is a concern to many nations. Because of its adverse effects, nations have tried to implement conservation techniques. Geopolymer Alliance (n. d.) argues that the manufacture of Geopolymer concrete helps reduce the amount of carbon dioxide released into the atmosphere. Geopolymer Alliance (n. d.) argue that Geopolymer concrete is much more energy friendly that Portland cement. According to Jaarsveld, Portland cement form calcium silicate-hydrates. Calcium silicate-hydrates are used to give strength during construction. However, this is not the case for Geopolymer concrete. Jaarsveld showed that several things influenced properties of Geopolymer. Examples of these things are water and temperature.

Palomo further discovered that Geopolymer ash is affected by time, temperature, and technologies. The ash is manipulated in such a way that carbon dioxide is not present. Ismail argues that as a result of curing time and technologies Geopolymer concrete ash is made up of silicon oxide, aluminum trioxide, Iron oxide, calcium oxide, magnesium oxide, and potassium oxide (Monita and Hamid 2009). Instead of carbon dioxide, Geopolymer concrete products can be converted into ash, which does not have carbon dioxide. Literature shows that Geopolymer concrete is better

than Portland cement. Characteristics of Geopolymer concrete are strong, high abrasion resistance, fire resistant and lower thermal conductivity.

Research Methodology

Research methodology used in this research is carrying out experiments in the laboratory. The experiments involve a trial method with varying amounts of alkaline. Using varying amounts of alkaline brings about different types of solutions. This research obtains its data from secondary data, which is mainly literature from other scientists and authors.

The research uses two types of data collection methods. The first method is primary collection method. Primary collection method involves collecting data from the experiment. Data obtained from primary collection methods are raw. They are also original.

The second type of data collection method is secondary data collection method. Secondary data collection method involves analyzing already collected data. This data is acquired from articles, previous experiments, and journals. Secondary data can also be described as analyzed data. Nearly all research have hypothesis. Hypothesis is defined as an explanation of the potential outcome of an experiment. Hypothesis is an important concept of research. Hypothesis gives researchers the opportunity to predict the potential outcome of research. Before hypotheses are formulated, research questions must be in place. Research problem and research questions help in the formulation of the hypothesis.

According to research, hypothesis should be measurable and testable. There are two different types of hypothesis namely scientific and working hypothesis. This research uses working hypothesis. Working hypothesis is

used because it can be tested and falsified. Working hypothesis is formulated

on the basis of previous research. Like all other types of hypothesis, working

the hypothesis is formulated in such a way that it can relate to existing

research. It also has expected explanations. Working hypothesis is

formulated in such a way that it allows further investigation and research. In

qualitative research, working the hypothesis is used as a conceptual

framework.

As stated above, all types of hypotheses must be verified. Hypothesis must

also be measurable. A measurable hypothesis gives room for verification.

Verification is defined as using acquired data sets to test and confirm the

hypothesis. The researcher's perspective must be supported by well-

researched information. In this research, the method of hypothesis

verification is testing. This research involves experiments that are used to

test whether the hypothesis is null or not.

Data analysis technique used in this research is guided by evaluation

objectives and research questions. Evaluation objective gives the reason for

carrying out analysis of data. Therefore, this research will use inductive and

comparative analysis. Inductive analysis involves the use of coding.

Comparative analysis, on the other hand, involves creating comparisons

between Geopolymer concrete and Portland cement.

Data validation is described as examining the accuracy and completeness of

data. The type of data validation used in this research is called triangulation.

Triangulation is a method borrowed from the field of survey. Triangulation

involves three steps. The first step is carrying out interviews. The interviews

are recorded using tape recorders. Note taking cannot be used because it

creates destruction. The second step is transcription of the tapes and taking them back for validation. The last step involves a third party to carry out interview trail. Involving of a third party helps to improve accuracy of the information.

- Data Verification

2. 1 Critique of Hypothesis

Hypothesis is described as a suggested explanation of the event. Hypothesis in research usually comes after the research questions. All hypotheses must be falsifiable. Moreover, they should be testable. Hypotheses have been categorized into different types. The type of hypotheses used in this research is called working hypotheses. Working hypotheses can be tested. It is a type of hypothesis that can be given using existing knowledge. Working hypothesis is a type of hypothesis that has been put forth as a result of research that had been done before. Similar to all other hypothesis, working hypothesis is constructed in a way that it can be related to another research. Working hypotheses have expected explanations. They are constructed in such a way that it allows further investigation and research. In qualitative research, working the hypothesis is used as a conceptual framework. Irrespective of how hypotheses have been constructed, they must be verified. Verification involves employing data and tests to confirm the hypothesis. Researcher's point of view must be supported by well-researched information. In this research, the method of hypothesis verification is testing. This research involves experiments that are used to test whether the hypothesis is null or not.

Primary and secondary data are used to verify the hypothesis. Primary data

is acquired from experiments carried out by the researcher. Secondary data, on the other hand, is acquired from literature reviews carried out by the researcher. Primary data are good for verification because they are accurate. Moreover, the data sets are original. However, irrespective of its advantages primary data sets are susceptible to biasness. Furthermore, primary data sets need a number of people to collect and analyze it.

Secondary data has its advantage and disadvantage when used in the verification. The first advantage is that it is easy to analyze. Secondly, it is cheap. Disadvantage of this type of data set is that it is sometimes not accurate. It cannot utterly depend on. This is because someone else collects the data.

- Hypothesis Verification

During the verification of the hypothesis, the data set from both secondary and primary data is run for verification. Primary and secondary data sets collected in this research are good for verification. This is because primary data from the experiment is accurate. Moreover, the secondary data has been properly coded to come up with relevant theories good for verification.

- Research Validation

3. 1 Data Analysis

This research uses both secondary and primary data. Primary data is the data collected from the experiment. The data given by the experiments are regarded as primary data. Secondary data, on the other hand, is data already analyzed. In this research, secondary data is acquired from literature reviews.

In order to come up with an effective research, data quality must be taken

into consideration. Primary data must be validated for accuracy, validity, and completeness. Data analysis involves examining raw data to establish a relationship between variables. Data analysis technique used in this research is guided by evaluation objectives and research questions. Evaluation objective gives the reason for carrying out analysis of data. Therefore, this research will use inductive analysis method to analyze data. Inductive analysis is described as a method of analysis where researchers come up with patterns by studying blueprints in data. It involves keenly studying data and recordings given, to come up with patterns of comparisons. Data collected during experiments and materials collected are reduced to themes.

Inductive analysis starts by arranging raw data from the literature. Method used to arrange data is called open coding. Open coding involves the researcher carrying out literature reviews. The review entails recording important information, heading of the articles and note taking. In open coding, the researcher reads an article more than once. After re-reading, the notes are headings are then transcribed into a coding sheet. Transcription is then followed by grouping the data. Grouping of data helps to establish categories. The headings are grouped and put in categories. Through data coding, researchers are able to come up with knowledge of Geopolymer concrete.

Inductive method of analysis was used because of several reasons. The first reason is that the research is inductive in nature. Secondly, this method matches the method of data collection method used. Inductive analysis is commonly used when secondary data is involved. This research uses

literature from different scholars to collect its data. Therefore, inductive analysis is the correct method to use while analyzing this data.

Second method used for analyzing data in this research is comparative data analysis. Other than carrying out analysis of literature reviews, this research carries out an experiment to determine the unique properties of Geopolymer concrete. Therefore, the suitable technique for analyzing primary data acquired is a comparative analysis. Comparative analysis is an old technique of analysis, which was developed in 1987. Comparative analysis is commonly used in Europe and United States.

Comparative analysis is commonly used to examine data sets. In this case, it analyzes the sets of data from Geopolymer concrete and Portland cement. Comparative analysis starts by enumerating all types of cases. Every case is usually defined by a set of data or values. The set of values are either from its independent or from dependent variable. After counting all types of cases, the data is passed through inferential logic. Inferential logic is used determine the sets of data that is supported by the research. Data sets that have been inference are called prime implicants.

The data acquired from the tables are enumerated b y case type. When the data has been enumerated, it is then passed through inferential logic. Inferential logic then determines the sets of data relevant to show comparison between Geopolymer concrete and Portland cement. Comparative data analysis is relevant to this research because the research carries out a comparison between Geopolymer concrete and Portland cement. Moreover, comparative analysis goes in line with the type of primary data collection method used. This research carries out an experiment to

determine properties of Geopolymer concrete that can distinguish it from Portland cement. The method involves carrying out comparative analysis in tables and figures. In addition, this method of analysis helps to answer the research questions effectively. The research questions are what are the properties of Geopolymer concrete with respective to different molarities in order to use as alternative for ordinary Portland cement? Second question is what are conclusions that can be drawn in order to favor why Geopolymer technology is an appropriate replacement for ordinary Portland cement? Both questions involve carrying out comparisons.

3. 2 Data Validation

Data validation is a concept where the analyzed data is examined to determine its accuracy and completeness. Inductive or qualitative research has different methods of validation. This research uses a validation method called triangulation. Triangulation is described as a method, which examines integrity of data collected. It also examines inferences drawn in the research. Triangulation is a concept that has been borrowed from surveying. It involves the use of different data to come up with a concept. As a data verification method, triangulation uses different types of data, sources, and researchers. Triangulation has three steps. The first step is conducting of interviews. The interviews are taped for reference. Taping of interviews is much effective compared to note taking. Research shows that note taking causes distractions.

Triangulation in this research can be done by carrying out interviews on top-level management of cement industries. The interviews will involve environmental department. Residents near the factory and scientists

concerned with this subject are also interviewed.

The second step of triangulation is the transcription of audio tapes. After transcription, the tapes are the given to subjects who participated in the research for verification. Consent is also sought from interviewees to use the information given. Third step of triangulation is the involvement of a third party during analysis of the data. Research shows that researchers involve an external evaluator after collecting data. External auditor looks at the trail created by the interviewee.

Conclusion

This research uses different literature reviews to come up with the problem statement. The research reveals that the manufacture of Portland cement leads to increased the percentage of carbon dioxide in the atmosphere. Manufacturing of Portland cement leads to release of 7% carbon dioxide into the atmosphere. Increase in carbon dioxide in the atmosphere leads to increased lower atmosphere temperature.

Further, research reveals that Geopolymer concrete can be a substitute of Portland cement. The research shows that Geopolymer concrete is strong, and its manufacture does not lead to release of carbon dioxide in the atmosphere. Therefore, this research endeavors to answer two questions. The first question is what are the properties of Geopolymer concrete with respective to different molarities in order to use as an alternative for ordinary Portland cement? The second question is what are conclusions that can be drawn in order to favor why Geopolymer technology is an appropriate replacement for ordinary Portland cement?

The goals of this research are examining characteristics of Geopolymer

concrete with the aim of replacing ordinary Portland cement. The second goal is coming up with the benefits of Geopolymer binder over ordinary Portland cement.

In order to answer these questions, this research uses an inductive approach to carrying out the research. Inductive method of analysis is used because of several reasons. The first reason is that the research is inductive in nature. Secondly, this method matches the method of data collection method used. The methods used to collect data were primary and secondary. Inductive approach of design is good for this research because it has the ability to predict the future. It has the ability to give a probability effectively. On the contrary, inductive approach is usually incomplete and may lead to an inaccurate conclusion.

Inductive approach uses primary and secondary data to collect data. Primary data is data that is acquired directly from the experiment. Primary data is good for this research because it can be applied with high confidence level. Moreover, it is reliable. It reliability brings out the concept of accuracy. However, primary data can also be expensive because it needs more people to carry it out. Moreover, it needs more time to carry it out. Secondary data, on the other hand, is data that has already been collected. Unlike, primary data, secondary data collection method is much cheaper. Moreover, it does not need a lot a lot of people to carry it out. However, secondary data can sometimes be misleading. Its reliability is quite low.

However, both primary and secondary data have its limitations they are very effective methods of collecting data. Therefore, the use of these two data collection methods made the research successful. However, this research

has its limitations. First, the use of experiments and literature without interviews makes the research questionable. Moreover, the research does not cover concepts and variations in Geopolymer concrete. Therefore, there is more room for further research.

Reference

Geopolymer Alliance n. d. The Geopolymerization Process Geopolymers. [29 October 2014]

Geopolymer Institute 2014, Geopolymer Cement. [29 October 2014]

Monita, O and Hamid, N 2009, Optimization of Fly Ash Geopolymer Concrete Mixtures in a Seawater Environment. Available from [29 October 2014]