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USING GEOGRAPHIC INFORMATION SYSTEMS TO INCREASE PRODUCTIVITY AND REDUCE WORKPLACE DIFFICULTIES

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ABSTRACT

Based on the findings of this study, researchers who are working in the field of information systems will be supplied with a research framework as well as an overview of geographic information systems. This page contains a research framework for geographic information systems (GIS), as well as an overview of the fundamental capabilities, features, and functions of GIS. Additionally, this article describes the research framework. It is also recommended that research potential be investigated in a wide range of different domains, including the management of geographic information systems (GIS), the implications of organisational structures, the challenges of working together, evaluations of the efficiency of decision-making, and the social effects in both industrialised and developing nations. Since its inception in the 1960s, multicriteria analysis has been successfully used in a wide variety of fields of study. It is a family of operations research and management science methodologies that has successfully been utilised. Creating a method that can be utilised to combine multicriteria analysis with geographical information systems is the major purpose of this study that is being done. The reality of the matter is that geographic information systems are susceptible to a range of restrictions when it comes to the provision of help for the process of making decisions regarding spatial matters. In order to discover a solution to these limitations, it is recommended that the methodologies of operations research and management science, in particular those associated with MCA, be combined with the tools of geographic information systems technology. This type of integration is intended to ultimately result in the establishment of a system that is referred to as the "spatial decision support system." The purpose of this system is to offer aid to decision-makers who are dealing with difficulties that are related to space. As a result of this, a design for an SDSS is also offered as a consequence.

Key words: *Quality, Continuous Improvement, Deming Circle, Geographic Information Systems*

INTRODUCTION

It is possible that this caution, which is sound counsel that lays the groundwork for the discussion, will make it easier to have a talk about the possibilities of the study and use of geographic information systems (GIS) in the business sector. Global positioning systems (GIS) are gaining popularity in the business sector as a result of their capacity to unearth the richness of information that is concealed inside location-specific data. Their ability to

do this is the reason for this appeal. The reason for this is because geographic information systems are quite good at displaying this information. This document contains a variety of information, some of which includes addresses, zip codes, counties, latitude, and longitude coordinates. Through the use of a decision support tool that is known as a geographic information system (GIS), users are provided with the capability to integrate geographical data, such as maps, with databases that include attribute data in addition to other types of data, such as graphs and pictures. This is made possible through the utilisation of a geographic information repository. When compared to other information systems, Geographic Information Systems (GIS) stand out due to its capacity to include the geographical link between a variety of things into research. In comparison to other information systems, they are distinguished by these qualities. Customers have the opportunity to get higher value from their data as a result of the fact that the vast majority of data have a strong geographic component. This may be a big advantage for customers.

Definition of Geographic Information Systems

First and foremost, in order to get a complete comprehension of this system, it is necessary to provide a definition of the Geographic Information System (GIS). Geographic Information Systems (GIS) are more than simply a tool for making maps and providing graphics for presentations, and it is necessary to have the knowledge that they are more than just that. Now available spreadsheet applications, for example, come pre-loaded with Geographic Information System (GIS) components that enable users to construct presentations that contain maps. These components allow users to create presentations that include maps. However, despite the fact that these properties are necessary for the production of presentations and other displays that are comparable, they only cover a relatively tiny percentage of what a full-function geographic information system (GIS) is capable of accomplishing. As a result, Geographic Information Systems (GIS) need to be seen as a tool that is far more than just a mapping tool. The term "geographic information systems" (GIS) can be defined in a variety of ways; however, the one that we will be utilising is as follows: "A computer-based information system known as a geographic information system (GLS) offers tools for gathering, organising, managing, analysing, modelling, and displaying data that is linked to a precise cartographic representation of objects in space."

One of the most important things to bear in mind is that Geographic Information Systems (GIS) are distinct from other kinds of information systems in a number of different ways. While taking into consideration this description, it is important to keep this particular aspect in mind. Geographic information systems (GIS) are designed to simplify the process of making maps, which is the first step in the process. When it comes to the process of making maps, there is a myriad of different ways that may be used. It is possible to generate maps using satellite or aerial photographs, as well as to digitise paper maps. Both of these possibilities are possible. On the other hand, the acquisition of map coordinates can be accomplished through the use of surveying techniques or through the utilisation of global positioning systems (GPS). In order to do these duties, either a

significant amount of manual effort is required, or specific equipment and training must be acquired. Both of these options are necessary. The process of gathering data may be one of the most challenging and costly components of putting a geographic information system (GIS) into operation. This is because of the reasons stated above. The factors that were discussed earlier are the explanation behind this.

OBJECTIVE

1. To research GIS and data management technologies.
2. Researching how geographic information systems might boost output and lessen challenges at work

METHODS

Inductive reasoning was employed to carry out the grading system, beginning with the section and working its way up to the entire. The development of a cause-and-effect diagram and a Pareto chart followed the conclusion of the data collection procedure, which was the first stage. With the use of these visual aids, we hoped to pinpoint the issues plaguing the company and explain why fixing them was imperative. Geographic Information System (GIS) software is a powerful tool for creating objective maps, modelling oil exploration regions, and studying the advantages of GIS in environmental, health, safety, and quality management. You can generate maps using all of these programmes. In order to construct maps, GIS software is an absolute must-have. The following theoretical framework, outlining the following, is the basis of the research: Within this subfield of the study, we are investigating the theoretical underpinnings of several ideas, including GIS, continuous quality improvement, health and safety management, and environmental management. Furthermore, this section of the study will go over the basics of geographic information systems. As stated by the American Society for Quality Control (ASQC), quality is "all the characteristics and characteristics of a product that have the ability to satisfy certain needs." Every single attribute of a product is covered by this description. The ASQC is the organisation responsible for creating this definition. Another way to look about quality in the context of an organisation is as a well-oiled machine that can handle a wide range of component groups with ease. The overarching goal of this system is to meet or exceed customer expectations by delivering a high-quality product or service.

ANALYSIS

This community of living creatures, sometimes called an eco-system, may communicate with one another and with the inanimate elements like rocks, fire, and water that surround it. Both living and nonliving objects engage in this relationship. When several parts work

together, a dynamic and balanced system is born; nevertheless, all of these parts influence and are dependent upon one another. Common examples of this concept include providing workers with the means to obtain protection from qualified individuals and implementing measures to lessen the likelihood that they or the organisation might sustain injuries as a result of machinery and equipment. With these procedures in place, we hope to create a safe workplace for our employees and cut down on the frequency with which accidents happen. In addition, safety precautions should be implemented to ensure that no harm comes to employees as a result of or related to their employment.

Continuous improvement: The vast majority of people are in agreement that continuous improvement is the most effective method for enhancing performance, efficiency, quality, and competitiveness. This is a consensus that has been widely disseminated. As a result of the fact that it is a specialist collection of methods that assist the organisation in enhancing its performance, it also has a good and substantial influence on the performance of maintenance. This is due to the fact that it is a set of strategies that assist the business in raising its level of performance. Efforts that are made with the intention of achieving continuous improvement have as their objective the reduction of waste, namely in terms of the amount of time, resources, and injuries that are sustained by workers. people are transformed into valuable members of the team by their involvement in teams that are tasked with solving problems. This strategy not only enables departments to make use of technologies that are meant to address problems, but it also converts people into members of the team. In spite of the fact that the purpose of this strategy is to make an effort to forestall the occurrence of problems in the first place, it also gives departments the opportunity to make use of technologies that are specifically developed to address issues. Because of this, people have the impression that they have a greater sense of control over the tasks that they are responsible for and the commitments that they are responsible for doing.

Practical application for the Deming Cycle to improve processes: When it comes to the process of process improvement, it is essential for the Deming Cycle to go through seven crucial steps before it can be used. The First Step: Recognising the Capabilities of Potential Opportunities During this stage, opportunities are recognised, and a priority is assigned to each one in order to facilitate further development or expansion. In addition, in order to enhance the process, it is essential to recognise the issues that require resolution in order to make improvements. Throughout the entirety of this phase of the process, a wide variety of quality methods, in particular the seven fundamental quality approaches, are utilised.

Analyzing current processes: The purpose of this stage is to evaluate the manner in which the process is currently functioning.

developing the most appropriate solutions: Following the completion of this stage, the subsequent phase is to search for the most effective solutions, which are often approved in order to enhance the process and increase the quality of the produced product.

implementing changes: The stage of putting the best ideas into action follows the stage of picking the best ideas, and the working group continues to enhance the process by formulating a strategy for implementing the changes and beginning the process of putting them into action. The end goal is to put the best ideas into action.

Study and evaluation of results: The goal of this stage is to evaluate the changes that have been made to the process via the use of process observation and modifications to the characteristics of the product during this stage. In order to evaluate the success that has been achieved as a consequence of the implementation of process changes, it is essential to gather and examine data pertaining to the process.

Standardizing and establishing standard solutions: Keeping a record of these replies and establishing them as standard solutions is something that the researcher does in order to ensure that the process changes will lead to the results that are expected and will improve the quality of the outputs.

Planning for the future: Regardless of the significant achievements that were achieved in the stages that came before this one, the objective of this phase is to develop the ongoing exploration of the greatest feasible levels of process efficiency. A collection of resources that encourage ongoing improvement: In order to improve the efficiency of processes and guarantee quality, technologies that aid in the comprehension and evaluation of processes are utilised. (Ibrahim 2013: 637) These tools assist the organisation in a variety of tasks, including the collection of data, the generation of ideas, analysis, development, and evaluation of processes. There is a focus placed on fundamental quality techniques at each and every stage of the process improvement cycle; the researcher utilised two instruments in order to carry out her investigation:

Determine the Causes and Effects of the Problem Presented in this graphic are: According to Ibrahim (2013): 642, it is a record or diagram of the problem that has to be investigated inside the operational organisation of the industrial organisation. Those who are responsible for getting to the bottom of problems, including engineers, employees, and managers, all contribute to the development of this method. There is also a term for it that is called a "fishbone diagram," which is derived from the shape that it takes after the skeleton of a fish, which is a representation of perfection. The main bones and the subsidiary bones are the two categories of bones. The former are the primary offenders, whereas the latter are of a lesser significance. It is employed in order to study the sources of the variances and inconsistencies that are associated with the process, as well as the causes that led to the creation of these difficulties.
An example of the Pareto effect is as follows: It is possible to utilise Pareto diagrams to arrange errors, difficulties, or faults in order to obtain assistance in the process of problem solving. In order to discover a solution that is suitable, it is necessary to allocate resources and put into action a variety of tactics when dealing with a problem that has several aspects. The question is, should we choose a number of possibilities at random or should we make an effort to put each one into action simultaneously? According to the Pareto Philosophy or Law (80% - 20%), which claims that, on average, only 20% of the causes

contribute to 80% of the results, this question may have an answer in the Pareto chart, which rounds back to the Pareto Philosophy or Law.

The process of systematising geographical information: In each and every culture, the process of determining one's spatial or geographical position is the first step in the establishment of policies, plans, and decisions. In light of this, it is clear that there is a pressing requirement for systems that, in addition to capturing and monitoring variables, events, and human activity, are also capable of tracking their whereabouts. To add insult to injury, it is widely acknowledged as being among the most essential geographic information system (GIS) systems. No other information system can be compared to the one that is being discussed here. Computers in the modern day have developed into a powerful and one-of-a-kind instrument that can be used to solve a broad variety of issues that arise in a variety of human pursuits and academic subjects. The reason for this is because they make it possible to transmit enormous volumes of data in a reliable, speedy, and adaptable manner, all without compromising mobility. According to one particular definition, "geography is a group of techniques used for the purpose of achieving specific goals, determined by information related to the geographical features on the surface of the earth." This explanation provides a description of information systems. As a consequence of this, the characteristics is presented from the database that is associated to it. According to popular belief, data management is all about collecting, storing, retrieving, transforming, analysing, modelling, and displaying information. In addition to this, it encompasses the interactions that humans have with the land, which includes comprehending their motions, predicting their reactions, and determining how to deal with them. have a strong bearing on quantitative and systemic analysis.

By providing accurate renderings of the data's geographical location: For the purpose of depicting data at a particular position or throughout a certain region, it is feasible to make use of coordinate values (X, Y). "Height" is a possible meaning for the letter Z in certain circumstances. The information that these coordinates transmit is referred to as attribute data, whilst the coordinates themselves are considered to be geographical measurements. The raster and vector data models are jointly responsible for storing geographical information and properties. This obligation is split between the two approaches. The data is considered to be connected with a specific location on the surface of the Earth because of the geographical connection that exists between the two databases. The application provides the user with a wide variety of coordinate systems from which to choose, enabling them to select the one that is most suitable for their needs specifically. For the purpose of providing (X, Y) coordinates, traditional coordinate systems are utilised. Any collection of geographic data, together with the required spatial connections between them, may be represented using one of three fundamental vector geometric forms if the coordinate systems are equal. This is the case whenever the coordinate systems are equal. The use of these formats makes it feasible to provide a description of any collection of geographical data. These forms, which are often referred to as features, have a number of possible uses, including the following:

The display of data that is not dimensional may be accomplished through the use of point characteristics. This includes the portrayal of a particular phenomena or the position of a sample. At the location in question, there is only one solitary pair of coordinates, which are X and Y.

features of lines that were typically used to show anything that did not have more than one dimension, such as highways. The line is made up of at least two different sets of coordinates, with the vertices of the line functioning as the line's midpoints and the nodes of the line functioning as the line's endpoints.

The features of polygons are utilised for the purpose of constructing two-dimensional places, such as project staging areas. Areas that are closed and are defined by sets of vertices are referred to as polygons.

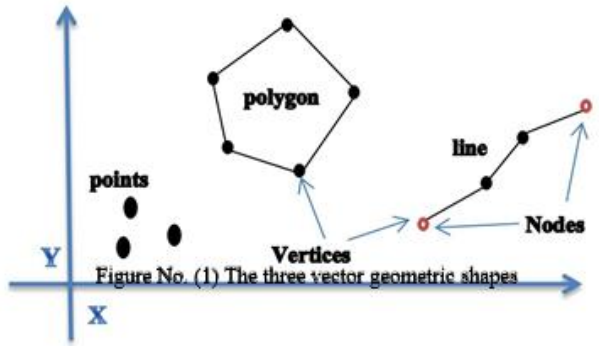

Figure No. (1) The three vector geometric shapes

There are a number of stages that must be completed in order to successfully project the theoretical framework of the topic that is being examined onto the ground. Within the confines of a methodological framework that is relatively particular, the first phase is conceptualised. This gives an explanation of the characteristics and fundamental criteria that are necessary in order to accomplish the goal of doing research using the Deming Circle and putting it into action in order to raise the standard in the manner that is defined below:

Identifying the opportunity: Additionally included at this level are the following:

For the purpose of successfully projecting the theoretical framework of the subject that is being investigated onto the ground, there are a number of processes that need to be performed. Conceptualization of the first phase takes place within the boundaries of a methodological framework that is rather specific. The purpose of this is to provide an explanation of the features and essential criteria that are required in order to achieve the objective of doing research using the Deming Circle and putting it into action in order to increase the standard in the manner that is outlined below:

Table No. (1) Categorization of work-related barriers

Obstacles to work	include
Nature	The character of the terrain that is being worked, the weather conditions, and the presence of rivers or other sources of water.
Technical	A malfunctioning mechanism, an absence of machinery and equipment, the absence of rectified satellite photos, an inadequate number of staff members, and a lack of training for personnel are all among the issues.
Security	There are mines, thefts, and military munitions present in the presence.
Social	In addition to residential areas, there are also farms, wetlands, and monuments..
Government	The existence of oil wells, government assets, military properties, and international roadways all contributing to the situation.

One of the quality tools, the Pareto chart, was used to visually represent the concerns in order to ascertain the degree to which the work impediments affected the twenty-three project samples. Furthermore, the obstacles should be listed in decreasing order of impact, starting with the most pervasive and ending with the least, according to the frequency with which they manifest. Accordingly, it is necessary to highlight the most widespread challenges initially. This makes it simpler to identify the problems with the greatest impact on quality, which aids in prioritising the solutions to those problems. In accordance with the Pareto principle, 80% of the quality concerns may be explained by 20% of the causes. Since this is the case, it is highly recommended to calculate the occurrences of each possible obstacle.

When assessing the obstacles that impede workflow, these numbers are considered. The importance, frequency, and total relative frequency of each category are used to rank these challenges. The following steps were then taken to complete the calculations presented in Table 3:

Table No. (3) The descending ranking of the obstacles based on their frequency and (Pareto analysis)

work obstacles	Duplicates	Relative frequency%	Cumulative relative frequency%
Nature	23	%28.40	%28.40
Technical	22	%27.16	%55.56

Social	16	%19.75	%75.31
Government	10	%12.35	%87.65
Security	10	%12.35	%100.00
Total	81	%100	

Following the immediate collecting of these discoveries, the data were analysed using a Pareto map, which may be seen in the following image in Chart No. (1):

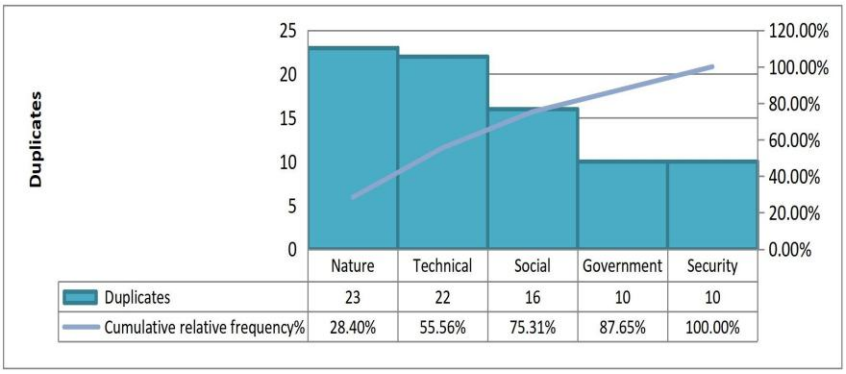

Diagram No. (1) Pareto diagram for work-related barriers in the 23 projects in the study sample

According to the previous Pareto diagram for the obstacles, there is a connection between the point where the cumulative relative frequency line meets, which accounts for 80% of relative frequency rates, and 75.31 percent of the cumulative relative frequency rate. There must be some sort of link between the two connections, since this one is so clear. Because of this, it's reasonable to assume that three primary problems demand solutions, and that these problems account for around 75% of workplace obstacles. The following work processes are expected to see an improvement over the next eighty percent: social, technological, and natural obstacles. Then maybe studies will be conducted on the survivors who have sustained injuries.

The researcher successfully accomplished the goal of finding the major causes by utilising the Ishikawa cause-and-effect diagram. We did this so that we could look at the main causes of these serious problems. We chose these four factors because their effects on the results we saw in our data analysis and reporting are quite obvious. This is illustrated, for instance, by the Ishikawa cause and effect diagram, which shows not only the four main causes but also some of the ancillary components that influence problems at work. Workplace environment, working conditions, tools & equipment, and people are all part of this.

the procedure for determining the strategy to address the issue: When a problem arises during a project, the team working on it needs to be ready to fix it. After a proposal has been presented to the participating company, the initial phase of the process will

commence. A member of the corporate team may be, for instance, a specialist in information systems, a safety team member, a representative from upper management, or a quality department official.

Consider the benefits that may be yours if you fix the problem: If you take on this task, you will have the opportunity to gain from doing analytical examinations of potential dangers and finding the best ways to deal with them and reduce the harm they cause. In addition to medical treatment, the business provides its workers with educational and awareness courses and training on how to comply with health and safety standards in the workplace. This is how it's done so that any potential workplace accidents may be avoided. Improving the accuracy of decision-making and increasing productivity are two of several benefits that accrue from employing modern ways of labour.

taking stock of what needs doing given the current state of affairs: The quality department's processes, activities, and strategies for identifying problems and explaining how they reach necessary choices are detailed at this level. Some examples of jobs that come under this category include identifying natural landmarks, gathering spatial data that describes the climate, geography, and terrain of the regions of operation, and so on. More specifically, woodlands, rivers, and desert areas will be considered alongside man-made features including roads, bridges, buildings, and dams. The engineering measurements, which could include things like the site's dimensions, distances, directions, and coordinates, are another crucial phase. You could also find the coordinates in these measurements.

development of the most practical and fruitful answers: During this stage, geographic information systems will be used for the reasons listed below: As a first step, we must identify potential solutions that are appropriate for fixing the identified problems.

Data map generation using geographic information systems (GIS) is a prominent GIS application in the oil industry. In addition to facilitating easy access to digital maps, these maps also alert users of the facts that are accessible. One other good thing that comes out of this is that people spend less time looking for information. It provides the ideal environment for rapid data evaluation since it provides a productive way to generate and collect various types of data to help decision makers. This is due to the fact that it provides a method that works. A rise has been seen in the number of oil-related activities, encompassing: Conversely, oil companies would do well to have access to the most up-to-date, accurate data on environmental changes. Since this is the case, geographic information systems may include, modify, and manage data pertinent to changing environmental conditions. It was determined that the data needed to complete the activities listed below was necessary for the purpose of implementing these technologies. Geographical data (such as an Iraqi map and position coordinates) and metadata (such as the names of seismic teams and the name of the project) make up the collected data. The information that could be captured has been collected.

implementing changes entails doing the following: There are now a number of actions being taken and put into effect, including:

Entering the information: A state-of-the-art and efficient tool for organising any type of data, including images and maps, ARCGIS 10.8 was instrumental in making this happen. Concerning the IT side of things, it was compliant with worldwide norms. In addition to having to be connected to the company's information network, building a large database with descriptive and geographical data and information is crucial. Everything here is related to the system's ability to meet the organization's information services and business needs. Since it can be completed using that, it may make use of the data collected from the exploratory seismic teams' multi-year efforts. This data set contains, among other things, the input of finished project site coordinates, the name of the seismic band, the project name, the number of completed points, the number of outstanding points, the implementation ratio, the start and end dates of the work, and the reasons for work abandonment.

Starting the process: Following the computer's analysis, a geometric representation of the data was generated and shown on an Iraqi map in conjunction with a satellite picture dated 2019 (the current year). The data was shown by the researcher using a projector (UTM WGS1984, ZONE38N). Another step was to save the information in a database that was built to handle shape files. When it came to engineering, the POLYGON model was used to depict Iraq's borders and seismic team projects, while the POLYLINE model was used to depict the country's main and subsidiary road layers. The engineering was shown using both of these forms.

reviewing and analysing the results in detail: Several significant and useful uses for geographic information systems have been identified by the study's findings. These applications may be used to take digital satellite images, save them, process them, analyse them, and manage them. Beyond this, they are also trying to supply a wide range of geographical information-related facts. It makes it possible to store, display, and analyse geographical and spatial data collected from several sources by classifying and integrating the data into a single location. Furthermore, data may be presented in a variety of formats such as maps, reports, tables, and charts; the specific choices rely on the requirements of the improvement process. This allows it to analyse the data in a fresh manner, highlighting patterns and correlations. During this stage, we focused on standardising and creating solutions for the following issues: Verifying the anticipated results and raising the bar for product quality by accomplishing the following with the field-proven process improvements (improving activities via the use of geographic information systems):

A massive data integration is necessary for spatial analysis to make use of the existing information. This is why geographic information systems offer the perfect setting for doing data analysis quickly. On top of that, it offers a practical way to make decisions, which gives you a huge leg up when competing for oil resource investment licences. Part of this duty includes overseeing oil site operations and the procedures used to compile production reports and other vital investment data. Environmental monitoring: Changes

will be analysed by environmental monitoring in order to effectively regulate the variables. So, environmental monitoring is going to be utilised.

At this juncture, the process of improvement will be the primary focus, and it is imperative that it be maintained continuously. The focus has to be firmly placed on the process of future quality planning by addressing the following issues, which may be accomplished by offering ideas to the company, which will then apply these changes.

- The creation of an interactive database that is connected to the field work authority should be done prior to the beginning of each new project.
- It is recommended that you create a geographic database that contains all of the previous projects and then preserve it for prospective usage.
- For the purpose of protecting the environment, determine what kinds of tools and systems are necessary.
- Employees should get training on the processes for ensuring their safety on the job and roads.
- For the purpose of monitoring and managing the climate and working conditions at work, as well as paying attention to quality improvement approaches, Deming's cycle of improvement and geographic information systems are being utilised.

CONCLUSIONS

Despite the fast commercialization of geographic information systems (GIS), only a small fraction of the information systems research community has given any attention to this technology. A person can further their education in several settings. Geographic information system (GIS) management, for instance, necessitates more data throughout the development, testing, and launch stages of the system's lifespan. Collaboration issues, GIS's effects on companies, decision-making efficacy, and the factors influencing human perception and cognition should all be investigated in future studies. Research into all of these areas is crucial. Geographic information systems (GIS) have far-reaching societal effects, although more research into these effects is still needed, in both developed and developing countries. Geographic information systems allow for large-scale data integration and the creation of an ideal environment for data review and analysis with minimal effort and in the least amount of time. An effective and efficient method is employed to achieve this. This makes it easier to make good decisions by facilitating the development of interactive maps and reports and bettering the company's resource management. This is due to their ability to build connections between descriptive and geographical databases and to simplify the flow of information across the many departments and seismic teams. This is the rationale for the situation. The research found that not having work process training courses was one of the main issues that were investigated, as seen in the fishbone figure. The study considered this to be among the

main justifications for its existence. This one factor alone explains why there has been little effort to integrate data across the many branches of government.

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