GIS based Project Information System for Project Management

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Abstract— **This paper investigates the capability of geographical information system in building up a system which can be used as an information system for quality control, rate analysis and safety in construction projects. Geographic Information Systems (GIS) is a moderately new branch of data innovation for dealing with the spatial and non-spatial data and can viably be utilized to build up a database identified with development asset and security and quality control proposals for conceivable development exercises. ArcView 3.2, is used in present study which stores all the information in tabular format. Asset information for materials, works, supplies, suggestions for security and quality control are put away in the distinctive tables and separate tables are utilized for every development extend for rate analysis. Scripts are added to GIS software making the use of avenue language which allows the planner to access and manipulate the existing database and helps in speeding up the decision making. This paper recommends that the proposed GIS based procedure may supplant the manual strategies to extricate the data from the accessible database and can without much of a stretch is refreshed as a large portion of the data is in computerized arrange.**

Keywords—geographical information system; quality control; rate analysis ; safety;spatial data ; non spatial data

I. INTRODUCTION

Individuals required in the construction business trust that sparing in time and cash can be accomplished in real development as opposed to applying any basic system for development extend administration, for example, cost estimation, planning, scheduling and control. Further, achievement or disappointment of a building contract to a great extent relies upon the quality and timing of the data accessible to the temporary workers from the database. Along these lines, requires a legitimate data framework to deal with the development ventures. Utilization of a PC based data framework may help in diminishing the excess and additionally sparing time and cost. proposed that a data framework intended for development industry ought to be fit for incorporating different sorts of information and give the required data and information convenient that will at long last bolster different choice and operation [1].

Construction industry is thought to be a standout amongst the most unsafe occupations and positioned low in the security guidelines. Development security is one of incredible sympathy toward development industry. Disappointment of overseeing development wellbeing may bring about wounds, monetary misfortune, human clashes, and penalties. Along these lines, development industry needs an apparatus that may help them to effectively coordinate security and wellbeing measure into venture arranging. In this manner the need of advancement of a database, that requests extend particular information from the client and gives, as yield, relevant wellbeing and quality control recommendations [2].

Mind boggling and unlimited measure of data accessible for a development extend requires a facilitated framework that may help in coordinating entire data together. With the progresses in the field of data advancements, development industry has begun taking the benefits of some of these improvements. GIS is a generally new branch of such advancements for dealing with the spatial and non-spatial data. Database is the basic piece of any data framework utilized for development administration so the convenience of geographical information system should be investigated [3].

GIS not just accelerate the displaying procedure and information extraction from the different assets however guarantees information integrity and exactness moreover. GIS shape an effective establishment for arranging development exercises. The Material Plan [4], a GIS based apparatus to supplant the manual techniques in amount departures and evaluating materials format configuration is one such illustration. The framework joins general guidelines and experience for estimating material stockpiling ranges and position of the material. Material Plan demonstrates that GIS is a promising instrument for illuminating amount departures and materials format issues and opens another state of mind in the administration of spatial data for development arranging and configuration utilizing a GIS [4].

The point of the present review is to evaluate the achievability and the capability of GIS to build up a simple to–use development extend data framework for contractors. A philosophy is produced to plan a data framework for security, quality control, man, and material prerequisite in GIS condition. Proposed GIS based approach may help the organizer to get to and control the accessible database, which at last aides in the basic leadership handle and may supplant the manual strategies to extricate the data from the accessible database for construction industry.

II. RESEARCH OBJECTIVE

The essential target of the paper is to test the feasibility of utilizing GIS for rate analysis and adequately incorporating different sorts of data utilized as a part of construction in GIS condition. The accompanying sub goals were additionally accomplished in building up this framework: [1] Development of the construction database in GIS condition, [2] Use of GIS to replace the manual strategies to extract the data from the accessible database and [3] Integrate security and quality control suggestions with different construction exercises.

III. GIS AS A MODELLING TOOL

GIS is a computerized system which can be used for capturing, storing, analyzing and presenting the geographical data. GIS involves four important components like a computer system, GIS software, human expert and information [5]. GIS action can be gathered into spatial information input, property information administration, data display, data investigation, data examination, and GIS modeling [6]. GIS can deal with both spatial and attribute information, spatial information identifies with the geometry of the components, while attribute information depicts the qualities of the diverse elements and put away in the forbidden frame i.e. in a tabular format. In a table, each row represents a feature while column represents the characteristic of features. Split data system is used to store spatial and attributes data in different files and these are linked together by identification descriptor [ID]. These two arrangements of data records are synchronized so that both can be quarried, broke down, and shown.

Data management feature in GIS software helps in developing a prototype construction project information system (CPIS] in ArcViewGIS 3.2 [8] making the use of a simple data set.

A. Resource Database

Planning a Construction Project Information System (CPIS) in GIS condition include in making diverse tables to store the example information. Putting away, keeping up, and refreshing example assets database are at the center of proposed model CPIS. Isolate tables are utilized to store the information's about work, material, equipment necessities, safety, and quality control suggestions. Extra data can be consolidated in all tables of the database to guarantee development and refresh the framework at later stages. This choice is outlined in a way that lone chose clients, for example, the owner or the framework designer may utilize it. Taking after tables are made in the outline of proposed CPIS:

- Material: The table contains following ten fields: key, list of activities, sand, cement, lime, course aggregate, impervious materials, steel, stones and brick. A key is the regular field in all information tables. The field key is utilized to set up the association between the comparing records of various tables. Field list of activities consists of different activities to be undertaken in a construction project. Each row (record) contains quantity of material required for activities in the corresponding fields (column). Quantities are entered for 10 work units (in m^3 or m^2 or m) to stay away from fraction.

- Labour: This table also contains ten fields such as key, list of activities, mason, helper, T&P, blacksmith, carpenter, watchmen, scaffolding, and shuttering. The table is filled in accordance with the data available and number of workers is entered for 10 work units.

- Equipment: This table includes four fields such as key, activity, equipment and rate and here also the rates are entered for 10 work units.

- Safety: This table contains two fields i.e. key and safety recommendations.

- Quality: This table contains two fields i.e. key and quality control recommendations.

- Project: This table contains five fields i.e. key, duration, EST, EFT and amount. Duration provides us with the information about time required for a particular activity for a particular project. EST and EFT are the earliest start and earliest finish time of various activities.

For rate analysis different project tables are used. An information system is established for interrelating data and to make decisions. The information that a contractor requires is details of different activities to be carried out, manpower required, and amount of materials required [9].

B. Relationship and Database

There are two types of table's source (from) and destination (to] table. If we have to add from database table to the project table then, database table is source table and project table is destination table. There are three types of relationships i.e. one-to-one, one-to-many and many-to-one. One-to-one relationship only one record in the destination table is related with only one record in the source table.

Two tables can be joined to each other with the help of JOIN and LINK functions of ArcView. LINK function can be used to establish relationships viz. one-to-one relationship between source and destination table. Once LINK function is established, once we select a record in destination table, it will automatically select the related record in the source table.

C. System Functions and Usage

As indicated by the capacities of programming and the data required by the clients for rate investigation, the elements of the present framework are upgraded. Based upon the appraisal of the user's needs, the prerequisites are converted into framework capacities with the assistance of road programming dialect utilized inside ArcView 3.2. Five capacities for material, labour, equipment, safety and quality are produced and utilized as a part of present CPIS.

- Material: In this case the source table is the material table and project table is the destination table. The tables are then joined as the field called 'key' is available in both the tables. An input dialogue box is displayed to specify the field in project table to specify a particular activity and another dialogue box is displayed to input the rate of various materials.

- Labour: In this case the source table is the labour table and project table is the destination table. An

input dialogue box is displayed to specify the field in project table to specify volume of work done for various activities and another dialogue box is displayed to input the rate of various classes of workers.

- Equipment's: In this case the source table is the equipment table and project table is the destination table. An input dialogue box is displayed to specify the field in project table to specify volume of work done for various activities and another dialogue box is displayed to input the rate of different equipment running cost.

- Safety and Quality: LINK function of ArcView is used to establish the relationship between safety and quality functions. Once these two tables are linked both the input tables remains unchanged.

IV. SCHEDULE OF CONSTRUCTION ACTIVITIES

Schedule is the work program or the timetable for the moves to be made amid execution of a development extend. Bar diagram strategy is one of the prevalent techniques utilized by the temporary workers for booking. In a bar diagram technique, development work is first part into various exercises. These exercises are then recorded altogether of development needs on the left hand side segment, while the time scale is plotted on a level plane on the base. ArcView GIS can likewise be utilized for producing bar outlines utilizing its in-fabricated graph report. Final output demonstrates the ArcView's graph report, used to demonstrate the calendar of the development exercises. The primary preferred standpoint of the ArcView's diagram record over routine bar graph is that when a bar on bar outline in ArcView is clicked, a window shows up which give the data identified with that specific movement.

V. CONCLUSION

This paper exhibits the utility of GIS framework in building up a data framework those backings the rate analysis of a sample construction project. This is a framework for data investigation; control, stockpiling, and recovery of non-spatial development extend information. This data framework is outlined in order to fuse the data about the wellbeing and the planning as bar graphs. On the off chance that the information is in advanced shape, it can be effectively be refreshed, and improve the methods of rate investigation. The proposed system emphatically advances the idea of automated acquisition and capacity of information in GIS condition to support construction management.

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