Using Microsoft Project in highways project planning

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Abstract

Project management is a new science that has been very recently systemized. However, in previous decades, project management was preceded as an artistic approach toward the implementation of a specific project. For instance, the occurrence of this art appears in many great buildings such as the pyramids. Nowadays, project management has become a science with specific criteria because of many factors such as the increase in the number of tasks at work that should be completed at a specific period of time. And by the development of the work methods there was a need for new tools that can help manage big size project and projects with more complexity. Projects now tend to be more complex, which brings the point of changing the project management methods that can be based on three points, according to J. Davidson Fram in his book “The New Project Management Tools for and Age of Rapid Change Complexity and Other Business Realities”, that are:

1- Project management should be more customer focused
2- Project management should explore new management tools
3- The need to redefine the project managers roles

And by then, project management can be considerate as of the new developed engineering disciplines.

Keywords:
Project management; Microsoft Project; Linear Planning; Highways; Tilos; Software

1. Microsoft Project:

Microsoft project is one of the appearances of the change in the project management field, since it is one of the most developed procedures to go through and tools to uses in order to reach a high quality project results.

Microsoft Project is a tool that helps managing portfolios and implementing projects in different fields by scheduling, budgeting, and allocating human and material resources.

2. Exploring Microsoft Project:
2.1 Templates
First of all, Microsoft project suggests several templates depending on the field and the purpose of the project, as it can be personalized depending on the users need.
For instance, there is professional templates related to budget analysis, software development, startups, commercial constructions, marketing campaigns, project management, as there is personal templates such as wedding planning etc..

**2.2 Creating a new platform project:**

As mentioned by Elaine Marmel in his book “Microsoft Project 2007 Bible”, planning for a project in Microsoft project needs to follow different steps to get the result.
1- **Determining the tasks results:**
   By determining the tasks, it is meant that the user should determine the major tasks that can define the major actions to be done and break them down to minor tasks or subtasks.

2- **Establishing Time limits**
   After defining the major and minor tasks, the user should define the time limits and deadlines of each subtask, which, by the end of filling the starting and ending time columns, will automatically define the starting and ending time of the major tasks.
   Defining the time limits will help the manager keep in track of the progress of the work by respect to the actual date.

3- **Defining resources**
   Each task should be performed by a specific person or team, and by defining the resources the project manager can assign each task to the correspondent team. This step helps defining the availabilities of the workers to perform each task at a time or several tasks at a time.

4- **Linking the tasks**
   The relation between tasks can appear either at the level of time or resources. By these steps, the project manager should pay attention to the relationship between the tasks in terms of the order of tasks (which task comes before which), and the period of time that links between them (eg: tasks 2 should be performed three week before task 1).

5- **Gantt Chart:**
   The Gantt chart contains two parts:
   - The table part was filed with the previous information and show the name of task, starting and ending time.
   - The chart part is the graphic representation that helps graphically defining the time limits of the tasks and the relationship between them.

### 3. Scheduling Method for Highway Construction:

In the journal “Developing a Traffic Closure Integrated Linear Schedule for Highway Rehabilitation Projects” written by Haribol Sharma, Charles McIntyre, Zhili Gao, and Tang-Hung Nguyen, “The success of any construction project is largely dependent on the selection of the planning, scheduling, and controlling system...
adopted for the project.” The differentiation of the projects makes the planning tasks very challenging that is why there should be the use of the available tools that helps with the organization of those complex projects.

Same thing for many linear projects, taking the example of the highways and railroads, in which time and space must be taken into consideration.

Introducing Microsoft project in linear scheduling is a need especially when it comes to the construction part of the project.

4. Using Microsoft project in a specified highway construction project:

Eg: Building Line T2 and extension of line T1: Tramway in Casablanca

Realizing a project in real may not match with the plan that was previously planned for on paper or on software (Microsoft project), because of the different obstacle that can happen and lend to a change in the date or resources. For this reason, managing several related schedules of the same project might be a demanding task that needs both effort and time, and sometimes can lead to committing mistakes.

The problem that was faced during the work is that a change in any date, and most of the times the major dates-the dates of the administrative orders in the tramway project-, the manager has to manually change all the other dates in the other schedules. Since the firm has about 30 schedules of different public contracts, the changes make the task very complicated and sometimes will be filled the schedules with wrong information.

1. Solution:

To solve this problem, there was the suggestion of a platform that will gather all the existing data on one spreadsheet of Microsoft project, and that will help the workers to easily manage them. the reasons behind choosing Microsoft project as software to work with is because it is easy to read compared to Tilos, and it has some of the functions that will be needed exactly like Microsoft Excel, but it helps relating between the tasks, so whenever there is a change in one date, it will affect the other dates. Moreover, after filling the data, it displays automatically the Gantt chart of the tasks.

2. Comparison with Tilos and Microsoft excel Softwares:

Before choosing Microsoft project, there was several trial of different softwares to compare the feasibility of having the needed results starting with the one that seemed easy to read and will give the right result which are Tilos.

Tilos Trial:

Tilos is software that can graphically provide a good linear scheduling, since it is a way to link graphically between the time and the place functions, and the result was looking like this.
Figure 3: Planning platform on Tilos divided by Sectors.

Tilos software allows getting different information in one document by using different shapes and colors.
For more understanding of Tilos software, this image shows a zoom of the platform that is divided by the different sectors of the project. After filling the needed information, the result is represented as follow:

- The horizontal axis represents the distance, divided by the PMs (Meter point)
- The vertical axis represents the time, divided by months
- The bars represent the different projects per each sector, limited by the time, the meter points and the holidays in which the work should stop.

The good part about using Tilos in linear planning is its ability to keep track of the progress of the project by using estimated percentages in either time-based or distance-based, and by that it gives the possibility to change the information to meet with the deadlines by providing different suggestions, for instance asking the project owner to provide another team that can work similarly on the project. To realize the evaluation, CID technicians should prepare a weekly report by visiting the sites and evaluating the work, its progress and estimating the percentage of the work done.

**Problem:**

The problem with using Tilos is that it is hard to read the information since it is linked with each other and is a bit confusing.

**Excel Trial:**

One other alternative can be Microsoft Excel. Microsoft Excel is softwares that gives the ability to work with functions, graphs, and formulas.
Figure 5: Excel table for the administrative orders of the project changes.

This table was basically done for one specific date, which is the date of the administrative order, for the analysis of the changes and their impact on the other projects.

- The first column has the name of the 16 different projects of the Tramway project.
- The second column contains the administrative order dates that was planned in the very beginning of the project that were subject of changes depending on the progress of the project, knowing that the change of dates for some projects may affect the period specialized for other projects.
- The third column contains the maximum date of change of the administrative order, and that means that any date chosen after this date will affect the non-respect of the deadline.
- The forth column has the final date in which the project officially started.
- The fifth column is the difference between the maximum date of the administrative order and the date of the official start.
- The sixth column is the difference between the official start of the project and the date of administrative order planned.
- The last column contains further comments to be added.

Problem:
The problem with using this method is that a table should be generated for each specific type of dates, which means that there will be the sale initial problem of using many tables and many documents to find the right information.

Ms Project Trials:
The first idea we had about Microsoft Project is, first of all, to prepare a document in which all the schedules of the same project can be gathered, and by then link the date of each project by the date of its administrative order. The document the first major tasks defined.

Figure 6: Project Section classification on Ms Project.

- The first one contains the dates of the administrative orders, so after indenting it, it looks exactly like this:
Each row contains the name of the different projects and the date of the administrative order.

- The second one contains the dates of the CDR that is an abbreviation of “Centre de Remisage” in French, which refers to the storage in which the tramway cars will be left. This is the result obtained:

![Figure 7: The Administrative orders of different subproject on Ms Project.](image)

The first column contains the names of the subprojects in the CDR part, the second contains the starting day of the project that is linked to the predecessors (column 5) which are the dates of the administrative order. For instance, in the 20th row, the starting date of the SIG project (signaling project), is linked to the finishing date of the administrative order that happens to be in the 7th row + 290 days, which explains the “7FS+290 days” in the predecessors column.

The duration column is a link between the starting and the finishing date of each subproject.

- The third and the forth ones contain the different task of the extension for line T1 and the new line T2, that will look similarly like this:

![Figure 8: Storage building subprojects on Ms Project.](image)
Figure 9: The different subproject on Line T1 of the tramway (Microsoft Project).

Similarly to CDR part, both line T2 and extension line T1 are characterized by the starting date, the finishing date, the period between the starting and the finishing date, and finally a predecessor that links the finishing date of the administrative order and the starting date of the task or subproject. (See Appendix 1)

- The fifth part contains the dates of the built of the CDM which is an abbreviation of “Centre de Maintenance” in French, which refers to the maintenance center. As the name shows it, it refers to the place where the tramway cars get the needed maintenance.

![Table](attachment:image.png)

Figure 10: Microsoft Project platform for the CDM part.

As a result the new Gantt chart will look like:
Figure 11: Gantt chart of the final Critical pathway platform.

This platform looked very helpful and easy to read so working with it would be much easier. In which there are clearly some deadlines, as mentioned before, that shouldn’t be exceeded. Secondly, it is a platform that shows the most detailed information about each different section. For instance, for Section 1 PK from 0 Km to 1 355 KM from Sector 2 of Line T2, the details will be displayed this way:

![Gantt chart](image)

Figure 12: Section 1 from sector 2.

The Final Platform:

After the previous temptations to get the right critical path that can show us the progress of the work for this project, the Gantt chart (Figure 24) resulted can be easily read and can provide all the information needed. In this platform the tasks are related and any change of any information will automatically change all the information of the related tasks thanks to the critical pathway that resulted from the tasks deadlines.
Conclusion:
The keys factor of the development of the project management field can be related to the method of planning and scheduling tasks. That’s why there is a need of continuous development in terms of the planning tools.

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