Some Features of Project Management Using Dedicated Software in the Land Surveying Works

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Abstract: - In this article we pointed out the main features to be taken into account in land surveying projects. These specific items are found especially in the area of risk management, which must be taken into account and properly quantified. Therefore, to carry out the project of land measurement is not enough to have specialized knowledge, but must be treated as a series of knowledge in terms of project management. It approached the topic from the perspective of project management knowledge that need to have any engineer in land surveying which is working as project manager in a company that performs surveying activities. He must know and properly manage human resources and materials at its disposal, thus obtaining maximum efficiency in the work done with minimum resources, in the shortest time.

Key-Words: - project management software, land surveying, risk management, project plan
1 Introduction
A project may be designed on different levels, covering the problems of different sizes. First it is important to begin to detail the concepts related to project management. Despite the extremely large variety of programs and projects there are some general characteristics that we find, regardless of geographical or temporal dimensions and sizes without budgets or teams to have any significance. The project represents an amount of activities that lead to achieving a common goal and requires a significant consumption of resources (human, financial, material, equipment, documentary information and time). Implementation of a project requires a baseline and a final project now, so a lasting achievement. Project management consists of planning, organizing and managing (control) tasks and resources aimed at achieving a particular objective, conditions of the existence of constraints on time, resources and costs. From a conceptual point of view there is a clear and necessary distinction between the notions of project and the institution - the project is a process, and the body is a structure. Ignoring the existence of this distinction may have consequences on the design and the implementation of the project. For example, if a company that operates land measurements, this distinction is important because, in general, more projects are in progress, and human and material resources must be allocated properly. In this case, the general manager must have the ability to work simultaneously on the allocation of resources in all projects to exploit them more judiciously. Project management requires the existence own structure, at least from an organizational perspective if not institutional. In this respect, the project definition is applicable to the institution, with a notable exception: the duration. By definition, the project has a predetermined time, when the company has an indefinite duration. On the other hand, the success of the company is monitored and evaluated throughout the duration operation, while assessing the project's success after its completion. For example, a company may engage in surveying an entire project structure, but does not mean that the company is identified with the project. After completion of the project company will continue to exist as an organization. In terms of resources and budgets, we must not forget that the budget is company project budget. Therefore, we must take into account the triple constraint. (Fig. 1)

Fig. 1 – The Triple Constraint

The triple constraint is composed by:
- Increased Scope = increased time + increased cost
- Tight Time = increased costs + reduced scope
- Tight Budget = increased time + reduced scope.

2 Key Areas of Project Management
It should be noted key areas of project management in order to get to the actual design implementation. They are:
- SCOPE MANAGEMENT – Ensuring all the appropriate work within the project scope is completed and only the work within scope is being conducted
- TIME MANAGEMENT – Schedule Management
- COST MANAGEMENT – How costs are controlled and incurred costs are paid
- QUALITY MANAGEMENT – Quality Assurance Plan – How quality control is measured and satisfied
- HUMAN RESOURCE MANAGEMENT – Development of the project team, reporting structure, resource capacity
- COMMUNICATIONS MANAGEMENT – How project communications will be handled to ensure all project stakeholders are informed
- RISK MANAGEMENT – Risk Management plan to have all project stakeholders in agreement on how project risks will be handled (aversion, mitigation or assumption)
- PROCUREMENT MANAGEMENT – Procurement process, contract processes
- INTEGRATION MANAGEMENT – Integration of all areas of project management to develop a cohesive project plan
3 The Project Plan Structure
The structure consists of project plan:
- Introduction.
- Project organisation
- Risk analysis
- Hardware and software resource requirements
- Work breakdown
- Project schedule
- Monitoring and reporting mechanisms

3.1 Activity Organization
Activities in a project should be organised to produce tangible outputs for management to judge progress.
In the specific works of land measurements are relatively easy to define these elements as part of a practice field, where the main operations are known. Milestones are the end-point of a process activity. Deliverables are project results delivered to customers. The waterfall process allows for the straightforward definition of progress milestones.

3.2 Project Management Tools
Gantt Chart is a popular type of bar chart that illustrates a project schedule. (Fig. 2)

Project scheduling
- Split project into tasks (Fig. 3) and estimate time and resources required to complete each task. For example, we have the phase of auction, preliminary operations, field operations, office operations, bookkeeping.
- Organize tasks concurrently to make optimal use of workforce.
- Minimize task dependencies to avoid delays caused by one task waiting for another to complete. In our specific projects, a problem is the interdependence between field work and office work that takes place afterwards. More advantageous is to divide the activities into several phases, so that a deployment phase of its office work can be done concurrently with phase 2 of the field work, etc.. (Fig. 4)
- Dependent on project managers intuition and experience.

Principal scheduling problems
- Estimating the difficulty of problems and hence the cost of developing a solution is hard.
- Productivity is not proportional to the number of people working on a task.
- Adding people to a late project makes it later because of communication overheads.
- The unexpected always happens. Always allow contingency in planning.
4 Risk management in land surveying projects

Risk management is concerned with identifying risks and drawing up plans to minimise their effect on a project. A risk is a probability that some adverse circumstance will occur. Project risks affect schedule or resources and the quality or of the work. Business risks affect the organisation and the organisation team who are working in the project. For this reason, is necessary and very suggestive a cash-flow graphic (Fig. 5) and a To do list (Fig 6.) in the land surveying project.

![Cash flow graphic](image)

**Table 1 – Possible risks**

<table>
<thead>
<tr>
<th>Risk</th>
<th>Affects</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff turnover</td>
<td>Project</td>
<td>Experienced staff will leave the project before it is finished. In land surveying projects, this situation often happens due to the large volume of land works.</td>
</tr>
<tr>
<td>Management change</td>
<td>Project</td>
<td>There will be a change of organisational management with different priorities.</td>
</tr>
<tr>
<td>Hardware unavailability</td>
<td>Project</td>
<td>Hardware that is essential for the office works will not be delivered on schedule.</td>
</tr>
<tr>
<td>Requirements change</td>
<td>Project and entire work</td>
<td>There will be a larger number of changes to the requirements of the beneficiary than anticipated.</td>
</tr>
<tr>
<td>Specification delays</td>
<td>Project and entire work</td>
<td>Specifications of specific work are not available on schedule</td>
</tr>
<tr>
<td>Size underestimate</td>
<td>Project and entire work</td>
<td>The size of the field work extent has been underestimated. This happens often as the situation on the ground is usually different than what was estimated, requiring a higher volume of work.</td>
</tr>
</tbody>
</table>

![To do list](image)

The risk management process implies:
- Risk identification - Identify project and business risks; (Table 1)
- Risk analysis - Assess the likelihood and consequences of these risks;
- Risk planning - Draw up plans to avoid or minimise the effects of the risk;
- Risk monitoring - Monitor the risks throughout the project;
Risk analysis implies (Table 2):
- Assess probability and seriousness of each risk.
- Probability may be very low, low, moderate, high or very high.
- Risk effects might be catastrophic, serious, tolerable or insignificant.

Risk monitoring implies:
- To assess each identified risks regularly to decide whether or not it is becoming less or more probable.
- Also assess whether the effects of the risk have changed.
- Each key risk should be discussed at management progress meetings.

Risk monitoring leads to risk indicators which are presented in Table 3.

Table 2 – Risk analysis

<table>
<thead>
<tr>
<th>Risk</th>
<th>Probability</th>
<th>Class of effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational financial problems force reductions in the project budget.</td>
<td>Low</td>
<td>Major</td>
</tr>
<tr>
<td>It is impossible to recruit staff with the skills required for the project.</td>
<td>High</td>
<td>Major</td>
</tr>
<tr>
<td>Key staff are ill at critical times in the project.</td>
<td>Moderate</td>
<td>Serious</td>
</tr>
<tr>
<td>The weather is bad and does not allow topographic surveys.</td>
<td>Moderate</td>
<td>Serious</td>
</tr>
<tr>
<td>Changes to requirements that require major design rework are proposed. The beneficiary changes the requirements of the project type (especially in the civil engineering projects)</td>
<td>Moderate</td>
<td>Serious</td>
</tr>
</tbody>
</table>

Table 3 – Risk indicators

<table>
<thead>
<tr>
<th>Risk type</th>
<th>Potential indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Late delivery of hardware or support software, many reported technology problems, including surveying instruments and old software resources.</td>
</tr>
<tr>
<td>Human resources</td>
<td>Low staff morale, poor relationships amongst team member, job availability</td>
</tr>
<tr>
<td>Organisational</td>
<td>Lack of action by senior management</td>
</tr>
<tr>
<td>Tools</td>
<td>Demands for higher-powered workstations and for high technology of surveying instruments</td>
</tr>
<tr>
<td>Requirements</td>
<td>Many requirements change requests, customer complaints</td>
</tr>
<tr>
<td>Estimation</td>
<td>Failure to meet agreed schedule, failure to clear reported defects</td>
</tr>
</tbody>
</table>

5 Conclusions

To be a successful project, the strategy - implementation gap of a project consists in:
- **Direction**: Must have a clear, simple summary of where we want to go.
- **Communication**: All activities have been communicated in a compelling manner.
- **Sponsorship**: Must be someone at the right level who is committed to making the strategy real.
- **Actions**: There are identified clear vertical and horizontal and projects with regular milestones.
- Accountability: Establishing absolutely clear who is accountable for each component of the plan.
- Resources: Redeploying adequate resources to ensure the actions are able to be implemented.
- Incentives: Creating the desired behaviours we need (without unintended side effects).
- Measurement: Having the mechanisms in place to collect evidence about implementation progress.
- Engagement: Having clear processes for regularly engaging those who need to implement the plan.
- Feedback: Having adequate mechanisms for checking we are still on track, or need to adapt our plans.

The project management team has to be integrated into the risk management. A regular reporting about the risk situation is essential like:
- Preparation of the risk report
- Marking of special risks
- Risk concentration
- Risks which are endangering the existence
- Missing of risks which are endangering the existence
- Categorizing of risks
- Description of risks
- Quantification of risks
- Meaning from the view of the enterprise
- Presentation of interdependences of risks
- Changes against forgoing year
- Total risk evaluation

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