RESIDUAL RISK ASSESSMENT FOR SOFTWARE PROJECTS BY CONSIDERING SUB FACTORS FOR THE RISK FACTORS

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Abstract:
Risk management plays crucial role in software development. Risk can be occurred at any stage of development of project with respect to some parameters. Risk mitigation is technique to minimize risk in the result during development.

In this paper we presented theoretical approach for avoiding residual risk by considering all the sub factors for top ten risk factors. We have identified the priority of each risk factor and identified solution to minimize risk.

Keywords: Residual risk, Risk factors, Risk management, Software development

Introduction:
Software usage is increasing day by day. Due to this reason each and every developer has to work hard during the development of their projects. Software developers face failure of project due to uncertainty of results. The uncertainty may arise through risk. Risk is one of the major factors to accept or reject a delivered software project. Risk is nothing but uncertainty, if you put a framework around that uncertainty, then you effectively de risk your project risk [5]. To keep the framework around uncertainty usually project managers use risk management tools.

Risk management can be used during software development to provide best results rather than performing as separate process. The risk management process involves the following steps:

Figure 1: Steps in risk management process [1].
1. Identify the risks: The risk management process starts with identifying the hazardous conditions in the project and we should describe how the risk might affect your project outcome.

2. Analyze the risk: After identification of risk, you determine the likelihood and conservancies of each risk.

3. Evaluate or rank the risk: Prioritize the risk by identifying the risk magnitude and might be classified as low, medium and high. Risk magnitude is a combination of likelihood and consequences of risk.

4. Treat the risk/control risk: Initially high priority risk can be planned out to treat or modify to achieve acceptable risk levels. Next consider the same for medium and low priority risks.

5. Monitor and review the risk: By maintaining risk registers to monitor number of similar and dissimilar risks occur during the development stage and review and re review the same to minimize the risks.

In this connection we have used some of the common software project risk factors to identify the hazard conditions. Later we will consider the sub factors.

List of software risk factors developed by Schnidt [1].

Table 1: List of software risk factors.

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<th>S.No</th>
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Solution method:

Some of the sub factors for each and every risk factor, which are stated in the previous section, are identified. We should consider all the sub factors for each risk factor while evaluating risk. We can cover each corner of risk part and avoid the residual risk. Some of sub factors we have identified for the top 12 risk factors are given below.
1. **Corporate environment:**

- Strength of employees: Knowledgeable persons are to be identified in project domain.
- Administrative procedure of organization: Identify the operational behavior of the organization is in the right way or not.
- Strategic risks: Identify whether the organization is fulfilling its goals in the business plan.
- Marketing and technical advancements in organization: Organization needs innovative in the form of marketing and enhancing new technological advancements to keep up with competitors.
- Financial risks: Delay of the project leads to extra funding [5].
- Employee risks: Employees are the key source and success for any business organization and also they are the risk creators to the organization in some condition such as strike action [5].

2. **Sponsorship/Ownership:**

- Appointing project sponsor: Chief Executive Officer (CEO) should appoint the right person as project sponsor.
- Approve the financial aspects: Project manager should get the budget reviewed and get approval from CEO.
- Approve the requirements traceability matrix: The requirements agreed with the customer must be traced to both hardware and software technologies.
- Approve the implementation plan with sponsor: The implementation plan should be prepared as per the chart identifying critical path.

3. **Relationship management:**

- Knowing customer need: Organization should know what customer need otherwise it will face problem to attract the customers to do business with them [3].
- Monitor the customer need: Each of the customer needs as it gets implemented should be reviewed with customer feedback.
- Ability to maintain friendly relationship: Make customer as a software team member.
- Strategic thinking skills:

4. **Project management:**

- People: Select proper skilled team members, team size and distribute accordingly [6].
Planning: Comprehensive planning makes success from the beginning of the project. Planning will help the team to meet the deadlines during the project development.

Open Communication: Open communication with the team and outside the team will lead the success of the project.

Careful Risk Management: Project managers should know what exactly planned. During the development of the project, the project manager needs to maintain the log register and action plan of each risk.

5. Scope:

Project objective/aim of project: We should identify the goals of the project clearly.

Deliverables/outcome: We should work in such a way that our project leads to an expected outcome.

Milestones: We should consider major objectives.

Technical requirements: Whether the project is having all the technical resources to complete.

Limits and exclusions: We should limit the goals to whatever the customer needs; we should not extend it.

Customer review: Conduct reviews continuously with the customer to make sure that project members are within the scope.

6. Requirements:

Accurate: Each requirement should be described correctly so that the functionality to be delivered.

Feasibility: Whether the requirement is within the capability of the system environment.

Important: Trace each requirement to see whether it is really necessary to your system.

Prioritization: Rank the requirement based on how important it is for implementation.

Unambiguous: Requirement should be easily understandable.

7. Funding:

Funding risk: Probability of loss from higher funding costs or from a lack of funds to finance a project.

8. Scheduling and planning:

Avoid overtime: The progress rate during overtime is very less, more mistakes may occur.

Reducing scope: Fix the scope of the project as per the client requirement that must be fixed with the time frame, otherwise the scope of the project needs to be reduced.

Doing series work in parallel: The risk may increase the developer may involve in multiple activities.
9. **Development process:**

- **Process selection:** You should choose the proper development process for SDLC.
- **Improvement in each release:** For each release of the product in the interactive SDLC, the successive iteration would build on the artifacts of previous iteration.

10. **Personnel & Staffing:**

- **Actual staff size:** Planned staff size = Actual staff size
- **Interdependent skill group:** Software project team should contain people with different skills and knowledge to develop software.
- **Hire required knowledge and skill people:** Recruit only employees who have the required knowledge and skills relevant to project.

11. **Technology:**

- **Technology risk factors:** Working in unsafe conditions resulting in accident. Unacceptable operational and maintenance or safety. Design unsuitable or inappropriate as a solution. Design not completed or not feasible. Technology suddenly becomes obsolete. Performance unattainable. Size of project or its complexity causes collapse. Technological incompetence revealed.

12. **External dependencies:**

- **Upstream internal dependency:** Prepare a Gantt chart and track the dependencies in such a way that all tasks needs to be happening in a planned manner.
- **Upstream external dependency:** Make sure that the people who are working with different modules should not delay their work.
- **Downstream internal dependencies:**
- **Downstream external dependencies:**

**Working model:**

We should start with identifying the hazard condition and later we have to categorize to which risk factor it belongs.

After identifying the risk factor, we have to consider all sub factors for that risk factor as stated above. For each and every sub factor we have to analyze the risk by identifying the severity and probability. Based on probability and severity of that
sub factor check weather control is required, if control is required then control the risk by following any of the existing traditional methods or using expert systems. This procedure is continued till all the sub factors are evaluated for all the risk factors. Finally we will document the results. In such a way we will avoid the residual risk in the system.

The working model for the approach is shown in the figure.

![Figure 2: Working model for the approach.](image)

**Conclusion:**

In this paper we consider twelve (12) risk factors given by Schimdt [1] and for those twelve risk factors we have identified some of the sub factors. By considering each and every sub factor of the risk factor we can avoid the residual risk. The sub factors which we identified are not complete, further more factors can be identified to make the residual risk negligible.

**References:**


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