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Research on Time Management and Risk Management of Small and Medium-Sized Enterprises

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Abstract: This study aims to explore SME time management and risk management in R & D projects. First, we define project time management and project risk management, and introduce commonly used tools and models. Next, the definition of SMEs and the type of R & D projects are explained, and the problems faced in time management and risk management are analyzed. We also explored the relationship between project risk management and time management in SMEs. Finally, analysis and selection methods for SMEs when selecting project time management and risk management tools. The purpose of this study is to provide effective time management and risk management solutions for SMEs.

Keywords: small and medium-sized enterprises, research and development projects, time risk management

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1. Introduction

In today's highly competitive business environment, smes are faced with unique challenges and opportunities. As one of their core competencies, the management of R & D projects is crucial. However, compared with large enterprises, SMEs often face the problems of limited resources, time urgency and high risk. Therefore, effective time management, risk management, and tool selection have become the key to the success of SMEs. This article will explore the importance of these keywords and provide SMEs with practical advice and methods to help them succeed in a competitive market.

2. Project Time Management and Project Risk Management

2.1. Project Time Management Definition

Project time management refers to the management process that ensures that the project is completed on time and achieves the expected goals and quality requirements through reasonable planning, arranging and controlling the project time during the execution of the project. It includes the development of project time plan, resource allocation, schedule control, time risk management and other activities, aiming to maximize the efficiency of project time and optimize the management of project schedule.

2.2. Introduction of Common Tools for Project Time Management

2.2.1. MJ Project (Microsoft Project)

MJ Project Usually refers to Microsoft Project, which is a comprehensive project management software, widely used in all industries. Microsoft Project Allows you to easily

create Gantt charts, allocate resources, set project schedules, and continuously track project progress. This tool is very helpful for planning, executing and monitoring projects, especially for projects of all scale and complexity, from small team tasks to large engineering projects.

2.2.2. Primavera Project Planner (Oracle Primavera P6)

Primavera Project Planner is a high-end project management software, primarily used in those industries that require precision planning and resource management, such as construction and engineering. It provides advanced scheduling, resource allocation, and flexible reporting capabilities, enabling project managers to better control the multifaceted requirements of complex projects and ensure that projects are delivered on time and completed within budget.

2.2.3. JIRA

JIRA is a hot issue and project tracking tool developed by Atlassian. Although it is not a traditional project management tool, it is widely used for agile project management and problem tracking. JIRA provides the team with the flexibility to plan, track and manage work efficiently. It is particularly welcomed by the software development team, helping them coordinate work, manage problems and tasks and ensure delivery of high quality software.

2.3. Project Risk Management Definition

Project risk management is a key project management practice that aims to fully understand the potential threats and opportunities of a program. By identifying, evaluating, planning, monitoring, and responding to these risks, the project manager and team are able to minimize the negative impact while maximizing the positive impact to ensure that the project is completed as planned.

2.4. Introduction of the Common Model of Project Risk Management

2.4.1. Risk Management Cycle Model

Risk management cycle model is one of the key methods in project management, which helps the project team to manage the risk in an orderly and systematic way. This model divides the risk management process into well-defined stages, ensuring that risk management is comprehensive and orderly. First, the risk identification phase is designed to identify risk factors that may have an impact on the project, including internal and external risks. Subsequently, qualitative or quantitative assessments of the probability or impact of these risks are performed at the risk assessment stage. Then, in the risk planning phase, coping strategies are developed, resources are allocated, and these strategies are incorporated into the project planning. Risk monitoring is an continuous process to ensuring that risk conditions remain up to date, new risks are identified and existing risks are tracked. Finally, in the risk response stage, the project team takes steps to reduce the risk or minimize its impact. This model helps to ensure that the risk management process is orderly and able to adapt to project changes, thereby improving the chances of project success.

2.4.2. Risk Matrix Model

The risk matrix is a powerful tool for assessing and ranking item risk. It represents the probability and degree of influence of the risk as a matrix, dividing the risk into different levels, from low to high. This helps the project team identify which risks are most pressing and need to be prioritized. Through the risk matrix, the team is able to assess the risk qualitatively or quantitatively, and then develop corresponding risk response strategies for each risk to minimize the negative impact.

2.4.3. Monte Carlo Simulation

Monte Carlo simulation is a powerful numerical simulation method that is widely used in project risk management. It simulates multiple possible risk scenarios to determine the probability distribution of project completion time, costs and other key indicators. This approach is particularly useful for dealing with complex project risks, helping project teams to predict project outcomes more accurately and take appropriate measures ahead of time.

2.4.4. Risk Pyramid Model

The risk pyramid model stratifies project risk, from underlying risk to strategic risk. This helps the organization to better understand the risks at different levels of risk and thus develop appropriate management strategies. Basic risk may be an operational risk within the project, while the strategic risk may involve market or competitive factors. Through the pyramid model, organizations can classify and manage risks, ensuring that each level receives appropriate attention.

3. Analysis of Time Management and Risk Management Status of R & D Projects of Small and Medium-Sized Enterprises

3.1. Definition of SMEs

Small and medium-sized enterprises (SMEs) usually refer to relatively small enterprises with small size, assets and number of employees, but also have a low market share. Specific definitions vary from country to country, but often include small and medium-sized enterprises, whose size makes it easier to respond to market changes flexibly, along with lower management and operating costs. These businesses play an important role in the economy, contributing to job opportunities and economic growth.Detailed classification are given in Table 1.

Table 1. Standard table for the classification of SMEs.

	term
industry	The number of employees is less than 2000, or the sales volume is less than 300 million yuan, or the total assets are less than 400 million yuan. Among them, medium-sized enterprises must meet the number of 300 or more, the sales of 30 million yuan and more, the total assets of 40 million yuan and more: the rest are small enterprises.
construction business	The number of employees is less than 3000, or the sales are less than 30 million yuan, or the total assets are less than 40 million yuan. Among them, medium-sized enterprises must meet the requirements of 600 employees, sales of 30 million yuan and above, and total assets of 40 million yuan and above; the rest are small enterprises.
wholesale business	The number of employees is less than 200 people, or the sales volume is less than 300 million yuan. Among them, medium-sized enterprises must meet the number of 100 and above, sales of 30 million yuan and above; the rest are small enterprises.
retail trade	The number of employees is less than 500 people, or the sales volume is less than 150 million yuan. Among them, medium-sized enterprises must meet the number of 100 and more, sales of 10 million yuan and more; the rest are small enterprises.

Accommodation and Catering	Small and medium-sized enterprises must meet the following conditions: the number of employees less than 800, or sales of less than 150 million yuan. Among them, medium-sized enterprises must meet the number of 400 and more, sales of 30 million yuan and more; the rest are small enterprises.

3.2. Definition and Type of SME R & D Projects

3.2.1. Definition

The SME R & D projects are projects undertaken by SMEs (SMEs) to promote innovation and technological progress. These projects often include developing new products, improving existing products, researching new technologies, or finding new ways to solve problems.

3.2.2. Small and Medium-Sized Enterprise Research and Development Projects Can Be Specifically Divided into the Following Types

New product development: A common way for SMEs to conduct R & D projects designed to design and produce new products or services to meet market demand or fill gaps in the market. Such projects cover all stages from concept development to product launch, going through market research, design, prototyping, testing and other steps to ensure product quality and market applicability.

Technological innovation: Another important way for SMEs to conduct R & D projects, aiming to study and adopt new technologies to improve production efficiency, product quality or service delivery methods. By introducing new production processes, equipment or software systems, enterprises can improve their competitiveness, constantly adapt to market changes and demands, and improve the competitiveness and added value of products.

Process improvement: Another important direction for smes to conduct R & D projects, aiming to improve their internal operational efficiency. SMEs may seek to reduce production costs, reduce waste generation, shorten delivery time, etc. By improving the production process, optimizing resource allocation and improving employees' skills, enterprises can improve their production efficiency and quality, and enhance their competitiveness and market position.

Research cooperation: a way of cooperation for SMEs to conduct research and development projects, which can cooperate with universities, other enterprises or research institutions to conduct research and development projects. Such collaboration can help companies share costs and knowledge resources and drive innovation. By cooperation with professional institutions, smes can use knowledge and technology in professional fields to improve their research and development capabilities and innovation level.

3.3. Problems Faced by Smes in Project Time Management

3.3.1. Limited Resources

SMEs often face limited resource challenges, which include not only limited financial resources, but also limited human and technical resources. This resource bottleneck can lead to a variety of problems in project time management. Small and medium-sized enterprises may not be able to hire the large teams of large companies, or invest in high-level technology and equipment. This makes it even more challenging to meet the project schedule requirements. Projects may be delayed due to insufficient resources because the task cannot be completed as planned, affecting the overall project schedule.

3.3.2. Lack of Professional Experience

Project time management requires deep expertise and experience. Large enterprises can often employ specialized project managers and teams, who have a rich project management background and can effectively plan and supervise project progress. However, SMEs may not have these professionals, leading to difficulties in time management. Lack of professional experience may lead to the irrationality in the project schedule, the complexity of the tasks, and the difficulties in handling unforeseen problems.

3.3.3. Uncertainty

The market environment of smes is usually more unstable, so the project time management is vulnerable to the uncertainty of external factors. This includes market volatility, competitive pressures, regulatory changes, etc. These factors may make otherwise reasonable project schedules outdated because businesses need to constantly adjust to adapt to changing environments. Uncertainty may lead to project delays and additional time costs.

3.3.4. Communication Problems

SMEs usually have smaller teams, but the communication between team members is not as smooth as for large companies. This can lead to a confusion and misunderstanding of the project schedule. Unclear communication may lead to unclear task assignment, and team members may not understand their roles and responsibilities, which negatively impacts the project schedule. Moreover, problems and risks may not be detected and resolved in time due to the lack of effective communication channels.

3.3.5. Scope Change

Se projects may be more vulnerable to scope changes. Changes in customer needs, market trends, or internal strategy may lead to changes in the scope of the project. This scoping change may have a negative impact on project time management as it may require reassessment of tasks, resources, and timelines, resulting in schedule delays.

3.3.6. Lack of Automated Management Tools

SMEs may not have costly project management tools and software. This makes time management even more challenging, as they may need to manually track and manage project progress. The absence of automated tools may lead to delays in data entry and analysis, preventing project managers to gain timely insights and making it difficult to manage schedules effectively. SMEs may consider adopting affordable project management tools or training staff to improve their competence in this area.

In small and medium-sized enterprises, Project is rarely used. In terms of project time management, many enterprises only set the basic time points for all relevant departments according to the time requirements of the project, and then each department uses the Excel form to make the project task schedule, as shown in *Table 2:*

Table 2. Excel Simple project schedule made.

module	Starting time	terminal time
steinkern		
MIPS engineering		
Simulation engineering		
service		2007-10-15
file serves		
Database service		

Multi-layer resource services		
Media services		2007-9-15
Graphic services		
Audio service		2007-8-15
Video service		2007-9-15
Elf service	2007-8-1	2007-9-15
Identification and evaluation services		2007-8-25
Bell service		2007-9-5
Console Service		2007-10-15
AMS		2007-10-15
Course Reading Service		2007-8-15
Driver Service Series		2007-8-31
CUI serve		2007-9-15
GDI serve		2007-9-15
Desktop service		2007-10-15
library function		2007-10-15

3.4. Problems Faced by Smes in Project Risk Management

3.4.1. Limited Experience and Expertise

SMEs often lack rich experience and expertise in project risk management. This means that they may underperform large companies in identifying, assessing, and responding to potential risks. Project risk management requires an insight into the different types of risks and how to effectively address them. SME teams may lack a professional background in this area, leading to a possible underestimation of risk and increasing the risk of project failure. Training the staff or seeking external professional support can help to fill this gap.

3.4.2. Resource Limitation

SMEs are often limited by their limited capital and human resources. This affects their ability to implement a comprehensive risk management plan. In risk management, resources are needed to implement risk assessment, develop risk mitigation strategies and monitor the implementation of risk. SMEs may not be able to allocate sufficient resources to effectively address risk or to meet the costs of hiring a dedicated risk management team. This means that they need to find practical ways to optimize resource utilization, such as focusing on high impact risk.

3.4.3. Time Pressure

SMEs usually complete projects in a limited period of time to meet market demand or competitive pressures. This time pressure may force them to ignore in-depth risk assessment and planning and focus more on the rapid advancement of the project. However, this may have led them to ignore some key risk factors due to difficult adequate risk analysis under time pressure. SMEs need to balance time requirements with the importance of risk management to ensure that risk is not ignored.

3.4.4. Complexity and Uncertainty

Certain projects can be very complex or conducted in unstable market environments, increasing the complexity and uncertainty of risk. SMEs may have difficulty coping effectively with this uncertainty and complexity because they may not have the resources and

expertise to cope with these situations. Complex projects may involve multiple interrelated risks, while an unstable market environment may lead to market risks and supply chain risks. SMEs need to be more careful in planning and executing these projects while considering how to respond with complexity and uncertainty.

3.4.5. Improper Risk Management Tools

SMEs may rely on traditional spreadsheets or documentation for risk management without appropriate risk management tools and systems. This may limit their risk management capabilities, as these tools are generally not sufficient to effectively identify, analyze and track risks. SMEs can consider adopting affordable risk management software or tools to improve their risk management effectiveness.

3.5. Relationship Between Project Risk Management and Time Management for SMEs

3.5.1. Impact of Risk on Time

Project risk management plays a key role in project management, and one of its main objectives is to identify and mitigate risks that may threaten project progress. If the risk has not been effectively managed, its potential impact may cause delays in the project, as the additional time required to address the risk may exceed the initial time schedule. This means that projects may miss important deadlines, have a negative impact on project progress and deliverables. Therefore, risk management plays a crucial role in ensuring that the project is completed on time, helping to reduce the risk of time delays.

3.5.2. Time Management Affects Risk Identification

Good time management is also critical for project risk management. When the project schedule is properly arranged, the team is more resilient to deal with the potential risks. This is because sound time management provides time for teams to identify, assess, and respond to risks without having to rush. With sufficient time, the team can take the necessary steps to develop risk response strategies and better respond when risks occur to mitigate the negative impact of risk on the project.

3.5.3. Integration of Risk Assessment and Time Plan

In the early stages of project planning, risk management and time management should be integrated. This means that the presence of potential risks is taken into account in the project schedule. The project manager and team need to allocate time to conduct risk assessments, develop risk response strategies and implement contingency plans. This integrated approach helps to better manage the risk as the project proceeds, ensuring minimal disruption to the project schedule. Integrating risk management and time management improves the chances of project success.

4. Time Management and Risk Management Tool Selection for Sme R & D Projects

4.1. Analysis and Selection of Project Time Management Tools for SMEs

4.1.1. Demand Analysis of Project Management Software for SMEs

According to the survey data of 2008-2009, the three aspects that users care about most when choosing project management tools are: easy operation, accounting for 69.4%; powerful functions and functions, accounting for 63.4%; and high flexibility, adapting to the needs of different projects, accounting for 59.2%. Secondly, the users also attach great importance to the technical support and rich learning resources provided by the tools, accounting for 27.2% and 24.5%, respectively. However, brand image accounted for only 14.3%, related information services were provided for only 10.2%, and other factors accounted for only 1.1%. As shown in Figure 1:

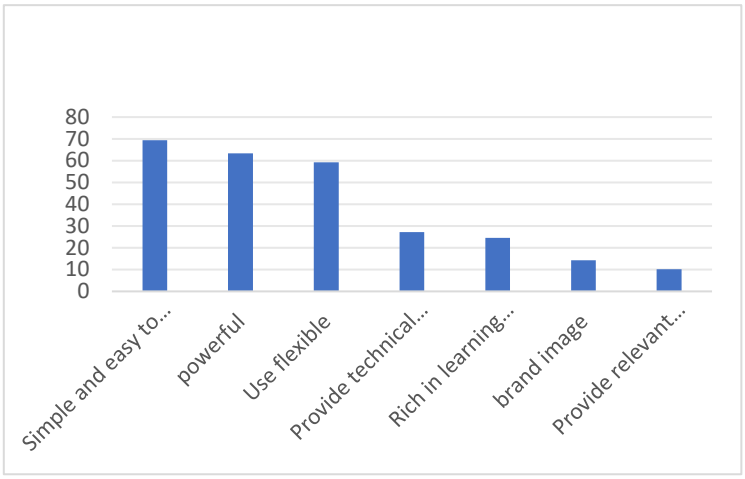

Figure 1. Select the distribution of factors of most concern to the project management tools.

4.1.2. Analysis and Comparison of the Existing Project Management Software

SMEs often face multiple options when choosing project time management software. Here is a brief analysis and comparison of some common project management software:

Microsoft Project：

Advantages: Microsoft Project is a powerful project management software that provides a wide range of functions, including project planning, resource allocation, task tracking, and report generation. It's a powerful tool for complex projects.

Disadvantages: With the relatively high price, it may not be the most economical choice for small and medium-sized enterprises. The interface is relatively complex and requires some learning curves.

Asana：

Advantage: Asana is an easy-to-use collaboration and task management tool for SMEs. It provides task assignment, schedule formulation, team collaboration, and visual project tracking capabilities.

Disadvantages: Asana may have limited functionality compared to other project management software, especially for complex projects.

4.1.3. Tools Suitable for SME Project Time Management

Asana：Asana is a powerful task management tool, suitable for small and medium-sized enterprises. It provides task assignment, schedule formulation, team collaboration, and visual project tracking capabilities. Asana is easy to use, adapted to various project types, and has reasonable price options.

Trello：Trello is a visual task management tool, which is very suitable for small and medium-sized enterprises. It uses cards and panels to organize tasks, is easy to cooperate, and is especially suitable for agile project management. Trello The basic function is free, applicable to enterprises with limited budget.

Monday.com：Monday.com Is a multi-purpose project management tool with a visual workbench, planning, task assignment, and custom workflow. It is applicable to projects of different sizes and types, and provides probation periods for business evaluation.

ClickUp：ClickUp is a powerful and highly customizable project management tool suitable for a variety of SME projects. It provides tasks, subtasks, time tracking, reporting, and integration capabilities. ClickUp Provide a basic free version and a paid plan.

Wrike：Wrike is an adaptable project management tool that provides project planning, task management, reporting, teamwork, and custom workflows. It is suitable for complex project needs, but the price is relatively high.

Google Calendar：Google Calendar Is a simple and free time management tool, suitable for small and medium-sized enterprises' daily time arrangements and meeting arrangements. It can be integrated with other Google applications, such as Google Tasks and Google Drive.

The scoring criteria for the above software are shown in Table 3

Table 3. Table of scoring criteria.

	90-100points	**80-90points**	**70-79points**	**Under 70 points**
price	Below 20,000 yuan	20000yuan-40000yuan	40000yuan - 60000yuan	More than 60,000 yuan
system compatibility	Compatible with each system	Good compatibility for windows	Limited-compatible with windows	Incompatible with the windows
Support projects	Support various research and development projects	We will basically support research and development projects for small and medium-sized enterprises	Only some research and development projects can be supported	Only a single type of project is supported
Easy to use	beyond compare	good	preferably	same as
Intuitive report	Direct graphical report	Plugin supports graphical reports	Support for simple graphical reports	nonsupport
flexibility	stubborn	stronger	same as	dissimilarity
Custom features	Very rich	rich	same as	limited

4.2. Analysis and Selection of Project Risk Management Model of SMEs

4.2.1. PMI Risk Management Framework

Analysis: The PMI (Project Management Association) provides a widely used project risk management framework. It includes the stages of risk identification, risk assessment, risk planning, risk response and risk monitoring. This model is very comprehensive and suitable for projects of different sizes and types.

Reason for choice: If smes want to adopt industry-standard risk management methods and have the ability to implement a comprehensive risk management process, the PMI framework is a good choice.

4.2.2. ISO 31000 Risk Management Standards

Analysis: ISO 31000 is a global risk management standard developed by the International Organization for Standardization. It emphasizes the comprehensiveness of risk management, including risk identification, assessment, response, monitoring, and communication. The standard applies to a variety of organizations and projects.

Reason for choice: If SMEs want to adopt international standard risk management methods to ensure global competitiveness, ISO 31000 is an appropriate option.

4.2.3. Agile Risk Management

Analysis: The Agile project management approach emphasizes rapid adaptation to change, so risk management is an inherent part of it. Agile approaches often include ongoing risk assessment and adjustment of project strategies.

Reason for choice: Agile risk management is a natural choice for smes using agile methods. It applies to projects that require flexibility and rapid response to market changes.

4.2.4. Customize the Risk Management Process

Analysis: SMEs can customize their risk management processes according to the specific needs and resource restrictions of their projects. This can include a simplified risk identification, assessment, and response approach.

Reason for selection: For projects with limited resources, small projects, or relatively simple projects, a custom risk management process may be the most practical option. It can be adjusted according to the specific requirements of the project.

5. Conclusion

In a rapidly changing business world full of opportunities and challenges, SMEs need to constantly improve their competitiveness to ensure their survival and development. Through effective R & D project management, SMEs can rationally allocate resources, reduce risks, and improve the success rate and efficiency of projects. In this process, time management, risk management, and tool selection are the key factors. By adopting appropriate management strategies and methods, SMEs can stand out in the fierce market competition and achieve long-term success. Let us continue to learn and improve, contribute our wisdom and experience to the R & D project management of small and medium-sized enterprises, and create a prosperous business environment together.

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