Diversitas Journal
ISSN 2525-5215
Volume 10, Issue Special_1 (Jan./Mar. 2025) p. 0101 – 0123
https://diversitasjournal.com.br/diversitas_journal

Evaluating agile project management and risk-mitigation practices in Chinese technology companies

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ABSTRACT

This research explores on the results of a mixed-methods study conducted to explore the adoption of Agile Project Management (APM) practices and associated risk management implications in China manufacturing companies. Without repeating the detailed list of research questions, it is helpful to recall that this study sought to explore what leads tech firms in China towards adopting APM practices, as well as risk mitigation strategies; and how such risk management could be integrated successfully into a broader strategic framework in the technology sector within the Chinese context. The research used a survey of 223 employees in Jiangxi Province, China in 10 technology companies coupled with qualitative interviews and focus groups. The quantitative analysis consisted of descriptive statistics, ANOVA and regression analysis while for the qualitative data we used thematic analysis. The survey showed strong adoption of APM practices, as well as the keys to success: Culture, Bi-modal approach and Benchmarking rated "Often Adopted." Nevertheless, wide differences in adoption and risk management practices were identified among different organizational roles: senior management and Scrum Masters displayed higher rates than some other roles. The strongest factor predicting risk mitigation practices in relation to individual characteristics was environmental factors, that were followed by organizational and cultural factors. The study provided insight into some of the challenges faced in tailoring APM to suit Chinese organizational culture, especially in aligning agile principles with top-down and hierarchical governance frameworks. It reinforced for me the need to have a real physical workspace designed in an agile way and supported by technology. Based on these findings, a strategic framework was developed for integrating APM and risk management, emphasizing organizational alignment, cultural adaptation, continuous learning, and environmental responsiveness. The study contributes to the understanding of APM adoption in culturally distinct business environments and offers practical insights for technology companies in China seeking to enhance their agile practices and risk management strategies.

ARTICLE INFORMATION

Article process:
Submitted: 01/05/2025
Approved: 01/24/2025
Published: 01/25/2025

Keywords:
Agile Project Management, Chinese technology, risk management, cultural adaptation, mixed-methods

RESUMO

Esta pesquisa explora os resultados de um estudo de métodos mistos realizado para investigar a adoção de práticas de Gestão Ágil de Projetos (GAP) e as implicações associadas à gestão de riscos em empresas de manufatura na China. Sem repetir a lista detalhada de perguntas de pesquisa, é útil recordar que nosso estudo buscou explorar o que leva as empresas de tecnologia na China a adotarem práticas de Gestão Ágil de Projetos (GAP), bem como estratégias de mitigação de riscos; e como essa gestão de riscos poderia ser integrada com sucesso em um quadro estratégico mais amplo no setor de tecnologia dentro do contexto chinês. A pesquisa utilizou uma pesquisa com 223 funcionários na Província de Jiangxi, China, em 10 empresas de tecnologia, juntamente com entrevistas qualitativas e grupos focais. Nossa análise quantitativa consistiu em estatísticas descritivas, ANOVA e análise de regressão, enquanto para os dados qualitativos utilizamos análise temática. A pesquisa mostrou uma forte adoção das práticas de APM, bem como as chaves para o sucesso: Cultura, abordagem bimodal e Benchmarking, classificadas como "Frequentemente Adotadas." No entanto, foram identificadas grandes diferenças na adoção e nas práticas de gestão de risco entre diferentes papéis organizacionais: a alta administração e os Scrum Masters apresentaram taxas mais altas do que alguns outros papéis. O fator mais forte que previu as práticas de mitigação de riscos em relação às características individuais foram os fatores ambientais, seguidos pelos fatores organizacionais e culturais. O estudo forneceu uma visão sobre alguns dos desafios enfrentados ao adaptar APM para se adequar à cultura organizacional chinesa, especialmente na alocação de princípios ágeis com estruturas de governança hierárquicas e de cima para baixo. Isso reforçou para mim a necessidade de ter um espaço de trabalho físico real, projetado de maneira ágil e apoiado por tecnologia. Com base nessas descobertas, foi desenvolvido um framework estratégico para integrar APM e gestão de riscos, enfatizando o alinhamento organizacional, a adaptação cultural, o aprendizado contínuo e a responsividade ambiental. O estudo contribui para a compreensão da adoção de APM em ambientes de negócios culturalmente distintos e oferece insights práticos para empresas de tecnologia na China que buscam aprimorar suas práticas ágeis e estratégias de gestão de riscos..

Keywords:
Gestão Ágil de Projetos, tecnologia chinesa, gestão de riscos, adaptação cultural, métodos mistos

DOI: 10.48017/dj.v10ispecial_1.3284

Introduction

The rapid evolution of the global technology landscape, characterized by fierce competition, continuous innovation, and ever-shortening product lifecycles, has necessitated the adoption of flexible and adaptive project management methodologies. Among these, agile project management practices stand out as a paradigm designed to accommodate change, foster collaboration, and facilitate rapid delivery of high-value products (Anderson, 2010) (Alqudah, 2016). This study aimed to delve into the integration of these methodologies within the Chinese technology sector, a powerhouse of innovation and technological advancement, to understand the implications for risk management within this dynamic context.

The Chinese technology sector has been at the forefront of global innovation, driven by a unique combination of government support, entrepreneurial zeal, and a vast market (Chen, 2017). However, the fast-paced nature of this sector, coupled with the complexities of operating in China's regulatory and cultural landscape, presents numerous challenges for project management. Traditional project management methodologies, often criticized for their rigidity and slow response to change, are increasingly being supplemented or replaced by agile practices (Liu, 2020). Agile methodologies, with their emphasis on flexibility, customer collaboration, and iterative development, offer a promising alternative for managing projects in the volatile technology industry (Moe, 2018).

The adoption of agile practices in China's technology companies signals a significant shift in management thinking and practice, yet it also introduces new dimensions of risk and uncertainty. Given this backdrop, this study seeks to explore how agile project management practices are being implemented, the associated risk management implications, and the outcomes of such transformations (Anderson, 2010).

This study was set against the backdrop of China's rapidly growing technology sector, which has become a significant player on the global stage. This growth has been fueled by a combination of factors, including government initiatives, a large and growing market, and a vibrant ecosystem of startups and established tech giants. However, this rapid development has also brought with it increased complexity and uncertainty, making the management of technology projects increasingly challenging. In this context, agile project management practices have emerged as a key strategy for enhancing flexibility, responsiveness, and competitiveness. This study aimed to investigate the adoption of these practices within Chinese

Agile methodologies, such as Scrum, Kanban, and Lean Startup, have been widely adopted globally as effective approaches to managing projects in volatile and uncertain environments. These practices prioritize adaptability, team collaboration, and customer value, principles that are particularly relevant to the technology industry. Studies tracing the evolution of project management practices highlight the shift from traditional, waterfall methodologies to agile practices (e.g., Highsmith, 2009; Sutherland and Schwaber, 2013). This

literature provides a historical context for understanding the development and adoption of agile methodologies.

Research focusing on the intersection of agile methodologies and risk management explores how agile practices offer mechanisms for early risk detection and continuous risk assessment (e.g., Boehm and Turner, 2003; Racheva et al., 2010). This body of work underlines the potential of agile methodologies to improve risk management in project settings. Literature on the challenges and strategies associated with adopting agile practices (e.g., Misra et al., 2009; Laanti et al., 2011) provides insights into the organizational, cultural, and operational barriers to agile transformation, as well as strategies for overcoming these barriers.

Studies examining the influence of contextual factors on the adoption of agile practices (e.g., Iivari and Iivari, 2011; Tolfo and Wazlawick, 2008) highlight the importance of organizational culture, management support, and team dynamics. This literature is particularly relevant for understanding the specific challenges and opportunities for agile adoption in the Chinese technology sector. However, these studies did not tackle the agile project management practices of employees within Chinese technology companies.

By examining the adoption of agile project management practices in Chinese technology companies, this study aimed to contribute to the existing body of knowledge by providing a deeper understanding of how these methodologies are implemented in specific cultural and regulatory context. Additionally, by exploring the risk management implications of agile adoption, the study sought to offer valuable insights for both practitioners and scholars interested in the effective management of technology projects in dynamic and uncertain environments. Specifically, this study aims to:

Determine the level of adoption of Agile Project Management in Chinese Technology Companies in terms of: Cultural, Organizational, Environmental;

Explore the risk management practices being employed by Chinese Technology companies in the adoption of Agile Project Management in the following area: Organizational Environment, Physical Environment, National Culture;

Determine the significant difference between means of responses on the level of adoption on Agile Project Management when grouped according to participation (Project Manager, Product owner, Software Developer/ Scrum Master, and senior management) in the Agile Projects;

Determine the significant difference between means of responses on the Risk mitigating practices when grouped according to their participation (Project Management staff, Product owner, Software Developer/ Scrum Master, and Customer) in the Agile Project

Methodology

The research design of this study was a mixed-method approach suitable for evaluating the adoption of agile project management practices in Chinese technology companies. It

visually integrated both quantitative and qualitative research phases, beginning with a broad survey to gather quantitative data from a large sample of companies, followed by in-depth interviews and case studies for qualitative insights.

The final phase involved the analysis and interpretation of both data sets to draw comprehensive conclusions, clearly showing the flow and integration of methods throughout the study. A mixed-methods approach, combining the strengths of both quantitative and qualitative methodologies, offers a comprehensive and contextually grounded analysis of the adoption of agile project management practices in Chinese technology companies. This approach aligned with several studies conducted in China that have effectively employed mixed methods to investigate complex organizational phenomena, such as agile adoption and software development practices.

The participants of the study were professionals working in Chinese technology companies that have adopted or are in the process of adopting agile project management methodologies. The sampling method was achieved through a combination of purposive and snowball sampling techniques in Jiangxi, China. In this study, the researcher included 223 software developers including 20 expert participants from a target of 10 Chinese technology companies in Jiangxi, China. This includes project managers, software developers, product owners, Scrum Masters, and senior management involved in agile adoption and risk management processes.

The researcher employed Porter's Five Forces analysis as a strategic framework to guide the selection of Chinese technology companies included in this study. This widely recognized tool for evaluating industry attractiveness and competitiveness provided valuable insights into the unique characteristics and challenges facing the Chinese technology sector, enabling the researchers to make informed decisions about the most suitable companies to participate.

The analysis assessed the intensity of industry rivalry, examining factors such as the number of major players, their market share distribution, product differentiation, and the pace of technological change. This helped identify companies operating in highly competitive, fast-paced markets, which more likely to have adopted agile practices to maintain their competitive edge. The bargaining power of key suppliers, including software vendors and hardware providers, as well as the bargaining power of customers, such as individual consumers and business clients, were also evaluated. This shedded light on the flexibility and challenges companies faced in adopting agile methodologies based on their position in the value chain.

Furthermore, the researchers analyzed the barriers to entry in the Chinese technology industry and the threat of substitute products or services. Companies that have demonstrated the ability to innovate and adapt to changing market conditions, potentially through the adoption of agile practices, were prioritized for inclusion in the study. By triangulating the findings from Porter's Five Forces analysis with other data sources, such as industry reports and expert interviews, the researchers had a diverse and representative sample of Chinese

technology companies selection, enhancing the validity and practical relevance of the study's findings.

Sampling Method

This study employed the purposive sampling method and snowball sampling method. Once the researcher identified key technology companies in Jiangxi that are known to have implemented agile project management practices, the researcher reached out to these companies and requested their participation in the study, explaining the research objectives and the potential benefits for their organization. The target participants were from various roles, such as project managers, software developers, product owners, Scrum Masters, and senior management involved in agile adoption and risk management processes. However, due to the use of purposive sampling, the results of the study cannot be generalized to other Chinese technology companies, particularly outside Jiangxi Province.

Instrumentation

The main research tool used for this study was a structured questionnaire that was designed to measure the adoption mode of Agile Project Management (APM) practices and their impact on risk management among technology companies in China. A questionnaire designed to acquire quantitative and qualitative data was used, consisting of three sections: The first section about demographics and company information collected data on respondents' roles, years of experience, company size, industry sector, and where their organization is located which helped explain the organizational environments. The second part measured the degree of Agile adoption from cultural, organizational, and environmental perspectives through a five-point Likert scale of "Not Adopted at All" to "Always Adopted." Articles in this section looked at things like flexibility, teamwork, leadership support, resource availability, and external factors (such as market competition and customer demands). For this section the frequency with which such Agile risk mitigation practices were performed on Agile projects was evaluated, again through a Likert scale that covered organizational, physical, and cultural dimensions, such as training, workspace design, and fit with Chinese cultural norms. Quantitative data was supplemented with open-ended responses to capture broader perspectives on challenges, leadership styles, and the influence of old ways of doing things on Agile transformation. Questionnaires were distributed in person and online via virtual conferencing, providing a wide reach. An internal consistency score of 0.816 obtained from Cronbach's α for reliability testing indicates a very good internal consistency score, showing the robustness and reliability of the instrument. The structured format and comprehensive feedback provided through the questionnaire allowed for the collection of rich data, which has generated credible insights and contributed to a nuanced understanding of Agile adoption in the context of risk management in Chinese technology enterprises.

Data Gathering Method

Semi-structured interviews were conducted with key stakeholders from the selected Chinese technology companies, project managers, team members, and executives. Meanwhile, focus group discussions were organized with cross-functional teams from the selected Chinese technology companies, facilitating open-ended discussions and enabling the identification of common themes related to agile adoption, cultural adaptation, and integration with risk management practices. The focus group discussions in this study were carefully designed and moderated to create an environment that encourages open and honest dialogue. Participants from various roles and functional areas within the organizations were invited to share their experiences, perceptions, and opinions regarding agile adoption, risk management practices, and the integration of these two aspects.

This study conducted on-site observations of project teams within the selected Chinese technology companies, witnessing the application of agile practices and risk management strategies in their natural working environments. The researcher conducted on-site observations of project teams as they engage in agile practices, such as daily stand-up meetings, sprint planning, and retrospectives. The observations focused on capturing the team dynamics, communication patterns, decision-making processes, and any cultural or organizational factors that may influence the adoption and integration of agile methodologies with risk management practices.

Lastly, a comprehensive survey questionnaire was developed to collect quantitative data from a large sample of technology companies in China. The survey aimed to quantify the level of agile adoption, including specific agile practices used, benefits realized, challenges faced, and project outcomes. The design captured relevant variables related to agile adoption, organizational characteristics, cultural factors, and risk management practices. The survey was administered online or through other appropriate channels to reach a wide range of respondents across different technology companies in China.

Data Analysis

This study employed several statistical treatments to analyze the data collected. Frequency distributions, percentages, and measures of central tendency (mean, median, mode) were used to describe the profile of the respondents from Chinese technology companies. The researchers also computed measures of central tendency, including the mean, median, and mode, to summarize the typical characteristics of agile adoption, such as the level of implementation, duration of use, and perceived benefits. Furthermore, measures of dispersion, such as standard deviation, range, and variance, were calculated to understand the variability in the agile adoption experiences among the Chinese technology companies

surveyed. To measure the significant difference in the adoption of agile project management and risk-mitigating practices by subgroups, Analysis of Variance was employed. Regression analysis was conducted to explain risk-mitigating practices in Chinese technology firms based on Agile Project Management (APM) adoption factors.

Results

Demographic Profile of Respondents

The study profiled the respondents as per their existing roles in Chinese technology corporations. Table 1 shows the distribution of responsibilities among the 223 participants surveyed. The findings exposed a diverse portrayal of duties inside the example, with an identifiable focus on positions linked to Agile methodologies. Scrum Masters comprised the biggest group, constituting 26.5% (n=59) of the respondents. Scrum Masters are responsible for facilitating the development process ensuring that the agile project management team uses the full range of appropriate agile values, practices and rules (Noll, et.al, 2017). This was intently followed by Product Owners, who represented 25.6% (n=57) of the sample. Jointly, these Agile-precise jobs accounted for over half (52.1%) of the total respondents, indicating a strong existence of Agile practices within the surveyed companies. Project Managers formed the third biggest group, making up 22.4% (n=50) of the respondents. This significant portrayal suggests that conventional project management approaches keep on playing a considerable part alongside Agile methodologies in Chinese technology firms. Software Developers, representing the technical knowledge within these companies, accounted for 19.7% (n=44) of the individuals. This proportion ensures that the viewpoint of those straight involved in product development is well-represented in the study.

Table 1.

Respondents' current role in the Chinese technology companies

Current Role	f	%
Project Manager	50	22.4
Software Developer	44	19.7
Product Owner	57	25.6
Scrum Master	59	26.5
Senior Management	13	5.8
Total	223	100.0

Table 2 presents the distribution of respondents based on their years of experience across Chinese technology firms. Comprising the largest group at 33.6% (n=75) are professionals with 7-10 years' experience. The second largest group is formed of those with under 1 year of experience, accounting for 24.2% (n=54) of respondents. Individuals with over

10 years' experience constitute the third largest group, representing 17.0% (n=38) of the sample. The categories of 1-3 years and 4-6 years of experience are represented by 13.5% (n=30) and 11.7% (n=26) of respondents respectively. Over half of respondents (50.6%) have 7 or more years of experience, suggesting a solid foundation of industry awareness. Simultaneously, the sizeable proportion of professionals with under 3 years of experience (37.7%) indicates a dynamic sector actively recruiting new talent.

Table 2.

Respondents' Years of Experience in the Chinese Technology Companies

Current Role	f	%
Less than 1 year	54	24.2
1-3 years	30	13.5
4-6 years	26	11.7
7-10 years	75	33.6
More than 10 years	38	17.0
Total	223	100.0

Table 3 below presents the distribution of the Chinese technology companies represented in this study according to their size, as measured by the number of employees. Large companies, defined as those of between 251 and 1000 employees, represented the largest segment at 36.3% (n=81) of surveyed organizations. Meanwhile, a significant proportion of the Chinese technology sector consists established, well-resourced firms. small companies, those with 1 to 50 employees, made up the second largest category representing 27.4% (n=61). Companies employing more than 1000 persons the largest category of all as it proved in survey accounted for 22.4% (n=50). This considerable representation by these industry giants points up the presence of major players in China's technology market and that is sure to affect its trends and standards. The smallest category is companies employing between 51 and 250 people, representing a mere 13.9% (n=31) of the sample.

Table 3.

Profile of the Chinese Technology Companies in terms of Number of Employees

Current Role	f	%
Small (1-50 employees)	61	27.4
Medium (51-250 employees)	31	13.9
Large (251-1000 employees)	81	36.3
Very Large (1000 + Employees)	50	22.4
Total	223	100.0

Table 4 presents the distribution of the surveyed Chinese technology companies across different technology sectors. Information Technology Services emerged as the dominant sector, accounting for 61.0% (n=136) of the surveyed companies. Software Development is the

second biggest category, with 59 of 223 companies surveyed falling into this group; and 26.5%. E-commerce is the third largest employer of the surveyed companies, taken from Online shopping or other digital marketplaces for 18 firms accounting oddly enough only 8.1%. Artificial Intelligence and Machine Learning companies make up 3.1% (n=7) of the sample or 7 in all. While this figure is low, it also demonstrates the presence in the region of ultra-high-tech businesses, perhaps indicative of a nascent concentration on highly sophisticated technological solutions.

Table 4.

Sector of Chinese Technology Industry

Current Role	f	%
Small (1-50 employees)	61	27.4
Medium (51-250 employees)	31	13.9
Large (251-1000 employees)	81	36.3
Very Large (1000 + Employees)	50	22.4
Total	223	100.0

Adoption of Agile Project Management

Results show that technology companies in China "Often Adopted" APM practices across cultural, organizational and environmental contextual dimensions, with the range of weighted mean scores of 3.5677 to 3.6135. The culturally related dimension showed the (highest mean) 3.7354 of strength demonstrated by the subjects regarding the openness to new methodologies (the lowest standard deviation of 0.763)(13). Agile adoption is also significantly aided by collaboration and collective cohesion. Some contexts may have difficulty with full adoption as moderate influences deter from traditional decision-making structures.

At an organizational level, it was also found that processes and workflows were in a good alignment with Agile principles (M = 3.6099). Provisions for adequate resources and cross-functional collaboration also have a positive effect on Agile implementation. Yet, leadership support, had the lowest mean value of 3.4709, suggests there is still work needed to create an organizational culture of commitment to applying Agile methods.

In environmental dimensions, Agile adoption can be driven by competition and customer-driven demands, which include the availability of skilled Agile practitioners in the talent market. These factors ranked high, indicative of the external pressures forcing companies into the agile mold. In contrast, government regulation and the economic environment received lower scores, showing that they have relatively little impact on Agile decisions.

Table 5.

Adoption of Agile Project Management

	Mean	Weighted Mean	Verbal Interpretation
Level of Cultural Adoption of Agile Project Management			
1. Traditional structures influence decision-making in Agile projects	3.4933	1.25874	Often Adopted
2. Cultural values that emphasize flexibility and adaptability align with Agile practices in your organization.	3.6771	1.38647	Often Adopted
3. Openness to change and new methodologies like Agile is a common trait among employees.	3.7354	1.43538	Often Adopted
4. Teamwork and collective harmony are emphasized to support Agile implementation.	3.5202	1.38144	Often Adopted
5. Maintaining 'face' does not obstruct open communication and feedback within agile teams.	3.5785	1.25629	Often Adopted
Weighted Mean	**3.6135**	**1.20629**	**Often Adopted**
Level of Organizational Adoption of Agile Project Management			
1. Leadership provides strong support for the adoption of Agile methodologies	3.4709	1.27971	Often Adopted
2. Adequate resources (time, training, tools) are provided for Agile Implementation	3.5695	1.36341	Often Adopted
3. Existing processes and workflows are designed to be compatible with Agile principles.	3.6099	1.40952	Often Adopted
4. The organizational structure facilitates the adoption and scaling of Agile methodologies.	3.5471	1.40664	Often Adopted
5. Cross-functional collaboration is encouraged and practiced to support Agile adoption.	3.565	1.31999	Often Adopted
Weighted Mean	**3.5767**	**1.21943**	**Often Adopted**
Level of Environmental Adoption of Agile Project Management.			
1. Industry competition drives the organization to adopt Agile practices.	3.4978	1.30099	Often Adopted
2. Customer demands and expectations push the company toward Agile methodologies.	3.5247	1.38137	Often Adopted
3. The availability of skilled Agile practitioners in the job market is a consideration in Agile adoption.	3.6009	1.40058	Often Adopted
4. Government regulations and policies are taken into account in the decision to adopt Agile.	3.4798	1.39765	Often Adopted
5. The overall economic environment influence the organization's decision to implement Agile practices.	3.4709	1.30412	Often Adopted
Weighted Mean	**3.5677**	**1.2285**	**Often Adopted**

Risk Mitigating Practices

The results show that the overall risk mitigating practices in APM (Agile Project Management) are "Often Adopted" at the organizational, physical, and cultural environment of Chinese technology companies. The statement within the organizational environment that scored the highest (mean: 3.5874) was senior management participation in periodic reviews to verify alignment with Agile objectives, illustrating its pivotal role in minimizing risks. Other well-rated practices included carrying out retrospectives and defining clear communication channels—this highlights transparency and iterative risk assessment. On a separate note, the relatively low mean rating for the implementation of comprehensive project management tools (mean:3.4798) indicates that there is a need to harness technology to build up the organizations' risk management process.

In the physical environment, ensuring that employees, installed the necessary hardware and software (mean: 3.6368), was the most applied measure, further demonstrating the importance of hardware in the Agile environment. Physical security measures and disaster recovery plans also rated highly, indicating strong focus on protecting assets and data. On the flip side, workspace design for team collaboration scored the least (mean: 3.4978) in this dimension, resulting in room for improvement to promote Agile practices through the workspace environment.

In terms of cultural environment, including cultural values in Agile training and onboarding was rated the highest (mean: 3.6502). Fostering open communication while respecting cultural norms and involving culturally aware Agile coaches were also common practices of Agile adoption, highlighting the critical need for cultural awareness tailored Agile adoption. On the other hand, the dimension of Adapt Agile practices to hierarchical structure (mean: 3.5022) indicated a lower mean, implying complexities related to meshing conventional cultural hierarchies with Agile processes.

Table 6.

Risk Mitigating Practices

	Mean	Weighted Mean	Verbal Interpretation
Risk Mitigating Practices in the Organizational Environment of Chinese Technology Companies			
1. Regular training and upskilling of employees to align with Agile methodologies.	3.5381	1.28999	Often Practiced
2. Conducting frequent retrospective to identify and address risks in Agile projects.	3.5830	1.36925	Often Practiced
3. Establishing clear communication channels to ensure transparency in Agile processes.	3.5830	1.41774	Often Practiced
4. Implementing robust project management tools to monitor and mitigate risks.	3.4798	1.36173	Often Practiced

5. Involving senior management in regular reviews to ensure alignment with Agile goals.	3.5874	1.32210	Often Practiced
Weighted Mean	**3.4897**	**1.21412**	**Often Practiced**
Risk Mitigating Practices in the Physical Environment			
1. Ensuring that workspaces are designed to facilitate Agile team collaboration.	3.4978	1.29056	Often Practiced
2. Maintaining physical security measures to protect Agile project assets.	3.5964	1.36507	Often Practiced
3. Providing employees with the necessary hardware and software to support Agile practices.	3.6368	1.39752	Often Practiced
4. Conducting regular health and safety checks to ensure a conducive working environment for Agile teams.	3.5022	1.38484	Often Practiced
5. Ensuring backup and disaster recovery plans are in place for Agile project data.	3.5785	1.31584	Often Practiced
Weighted Mean	**3.5803**	**1.22994**	Often Practiced
Risk Mitigating Practices in the Cultural Environment			
1. Adapting Agile practices to align with the hierarchical and respect-driven aspects of Chinese culture.	3.5022	1.28004	Often Practiced
2. Encouraging open communication while being mindful of cultural norms around 'saving face'.	3.5874	1.36897	Often Practiced
3. Incorporating local cultural values into Agile training and onboarding sessions.	3.6502	1.39613	Often Practiced
4. Balancing the emphasis on teamwork with individual accountability in line with cultural expectations.	3.5471	1.38729	Often Practiced
5. Engaging with culturally informed Agile coaches or consultant to guide adoption.	3.5695	1.31634	Often Practiced
Weighted Mean	**3.5713**	**1.22316**	Often Practiced

Analysis of Variance on Level of Adoption

The ANOVA results indicate a significant difference in the adoption of Agile Project Management between subgroups ($F = 14.211$, $p < .001$). The analysis compares variance between groups (represented by the "Between Groups" row) to variance within groups (represented by the "Within Groups" row). The between-groups sum of squares (66.132) with 4 degrees of freedom resulted in a mean square of 16.533, while the within-groups sum of squares (253.624) with 218 degrees of freedom yielded a mean square of 1.163.

The F-statistic, an indicator of the variation between groups relative to within them (the quotient of their respective mean squares), is 14.211, so there does indeed appear to be considerable fluctuation in how likely a group is to adopt Agile ways. The high F-value found in conjunction with p significance level, strongly identifies the impact individual role or group within an organization has on their level of Agile Project Management adoption.

Table 6.

ANOVA on Level of Adoption

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	66.132	4	16.533	14.211	<.001
Within Groups	253.624	218	1.163		
Total	319.756	222			

Based on these results, post-hoc analyses would be useful to identify those specific groups that are significantly different in Agile adoption. The post-hoc test reveals several significant differences between roles. Notably, Scrum Masters and Senior Management consistently show higher levels of perceived agile adoption compared to other roles.

Scrum Masters show a significantly larger increase in adoption over time than Project Managers (mean difference = 1.08549, p <. 001), 2) Software Developers (mean difference =. 94676, p =. 001), and Product Owners (mean difference = 1.19288, p <. 001). This is as expected since Scrum Masters are more likely to take the lead over other roles in terms of agile implementation and due to the greater exposure of learning agile practices.

Similarly, Senior Management exhibits a significantly greater perceived adoption than Project Managers (mean difference 1.39805, p =. 002), Programmers (mean difference = 1.25932, p <. 010, and Product Owners (mean difference = 1.50544, p =. 001). Interestingly, there is no statistically significant difference between Scrum Masters and Senior Management (p =. 925), suggesting that both the roles have similar levels of agile adoptions perception-wise. The alignment of the start of the people leading the agile practices (the Scrum Masters) with those defining organizational direction from Senior Management could be a good sign for adoption.

There are no major differences between Perception of Agile Adoption for Project Managers, Software Developers and Product Owners. This indicates that such roles may meet with similar difficulties or share the same experiences in transition to agile.

Table 7.

Post-hoc Test between the Perceived Level of Adoption of Agile Project Management across Roles

Role		Mean Difference	Std. Error	p-value	Verbal Interpretation
Project Manager	Software Developer	-.13873	.22296	.983	Not Significant
	Product Owner	.10739	.20900	.992	Not Significant
	Scrum Master	-1.08549	.20733	.000	**Significant**
	Senior Management	-1.39805	.33580	.002	**Significant**
Software Developer	Project Manager	.13873	.22296	.983	Not Significant
	Product Owner	.24612	.21645	.862	Not Significant
	Scrum Master	-.94676	.21485	.001	**Significant**

	Senior Management	-1.25932	.34049	.010	**Significant**
Product Owner	Project Manager	-.10739	.20900	.992	Not Significant
	Software Developer	-.24612	.21645	.862	Not Significant
	Scrum Master	-1.19288	.20032	.000	**Significant**
	Senior Management	-1.50544	.33152	.001	**Significant**
Scrum Master	Project Manager	1.08549	.20733	.000	**Significant**
	Software Developer	.94676	.21485	.001	**Significant**
	Product Owner	1.19288	.20032	.000	**Significant**
	Senior Management	-.31256	.33047	.925	Not Significant
Senior Management	Project Manager	1.39805	.33580	.002	**Significant**
	Software Developer	1.25932	.34049	.010	**Significant**
	Product Owner	1.50544	.33152	.001	**Significant**
	Scrum Master	.31256	.33047	.925	Not Significant

Difference between mean responses on the risk mitigating practices when grouped according to their participation (Project management staff, Product owner, Software developer/ Scrum master, Customer) in the agile projects

The ANOVA results show that there are significant differences within the groups for risk mitigating practices taken by them (F = 13.177, p <. 001). The very low p-value (0.000) is a statistically significant, showing that the differences found between groups are not results of chance but reflect genuine variations in risk management procedures by organizational roles or groupings.

The analysis compares variance between groups (represented by the "Between Groups" row) to variance within groups (represented by the "Within Groups" row). The between-groups sum of squares (62.036) with 4 degrees of freedom resulted in a mean square of 15.509, while the within-groups sum of squares (256.571) with 218 degrees of freedom yielded a mean square of 1.177.

Table 8.

Results of ANOVA on Risk Mitigating Practices in the Agile Project Management

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	62.036	4	15.509	13.177	.000
Within Groups	256.571	218	1.177		
Total	318.607	222			

The post-hoc test discloses several significant differences among the roles for risk mitigating practices with Scrum Masters and Senior Management consistently reporting the higher levels followed by other roles.

Scrum Masters exhibit dramatically more risk mitigating practices than Project Managers (p <. 001), Software Developers (mean difference = -0. 87142, p =. 003), and

Product Owners (mean difference = 1.17086, p <. 001). This fits with the traditional role of Scrum Master as an expert in facilitating agile practices, including risk management.

Similarly, Senior Management demonstrates significantly higher levels of risk mitigating practices compared to Project Managers (mean difference = 1.36031, p = .003), Software Developers (mean difference = 1.19988, p = .017), and Product Owners (mean difference = 1.49933, p = .001). This finding suggests a strong emphasis on risk management at the senior level, which is crucial for effective agile implementation and organizational risk mitigation.

Interestingly, there is no significant difference between Scrum Masters and Senior Management (p = .913), indicating that these two roles have similarly high levels of risk mitigating practices. This alignment between operational agile leaders (Scrum Masters) and strategic decision-makers (Senior Management) could be a positive indicator for effective risk management in agile environments.

Project Managers, Software Developers, Product Owners differ at no statistically significant level in terms of their employment of risk mitigating practices. These results imply that these roles either use the same practices or encounter common problems when it comes to risk management for agile projects.

Table 9.

Post-hoc Test for Pairwise Comparison

Role		Mean Difference	Std. Error	p-value	Verbal interpretation
Project Manager	Software Developer	-.16042	.22425	.972	Not Significant
	Product Owner	.13902	.21021	.979	Not Significant
	Scrum Master	-1.03184	.20853	.000	**Significant**
	Senior Management	-1.36031	.33775	.003	**Significant**
Software Developer	Project Manager	.16042	.22425	.972	Not Significant
	Product Owner	.29944	.21771	.756	Not Significant
	Scrum Master	-.87142	.21609	.003	**Significant**
	Senior Management	-1.19988	.34246	.017	**Significant**
Product Owner	Project Manager	-.13902	.21021	.979	Not Significant
	Software Developer	-.29944	.21771	.756	Not Significant
	Scrum Master	-1.17086	.20148	.000	**Significant**
	Senior Management	-1.49933	.33344	.001	**Significant**
Scrum Master	Project Manager	1.03184	.20853	.000	**Significant**
	Software Developer	.87142	.21609	.003	**Significant**
	Product Owner	1.17086	.20148	.000	**Significant**
	Senior Management	-.32847	.33239	.913	Not Significant
Senior Management	Project Manager	1.36031	.33775	.003	**Significant**
	Software Developer	1.19988	.34246	.017	**Significant**
	Product Owner	1.49933	.33344	.001	**Significant**
	Scrum Master	.32847	.33239	.913	Not Significant

Regression Analysis between Respondents' Agile Project Management Adoption Factors and Risk Mitigating Practices

The results of the regression analysis explaining risk mitigating practices in Chinese technology firms based on Agile Project Management (APM) adoption factors are illustrated in Table 10. The regression analysis was conducted in three models, progressively incorporating different factors to explain the variance in risk-mitigating practices.

Model 1 showed that environmental variables only contributed to greatly mitigate the risk at a farm. Again, using the shared coefficient version produces much more similar estimates with an unstandardized coefficient of 0.945 (p <. Model 4 (squared multiple correlation coefficient =.001) and standardized effect of lobbyist influence with mail-in ballot, 0.964, environmental factors explain for 93% variance in practices risk mitigation (Adjusted R^2 =. 93). This implies that the proposed hypotheses related to external factors like market conditions or pressures from industry exert much more influence on risk management mechanisms in the agile environment.

Model 2 introduces organizational factors alongside environmental factors. Both factors show significant positive relationships with risk mitigating practices. Environmental factors remain the strongest predictor (β = .539, p < .001), followed closely by organizational factors (β = .463, p < .001). The addition of organizational factors increases the explained variance to 96% (Adjusted R^2 = .96), indicating that internal organizational characteristics also play a substantial role in determining risk management practices.

In the full model (Model 3), environmental and organizational factors were adjusted for cultural factors. Risk mitigating practices are significantly positively related with all three factors. Although the β value for environmental factors are slightly reduced compared to those obtained at step 1 (β =. 457, p <. 001), organizational (β =. 287, p <. 0·001) as well as for sociodemographic (β = 0. 262, p <. 001). This complete model accounted for 97% of the variance in risk-mitigating practices (Adjusted R^2 =. To sum up, this study suggests the adoption of a more holistic model spanning systems and organizational context (e.g., external, internal, and cultural aspects) is the best way in which to comprehend and predict risk management practices within agile environments

Table 10.

Regression Analysis Between Respondents' Agile Project Management Adoption Factors and Risk Mitigating Practices

	Model	Unstandardized Coefficients B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Adjusted R square
1	(Constant)	.226	.065		3.476	.001	.93
	environmental	.945	.017	.964	54.186	.000	
2	(Constant)	.081	.048		1.689	.093	.96
	environmental	.528	.032	.539	16.621	.000	
	organizational	.453	.032	.463	14.280	.000	
3	(Constant)	.049	.046		1.072	.285	
	environmental	.448	.034	.457	13.319	.000	.97
	Organizational	.281	.044	.287	6.356	.000	
	Cultural	.258	.049	.262	5.309	.000	

Conclusions

The results of the study show that Agile Project Management models, especially in the IT service field, are emerging in Chinese IT companies, reflecting a distinct transition in the current project management mentality. This trend highlights not only Agile's proven ability to navigate the rapid shifts of the technological landscape and countless forms of changing customer needs, but also that the "Oh, everyone is doing this thing!" phase is quickly turning into "Oh, everyone is doing this thing and its is going to kill us if we don't..." In an era of competitive landscape rapid project implementation, Agile's focus on flexibility and quick response is a good fit with the industry.

A key learning from the research is how to embed risk mitigation functions into Agile while maintaining an Agile framework. This represents a maturation of risk management as an increasingly accepted component of Agile approaches. Through this, Chinese tech giants have integrated traditional procedures for risk management into the Agile framework of continuous iteration and flexibility, thus creating a risk management framework that is simultaneously solid and well-balanced between innovation and control.

It also discusses lack of consensus on Agile practices and risk management among people in different roles within the organization. Senior Management and Scrum Masters are an advanced practice compared to the other cohorts of respondents (e.g., Software Developers, Project Managers and Product Owners) in terms of Agile adoption and risk mitigation capabilities. The found difference indicates an even more comprehensive implementation of Agile methodology within the organization. Work still needs to be done to train and align on creating a common Agile culture and to improve the ability to be more Agile as an organization.

The adoption of Agile practices and risk management approaches is largely determined by environmental, organizational, and cultural factors. At the same time, external factors like market competition and customer expectations are critical, emphasizing the necessity of aligning Agile practices with the broader business environment. To truly exploit the power of Agile and stay competitive, organizations need to stay free-flowing to external change.

The study also highlights the contextualization of Agile practices amongst Chinese technology companies. Such adaptation usually means finding a balance between traditional values in culture — like hierarchy, or the concept of "saving face" — with Agile's values like flexibility and open communication. Companies can interpret Agile methodologies through their unique lens, ensuring long-term continuity and plans to density Agile methodology.

Recommendations

Since Agile practices may not be adopted uniformly across all organizational roles, organizations need to develop customized training initiatives that fit the unique needs of individual roles ranging from developers to senior management. For developers, training should be on how to apply Agile and to which kind of things (task oriented application) in order to be able to be Agile in their day to day work. For senior management, training may need to focus on ensuring they have strategic alignment, leadership principles, and Agile culture. Focusing on the specific needs of each department can help fill gaps in knowledge and adoption so that Agile approaches can be more uniformly understood and adopted throughout the organization.

Understanding the unique cultural background of Chinese tech companies, it is necessary to combine the Agile practice with the local cultural custom. Strategies should leverage supportive cultural factors, like teamwork and hierarchy respect, but also confront barriers, such as siloed decision-making. Agile consultants and cultural specialists will help to tailor and implement these practices. Agile adoption will therefore become more successful by having methodologies align better with the needs of Chinese businesses which will convert resistance to change into culturally sensitivity.

In addition to these measures, encouraging collaboration and knowledge sharing will go a long way in driving Agile adoption and risk management. Initiatives like cross-functional Agile teams, workshops across departments and "Communities of Practice", where topics span from Agile methodologies, to new strategies for risk management, should all be practiced by companies. These structures will foster the dismantling of organizational silos, encourage holistic viewpoints, and enable best practices sharing — all towards strengthening the overall Agile environment across teams.

It is recommended for the future researchers to extend studies on Agile adoption to other industries beside the technology sector, like healthcare or education, to serve as the

foundation for understanding its broader applicability. If you are interested, Chinese organizations standpoint compared with global organizations can help in revealing some researching into cultural and economic factors impacting supported Agile practices. Longitudinal studies could better evaluate the long-term effects of Agile methods, and niche investigations on a single role (e.g. Scrum Masters, developers, etc.) may highlight specific role-based difficulties. Likewise, exploring the blend of emerging technologies and the role of Agile, over organizational performance, would provide interesting insights. The paradigms of Agile also need to be studied in its wider lens by conducting research in the SMEs and culturally relevant Agile practices in the Eastern context.

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