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Post-Pandemic Resilience: A Study on the Adaptive Strategies of Construction Company in Xichang City, China†

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Abstract

This study aimed to investigate the impact of the epidemic on construction companies in Xichang City, China, analyze their post-pandemic management strategies, and assess their effectiveness. Employing a qualitative approach, the research focused exclusively on the construction projects undertaken by A Construction Enterprises, comprising all 11 projects. Data collection involved document analysis and semi-structured interviews with 12 key stakeholders representing diverse roles within the company. The findings revealed profound impacts of the epidemic on construction companies in Xichang, including project delays, workforce shortages, and communication challenges. Supply chain disruptions escalated material costs, strained finances, and hindered project management efficiency. Labor faced income loss and health risks, necessitating safety investments, while site closures and coordination issues exacerbated delays and costs. Online communication replaced face-to-face interactions with clients, potentially impacting trust and project progress. In response, construction companies in Xichang City implemented various post-pandemic management strategies focusing on project management, workforce policies, risk mitigation, and client communication. These strategies included remote collaboration, online training, telecommuting, revised compensation systems, disaster recovery plans, and enhanced health and safety measures. Additionally, companies optimized supply chains, facilitated remote work, enhanced safety protocols, prioritized client satisfaction, and proactively managed risks. These efforts showcased the companies' resilience and adaptability, fostering innovation in the post-pandemic era while effectively navigating challenges.

Keywords: Post-pandemic resilience**,** Organizational resilience, Adaptive strategies, Risk mitigation, Client retention

Introduction

Since the first cases were reported by the World Health Organization on 31 December 2019, the virus has spread to over 200 nations. The WHO declared the crisis as first being a public health emergency of international concern on 30 January 2020. Then, the crisis was declared as being a global health pandemic on 11 March 2020. COVID-19 is spreading rapidly around the world. It is not a simple accident from the first discovery of the new corona virus in Wuhan, China at the end of 2019. Tedros Adhanom Ghebreyesus pointed out that the new corona virus will coexist with us for a long time. The outbreak of COVID-19 has disrupted the world economy. Because of its high infectivity, high mortality and incubation period, the main preventive measures are to control social distance and isolation, which makes many economic activities impossible. The COVID-19 will change the macro environment of the world economy from the aspects of aggregate demand and total supply, labor income and financial market trade (Jinjin, 2020).

Like other careers, the construction industry has also been impacted by the pandemic in a number of ways. The adverse impacts include significant delays in projects, failure to deliver materials on time, decreased productivity rates, and increases in material prices, recruitment problems. These problems have seriously affected the normal operation of construction companies, resulting in the stagnation of the

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construction industry, many companies face bankruptcy, and employees are unemployed, which has caused a devastating blow to the construction industry (Ari et al., 2022).

Take Construction Company A for example, every time workers enter and leave the site, they need to wear masks, scan their temperature and show negative results of nucleic acid. Construction materials also need to be sterilized when entering the site, and materials transporters also need to be checked at high-speed exits. These processes greatly affect the construction schedule, although this is tedious, it is necessary. It was found in the previous literature that the excellent problem is the staff salary. Construction Company A is a company supported by the government and all employees are guaranteed a regular salary every month, similar to civil servants. But unlike many private companies, there is no government support and staff pay is based on performance. Because of the pandemic, employees can't go out to get projects, and employers won't pay them, which leads to layoffs. But they all have the same situation, construction projects need to be completed by workers, workers are restricted by salary and pandemic, the project naturally stopped.

This paper research on the positive and negative of the external environment and internal situation of Construction Company A. Based on its own actual situation, choosing the right strategy to get over the epidemics, the lack of materials and workforce. The analysis of A's post-pandemic management strategy This would help other construction company rapidly restore the productivity, recovery of projects under construction, complete the project on time. By studying the post-pandemic management strategies of Construction Company A, this paper evaluated the effective post-pandemic management strategies of construction company. Based on the evaluation and summary of the effectiveness of construction companies' strategies in the post-pandemic era, this paper proposes some strategies that can be implemented in the future when similar force majeure situations occur, to the companies in the construction industry overcome some internal and external factors. Thus, the researchers set the research objectives as below:

1) To investigate the impact of the epidemic on the construction company in Xichang City, China.

2) To assess the effective post-pandemic management strategies of construction company in Xichang City, China.

3) To analyze post-pandemic management strategies of construction company in Xichang City, China.

The researchers developed the working hypothesis below:

Hypothesis 1: Construction companies in China experienced multifaceted challenges during the epidemic, affecting various aspects of their operations, workforce, and project timelines.

Hypothesis 2: Construction companies developed diverse strategies to adapt to the post-pandemic environment, encompassing changes in project management, workforce policies, and risk mitigation.

This article focuses on Construction Company A, analyzes and compares its different impacts during and after the epidemic, different action strategies developed and whether these strategies are feasible and effective. The epidemic has affected construction projects in different ways, mainly in operation, workforce, project timeline and client relationships (Pamidimukkala & Kermanshachi, 2021). Therefore, this article mainly studies the impact of the epidemic on construction company A in the above aspects, and what strategies they adopt to deal with the epidemic. How has their strategy changed in the post-pandemic period? The effectiveness of these strategies is evaluated by comparing the strategies of the 2 periods.

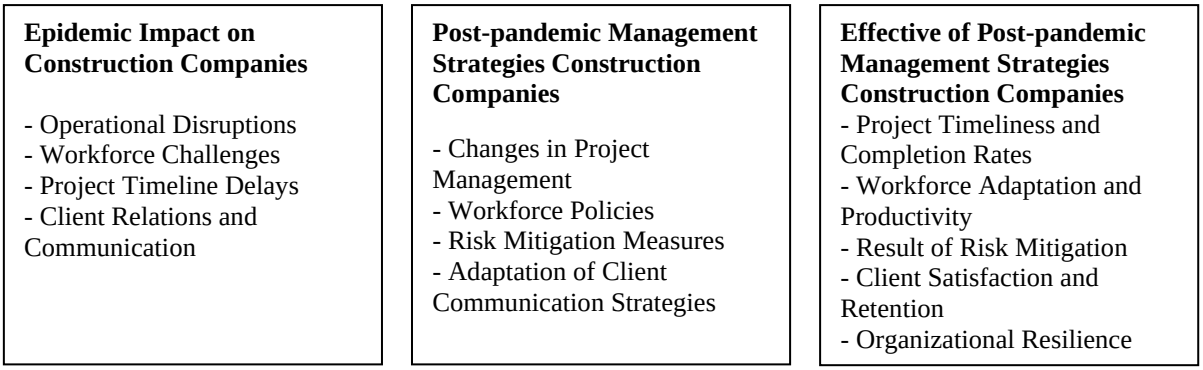

Figure 1 Conceptual framework.

The conceptual framework presented in **Figure 1**. Elucidates the intricate interplay between the epidemic's impact on construction companies in Xichang City, China, and the subsequent strategic responses adopted by these firms. Firstly, the framework delineates the multifaceted disruptions inflicted by the epidemic, encompassing operational challenges, workforce constraints, project timeline deviations, and alterations in client communication dynamics (Mishra et al., 2022; Jang et al., 2023; Evans & Farrell, 2023). These disruptions collectively underscore the breadth and depth of the challenges faced by construction enterprises amidst the pandemic's upheaval. In response to these challenges, construction companies in Xichang City have implemented a spectrum of post-pandemic management strategies aimed at fortifying resilience and restoring operational efficacy. These strategies encompass nuanced adjustments across various domains, including project management protocols, workforce policies, risk mitigation frameworks, and client engagement methodologies. Through these adaptive measures, construction firms endeavor to navigate the complex landscape of post-pandemic uncertainties while sustaining their operational momentum and client relationships (Scandizzo & Knudsen, 2024; Wang, 2024).

Crucially, the effectiveness of these post-pandemic strategies is gauged through a comprehensive evaluation lens, encompassing key performance indicators such as project timeliness, workforce productivity, risk mitigation outcomes, client satisfaction levels, and organizational resilience (Liang et al. 2022; Mer & Srivastava, 2023). This evaluative framework enables a holistic assessment of the efficacy and impact of the strategic interventions undertaken by construction companies in Xichang City, thereby informing future decision-making processes and enhancing the sector's adaptive capacity in the face of dynamic external challenges. The conceptual framework serves as a structured roadmap for understanding the symbiotic relationship between epidemic-induced disruptions, strategic responses, and organizational outcomes within the construction industry context of Xichang City, China.

Methodology

A qualitative approach was employed in this study to achieve its objectives, namely, to analyze and evaluate the effectiveness of strategic management and to offer guidance to construction enterprises on strategies for economic recovery and sustainable competitive advantage (Mattera et al., 2022; Suder et al., 2022). This study utilized both primary and secondary data sources. Document analysis and semi-structured interviews were conducted to select research samples and gather preliminary data.

The research sample was determined through purposeful sampling, encompassing all ongoing and planned projects undertaken by Construction Company A. Secondary data was sourced from project reports, contract documents, completion reports, and other relevant documents associated with Construction Company A's past collaborations with enterprises and customers. Additionally, data regarding the effectiveness of strategic management in similar construction enterprises was also collected. The document analysis phase involved consulting relevant theoretical literature on strategy management, particularly from the perspective of project management. This step laid a solid theoretical foundation for the subsequent research activities. In the interview phase, insights were gleaned from an investigation of Construction Company A, supplemented by personal work experience. By analyzing the current management practices of Construction Company A in conjunction with relevant theories and methodologies, the study formulated interview questions aimed at identifying effective strategic approaches pertinent to Construction Company A.

Population and sample size

This research centers exclusively on the construction projects undertaken by A Construction Enterprises as its primary objective. The population under consideration comprises all 11 construction projects currently managed by Construction Company A. The entirety of these projects forms the sample for the study. The data collection approach involves purposeful sampling, strategically identifying key stakeholders from within the construction projects. This selected group will represent diverse roles within the construction company, encompassing executives, project managers, and employees engaged in various operational capacities (Bunderson & Sutcliffe, 2002).

12 Key informants, ensuring a comprehensive understanding of the impact of the epidemic and the subsequent post-pandemic management strategies within the specific context of Construction Company A's projects. This targeted and focused sampling strategy aims to provide in-depth insights and valuable perspectives from key figures involved in different aspects of the construction operations under consideration. Criteria for selecting key informants in the context of construction projects for Construction Company A as show in **Table 1**.

Table 1 Criteria for selecting key informants.

Criteria	Detail	Rationale
Role and Responsibility	Key informants should represent various roles within the construction projects, including executives, project managers, and employees involved in different aspects of operations.	This criterion ensures a diverse range of perspectives, considering individuals from different hierarchical levels and functional areas within the construction company.
Involvement in Operations	Key informants should be actively engaged in the ongoing construction projects of Construction Company A.	Involvement in the projects ensures that informants possess firsthand knowledge and experiences related to the impact of the epidemic and the subsequent management strategies.
Knowledge and Expertise	Informants should have substantial knowledge and expertise relevant to their roles within the construction projects.	This criterion ensures that key informants can provide in-depth insights into the specific challenges, solutions, and strategies associated with their respective areas of expertise.
Willingness to Participate	Key informants should express a willingness to participate in the research and share their experiences.	The voluntary participation of informants is essential for obtaining candid and genuine perspectives, fostering open communication, and ensuring the success of the research.

The questions encompass various aspects related to the impact of the epidemic, post-pandemic management strategies, and their assessment of effectiveness within construction companies in Xichang City, China. Examples of such questions include: How did the epidemic impact the day-to-day operations of your construction company? What specific measures were taken to mitigate risks in post-pandemic operations? In the context of post-pandemic management, can you provide examples of how your company has fostered a resilient workforce, including any initiatives related to employee training, mental health support, or flexible work arrangements? The respondents comprise members from these 11 construction projects, including executives, project managers, and employees involved in various operational capacities, totaling at least 12 key informants. The objective is to garner insights from a diverse set of perspectives, ensuring representation across different hierarchical levels and roles within these construction projects. By soliciting input from multiple organizational levels, spanning from top-level executives to project-level staff, the research aims to capture a comprehensive understanding of the challenges encountered and strategies employed in response to the epidemic. This inclusive approach to data collection is designed to facilitate a nuanced analysis and provide valuable insights into the varied experiences and viewpoints within the construction industry in Xichang City, both during and after the pandemic.

Data collection

The respondents are the members of these 11 construction projects, executives, project managers, and employees involved in different aspects of operations at least 12 key informants.

The data collection process for this research will engage with a diverse group of participants to ensure a comprehensive understanding of the impact and management strategies related to the epidemic within construction companies in Xichang City, China. The primary respondents will be drawn from the 11 ongoing construction projects in the region. This selection includes key stakeholders such as executives, project managers, and employees actively engaged in various operational facets.

The aim is to gather insights from 12 key informants, ensuring representation from different hierarchical levels and roles within these construction projects. By including perspectives from multiple levels of the organizational structure, ranging from top-level executives to project-level employees, the research aims to capture a holistic view of the challenges faced and strategies implemented in the wake of the epidemic. This inclusive approach to data collection will facilitate a nuanced analysis and provide valuable insights into the diverse experiences and perspectives within the construction industry in Xichang City during and after the pandemic.

Data analysis

Transcription plays a pivotal role in the research process, involving the conversion of spoken language from interview recordings into written text (Rutakumwa et al., 2020). This step is critical for accurately analyzing and interpreting the data collected. It is recommended to utilize transcription software or services to transcribe the interview recordings verbatim, ensuring precision in capturing participants' exact words, including pauses, tone, and non-verbal expressions (Craig et al., 2020). Subsequently, transcriptions should be thoroughly reviewed and cross-checked for accuracy, comparing them with the original recordings to identify any discrepancies and maintain fidelity to participants' statements.

Thematic analysis serves as a qualitative method employed to identify, analyze, and report patterns or themes within the collected data. This approach aids in organizing and interpreting large sets of textual data, enabling researchers to derive meaningful insights. The researcher will proceed with thematic analysis as outlined in **Table 2**, utilizing the identified themes to elucidate key findings and implications derived from the data analysis process.

Table 2 Thematic analysis process.

Process	Details
Immersion in Transcribed Data	Gain a comprehensive understanding of the content by immersing yourself in the transcribed data. Read through the transcripts multiple times to familiarize yourself with the material.
Initial Coding	Begin the coding process by assigning initial codes to meaningful segments of the text. These codes represent the most basic units of analysis.
Generating Themes	Group related codes into broader themes. Look for patterns, connections, and recurring ideas that capture the essence of participants' experiences and perspectives.
Refining Themes	Refine and define themes through an iterative process. Ensure that themes are coherent, distinct, and representative of the data. Validate them against the original transcripts.
Descriptive and Interpretive Analysis	Provide a detailed description of each theme, supported by quotes from the transcripts. Move beyond description to interpret the meaning and significance of each theme in the context of the research objectives.

Source: Adapted from (Vaismoradi et al., 2013; Nowell et al., 2017).

Validate the coding scheme by comparing it with the original transcripts and ensuring that it accurately reflects the participants' perspectives. Triangulate findings by cross-referencing qualitative data with quantitative results if applicable.

Results and discussion

1) The impact of the epidemic on the construction company in Xichang City, China

The impact of the epidemic on the construction company in Xichang City, China are summarized in **Table 3**.

Table 3 The impact of the epidemic on the construction company in Xichang City, China.

Operational disruptions	Workforce challenges	Project timeline delays	Client relations and communication
Project delays	Impact of income	Construction site closure	Loss of intimacy/trust
Material cost increase	The costs for safety measures	Labor shortage	Inaccurate information delivery
Inefficient remote working	Communication and coordination issues	Lack of construction materials	Inefficient communication
Financial strains	Physical and mental health issues	Ripple effects from delays across enterprises	Project information update not in time

The epidemic has had a huge impact on construction companies in Xichang, mainly affecting project operation, labor force, project completion time, customer relationships and communication. Due to various lockdowns and supply chain disruptions, raw materials and equipment could not reach the site on time, resulting in many projects having to be postponed. Material and equipment prices rose, resulting in an increase in project costs, further increasing the company's financial constraints. The epidemic requires employees to telecommute, and new collaboration tools and online communication platforms cannot be quickly mastered in a short period of time, resulting in inefficient information communication and affecting project management and executive decisions. As for labor, workers will lose income due to project stoppage, the epidemic has a huge impact on people's physical and mental health, and construction companies need to invest financial and human resources to ensure the health and safety of employees. The implementation of blockade measures makes the construction site unable to carry out normal construction, and the resources and equipment invested cannot be fully utilized, resulting in an increase in project costs. At the same time, due to the production, supply, logistics and other aspects of cooperation between enterprises, the progress of the entire project is difficult to guarantee.

The epidemic will reduce the face-to-face contact between construction companies and customers, and the communication mode will change to online communication, which will affect the closeness and trust between customers. Under the influence of the epidemic, the communication and coordination between the construction company and the client are slow, and the statement and communication of information transmission may be inaccurate, resulting in some misunderstandings with the client, resulting in the slow progress of the project.

2) The post-pandemic management strategies of construction company in Xichang City, China

The post-pandemic management strategies of construction company in Xichang City, China are summarized in **Table 4**.

Table 4 The post-pandemic management strategies of construction company in Xichang City, China.

Changes in project management	Workforce policies	Risk mitigation measures	Adaptation of client communication strategies
Adopt remote collaboration	Implement telecommuting and flexible working system	Develop disaster recovery plans	Improve digital communication efficiency
Provide employee online training	Increase health and safety measures	Diversify supply chains	Increase customer satisfaction and loyalty
Develop the emergency plan and risk management	Set up employee assistance stations	Strengthen health and safety management	Enhance brand image and awareness
Embrace digital transformation	Improve employee skills	Enhance resilience to risks	Provide client personalized service
Optimize supply chain management	Reevaluate the compensation system	Develop risk assessment measures	Optimize customer service and product quality
Adjust project plans flexible	Make personal development plans	Build emergency Reserve	Deepen customer trust

Facing the impact of the COVID-19 epidemic, Xichang Construction companies have adopted various strategies in different aspects to deal with. In Project Management, they had many changes. Adopt remote collaboration to strengthen communication among team members and reduce mistakes in communication. For the difficulties arising in the process of remote collaboration, provide online training for employees on new technologies, tools or software, ensure that the team has the latest knowledge and skills, and ensure that employees can quickly use and become proficient in the shortest time. According to the actual progress of the project site, customer demand changes and market dynamics, timely adjust the construction progress, resource allocation and quality inspection standards, adjust the company's overall project planning.

Implement telecommuting and flexible working system, and implement job rotation or time-sharing telecommuting to ensure the personal safety of employees. Set up an employee assistance station to provide psychological counseling. Re-evaluate compensation systems to consider short-term performance bonuses to motivate employees to respond positively to challenges in times of adversity. Establish a long-term incentive plan to stabilize the staff team. Pay attention to employees' career planning, make personal development plans, and let employees clearly understand the direction of skills improvement, and make detailed long-term personal development plans. Develop disaster recovery plans to improve the ability to respond to emergencies, ensure that enterprises have the ability to respond quickly to emergencies, reduce business impact and return to normal operations as soon as possible. Establish supplier reserve pool. Select and introduce alternative suppliers, establish investigation and audit mechanism to ensure the quality and stability of suppliers. Establish a health and safety monitoring team to enforce and update quarantine policies. Implement strict cleaning and disinfection procedures in offices, production lines and other work areas. Real-time temperature monitoring in the work area, office personnel must wear protective equipment. These risk mitigation measures have been remarkably effective in preventing potential disruptions. By applying these measures, enterprises provide guarantees for stable development and reduce the impact of factors such as unexpected accidents and supply chain disruptions on enterprise operations and profits. At the same time, these measures have also played a positive role in improving the adaptability and resilience of enterprises, so that enterprises can be more resilient and competitive in the face of complex challenges in the post-pandemic period.

Effective digital communication enables businesses to communicate with customers more quickly and easily. Optimizing customer service and product quality can not only strengthen the brand image, improve customer awareness of the company's products and services, but also improve customer satisfaction and deepen customer trust.

3) Effective post-pandemic management strategies of construction companies in Xichang City, China

The effective post-pandemic management strategies of construction companies in Xichang City, China are summarized in **Table 5**

Table 5 Effective post-pandemic management strategies of construction companies in Xichang City, China.

Project management strategies	Workforce adaptation and productivity	Risk mitigation strategies	Client satisfaction and retention	Organizational resilience
Accelerate project resumption	Implement remote work	Develop disaster recovery plans	Improve communication responsiveness	Implement hierarchical management
Enhance safety management	Improve communication and collaboration	Diversify supply chains	Offer competitive pricing and incentives	Optimize resource allocation
Optimize supply chain management	Empower employees with autonomy	Strengthen network security	Increase customer satisfaction	Provide staff skill retraining
Embrace digital transformation	Prioritize employee well-being	Conduct periodic risk assessments	Build strong relationships	Facilitate team-building activities
Foster cooperation and coordination	Enhance productivity and engagement	Invest in employee training	Cultivate positive reputation	Foster risk management culture

In Xichang City, China, construction companies have implemented effective post-pandemic management strategies to address the challenges brought about by the unprecedented circumstances. These strategies are multifaceted and encompass various aspects of project management, workforce adaptation, risk mitigation, client satisfaction, and organizational resilience.

Project management strategies have focused on ensuring timely project completion while maintaining stringent safety standards. Companies have optimized supply chain management and logistics to mitigate disruptions, leveraging digital tools and communication platforms for efficient coordination among stakeholders. Additionally, efforts have been made to foster collaboration and cooperation among project teams and partners. Workforce adaptation and productivity have been key priorities for construction companies. Embracing remote work arrangements and digital collaboration tools, they have facilitated better communication and teamwork, leading to increased engagement and productivity among employees. Empowering workers with autonomy and prioritizing their well-being, mental health, and work-life balance have been integral to maintaining a motivated and resilient workforce.

In terms of risk mitigation, construction companies have developed comprehensive disaster recovery plans and contingency measures. They have diversified supply chains and bolstered network security to safeguard against potential disruptions. Regular risk assessments and employee training programs have been implemented to enhance risk awareness and preparedness across the organization. Client satisfaction and retention have been paramount, with companies strengthening communication channels, offering competitive pricing, and focusing on personalized solutions. Building trust-based relationships with clients and cultivating a positive reputation and brand image have been essential strategies for sustaining long-term partnerships and securing new business opportunities. Organizational resilience has been achieved through various measures, including transitioning to flatter management structures for increased agility, optimizing resource allocation, and providing skill retraining to employees. Team-building activities, decentralized decision-making, and the implementation of mental health support services have further contributed to building a resilient organizational culture focused on proactive risk mitigation and continuous improvement.

These comprehensive strategies highlight the resilience and adaptability of construction companies in Xichang City as they navigate the complexities of the post-pandemic business landscape. Through a holistic approach to management, these companies have demonstrated their ability to overcome challenges, foster innovation, and emerge stronger in the face of adversity.

Discussions

The impact of the COVID-19 pandemic on construction companies in Xichang City, China, presents a myriad of challenges encompassing operational disruptions, workforce issues, and client communication breakdowns. These challenges resonate with broader global trends observed in the construction sector during the pandemic.

The disruptions caused by the pandemic highlight the vulnerability of construction projects to external shocks, including material shortages and site closures, significantly impeding project progress. To address such disruptions, agile project management practices could be adopted to enable rapid adaptation to changing circumstances (Leybourne, 2009; Cobb, 2023). Furthermore, the pandemic exacerbates existing labor shortages and introduces new health and safety concerns for construction workers, emphasizing the importance of prioritizing worker well-being to sustain productivity (Rudolph et al., 2021). Implementing digital health monitoring technologies could enhance workplace safety and mitigate health risks among construction personnel (Nnaji & Karakhan, 2020; Okpala et al., 2020; Patel et al., 2022). Moreover, the shift towards online communication due to reduced face-to-face interactions poses challenges for maintaining client relationships and trust. Leveraging digital collaboration platforms and Building Information Modeling (BIM) technologies could facilitate transparent communication and foster trust between construction companies and clients (Oraee et al., 2022). The pandemic-induced economic uncertainties exacerbate financial strains on construction firms, as evidenced by rising material costs and project expenses. Strategic cost management practices, including value engineering and lean construction principles, could help mitigate financial risks and enhance project cost-effectiveness (Mohammadi et al., 2022). The COVID-19 pandemic underscores the need for resilience and adaptability within the construction industry, with the adoption of innovative strategies essential for navigating the challenges posed by the pandemic and emerging stronger in the post-pandemic era.

The study found several impacts of COVID-19 on construction business operations. These include project delays, psychological impact on workers, financial issues, project cancellations, workforce reductions, and resource availability issues. To overcome the resulting impact, the study offers some strategies for coping in the post-pandemic period. Strategies adopted include implementing effective communication, emphasizing health and safety, and enhancing the use of technology.

The health and safety protocols put in place on-site by management were highly mandatory for workers to prevent the virus from spreading. In addition, the development of COVID-19 pandemic awareness programs was the most widely accepted tactic implemented by construction company. Construction businesses should provide transportation for construction workers, regular health assessments, COVID-19 palliatives, pre-time payment of earnings and salary, and source reputable material suppliers, according to the recommendations derived from this research work. Disruptions that need to be implemented in construction businesses are using a digitalized work environment to help construction businesses to continue even during the pandemic (BIM & machines) (Lekan et al., 2023).

The post-pandemic management strategies embraced by construction companies in Xichang City, span diverse areas such as project management, workforce policies, risk mitigation, and client communication strategies. These strategies are pivotal for fortifying resilience and navigating the challenges instigated by the COVID-19 pandemic, in coherence with evolving trends within the construction sector (Ali et al., 2021; Ivanov & Dolgui, 2021).

In terms of project management, the integration of remote collaboration tools and online training signifies a proactive stance towards enhancing intra-team communication and skill development. This mirrors findings by (Zhang & Zou, 2022), underlining the efficacy of digital collaboration technologies in bolstering project efficiency and minimizing communication errors. Moreover, the adaptability to modify project plans in response to evolving customer needs echoes agile project management principles advocated

by (Masia & Poll, 2021; Albuquerque et al., 2020), enabling construction firms to swiftly adjust to dynamic market conditions.

Regarding workforce policies and health measures, the implementation of telecommuting and flexible work arrangements, alongside employee assistance programs, underscores a commitment to prioritize employee well-being and mental health. These initiatives resonate with recommendations by (Morganstein & Flynn, 2021), emphasizing the significance of supportive work environments in alleviating stress and fostering resilience amidst crises. Additionally, adherence to stringent health and safety protocols aligns with regulatory standards and industry best practices, as emphasized by (OSHA, 2020), thereby mitigating health risks and ensuring operational continuity.

In terms of risk mitigation, the development of disaster recovery plans and diversification of supply chains exemplifies a proactive approach to mitigate operational risks and uphold business continuity. These measures align with risk management strategies advocated by (Pettersen & Schulman, 2019), underscoring the importance of resilience and adaptability in navigating disruptive events. Furthermore, the establishment of supplier reserve pools and robust quality control mechanisms enhances supply chain resilience, reducing reliance on single-source suppliers and mitigating disruptions, as recommended by (Sudan et al., 2023).

Adapting client communication strategies involves prioritizing effective digital communication and personalized client services, underscoring a customer-centric approach to uphold client relationships and trust. These strategies resonate with the tenets of customer relationship management (CRM) highlighted by (Chen et al., 2020), stressing proactive communication and tailored services to foster customer loyalty. Optimizing customer service and product quality enhances brand reputation, fostering customer satisfaction and competitiveness. The proactive adoption of management strategies by construction firms in Xichang City, China, underscores a comprehensive approach to bolster resilience, mitigate risks, and nurture client relationships in the aftermath of the COVID-19 pandemic. By aligning with emerging industry trends and harnessing digital technologies, these strategies position construction companies for sustained growth and competitive advantage in the post-pandemic landscape. The study on effective post-pandemic management strategies of construction companies in Xichang City, China reveals a multifaceted approach adopted by these companies to address the challenges posed by the unprecedented circumstances. The findings underscore the importance of implementing comprehensive strategies that encompass various aspects of project management, workforce adaptation, risk mitigation, client satisfaction, and organizational resilience.

Project management emerges as a critical area of focus for construction companies in Xichang City. Companies prioritize timely project completion while upholding stringent safety standards. This is evidenced by the optimization of supply chain management and logistics to mitigate disruptions, as well as the utilization of digital tools and communication platforms for efficient coordination among stakeholders (Patel, 2023; Sudan et al., 2023). The emphasis on fostering collaboration and cooperation among project teams and partners reflects a proactive approach to overcoming challenges and ensuring project success.

Workforce adaptation and productivity are identified as key priorities for construction companies in the post-pandemic era. The adoption of remote work arrangements and digital collaboration tools facilitates better communication and teamwork, leading to increased engagement and productivity among employees (Busse & Weidner, 2020; Sirait & Zellatifanny, 2020). Empowering workers with autonomy and prioritizing their well-being, mental health, and work-life balance are integral to maintaining a motivated and resilient workforce in the face of adversity.

Risk mitigation emerges as a crucial aspect of post-pandemic management strategies. Construction companies in Xichang City have developed comprehensive disaster recovery plans and contingency measures to safeguard against potential disruptions (Sahebjamnia et al., 2015; Sawalha, 2021; Pavlov et al., 2022). Diversifying supply chains and bolstering network security are additional measures undertaken to enhance resilience and preparedness. Regular risk assessments and employee training programs further contribute to building a proactive risk management culture within organizations. Client satisfaction and retention are paramount considerations for construction companies seeking to navigate the complexities of the post-pandemic business landscape. Strengthening communication channels, offering competitive

pricing, and focusing on personalized solutions are identified as effective strategies for building trust-based relationships with clients (Nayal et al., 2022; Doğan, 2023). Cultivating a positive reputation and brand image are essential for sustaining long-term partnerships and securing new business opportunities.

Organizational resilience is highlighted as a key outcome of the comprehensive strategies adopted by construction companies in Xichang City. Transitioning to flatter management structures, optimizing resource allocation, and providing skill retraining to employees are indicative of organizations' commitment to adaptability and innovation (Nyaupane et al., 2020). The implementation of team-building activities, decentralized decision-making, and mental health support services further contribute to fostering a resilient organizational culture focused on continuous improvement (Obrenovic et al., 2020).

The comprehensive findings of the study on effective post-pandemic management strategies of construction companies in Xichang City, China, underscore the adoption of a "holistic management approach". This approach entails integrating various facets of management, including project management, workforce adaptation, risk mitigation, client satisfaction, and organizational resilience, into a cohesive and interconnected framework.

At the heart of this holistic management approach lies project management, where companies prioritize timely project completion and stringent safety standards. This involves optimizing supply chain management and logistics to mitigate disruptions, as well as leveraging digital tools and communication platforms for efficient coordination among stakeholders. The emphasis on fostering collaboration and cooperation among project teams and partners reflects a proactive stance towards ensuring project success (Larsson & Larsson, 2020). Workforce adaptation and productivity form another crucial aspect of the holistic management approach (Obrenovic et al., 2020; Kalogiannidis, 2021). Companies prioritize empowering their employees with autonomy and prioritizing their well-being, mental health, and work-life balance. The adoption of remote work arrangements and digital collaboration tools facilitates better communication and teamwork, ultimately leading to increased engagement and productivity among employees.

Furthermore, risk mitigation strategies are integral to the holistic management approach (Mishra et al., 2020), with construction companies in Xichang City developing comprehensive disaster recovery plans and contingency measures. This includes diversifying supply chains, bolstering network security, and conducting regular risk assessments. Employee training programs also contribute to building a proactive risk management culture within organizations. Client satisfaction and retention are paramount considerations in the post-pandemic business landscape (Olowoporoku & Olubiyi, 2023), with companies focusing on strengthening communication channels, offering competitive pricing, and providing personalized solutions. Cultivating a positive reputation and brand image are essential for sustaining long-term partnerships and securing new business opportunities.

Organizational resilience emerges as a key outcome of the holistic management approach (Hillmann & Guenther, 2021; Rodríguez-Sánchez et al., 2021), reflecting the commitment of construction companies in Xichang City to adaptability and innovation. This is evident in the transition to flatter management structures, optimization of resource allocation, and provision of skill retraining to employees. The implementation of team-building activities, decentralized decision-making, and mental health support services further contribute to fostering a resilient organizational culture focused on continuous improvement. This research demonstrates the resilience and adaptability of construction companies in Xichang City as they navigate the challenges of the post-pandemic era. Through a holistic approach to management, these companies have demonstrated their ability to overcome obstacles, foster innovation, and emerge stronger in the face of adversity.

Conclusions

Research conclusions

The impact of the epidemic on construction companies in Xichang City, China has been profound, affecting various aspects of their operations. Lockdowns and supply chain disruptions resulted in project delays and increased material costs, straining financial resources. The transition to remote work posed communication and coordination challenges, impacting project management efficiency. Furthermore, the

epidemic's toll on the physical and mental health of workers necessitated investments in safety measures. Shifts to online communication with clients altered the dynamics of trust and project progress, highlighting the need for adaptation in client relations.

In response, construction companies in Xichang City have implemented a spectrum of post-pandemic management strategies. These strategies encompass changes in project management practices, adoption of remote work policies, implementation of risk mitigation measures, and enhancement of client communication strategies. Through remote collaboration tools, online training, and flexible work arrangements, companies aimed to improve project management efficiency and employee productivity. Disaster recovery plans and supply chain diversification were adopted to mitigate risks, while digital communication channels were optimized to maintain client satisfaction and loyalty.

Effectiveness in post-pandemic management strategies is crucial for construction companies in Xichang City to navigate the challenges of the evolving landscape. Strategies such as accelerating project resumption, enhancing safety management, and fostering cooperation among stakeholders are integral in ensuring timely project completion and sustaining workforce productivity. Prioritizing employee well-being and building strong client relationships contribute to organizational resilience and long-term success. Through these holistic strategies, construction companies in Xichang City demonstrate their resilience and adaptability in overcoming adversity and positioning themselves for sustainable growth in the post-pandemic era.

Practical recommendation

1) This research provides examples and directions for Xichang Construction Company's development strategy in the post-COVID-19 era, and offers suggestions and opinions for those small and medium-sized construction companies that still survive or are preparing to start. The project management strategy should focus on ensuring timely completion of the project while ensuring project quality and safety. Optimized supply chain management and logistics to avoid the lack of raw materials and machinery, strongly recommend the use of digital tools and communication platforms to achieve effective coordination among stakeholders, the digital age is multi-faceted, the faster the company digitization speed, the faster the development will be. On the workforce side, it improves employee engagement skills to improve productivity, while focusing on employee career development planning to help them achieve development goals. The development of employees is inseparable from the development of the company, and the development of the company and the development of employees are mutually beneficial.

2) Having a good disaster recovery plan and emergency response is a manifestation of a company's hard power. Construction companies need to conduct regular risk assessments to enable the organization to identify risks early and develop appropriate response strategies. This proactive approach minimizes the impact of potential problems. The implementation of team building activities, decentralized decision making, and mental health support services further contributes to the development of a resilient organizational culture focused on continuous improvement, which is key to the cultivation, reserve, and expansion of an organization in order to shape or maintain its core competencies.

3) Construction companies should prioritize investment in robust digital infrastructure, including remote collaboration tools, project management software, and communication platforms. Providing comprehensive training programs and technical support will ensure that employees are proficient in utilizing these tools effectively. Regular updates and upgrades to the digital infrastructure will enable companies to stay ahead of technological advancements and adapt to changing work environments seamlessly.

4) Employee well-being should be a top priority for construction companies. Implementing flexible work arrangements, such as telecommuting and flexible scheduling, will accommodate employees' personal needs and promote work-life balance. Establishing employee assistance programs and mental health support services will provide resources and guidance for employees facing challenges related to the pandemic. Regular communication channels should be established to foster open dialogue and address any concerns or issues promptly.

Future research recommendations

1) Future research should conduct longitudinal studies to assess the long-term impact of post-pandemic management strategies on construction companies' performance, resilience, and competitiveness. Comparative analyses across different regions, industry sectors, and organizational sizes will provide valuable insights into the generalizability and scalability of these strategies.

2) Investigating the adoption and impact of emerging technologies, such as Building Information Modeling (BIM), Internet of Things (IoT), and artificial intelligence (AI), in post-pandemic construction management will contribute to theoretical advancements in the field. Future research can explore the potential of these technologies to enhance productivity, safety, and sustainability in construction projects.

3) Exploring collaborative approaches between construction companies, government agencies, academic institutions, and other stakeholders will advance theoretical discussions on resilience and risk management. Future research can investigate collaborative governance mechanisms, such as public-private partnerships and industry consortia, and their impact on organizational resilience and adaptive capacity.

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