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Integrating Agile, Lean, and Digital Practices in Industrial Project Management: A Conceptual Framework for Eastern and Western China

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ABSTRACT: Administration of industrial projects demands the integration of a number of critical enablers including, but not limited to, adaptive management, process and digital enhancements, and collaboration with relevant stakeholders. The variability in industrial development and innovation across China's regions offers a context within which integrated project management practices can help optimize administrative efficiency. However, literature has mostly treated project management practices including flexibility, lean project management, digital project management, and "stakeholder management as separate practices. This fragmented focus creates challenges when trying to integrate the practices in a project administration system. The main contribution of this paper is the development of a conceptual framework illustrating the interrelation of flexibility, lean project management practices and integration of digital tools in project management, and stakeholder management. Leveraging project management and other related literatures, the author hypothesizes that achievement of project management goals is associated with the integration of management processes and digital infrastructure and engagement of stakeholders. The framework illustrates some of the regional conditions across China where integration of these practices may be challenging. Additionally, the author argues that for project management outcomes to be achieved, integration of management processes, digital and social infrastructure, and stakeholder engagement is required. The framework serves as a basis for future empirical study and outlines possible pathways for business-unit-led and managed coordination to provide responsive project-administration systems.

1. INTRODUCTION

1.1 Background and research context

Project management is one of the principal means of a firm to dynamically integrate the resources at its command and transform strategy into projects. Industrial projects typically combine several complex and interrelated activities, spans of work and/or multiple subunits within the firm. Additionally, they may involve external subsystems (e.g., suppliers and buyers), and be subject to numerous legal and administrative requirements, as well as the interests and concerns of multiple groups, both inside and outside the firm. While the administration of a project often includes control of budgets and schedules, it may also involve the control and direction of other activities concerned with the firm's resources, information, and decisions.

Agile practices can help industrial project administration through mechanisms such as iterative planning and prioritization, the establishment of cross-functional project teams, and the improvement of project requirements. Moreover, it embraces feedback cycles, which can help identify and respond to varying project requirements, and can increase flexibility. The practices are beneficial for projects with requirements that are subject to change. Adjusting practices to match varying circumstances does not guarantee effective administration, however. Agility can also amplify the effect of changes to project requirements,

administrative costs, and the potential for conflicting administrative priorities. Agility must be combined with other established practices and procedures.

In their study, Babalola et al. (2019) evaluated 102 articles published between 1996 and 2018, and characterized case studies on the assessment of the implementation of lean practices in the construction industry, and the benefits derived from such implementations.

Agile practices and lean principles and practices are comparable and complementary. While agile practices are grounded in learning and feedback, lean practices are founded on processes and workflow. Both involve the improvement of project administration.

Modern administration of projects is increasingly reliant upon digital technology. It is not the case that advanced digital tools would improve project outcomes. In reality, project outcome quality is contingent upon the ability to aggregate data across different information systems and integrate technologies into business processes. Depending on the context, the integration of digital tools can facilitate a range of functions, including automated progress reporting, proactive work scheduling, and identification of substitutes for project resources.

There is a growing recognition that the integration of digital tools in project environments can be aligned with organizational digital transformation strategies. Digital transformation creates an imperative for new skills and behaviors to be integrated into the workforce, and project-management methodologies and digital frameworks can be employed for organizational change. Concurrent research in the field of project management has begun to integrate frameworks relating to socio-technical systems, including systems of misalignment and integration, leadership and governance, and change. Ultimately, these studies emphasize the need for integration of multiple digital levers in complement with business and organizational processes.

Another consideration is the importance of communicating and consulting with stakeholders. There are many participants (employees, suppliers, contractors, customers, etc.) involved with a project who may have differing interests. Simple stakeholder communication includes the dissemination of project information. But, effective administration includes the identification of stakeholders, the articulation of their expectations, and the handling of their participation to resolve competing interests, as well as the exercise of sound judgment in reaching decisions, and the clarification of the responsibility of authority delegated to them. It is through stakeholder engagement that the collaboration of individuals representing the interests of all the various participants of a project is achieved. It is important to understand that project management may not always allow for the engagement of all participants to the extent that is desired, and/or needed.

Different groups of participants in a project may evaluate its success on various parameters, for example, the cost of project completion, safety and quality of end product, and time taken to complete the project, among others. For effective engagement, the focus should not always be on the raw numbers. It may be important to engage the participants to gain useful information needed to resolve competing interests, and/or to integrate coordinated efforts and cooperate to facilitate productive participation.

These dynamics are critical to understanding the development of industry in China. The differences between Eastern and Western China, for instance, vary in terms of their economies, industry, infrastructure and technological levels, and their work force. The eastern coastal provinces contain the major industrial centers of the country, including manufacturing and logistics. The western provinces contain, among other things, the country's major energy and resource industries, as well as some of the more advanced and emerging industries. Though these tendencies are broad, the western and eastern provinces can vary greatly in terms of their industries, and even within provinces there can be great variance in the industrial mix.

Due to variations in the market, industry and competitiveness of different regions, practices and structures that successfully administer projects in one region of China may not be adequate for other regions. When comparing different regions, it should be done with respect to contextual differences. It is also important to look at the customer, competitor, supplier, partnership and alliance relationships of an organization in different regions.

1.2 Problem statement

There remain challenges and limitations in managing projects across various regions of China due to the integrated and synchronized nature of practices, systems and relationships, despite conceptual advances in adaptive and integrative management, project and digital interfaces with customers and other stakeholders.

The use of agile practices increases the pace at which organizations can change. But, if changes are not complemented by systematic ways of making decisions, this may create further problems of coordination. Use of lean practices can help to remove unnecessary waste in a process and improve overall system effectiveness. However, if strict practices of lean management are used, then adaptability and responsiveness may suffer. Furthermore, use of digital tools to make information readily available to stakeholders does not necessarily lead to improved outcomes. Digital tools help improve communication and coordination among stakeholders, but in the absence of procedures to effect decisions, as well as technical means for implementing those decisions, outcomes are not likely to improve. In general, means do not always ensure the right ends.

Such experience suggests the use of a combination of approaches, based on the needs and priorities of the situation, is more likely to lead to the desired outcomes. This implies that a thorough understanding of the interplay of adaptive management, process and system improvement, stakeholder engagement and integration of various means, is required for effective project implementation.

One of the management practices that is widely used in the field is stakeholder engagement. While a positive relationship between stakeholder engagement and attaining desired outcomes is well known, the theoretical background to this relationship requires further elaboration. Engaging various stakeholders may help prioritize, align and/or synthesize management actions. However, engaging too many stakeholders may prolong the process to the extent that it negatively impacts management actions. In general, the relationship between engagement and practice depends on a number of context specific factors.

There are contextual issues with applicability. There are variations in digital environments, organizational maturity, supply and value chain structures, project and work complexity, and interactions with stakeholders. Depending on these, the fit and effectiveness of various management techniques may vary. A framework or tool that does not consider context may result in suggestions that are overly general or abstract to be of any industrial use.

The main focus of the paper is to present a conceptual framework that addresses the integration of the use of agile and lean practices, and the integration of digital practices for the achievement of stakeholder management and project delivery in the context of China and particularly of Eastern and Western China.

To address the gap identified the author presents an integrative conceptual framework. The author does not claim that with the presented integrative framework he provides evidence for the relationships described within the context of the Chinese regions. The author describes possible relationships and illustrates the evidence and types of research that may be used to test the relationships.

1.3 Research gap

The key concepts that inform the constructs of agile project management, lean practices, digital transformation and integration of stakeholders, and factors of project success have been researched and published. However, there are gaps in the literature which warrant further research.

First, a construct-integration gap exists: Agile, lean, and digital approach frameworks show inconsistency in research methodology and definition. Agile project management research focuses on project management in general. Other research focuses on implementation of lean practices and identification of process and people-related waste as well as integrative use of Information Communication Technology (ICT) and other approaches of Change Management. There are ample theories which if combined, may prove beneficial in the administration of industrial projects. Therefore, further research in this area is justified.

Second, a mechanism-explanation gap exists: The absence of improvement in the overall effectiveness of project management, as a result of the adoption of new approaches by management and the use of new ICT, creates an explanation gap. Effectiveness of project management may improve as a result of integration of the aforementioned components. However, the influence of these factors may vary, depending on the project context and the extent of management control in an organization. Given the theories and practice in the field of project management, a case exists for further research in project management and engagement to evaluate the influence of stakeholder engagement on project management.

Third, a systems-integration gap exists: Project administration is made up of interacting sub-systems such as information technology, business processes and people. Technology may be available, but not fully adopted. Efficiency may not lead to effectiveness, and adapting to various situations may be of little help if the information needed to make the decisions is

unavailable. There are interactions of this nature which can be described using the sociotechnical approach. However, for project administration these interactions must be described using a different, more applicable framework.

Fourth, a regional-context gap exists: Research on international project management may not be applicable to industrial enterprises in Eastern and Western China. Operations within a region may vary and impact how different people or groups integrate and collaborate to accomplish a common goal. Relying on integrated processes and available resources, different groups may also evaluate technology readiness. There are legitimate differences in a region which should not be confounded with geography.

Fifth, a measurement and validation gap exists: The term "effectiveness" in project management has been interpreted in various ways. This is also true for related concepts such as efficiency, performance, and utility. The project management body of knowledge is extensive and, if not defined and operationalized clearly, is of little value in comparing studies and identifying relationships.

The lack of integration of the different management practices described in the empirical evidence generates the need to develop an integrated conceptual framework. The aim of this work is to integrate agility and leanness practices with the use of digital tools and to take into account the context in which the practices and the tools are implemented, as well as the engagement of the stakeholders, within the limitations of the integration of the different types of management practices and the scope of this work. This is an integration-type contribution. The author's judgment on the absence of comparable contributions will be supported with a complete review of the literature.

1.4 Research aim and objectives

The aim of this paper is to build a conceptual framework based on existing literature to project-management practices to illustrate the impact of the integration of digital tools, the use of agile and lean management practices and stakeholder engagement in the industrial sectors of Eastern and Western China.

The objectives of the paper are to:

1. Synthesize the literature on project-management practices, including the integration of digital tools, the use of agile and lean management practices, and stakeholder engagement.
2. Propose and explain potential relationships among the independent variables, and stakeholder engagement as a potential mediator, and project-management effectiveness as the dependent variable.
3. Analysis the contexts in which the relationships are proposed to be valid, i.e. the field of work and the geographical area of Eastern and Western China.
4. Develop a conceptual framework that reflects the interrelationships among variables pertaining to project management, and develop theory-based propositions to be tested in future research.

These objectives and the accompanying literature review focus on integration and formation of ideas (conceptual frameworks) rather than statistical hypothesis testing and research design.

1.5 Research questions

The study is guided by four research questions:

RQ1: How has the existing body of knowledge dealt with the influence of agile practices, lean practices and digital tools on project management?

RQ2: What are the organizational and interpersonal mechanisms through which these management practices connect with project management?

RQ3: What are the organizational, technological, and inter-sectoral integration as well as the intra-regional bridging mechanisms that might influence the relationships of the above mentioned constructs found in the industrial settings of Eastern and Western China?

RQ4: How should these relationships be articulated in a framework of linkages for purposeful project administration?

The questions outline the extant evidence, and define the boundaries of the research. The research aims to elucidate the relationships within these boundaries, appraise the body of knowledge for deficiencies and describe how the framework will assist in this appraisal.

1.6 Significance and expected contribution

This research may be of interest theoretically, methodologically, and/or to practice.

Theoretical contribution: Agility can be viewed as a systematic integration of various practices and tools, combined with the engagement of project stakeholders. Using a systems-based approach, this research introduces a comprehensive integration of agility, leanness, and the digital integration of tools and practices within the project-management continuum. This integrated approach helps to discern the management practices that are adopted and the organizational structures and mechanisms that facilitate and amplify them.

Methodological contribution: This study presents a common framework to synthesize literature, despite differences in terminology and level of analysis. The authors present the three constructs of the cognitive-social brain, the proposed mediator, and the outcome. While the authors of the paper acknowledge that effectiveness in project management can be measured with multiple dimensions, they provide a framework that can be used in development of measurement instruments and promot research.

Practical contribution: In the context of workplace practice, the proposed framework signals the potential benefit of managing projects using multiple integrated practices, rather than using single practices in isolation. The proposed practices could include, for example, the use of project management techniques and tools aligned with agile, lean, digital, and stakeholder strategies. Assessing such integrated practices may help identify and understand the main obstacles to the effective use of such integrated practices, which may remain invisible when practices are evaluated separately.

Regional contribution: This study provides the framework in different contexts of the Chinese industry, be it in the east or in the west. The study proposes that there are various regional and firm-specific conditions (like the industry mix, workforce, digital connectivity and supplier networks) that may affect the appropriateness of the use of agility and lean practices and digital management tools. This study takes a more context-rich view of the region and sheds light on avenues for future research in this domain, while acknowledging that the author may need to verify his/her views through various case studies in the region.

As noted above, the framework should not be viewed as affirmation of any of the hypothesized relationships, nor should it be interpreted to mean that stakeholder/customer engagement and relationships always/automatically/solely mediate the relationships, or that there are performance differentials between the two regions of China. Affirmation of any of these views will depend on other research (including case studies) in the field.

2. THEORETICAL FOUNDATIONS

This research adopts an integrated perspective to management and integrates various theories to explain how management practices contribute to the overall effectiveness of project management. First, systems thinking helps understand how different parts of an organization influence and are influenced by each other. Second, management of project stakeholders helps in integrating and facilitating the work of the project team. Third, management practices can facilitate and facilitate the adoption of an agile or leisure approach within the project management context. Finally, management practices should facilitate the integration of technology within the project management context.

Improving project management practices can be viewed through a systems perspective. From a sociotechnical and integrated perspective, the use of information technology to facilitate and integrate various activities within a project may help improve the overall effectiveness of project management practices. A systems perspective suggests that management practices may foster synergies and facilitate improvements across project management.

Agile project management incorporates flexible planning and forecasting, as well as the capacity to adapt to shifting project needs. Dong et al. (2024) describe the persisting ambiguities in the definition of agile project management. While some authors have extended the use of agile management beyond software development, most agree that the foundations of agile management remain grounded in software development. Agile practices help facilitate more immediate and collaborative management of project activities, and greater responsiveness to changes in the project environment; however, erring on the

side of agility can lead to activities becoming unmanageable. Skewed implementation can lead to lack of control and/or inefficient use of resources.

When integrated with agile practices, lean management encourages different yet complementary foci on project activities, including the pursuit of project goals and value, evaluation of process performance, and elimination of barriers to the attainment of project goals. As noted in the systematic review conducted by Babalola et al. (2019), lean practices adopted in project management span the full range of activities and services. Michealski et al. (2022) point to the symbiotic nature of integration of various management philosophies and practices, including lean construction and building information modeling (BIM). Improving project management practices and strategies to increase responsiveness to changing project conditions and requirements is desirable.

This section considers the integration of various digital tools in business processes, rather than the adoption of individual digital tools. Chen et al. (2025) include sociotechnical misalignment and poor governance as key challenges of digital transformation. Alnajjar et al. (2025), on the other hand, found the review of 64 studies confirmed positive and integrative synergies between lean construction and BIM, along with other building information modeling (BIM) and construction-related technologies. It can be inferred that integration of appropriate digital tools, in alignment with the processes and capabilities of project stakeholders, enables efficient and effective project administration.

Stakeholder theory focuses on relationships; therefore, it will be utilized here to explain the mediating role of project participants. The nature of industrial projects necessitates that project managers, employees and other service providers work together with clients and other project stakeholders. Achterkamp and Vos (2008) emphasize that project management literature contains numerous concepts and theories which lack clarity and adequate analysis on the identification and classification of project stakeholders. Additionally, Davis (2014) explains and justifies that perceptions of project success by stakeholders can vary. It can be concluded that participation, and not the number of meetings and communications, by stakeholders is of utmost importance.

The study suggests stakeholder engagement serves as a link between the integration of agile and lean practices and the use of digital tools in project management. Digital tools can be used to aggregate and create a single source of project information. Combined with other methods, lean tools and practices can be used to enhance project information flow to support and structure work processes. The use of digital tools can also be used to improve the timeliness and relevance of project information. While the framework recognizes the above integrations, it does not completely rule out other possible integrations of digital tools, lean and agile methods, and practices with stakeholder engagement.

The interpretation of project-management effectiveness is the ability to manage projects to fulfill project goals, e.g. through schedule management and control, optimized utilization of project resources, enhanced quality and output of project work, and integrated project coordination and collaboration. Variability in stakeholder priorities can impact the project management processes, and as such, those processes should not be harmonized.

3. CRITICAL LITERATURE REVIEW

3.1. Integration of management practices and digital capabilities

In the studies reviewed, the practices and methods of Agile, lean, and digital project administration appear to be complementary. Cruz et al. (2020), in a review of conventional, Agile, and lean project management, assert that, in the 80 reviewed articles, the focus of project management was on the use of Agile methods, while the role of lean methods was more supportive. Dong et al. (2024) also identify a gap in understanding the use of Agile project management.

While lean and Agile management practices may appear to be competing practices, combining the two may provide a more effective project management method. Managing project requirements using Agile practices enables the discipline to address changing project requirements; managing project tasks using lean practices enables elimination of tasks that do not add value. However, too much standardization may restrict flexibility to address varying requirements. Balancing the two practices (and avoiding overreliance on either) is recommended for effective management of project administration.

The authors indicate digital integration adds an information and coordination dimension to existing relationships. The authors of (Chen et al., 2025) identify important themes in digital project management as integration of digital technologies, governance, and sociotechnical alignment. The authors of (Michalski et al., 2022) consider the integration of lean construction and BIM,

while (Alnajjar et al., 2025) provide a literature synthesis of lean construction and BIM. The synthesized literature provides evidence that the integration of digital systems in construction facilitates process integration, but the potential is contextual and dependent on integration with the actual process.

A major constraint is that the desired improvements in processes and projects are separate constructs, and therefore may not be improved simultaneously. A digital or information system may improve process integration and/or decision-making; a lean system may reduce waste but not improve integration; and an agile system may improve integration and adaptability but increase the need for system control and integration. Therefore, the science of integration may involve trade-offs, and therefore warrants analysis and consideration.

3.2. Stakeholder engagement and project-management effectiveness

Stakeholder engagement is one mechanism through which the integration of project management systems leads to integrated project outcomes. Achterkamp and Vos (2008) discuss the need to identify and communicate project stakeholder roles. Davies (2014) discusses the need to integrate the perspective of different stakeholder groups to achieve a "rich picture." Several of these stakes, particularly in the context of heavy industry and construction, may have competing interests.

Agile and lean interactions with stakeholders work differently. With agile, feedback cycles are short, and stakeholders can communicate recent requirements. Lean offers opportunities for stakeholders to define the problems they're having with a company's processes. Digital technology can help coordinate and provide stakeholders with the information they need to engage. Improving the ability of stakeholders to engage can increase the quality of decisions made, but can also slow the process of making decisions. Delays can occur from having to seek approval from too many people, consult with people unnecessarily, or from conflicting interests. When decision-making is slowed to this extent, engagement becomes ineffective and a waste of time and resources.

Engaging stakeholders can increase the effectiveness of project management, and improving project management can improve the overall effectiveness of the project in a variety of ways (i.e. schedule, cost, quality, efficiency, service levels, stakeholder satisfaction, etc.) The area of project management that's most important to improve in a given situation can be defined by the context of the situation.

One way to view the role of stakeholder engagement is to define it as a mediating role between the relationship of the use of agile and lean methods and tools to improve the management of projects. Although this mediating role is plausible, it has not been demonstrated or proven in the case of improving project management in Chinese industry.

3.3. Contextual gaps and research contribution

The literature available reflects three major gaps. First, agile and lean methods and digital means are looked at independently, and consequently, integrated into strategies for the management of industrial projects in diverse ways. Second, although it has been indicated that stakeholder engagement is primarily concerned with project coordination and integration and project success, the nature of their association with project management effectiveness has not been adequately analyzed. Lastly, the literature reviewed did not investigate the aforementioned relationships in the case of the Western and Eastern part of China.

For this study, the main contextual gap is defined as the integration of project administration practices in the case of Eastern and Western China. The studies included in this work do not sufficiently support systematization and delineation of the case for project management in the two China regions, in the way that systematization is supported in case of other countries and regions. Although project, industrial, and company specifics support the need for analysis of the two China regions, for the purposes of this study, the case for Eastern and Western China is treated as a basis for potential comparison.

The novelty of this research is to incorporate the integration of agile and lean practices as well as the integration of digital tools, and evaluate their effect on the engagement of stakeholders and the effectiveness of project management. The integration of the practices under study reflects the understanding of the authors that in certain contexts, especially in project management, the three practices may be interrelated and complementary. Therefore, the propositions are intended to stimulate new lines of empirical work, and they are not intended to reflect hypotheses that have been previously established by statistical methods.

Considering the body of knowledge in the field, an approach to integrate management practices in a flexible manner is valid. Likewise, universal positive effects may not be assumed, and full mediation should not be assumed either. For similar reasons,

a regional gap in management practices may be expected. The above permits the definition of the methodology and evidence synthesis used in the following chapters of this work.

4. RESEARCH METHODOLOGY

This study takes an integrative approach to the research design to develop a synthesis of academic studies focused on agile and lean management, integration of digital tools, stakeholder management, and the art and science of efficient project management. This approach was taken to integrate and synthesize research streams rather than to merge and integrate individual research findings. The review is aligned to the PRISMA 2020 transparency standard to enhance transparency with respect to search strategies, evaluation of studies, and integration of research (Page et al., 2021).

The author of this study searched for scholarly publications focusing on the introduction and implementation of agile and/or lean management practices in China's industrial projects, Digital transformation in project management, stakeholder engagement in the context of project management and project success, as well as project management effectiveness in China.

Further search combinations focused on interdisciplinary and integrative practices between lean and agile management. Other search combinations focused on the integration and interrelationship between digital management practices and stakeholder and/or workforce engagement and performance in an organization.

Peer-reviewed journal articles and relevant systematic reviews on the main topics of interest were considered eligible for review. It was desirable that eligible articles contained sufficient detail to allow the description of their methods and the analysis of their findings. Articles of interest that addressed project administration in an indirect manner and articles of insufficient or unclear relevance were not included in the synthesis. It was assumed that articles which did not meet the project administration synthesis criteria would not contain relevant data to address the research questions or enforce project administration assumptions of the study.

The review of the articles was structured to synthesize the objective of the research, the theory, the context and the methods of each article, and to analyze the conclusions and the limitations of the articles. Based on this analysis, particular views on the integration of digital technology and project management were synthesized and differences in agile and lean methods and practices were analyzed.

Research articles were assessed for their contribution to the project and the extent to which they supported the project administration assumptions of the study. Attention was directed toward the clarity of the research questions and methods of the articles, and the transparency of the evidence provided. PRISMA 2020 was used to evaluate and structure the procedures undertaken in this review of the literature. The authors of the research articles assessed are advised to analyze and test the proposed relationships and the mediation frameworks.

5. RESULTS OF THE LITERATURE SYNTHESIS

The literature analysed represents four interrelated areas. First, agile and lean practices comprise different aspects of management. While there are overlapping elements of the two practices, it is generally considered that lean management is more concerned with the elimination of waste and improvement of process efficiency, while agile management focuses on adjusting and responding to changes and feedback (Cruz et al, 2020; Dong et al, 2024).

Second, it is recognized that the use of digital tools to enable project management remains insufficient without sufficient commitment from the organization. One of the most cited articles included in this research (Chen et al, 2025) reviews 66 articles and identifies important elements of sociotechnical integration in project management, including alignment of governance and the organization. Lean construction and Building Information Management (BIM) are also recognized to have great synergy and integrate a number of concepts (Michalski et al, 2022).

Third, work management practices are recognized as affecting the outcome of a project, although the emphasis is generally on work project management, rather than practices per se. It is recognized that effective project work management requires clarity on the roles of participants, and may also require flexibility to adapt to the views of participants on project success (Achterkamp & Vos, 2008; Davis, 2014).

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Fourth, the variability of project management requires consideration of differing project situations. Cost, schedule, scope, resources, and project interactions are some of the many factors that may require tradeoffs on a given project. Due to this variability, project-management effect and the resulting outcomes may not be represented by a single indicator.

Each of the previous themes supports the main proposition of the Mother Framework. Adoption of agile and lean practices as well as digital tools and integration of technologies are represented as independent variables; stakeholder engagement is suggested as a mediator; and project-management effectiveness is suggested as the dependent variable. Responsiveness and improvements in the types of information available to project teams are indicated as plausible effects on project outcomes and may occur independent of stakeholder engagement.

As noted, additional caution is required for the situation considered. The documents analyzed in this study do not show that the relationships of interest are more pertinent to Eastern and Western China, respectively, and do not justify consideration of either region as a single entity. Hence, the situations described are maintained as cases to be considered and the situations analyzed are retained as unsolved cases.

6. PROPOSED CONCEPTUAL FRAMEWORK

6.1. Integrated conceptual model

This study integrates the findings from the critical synthesis and develops a new framework to analyze the field of project management in the Eastern and Western Chinese industries. The focus is on three independent variables: adopting agile and lean practices and integrating digital tools. The framework assumes project management mediated by one or more stakeholder groups. The goal is to increase understanding about how effectiveness of project management is accomplished in systems within varying contexts and frameworks (Chen et al., 2025).

Management of varying and uncertain project scope, requirements and schedule may be improved through agile practices. Reliability of project processes and efficiency of project resource utilization may be improved through the adoption of lean practices (Cruz et al., 2020). Integration of digital tools may improve project work coordination and progress visibility (Chen et al., 2025; Michalski et al., 2022).

Coordination may be improved through integration of stakeholder practices and may be strengthened by the use of facilitating aids (Achterkamp & Vos, 2008). Stakeholder practices and coordination of project management may assist in mediating the relationship between the use of various tools and practices. Stakeholder practices may be useful to manage the conflict of goals among various participants (Davis, 2014).

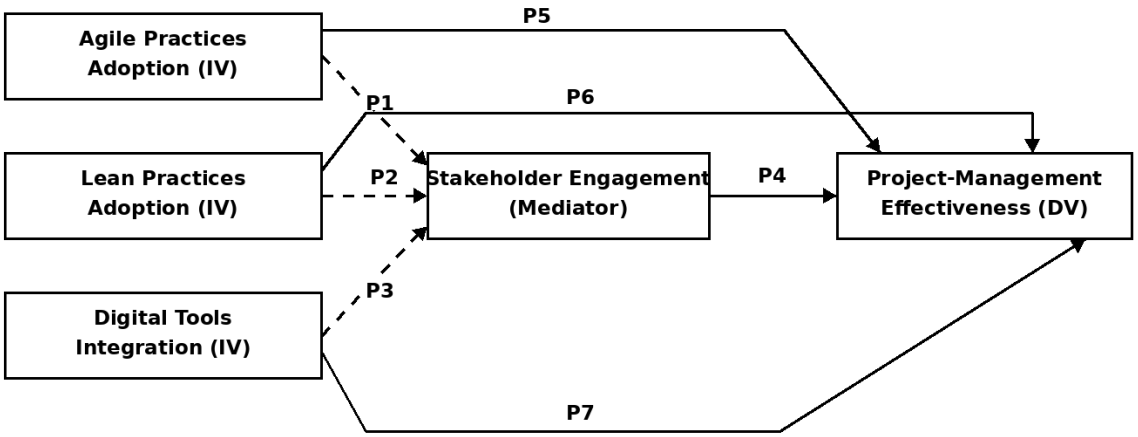


Figure 1. Conceptual framework linking agile, lean, and digital practices with project-management effectiveness in industrial sectors of Eastern and Western China.

In Figure 1, the thin lines P1-P3 show the association between the three main variables of interest and stakeholder engagement. The thick line P4 shows the association between stakeholder engagement and project-management effectiveness. The thin lines P5-P7 show the association between adoption of Agile and Lean practices and integration of digital tools with project-management effectiveness.

6.2. Research propositions

Since this study builds a conceptual framework using a review of the literature, rather than utilizing primary data, the expected relationships are framed as propositions, rather than tested through hypotheses.

P1: It is proposed that the adoption of Agile practices would be related to increased engagement of project stakeholders as a result of iterative and adaptive planning as well as the provision and receipt of feedback (Dong et al., 2024).

P2: The adoption of Lean practices would also be related to increased engagement of project stakeholders as a result of joint work to identify and address gaps in the project process as well as and the formation of a project process flow (Cruz et al., 2020).

P3: The use of digital tools to integrate and facilitate stakeholder engagement would also be related to increased project stakeholder engagement as a result of improved visibility to project status, communication and accessibility to project information (Chen et al., 2025; Michalski et al., 2022).

P4: Improved engagement of project stakeholders would also result in improved project management as a result of greater integration and exchange of information and facilitation of the resolution of project issues and constraints (Achterkamp & Vos, 2008; Davis, 2014).

P5: It is anticipated that the use of Agile practices will enhance project-management effectiveness by means of more responsive and adaptive control of projects (Dong et al., 2024).

P6: It is anticipated that the use of Lean practices will enhance project management by means of more reliable and productive use of project resources (Cruz et al., 2020).

P7: The use of digital tools is anticipated to enhance project management by means of improved project-management-related activities and processes (Chen et al., 2025).

Propositions P1 to P3 postulate that the independent variables are responsible for engaging stakeholders, and Proposition P4 is concerned with the connection between stakeholder engagement and project-management effectiveness. Proposition P5 to P7 stipulate the anticipated relationships. With this framework, other researchers are able to explore the same direct effects and/or effects through stakeholder engagement. The propositions are anticipated effects and should not be misconstrued to be results of empirical analysis.

6.3. Regional contextual considerations and methodological implications

The project-administration practices captured in the case studies are set within real-world organizations and industries, and are thus subject to a range of local and regional constraints. The case studies encompass a range of industries and infrastructure conditions within Eastern and Western China, and consider local supplier and contractor networks and the level of industry and technological capabilities.

Those networks and relationships enable the adoption of lean and Agile methods, integration of digital tools, and the use of information systems for project coordination and control. Conversely, some organizations may need to improve the interconnection of their work processes and integrate digital systems to align business processes and improve the quality of data and business information.

The lean and Agile balance for a given project may be determined by the extent of the project's and the organization's flexibility, and the level of uncertainty of the project's technical requirements and the regulatory environment (Chen et al., 2025; Dong et al., 2024).

The framework, from a methodological perspective, allows the definition and measurement of key constructs for research, and identifies areas for the development of other research-related methods and tools. The direct and indirect relationships may be tested and evaluated using construct and instrument validation and based on the assumptions and limits of the selected research

methodology. The framework allows researchers to identify sample and control biases and develop comparative research designs in the region of interest.

Eastern and Western China are placed within the systems framework, and not in predefined categories of project management performance. The industrial and digital infrastructures, organizational and talent resources, and the supplier base of a region or country may influence the application of lean and agile practices as well as the use of digital tools and systems. The conceptual synthesis is not sufficiently developed to speculate on such influences.

It is recommended that future research looks into a limited number of regions or industries using a uniform set of indicators. Such research should examine the effect of enterprise size, sectoral and regional situations, and the maturity of the regions in the use of information and communications technology and other enabling digital infrastructure. Until such research is conducted, it would be best practice to analyze and interpret research findings based on the regional situations of focus and consider context as a variable of the research, not as a source of fundamental and underlying assumptions.

7. DISCUSSION

In the project management framework and practice, integration of systems is required to enable the use of agile, lean and digital practices in conjunction with stakeholder engagement. The research framework and practices integrate the various research and project management practice strands to provide possible relationships that may exist within organizations. The research framework proposes areas of relationship. Further research may help to test the validity of the framework.

7.1. Theoretical contribution and comparison

The first contribution is the integration of adaptive management, management processes, and digital management in one integrative management framework. The meaning and definition of agile project management is analyzed in Dong et al. (2024). Cruz et al. (2020) cover traditional, agile and lean management methods and provide a theoretical frame to analyze and define the principles of management and the lean system. The present integrative management framework builds on this work and focuses on industrial project management.

The second contribution is linked to the role of stakeholder management. Achterkamp and Vos (2008) analyze case studies where project success was achieved due to effective stakeholder management and alignment. Davis (2014) provides case studies where project success was achieved in the presence of a conflict and opposition among stakeholder groups. The framework suggests that management practices facilitate stakeholder engagement, and specifies that the integrative nature of stakeholder engagement, management processes and project leadership influence the outcome of the project.

The last contribution focuses on the combination of management and digital integration. The integration of management and digital integration in project management is analyzed in Chen et al. (2025) and Michalski et al. (2022). The framework outlines how integration of digital, management and project integrative processes can be embedded with stakeholder management processes.

Importantly, the framework does not suggest that engagement of stakeholders is the only mechanism through which the outcomes of agile practices, lean practices and digital integration are realized. Any of the three practices could impact outcomes of a project through multiple pathways. Understanding the different pathways allows other researchers to examine the nature of the relationships between the three practices and the outcomes of the project, and the mechanisms through which these relationships operate.

7.2. Practical implications for industrial project administration

With respect to industrial/commercial project administration, the model says that project administration teams should consider agile and lean ways of working as complementary ways of working. As described above, the use of agile ways of working may improve the reliability of adapting to changing requirements, while the use of lean ways of working may help increase the reliability of the workflow and improve the removal of waste. The combination of the two should be considered to address the uncertainty in the project and the constraints in the way the work is organized. (Cruz et al., 2020; Dong et al., 2024).

With respect to the use of digital technologies, the model suggests that organizations should evaluate the digital tools they use to support the management of project activities, and remove the need for management to repeatedly assess the same activities.

This framework is primarily regionally useful in its potential to facilitate culturally sensitive research. It may, however, be useful in other regions beyond East and West China. Depending on varying industrial and country conditions, relationships postulated in this research may behave differently. Whether relationships identified in this research are East or West China-specific remains unanswered. Researchers interested in further identifying such regional China-specific differences should, however, include adequate controls to account for the variability in firms operating in different sectors.

Management philosophies applied by firms in different regions of China may also differ to explain differing sectoral conditions. Changes in the industrial and economic conditions, infrastructure and enterprise environments may necessitate different structures, policies and management systems. What works for one region may not be appropriate for the other. For sustainable competitive advantage, each firm has to determine the best management systems for its own environment and not depend on the assumption that what works for firms in the other region of China is appropriate for it.

Finally, the review process has not created a full, repeatable record of Scopus screening. Therefore, the paper cannot declare coverage of all Scopus-indexed research, and screening results should not be reported. Additionally, the framework lacks clear, measurable differences between regional divisions of Eastern and Western China. Reliable evidence should be collected and controlled for sectoral and organizational differences to support comparisons.

7.3. Limitations and research implications

The main limitations of this study arise from synthesizing existing literature rather than conducting primary research. As a result, some relationships may be hypothesized rather than proven. Second, research in different sectors and disciplines use different methods and definitions of success. The results of this study may only be applicable to projects similar to those researched, including similar sectors (e.g., Construction vs. Manufacturing).

Third, establishing a standard, replicable record for the review of Scopus literature may not have been completely extensive and, therefore, the framework of this study should not claim to have covered the entire body of Scopus literature. Furthermore, the framework does not prove the existence of regional differences, only that the Eastern and Western regions of China are pertinent.

In the future, research should focus on collecting primary data from industry to validate measurement tools. With adequate data and research design, relationships between Agility, Lean, Digital Integration and Project Management and the outcomes of Stakeholder Management may be evaluated. Analyses of this nature may be extended to different geographic regions in China, particularly Eastern and Western China.

8. CONCLUSION

The goal of this study is to develop an integrated systems framework for project-management in the case of companies in Eastern and Western China. The framework focuses on integration of Digital tools and Practices, Lean practices, Agile practices, and Engagement with Stakeholders. Project-Management effectiveness and efficiency is the dependent variable.

The literature synthesis suggests that the application of agile behavior may lead to better adaptability and absorption of feedback, whereas the application of lean behavior may improve process efficiency and reliability. Digital integration may help with information and activity coordination. These behaviors may be further articulated through the engagement of project stakeholders. Other factors may also influence the degree of integration of these behaviors with project outcomes. This includes the in-built flexibility of the organizations' processes and routines.

The main contribution of the study is the development of a unified framework that incorporates the above-mentioned behavioral integrations. The study shows that in Eastern and Western China, there is a need to integrate the various interventions into management, technology, and people in an appropriately contextualized manner. Findings should not be interpreted to mean that management, technology, and people integrations vary from one region of China to the other.

The behaviors integrated in the framework should be examined in combinations, and especially through comparative studies of units within the same or allied industries. It is also necessary to explore the interactions of the framework with variations in the nature of technologies, stakeholder configurations and project complexity.

The methodology integrates management, technology and people integrations in a manner that enables future researches to build on it and explore other similar coordinated" and integrated industrial project administration.

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