

Agile Approach - Study of Project Management Methods in the Banking industry

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Abstract

The concept of “Agile” originated nearly three decades ago from the software development and project management disciplines and existing presently in diverse forms and levels is an intriguing research arena that has wider scope and implications. Agile as a method has germinated into various forms such as scrum, kanban, scaled agile framework (SAFe), large-scale scrum (LeSS), spotify model, continuous integration, scaled agile lean development (SCALeD), and many more. Agile initially adopted in an isolated software development and team level, has over the years progressed into projects and programs, and furthered into solutions and portfolios, and achieved full-service expansion into an enterprise level framework. It has been proposed in this article to undertake a novel approach to survey the literatures of agile methods, models, and practices from software development and modeling to large-scale case study organization levels in a less explored banking and financial services sectors. Outcome of this study highlights the causal factors, best practices, benefits along with learnings that practitioners of banking and financial services sectors could adopt and envision a streamlined agile implementation.

Keywords

Agile Methods, Banking, Agile Software Development and Project Management, Large-scale Agile Case Study

1. Introduction

Agile is the buzzword of 21st century that has its roots in software development domain (Gerster et al., 2019) has invariably caught the attention of practitioners from diverse industries and practices. The term “agility” is referred as a real-time software development method that engages in simultaneously creating and learning from client induced changes and adding value to client engagements through continual components development (Mikalsen et al., 2018). Agile methodology has been restructured into various models based on features, types and velocity such as scrum, scaled agile framework (SAFe), kanban, spotify model, and so on. PMI defines “project management as a specific management action that contributes to the execution of a process and that might employ one or more techniques and tools” (PMI, 2008, p. 433). Agile project management is defined as “an approach having a set of principles with the objective of delivering the project management in a much more flexible and iterative manner to reap benefits of highly innovative and valued products for customer with exemplary performance in terms of schedule, budget and quality” (Conforto et al., 2014). Agile method got introduced as a siloed software development methodology has over the years progressed into projects, cross-functional solutions, portfolios, and as an enterprise level guiding framework.

Banks are highly regulated and complex institutions that has diverse functions and social responsibilities. Banking functions characteristics are well-structured, traditional approach and the services necessitates inculcating high levels of trust, whereas agile methods perform iterative updates and continuous releases. A working agile framework (Figure 1) from one of the leading financial institutions has been presented in a logical architecture based on the real experience of the author of this study from the information technology industry during 2018.

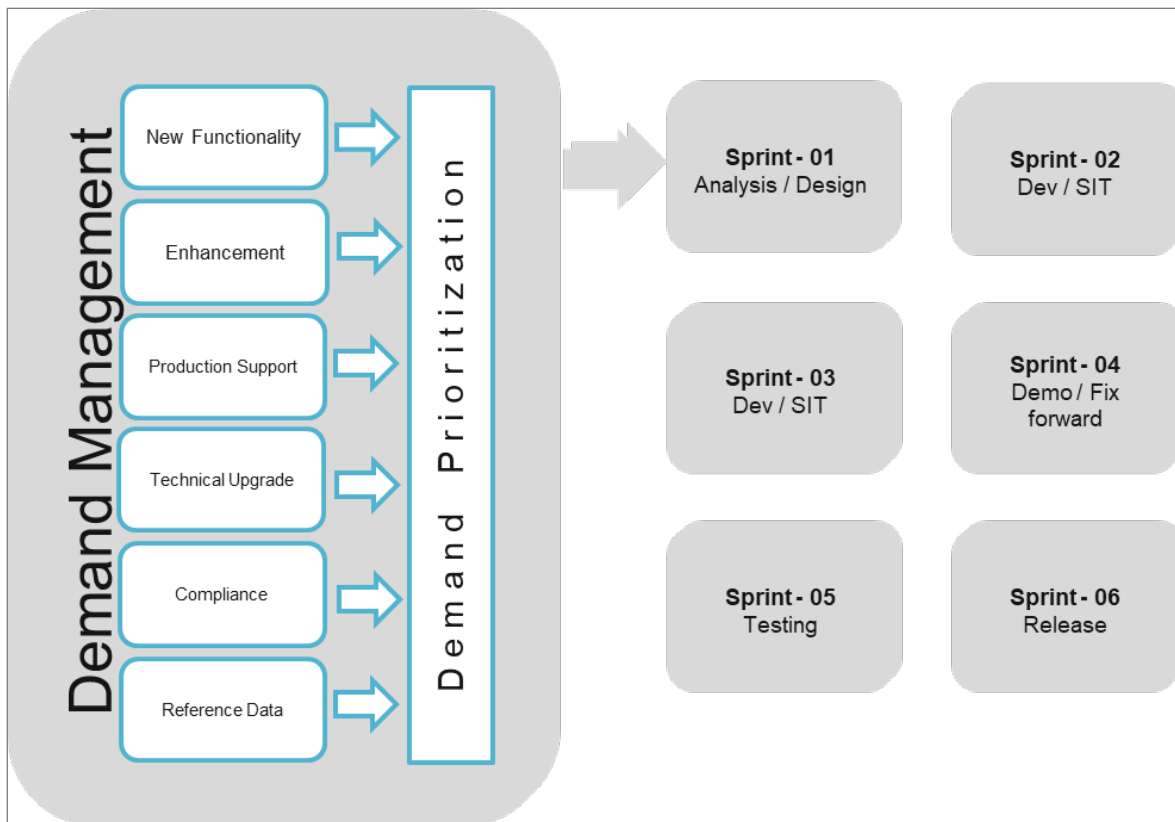


Figure 1: Architecture diagram of an agile framework for a bank (based on author’s work experience)

Banks use many agile methods, however, SAFe is the most frequently used method. SAFe is defined “as a set of principles and practices that aims at scaling agile methods for large organizations and has an implementation roadmap to guide organizations on how to go through the transformation” (Sara et al., 2021). This discrepancy in the approach to implementation between banking functions and agile approaches raises research questions and unfolds opportunity for a detailed review of literatures to understand about the Agile fitment factors in the Banking and Financial Services (BFS) sectors.

Research questions pertinent to this study has been stated below.

RQ1: What are the limitations of survey of existing literatures in Banking and Financial Services sectors?

RQ2: Are there best practices in the existing literature that could be harnessed for the BFS domains and remedial measures that could be envisioned from the challenges?

RQ3: Agile works on continuous updates, whereas Banking frameworks are more structured and works in a traditional approach, what success attributes makes this confluence of Agile methods and Banking functions work?

Based on the initial literature review and the resulting research questions, the objective of this article has been postulated to undertake a novel approach to survey the literatures of agile methods, models, and practices from software development and modeling to large-scale case study organization levels and deduce various causal factors, challenges, benefits, and learnings for practitioners of BFS sectors to envision successful Agile implementations.

2. Literature Review

In the initial stages before developing the literature search strategy, there were many available literatures in general about agile methods for software development and project management. After defining a literature search strategy and keywords filtering criteria like “agile adoption” and “banking” (discussed further in Methodology section), lesser number of articles were listed in the public domain that matched with the research objectives of this study. In congruence with the evolution of agile methodology that originates from software development and modeling of projects, this paper has pursued a systematic and detailed survey of literatures titled in subsections such as agile

software development and modeling domains and, expanded to methods, projects, programs, solutions, portfolios, and enterprise frameworks.

Agile Software Development and Modeling

Conforto et al. (2014) has postulated in their landmark article of an exploratory survey on agility for traditional non-software industries that agile project management is a culmination of a collection of software development methods written for the software industry and refer to some noteworthy books that points to many forms of agile software development such as dynamic system development method, extreme programming, scrum, and, adaptive (lean) software development as testimonies for the origination of agile project management from the application of agile to software development projects. This unique paper conducts an investigation to identify agile practices and enablers in a non-software industry, and innovative project situations. Authors of this landmark study conducted systematic literature review and selected six agile project management practices such as use of product vision concept, simple project plan communication tools and processes, iterative planning, self-managed and self-directed teams in development, monitoring and updation activities of the plan along with frequent monitoring and updating of processes. Results of this exploratory survey demonstrates that four agile project management practices most frequently utilized by non-software companies with reference to project plan were, updation frequency, use of minimal textual description to refine the project plan, coordinated and mutually responsible teams for plan development, and variance of iterative planning applied. They are in congruence with agile project management theory and are sliding towards the blended management practices, that is, traditional combined with agile management practices. Findings of this survey evidences ten agile project management enablers of companies from other industries preferring agile approaches as a testimony such as having cross-functional teams with an experienced project manager, some fewer formal processes and autonomy for teams, while developing innovative products in a dynamically changing projects, despite negative effect of challenges on agile implementation. Authors conclude positive results of this exploratory study that agile project management approach could be adopted in non-software companies (traditional large-scale industries) involving innovative projects and project initiatives that requires flexible management approach.

Yang and Yao (2014) in a detailed study on continuous integration in JP Morgan Chase bank (JPMC) has demonstrated that agile is a flexible approach to dynamic changes and agile software development and project management is a robust solution for addressing the weaknesses of Waterfall or other sequential project management methodologies. This bank case study has embraced the cutting-edge agile practice of continuous integration that works on automating the requirement changes in a real-time mode by integrating them immediately through automated build, test and deploy processes. In a step further, authors of this study restructured the bank's technology components and reengineered the information technology platform by merging the regression testing component that was earlier part of quality assurance into the automated software development lifecycle with the highly optimized continuous integration technique (as shown in figure 2 adapted from Yang and Yao, 2014). This new platform of JPMC has found to be schedule and cost-effective during deployment and testing.

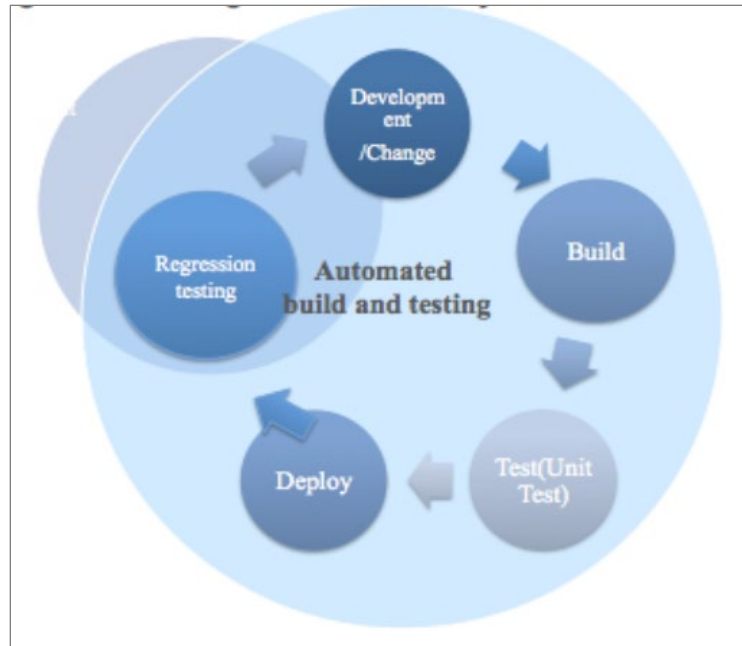


Figure 2: Optimized SDLC using refactored Continuous Integration (Source: Yang and Yao, 2014)

Mikalsen et al. (2018) indicate in their article, the delivery of working software to end-users in an iterative and periodic sprints with real-time link between business functions and software development as one of the major principles of agile Software development. Gerster et al. (2019) validated in their recent study on the agile adoption and scaling of traditional companies that agile approaches have its origin in software development and the initial contributors of these agile methods prepared the agile manifesto for software development that applies the principles of systems thinking to software development such as developing working software, response to changes and collaborating with customers, and so on. This intriguing paper on agile models, first discusses about a fully agile model and LeSS applied by spotify to embrace agile approaches for their whole enterprise. This model includes squads (single-feature focused cross-functional teams), tribes (independent teams with knowledge sharing), chapters (methodological consistency), and guilds (shared communities), and has been applied by many traditional organizations due to its simple and customizable features. Authors of this case study modifies the spotify template to include sharing of non-core related cross functions such as human resources, legal, financial & control, and so on, to the tribes for helping with consistent architectures and tools across feature squads. It has been demonstrated in this landmark case study article that there is a strong relationship between business model and digital technologies and it is supported by fully agile models. Authors conclude that agility should go beyond standalone structure from information technology architectures to business functions and, finally to the whole enterprise, so that the velocity and flexibility of the results of the organization could be exponentially increased.

Christou et al. (2010) performs an extant study of the effects of combining agile approaches (agile modeling, test driven design, database refactoring and so on) with rational unified process adopted in a small to mid-scale banking project that aims to automate the tasks for managing multiple concurrent customer sessions with a single sign-on feature and replacing the traditional client-server-based architecture to service-oriented architecture. It has applied the agile unified model to this banking project and achieved significant benefits from implementing and reporting this novel approach. This unique case study states agile modeling as a collection of principles, values, and practices to software modeling in a light-weight manner and categorizes the combined agile unified modeling with four key phases such as iteration, elaboration, construction and transition, along with seven guiding principles with features such as high-level process training, concise documentation, focused activities, and customized processes. Authors of this novel research article have demonstrated that agile modeling key principles of honesty and open communication were adapted by the project team and, organizational culture and teams have undergone a major transformation from a traditional prescriptive process to a much more flexible agile unified modeling approach to achieve better customization of the case study bank's information technology projects.

Adopting Agile Methods and Project Management in BFS sectors

Roses et al. (2016) in a qualitative survey that assesses the degree of favorability conditions in the adoption of agile methods while developing software and managing projects highlights that those organizations with lesser hierarchy, flexible communication, people-orientation, customer involvement, and having projects with frequent changes in requirements are much suitable for agile methods adoption. Based on the extant quantitative and qualitative analyses of this study, it is evident from various practices, perspectives and dimensions that the overall score of degree of favorability is low (4.39) to the adoption of agile practices in the bank's information technology projects. In spite of this concern, both the administrative dimension (use of methodology, methodological flexibility and implied or undocumented knowledge) and processes dimension (problem solution subsection - incremental development, requirements subsection - rigor in definition of requirements and multidisciplinary teams) either strongly favors the adoption of agile method practices or to review the current method to formalize the required practices in the bank's software projects. Authors have analyzed the results and found that the research model suggested demonstrated moderate favorability for adopting agile practices and co-existence of traditional and agile methodical practices in software development in the case study bank, although there is no significant dependability of bank's businesses with agile methods or other approaches.

Mikalsen et al. (2018) has empirically studied about the key interdependencies of agile digital transformation in a large-scale case study bank by applying agile and bizdev methods, the implementation of which is discussed in detail in this landmark article. These methods were selected for the case study bank's digital transformation as they are characterized by autonomous and diverse teams, and experimental development with the aim of achieving faster time-to-market and customer centric digital offerings. However, increased autonomy and diversity may lead to interdependencies such as continuous negotiation of boundaries (goals and tasks) within teams, and between teams and the rest of the organization. Authors of this significant case study refer to another review study that illustrated the major challenges of implementing a successful enterprise-level agile transformation such as interactions with multiple teams across organizational boundaries and integration of peripheral functions like customer service and business development.

Based on the findings of the interpretive approach of this qualitative case study, three dynamic interaction-based interdependency themes emerged such as, co-located agile bizdev teams, negotiating goals within teams, and negotiating tasks and resources across teams. Agile bizdev teams applied scrum for work break down into sprints with continuous interactions and kanban for continuous planning and estimation, delivery of prioritized work and, conducted frequent user story mapping sessions to explain on the user's product journey on an ongoing basis using a visual model. Authors of this breakthrough case study article found key observation from negotiating goals within the teams (second theme) that the diversity of goals and tasks of individual team members have increased in spite of the team's common goal of agile approach implementation. Another key finding from negotiating tasks and resources across teams (third theme) is that the agile bizdev teams had to negotiate their prioritized tasks and have periodic meetings with the members of supporting groups such as customer service, marketing, etc., for a better understanding of their work to develop working relationships. Authors of this landmark case study paper have demonstrated that agile and bizdev methods significantly aids in implementing the digital transformation with its diverse teams negotiate and identify each other by their goals and tasks within teams and across other groups using primary documentation such as requirements specification, digital transformation offerings and solutions, and communicative tools.

Beerbaum (2019) evaluated the fitment of agile methodology to regulatory compliance projects for a single qualitative financial services case study and illustrates from another accounting regulatory study that the advantages (collaborative, flexible, individual autonomy, social autonomy, streamlined deployments and increased productivity) exceeds disadvantages (incomplete documentation, unable to realize a solution, and inadequate testing), as there is a progress to become the state-of-the-art dominant project methodology. It has been discussed in this article that agile project management adhere to a continuous innovation, people and process adaptability and helps to deliver innovative products to customers under highly uncertain conditions. Specifically, due to higher risk of regulatory compliance agile projects, there is a need in providing real value considering the different sprint cycles, as they are primary components of the agile scrum methodology. Author of this detailed case study concludes that agile methodology for regulatory compliance projects has significant advantages such as, high flexibility, planned deployment and testing, team independence due to immediate feedback, highly result-oriented and that overweigh challenges such as no beta implementation, regulatory requirements do not require frequent refinements, banking and financial services sector requires evolutionary building of agile projects.

Bruhl (2021) conducted a structured survey to investigate the level of adoption of agile methods in projects and tools preferred in some leading german banks and categorized based on the bank's experiences and success factors of multiple agile methods. It has been observed that agile scrum is the most preferred approach in german banking sector due to its many benefits such as acceleration of projects deployment, cost savings, better quality and innovative

performance. However, it is prudent from the article that fintechs have higher exposure of applying the agile methods in information technology projects than banks due to the legacy IT issues and other complexities of the banks. Based on the findings of this qualitative survey study it is demonstrated that the german banking sector is either in a learning stage of implementing agile methods or to prefer using more familiar, non-agile methods in many projects. Author have illustrated that an agile mindset is a strategic asset to enhance competitive position in a rapidly changing environment of frequent disruptions and german banks have to adopt the agile methods with an agile thought leadership in order to regain market share from fintechs in multiple segments.

Dhevina et al. (2021) performed a systematic review of literatures to analyze the agile adoption challenges and solutions in banking domain across geographies and mapped their insights into nine PMBOK knowledge areas. This paper has discussed in length about the challenges categorized into each PMBOK knowledge area indicated within parenthesis such as difficulties in transitioning from legacy to agile at the architecture and system levels (project integration), prioritizing changing business requirements and unclear user stories (project scope), downtime frequency and schedule slippages (project schedule), legacy maintenance costs and high-cost automated testing systems (project cost), stricter quality assurance and regulatory requirements (project quality), inadequate skilled teams and unclear responsibilities (project resource), misaligning team goals with organizational goals and communication lapses (project communication), inadequate risk and impact identification (project risk), top management engagement and complex products (project stakeholder). The merits of adopting the agile scrum method has been indicated by the article that scrum and sprints helps to speed up the changing customer requirements, uses automated testing to rapidly meet the delivery date, increases the cost efficiency and improves the quality assurance. It has further been discussed that large-scale financial institutions could make use of SAFe framework and SATP (Scalable Agile Transformation Process) for phased agile implementation. Authors have comprehensively provided solutions for each PMBOK knowledge area, some of them are discussed such as facilitating the current conditions (upgrading the legacy system and team collaboration), incorporating the agile approach in an incremental manner with the help of a formal agile steering committee and an agile coach or subject matter expert as product owner for restructuring the traditional projects, creating agile workspace and knowledge repository of agile related activities, and reaching a common understanding on the agile methods and implement COBIT (an international standard for IT management and governance) to identify risks and mitigative controls.

Factors triggering large-scale Agile Implementations in BFS and Traditional Industries

Stettina and Horz (2015) conducted an empirical study in fourteen large organizations from multiple sectors and geographies that have been applying agile methods to project portfolios and evidenced that organizations either combine their traditional portfolio management framework with the flexible agile framework or applying hybrid methods such as agile scrum and kanban together. This article has charted the challenges in the implementation of agile processes including difficulty in aligning them with existing processes, lack of commitment at senior level, and the need for a different approach to resource allocation (fewer projects at a time, enabling greater focus) and demonstrated that these challenges were significantly outweighed by the advantages such as greater alignment to customer needs, greater transparency for planning purposes, and improved cooperation and efficiency. Authors have categorized the analysis of the findings of applying the agile methods into four practice domains namely project management at the operations level, portfolio prioritization, portfolio collaboration, and strategy at the senior level. Application of agile approach to project management involves autonomous teams employ iterative practice of periodic meetings at operational level, and requirements backlog derived from a prioritized list organized at the portfolio level. Based on the results and analysis, some of the major agile practices at the portfolio level illustrated are, scaled agile method, increased frequency of collaboration within teams and external groups, periodic portfolio status meetings, integrating projects as one portfolio and, focused project teams for information technology enablement and efficient resource utilization. Authors have enlisted that the primary benefits of agile methods to project portfolios are close coordination among management domains, appropriate planning, better understanding of customer requirements, and increased efficiency, whereas lack of senior management commitment towards agile methods has been demonstrated as a bottleneck for agile practice in strategy domain. This landmark study has identified the information technology governance mechanisms for agile projects, strategic management, hybrid approaches, and comparing the agile practices to the portfolio management case studies in multiple sectors as future avenues of research.

Serrador and Pinto (2015) in their large-scale online survey study (with the help of PMI Inc. and other platforms) quantitatively analyzed more than one thousand projects in diverse sectors and geographies about the benefits and detrimental effects of applying an agile method of project management as against the traditional methods. In this landmark study participants were asked to describe one highly successful and one less successful project they worked. Successful project is defined by authors of this article as whether the project has met its allocated goals, schedule, budget and the requirements of customers. Based on the findings and analyses of this article, authors have

demonstrated that multiple factors through which projects could achieve benefits and success by adopting agile methods are existence of a strong positive correlation between agile methods and projects success, flexible and adaptive to changes throughout the project life-cycle, continuous planning of project schedule, milestones, effort and activities, iteratively develops the software so that the technology being built works in all scenarios, setting feasible and quality goals. Authors have demonstrated that industries that highly use it such as software, healthcare, technology and professional services are likely to succeed due to its first-mover advantage, and achieve customer defined goals, schedule and budget milestones. Future research identified by this article are empirical validation of large projects implementing agile methods is essential for proving its usefulness and limitation of this study is that the project team's exposure in similar flexible methods is not related to agile project's success.

Dikert et al. (2016) performed a systematic review of literatures on the scale of adoption of agile methods and lean software development by focusing on challenges and success factors in the agile enterprise transformation. This landmark paper defines "large agile software development as software development organizations with 50 or more people or at least six teams". The challenges in scaling up agile practices to larger organizations with multiple teams based on the findings are, methodology difficult to implement, collaboration issues of agile development function with other support functions such as user experience, marketing, and sales, project non-core teams resisting the change, requirements engineering issues, and lack of empirical guidance. Authors have also enlisted the success factors of agile method adoption such as easily customizable, support from management, strategic alignment and agile mindset, appropriate coaching, and pilot study for initial acceptance. It is noteworthy that this landmark review article concludes that there is insufficient research conducted in this topic that misleads the practitioners to some inaccurate challenges and success factors.

Denning (2017) engages in a deeper exploration of the opportunity of enterprise-wide strategic agility and found that speed and customer relationships are some of the new frontiers of strategic agility based on the review of literatures. This paper illustrates that agile adopted organizations have mastered the three laws such as: law of small team, law of customer and law of network and, the objective for senior leaders initially should be to gain sufficient experience in operational agility and then move on to strategic agility. Author refers to a scrum survey that depicts majority of the agile teams feels the stress on the approach of the teams and the manner in which the organization operates and confirms that agile method and agile mindset should be inculcated to benefit from both operational agility and transform to strategic agility in an incremental approach for opening up new markets and products. This breakthrough article tables the sector specific companies that either got redefined and crossed the boundaries to other industries using agile mindset and methodology or transformed by the technology change. Author refers to a survey report and concludes that in order to achieve strategic agility, companies need to build a culture of innovation and aligning with the strategy of the whole enterprise rather than gaining small improvements with research.

Birkinshaw (2018) illustrated agile as a management practice with reference to ING bank case study that has adopted agile approach (across its operations in Amsterdam). Author signifies that studying about the agile implementation across ING bank is noteworthy and would be a highly useful case study for other organizations to pursue its approach. It has been demonstrated in this article that the case study ING bank, being a first-mover in internet banking, had a greater advantage by restructuring its traditional banking and savings business and, redesigned the whole bank branch in Netherlands into flexible team (using spotify model) responsible for specialized customer related activities resulting in higher savings and lesser costs.

Author of this article has enlisted the agile implementation learnings of this case study bank into five broad categories as follows:

1. Senior management willingness to hand over some of the responsibilities and some aspects of authority to the operational teams that implements the agile approach in their projects, leading to major restructuring of senior management personnel.
2. Assuring the stakeholders about the agile transformation entails explaining that the whole enterprise requires to transition to this cutting-edge approach for competitiveness and authorize junior staff with higher responsibilities. Specifically, regulators were demonstrated in-person about the continued operations of support functions in a traditional manner.
3. Develop an organizational structure (agile squads and tribes) focusing to serve customer needs to manage any one-off project.
4. Create ambitious performance goals with the help of quarterly tribe leadership focus group meetings and top management's continuous guidance and oversight on the goals framework.
5. Defining roles such as product owners, agile coaches, and chapter leads and clearly specifying their responsibilities to ensure the agile team members are fostered with well-defined career direction and appropriate coaching to achieve their career goals and responsibilities.

This landmark case study bank has clearly demonstrated the challenges, benefits and best practices of agile adoption and provides a benchmarked management framework for the leaders from financial institutions and other industries to get real-time experience of agile adoption in a large established financial institution.

Akim et al. (2019) has undertaken a qualitative case study research design to investigate the adoption of agile methods in a central bank's information technology department transitioning from an origination phase to an execution phase. Author of this case study points to the learnings from the review of literatures that when an agile method is first introduced to an organization and its practices, it is prudent that the adoption process under the analytical framework gives lesser insights about the different decisions made during the different sequences of agile method adoption. Based on the findings of the study, the agile project management lifecycle in the case study bank has been categorized into three sequences: initiation of multiple agile frameworks, decision using experimentation of a formal internal agile framework through rigorous training (from different agile practices), and implementation by simplifying the existing internal agile framework into a set of 14 agile practices and projects. This paper analyzed that the scaled agile framework has been experimented for various agile projects to broaden the scope of agile practices and upskilling the IT team members. The CMMI assessments that have been conducted in the second phase have demonstrated a positive effect of internal agile project management framework on bank's software projects. As part of the generalization plan of the case study bank, an agile centre of excellence has been created and engaged in agile and business alignment, cultural awareness and restructured the purchase management and human resources management. This breakthrough case study paper has determined key inputs for larger agile projects success criteria such as positive outcomes of experimentation (validation of new agile approaches), enterprise-wide agile adoption, quantitative and qualitative data and senior leadership support for large-scale agile implementations.

Sara et al. (2021) conducted a qualitative survey to study the main challenges with scaled agile framework-based transformation at a large full-service bank and compared the findings with experience reports from other banks as well as with research on SAFe transformations in other domains and enlisted some common and banking industry-specific challenges on account of the findings. The case study bank has been transitioning to SAFe with some agile release trains and it has selected SAFe due to its highest chance to be accepted and trusted by decision-makers as well as the standardization of roles and practices making it easier to both educate employees and recruit new ones.

Sara et al. (2021) refers to SAFe defined guidelines for four defined levels of the organization such as team, program, value stream (solution level), and portfolio that has been discussed as follows:

1. At the team level, the scrum master, agile teams, and the product owner are operating and delivering working systems at least every two weeks.
2. At the program level, the agile teams are coordinated by an agile release train that focuses on creating artifacts such as a vision, roadmaps, and features.
3. The value stream level is for organizations that require additional roles to integrate the work of complex systems that are dependent on each other. At this level, release management roles work with economic frameworks to coordinate multiple value streams.
4. The portfolio level has the purpose of aligning the value streams from the lower levels to meet the business goals and financial goals of both the portfolio and the organization's overall business goals by program portfolio management. At this level, epics (portfolio initiatives) transcend to all levels of the organization, that is, from the visions of the upper levels to concrete development projects in the lower levels.

Author of this detailed survey paper found many common challenges as outcomes categorized into seven dimensions such as management and organization, education and training, culture and mindset, requirements engineering, quality assurance, and systems architecture. Some of the banking industry-specific challenges due to big transformations includes external regulations complicating transitions, and adventurous for the external stakeholders. This landmark paper concludes that there are some significant challenges such as technical and architecture issues, goals alignment and target optimization for the whole organization.

3. Research Methodology

This article has undertaken a novel and systematic survey of literatures by searching the renowned research databases such as elsevier, sciencedirect, mdpi, emerald, springer, scholarspace, researchgate, ieeexplore, scielo and so on. Based on the goals of the literature survey, search strategy has been determined and the relevant articles for review has been discovered based on the keywords such as: "agile approach" or "agile project management" or "agile adoption" and "banking" or "banking industry" "financial services" with the search period set as 2010-2022 that covers a decade of recent articles for review that correlates with the origination of state-of-the-art Agile techniques such as SAFe, Continuous Integration, LeSS and so on. It has been observed from the search results for the defined search criteria and time period that there were countable number of studies (56 articles) pertaining to agile adoption

in Banking and Financial Services sectors. These articles were downloaded for evaluation leading to a definite set of 16 articles qualifying the search criteria and set objectives (as shown in Table 1) to draw further insights on the research topic.

Table 1: Search Database Results based on search criteria and objectives

Search Database	Number of Papers
Elsevier	2
ScienceDirect	3
Springer	2
Emerald	1
IEEE Xplore	1
ScholarSpace	1
SINTEF Open	1
SciELO	1
MIT Sloan Management Review	1
ResearchGate	1
Journal of Applied Research in the Digital Economy	1
Other: JP Morgan Chase Bank	1
Total	16

Based on the causality and case study approaches of the selected articles, deductive causal inference methodology has been selected. According to the Chapter on Deductive Approach by Dudovskiy, J. (2022), “deductive causal inference method is defined as developing a general conclusion from a particular causal relationship or case study”. This methodology facilitates this systematic paper in deducing various causal factors, challenges, benefits, and learnings from the selected articles for a novel survey of literatures. The insights resulted from them has significantly aided in categorizing the literature study into three major themes such as agile software development and modeling, adopting agile methods and project management in banking and financial sectors and factors triggering large-scale agile implementations in banking and financial as well as traditional industries, that guided the Author in a detailed approach to analyzing the findings of the literature survey.

4. Results and Discussion

Findings of this novel survey of literatures with the evolution of three major themes symbolizes the original agile evolution in the last three decades that germinated in software development and modeling and expanded into diverse domains such as methods off-springs, project management, cross-functional agility, portfolio-level implementations, enterprise digital adoption and full-service transformations. After synthesizing the evidences from each of the three major themes of literature review, the causal factors and remedies were elicited from challenges and, success attributes and best practices are summarized for analyzing the fitment of the organization towards agile adoption in the banking and financial services domain.

4.1 Eliciting Causal Factors and Remedial Measures from Challenges

There are issues of schedule and cost-effectiveness during deployment and testing while integrating the agile continuous integration method with the traditional framework, for which, optimizing the testing framework is the primary solution. Due to the moderate favorability found in adopting agile practices for those projects where there is coexistence of traditional and agile methodical practices in information technology development, remedial factors identified are, methodological flexibility, implied knowledge, defining requirements with rigor and collaborative teams. agile implementation issues caused due to increased diversity of goals and tasks for team members have to be addressed with frequent negotiation meetings on their prioritized tasks with the members of supporting groups to develop better working relationships. While implementing agile methods in regulatory compliance projects there are challenges due to planned regulatory implementation dates due to which there is less possibility of pilot implementation and regulatory function refinements. Banks in some major geographies are still in a steep learning curve in implementing agile methods and have to adopt an agile mindset to enhance efficiency and competitiveness

against fintechs. There are some specific banking industry challenges that includes traditional banking characteristics and stability implies difficulties for transformation, external rules and regulations complicate transformations in the banking industry, big transformations may adventure the external stakeholder trust.

4.2 Success Attributes and Best Practices for Analyzing Agile Fitment

Based on the findings of multiple literatures there are many learnings, success factors and best practices identified that are useful in analyzing the agile methods fitment for adopting the agile practices in the banking, financial services and traditional industries. It has been ascertained that agile project management approach could be adopted in traditional non-software industries where there is scope for innovative projects with flexible management approach, cross-functional and self-autonomy teams and experienced managers. There is strong evidence showing positive linkages between business functions and digital software development supported by fully agile models as part of agile software development principles. Agile modeling principles of honesty and open communication were commonly adopted by the agile project team in the traditional methods to agile methods transformation. When analyzing the regulatory compliance projects, agile methodology has significant advantages such as, high flexibility, planned deployment and testing, that outweighs the challenges such as no beta implementation, no frequent regulatory refinements. Agile success attributes at the project and program-levels are, strong positive correlation between agile methods and projects success, flexible and adaptive to changes throughout the project life-cycle, continuous planning of project schedule, setting ambitious customer-centric performance goals, and schedule and budget milestones. Adopting scaled agile method, periodic portfolio status meetings, integrating projects as one portfolio, and efficient resource utilization are some of the best agile practices at the portfolio level. Creating an agile centre of excellence and workspace, agile steering committee and agile coach as product owner for restructuring traditional projects, knowledge repository and implementing COBIT to identify risks and mitigative controls are some PMBOK specific solutions. Fostering a culture of innovation towards serving customer needs, senior management willingness to hand over some of their authority and responsibilities, stakeholder engagement, strategic alignment and mindset, pilot study for initial acceptance are some success attributes of large-scale agile projects.

Research findings of the systematic review of literatures has discussed the progression, challenges, remedies, best practices and learnings of agile from software development and modeling to multiple levels (methods, projects, cross-functions, portfolios, large-scale enterprise, full-service and so on) and industries (software development, manufacturing, banking, financial services and so on) as captured in the two subsections of the Section 4 on Results and Discussion. This article's originality lies both in its distinctive approach in reviewing the literatures of agile methods, models, and practices at various levels and, identifying the remedial measures and success attributes of Agile fitment in Banking and Financial Services sectors for guiding the practitioners in planning for successful Agile implementations in the BFS domains as summarized in Table 2 - Remedial Measures and Success Attributes.

Table 2: Remedial Measures and Success Attributes

Agile Method / Level / Industry	Remedial Measures	Success Attributes
Agile Continuous Integration integrated with a Bank's traditional framework	Optimizing the testing framework with Regression Testing to be co-integrated in the Agile framework.	Agile modeling principles of honesty and open communication adopted in traditional frameworks leads to significant transformation.
Favorability of Agile practices adoption in Bank's IT project	Methodological flexibility, implied knowledge, defining requirements with rigor and collaborative teams.	Adaptive to changes, continuous planning of project schedule, setting ambitious customer-centric performance goals, and setting realistic budget milestones.
Agile Project Management approach in traditional non-software industries	Frequent negotiation meetings by team members and support groups on prioritized tasks develops better working relationships.	Innovative projects with flexible management approach, cross-functional and self-autonomy teams and experienced managers.

Planning Regulatory compliance projects	Blended framework incorporating Agile approach and traditional framework addresses both innovation and timelines.	Greater flexibility of Agile methods during development coupled with planned deployment and testing.
Agile adoption in competitive geographies (with reference to German Banking)	Agile mindset across the Bank would enhance efficiency and competitiveness against Fintechs.	Agile CoE, agile coach as product owner for restructuring traditional projects, and implementing COBIT to identify risks and mitigative controls.
Agile fitment at the Bank's portfolio-level	Merge flexible agile framework with traditional portfolio management framework or apply hybrid methods such as agile scrum and kanban together.	Integrating projects as one portfolio, efficient resource utilization and periodic portfolio status meetings.
Stakeholder confidence in Large-scale Agile transformations (SAFe, SATP)	Top management involvement since inception and throughout the Agile implementation could foster better customer engagement.	Innovation culture, sharing some responsibilities and authority by Senior Management, strategic alignment, and pilot study for initial acceptance.

5. Conclusions

This paper evaluates in a systematic and detailed approach the earlier studies on agile methods, models, and practices from software development, modeling to large-scale case study organization level in a feeble explored banking and financial services sectors. Findings and analysis of this study highlights that there are multiple challenges, causal factors, remedies, best practices, success attributes that practitioners of banking and financial services sectors need to envision when they plan to adopt agile implementation. Due to the traditional banking values and approaches, there are challenges and impediments in the agile transformation in this sector. Practitioners have to strike a balance in adhering to regulatory complications as well as educating and servicing the customer to create trustworthy and long-lasting relationships when adopting the agile methods, models and practices. The thematic summary of agile implementations using state-of-the-art methods at multiple levels primarily for Banking and Financial Services domains consisting of remedial measures and success attributes (presented in section 4 and its sub-sections) could provide some valuable cues for practitioners to guide with mitigative measures and key success factors towards agile adoption. Literature evidences suggest future research avenues in terms of applying cutting-edge hybrid agile techniques, categorizing IT Governance mechanisms and widening the scope of agile adoption to other industries.

6. References

- Akim, B., Dominique C., Laurent T., Triggers analysis of an agile transformation: the case of a central bank, *Procedia Computer Science*, 164, pp. 449 - 456, 2019.
- Berbaum, D., Applying Agile Methodology to Regulatory Compliance Projects in the Financial Industry: A Case Study Research. *Special Issue for the Journal of Applied Research in the Digital Economy*, 2 (1), 2019.
- Birkinshaw, J., What to Expect From Agile. *MIT Sloan Management Review*, 59 (2), pp. 39-42, 2018.
- Bruhl, V., Agile methods in the German banking sector – some evidence on expectations, experiences and success factors, *CFS Working Paper Series, No. 669, Goethe University Frankfurt, Center for Financial Studies (CFS), Frankfurt a. M.*, pp. 1 – 37, 2021.
- Christou, T.I., Palaiologou, E., Using the agile unified process in banking. *IEEE Software*, 27 (3), pp. 72-79, 2010.
- Conforto, E.C., Salum F., Amaral D.C., da Silva S.L., de Almeida L.F.M., Can Agile Project Management be Adopted by Industries Other than Software Development? *Project Management Journal*. 45 (3), pp. 21-34, 2014.
- Denning, S., The next frontier for Agile: strategic management. *Strategy & Leadership*, 45 (2), pp. 12-18, 2017.
- Dhevina, D., Teguh R., Bob H., Andi W., Fahmi A., Challenges of Agile Adoption in Banking Industry: A Systematic Literature Review. *25th International Computer Science and Engineering Conference (ICSEC)*, 2021.
- Dikert, K., Paasivaara, M., and Lassenius, C., Challenges and Success Factors for Large-Scale Agile Transformations: A Systematic Literature Review, *Journal of Systems and Software*, 119, pp. 87-108, 2016.

- Dudovskiy, J., *The Ultimate Guide to Writing a Dissertation in Business Studies: a step by step assistance*, 6th Edition, research-methodology.net, 2022.
- Gerster, D., Dremel, C., Brenner, W., Kelker, P., How Enterprises Adopt Agile Structures: A Multiple-Case Study, *Proceedings of the 52nd Hawaii International Conference on System Sciences (HiCSS)*, pp. 4957–4966, 2019.
- Mikalsen, M., Moe, N.B., Stray, V., Nyrud, H., Agile Digital Transformation: A Case Study of Interdependencies. *International Conference on Information Systems (ICIS)*, pp. 1 – 9, 2018.
- Roses, L., Windmoller, A., Carmo, E., Favorability conditions in the adoption of agile method practices for software development in a public banking. *Journal of Information Systems and Technology Management*. 13, 2016.
- Serrador, P., & Pinto, J. K., Does Agile work? - A quantitative analysis of agile project success. *International Journal of Project Management*, 33 (5), pp. 1040-1051, 2015.
- Sara, N.T., Piotr, T., Markus, B., Ronald, J., Challenges of Adopting SAFe in the Banking Industry – A Study Two Years After Its Introduction. *International Conference on Agile Software Development, Springer International Publishing*, 2, pp. 157–171, 2021.
- Stettina, C.J., & Horz, J., Agile portfolio management: an empirical perspective on the practice in use. *International Journal of Project Management*, 33, pp. 140 – 152, 2015.
- Yang, Y., Yao, L., JP Morgan Chase Continuous Integration Project: MQP Report, *WPI, JP Morgan Chase Bank*, pp. 1 – 39, 2014.

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