

الجمهورية الجزائرية الديمقراطية الشعبية

People's Democratic Republic Of Algeria

Ministry Of Higher Education And Scientific
Research

Higher National School Of Management

Kolea



وزارة التعليم العالي و البحث العلمي

المدرسة الوطنية العليا للمناجنت
القليعة

MASTER THESIS

Submitted to obtain a Master-ACAD degree in Entrepreneurship and
Project Management

**Effects of Agile Principles on Project Performance with the
Mediating Role of Project Agility
Case study: Marketing Projects**

Elaborated by

Chahinez Chams El Assil OUADAH

Supervised by

Dr. Mahmoudi HACHEMI

Jury members :

Jury president : Dr. Amine FERROUKHI

Examiner : Dr. Mehdi BOUCHETARA

ACADEMIC YEAR: 2021/2022

ABSTRACT

Although many Marketing Managers unknowingly apply agile principles in their project management as proven by the latest agile report, the existent literature reveals a lack of research on project agility, this study examines the effect of agile principles on project performance through the project team members and project agility which will mediate to test the Performance in marketing projects.

the research sample was selected according to a Purposive method, a non-probability sampling, and a quantitative method for a cross-sectional survey, we had to share out the survey online via the Google forms platform the data were collected from 100 marketing project managers.

we found that Agile principles affect project agility, which affects project performance, the results will guide agile project managers, helping team members independently plan work, recruit team members with relevant, diverse skills, and emphasize collaboration with clients, the projects review requirements mostly in under 10 members and less than 6 months.

Keywords: Agile principles, Project Agility, Project Performance, Marketing Projects, Project Management Methods.

RÉSUMÉ

Bien que de nombreux gestionnaires du marketing appliquent sans le savoir les principes agiles dans leur gestion de projet, comme l'a démontré le dernier rapport agile, la documentation existante révèle un manque de recherche sur l'agilité des projets. Cette étude examine l'effet des principes agiles sur la performance du projet à travers les membres de l'équipe de projet et l'agilité du projet qui méditera pour tester la performance dans les projets marketing.

L'échantillon de recherche a été sélectionné selon une méthode Purposive, un échantillonnage non probabiliste et une méthode quantitative pour un sondage transversal, nous avons dû partager le sondage en ligne via la plateforme Google forms les données ont été recueillies auprès de 100 chefs de projet marketing.

Nous avons constaté que les principes Agile ont un effet sur l'agilité des projets, ce qui a une incidence sur le rendement des projets. Les résultats guideront les gestionnaires de projets Agile,

aideront les membres de l'équipe à planifier de façon autonome le travail, recruteront les membres de l'équipe avec les éléments pertinents. Compétences diverses, et mettre l'accent sur la collaboration avec les clients, les exigences d'examen des projets principalement en moins de 10 membres et moins de 6 mois.

Mots clés : Principes Agiles, Agilité du Projet, Performance du Projet, Projets de Marketing, Management de Projet Méthodes.

ملخص

على الرغم من أن العديد من مديري التسويق يطبقون عن غير قصد مبادئ رشيقة في إدارة مشاريعهم كما أثبت التقرير المرن الأخير، إلا أن الأدبيات الموجودة تكشف عن نقص البحث حول خفة الحركة في المشروع، إلا أن هذه الدراسة تبحث في تأثير المبادئ المرنة على أداء المشروع من خلال أعضاء فريق المشروع وخفة الحركة التي ستأمل في اختبار الأداء في المشاريع التسويقية.

تم اختيار عينة البحث وفقاً لطريقة هادفة، وأخذ عينات غير احتمالية، وطريقة كمية لمسح مقطعي، كان علينا مشاركة الاستطلاع عبر الإنترنت عبر منصة نماذج Google التي تم جمع البيانات من 100 مدير مشروع تسويق. وجدنا أن هذه المبادئ لها تأثير على خفة الحركة في المشروع، والتي تؤثر على أداء المشروع، والنتائج ستوجه مديري المشاريع المرنين، وتساعد أعضاء الفريق بشكل مستقل على تخطيط العمل، وتوظيف أعضاء الفريق ذوي المهارات ذات الصلة والمتنوعة، والتأكيد على التعاون مع العملاء، المشاريع في الغالب أقل من 10 أعضاء وأقل من 6 أشهر.

الكلمات المفتاحية: مبادئ أجيل، مرونة المشاريع، أداء المشاريع، مشاريع التسويق، إدارة المشاريع، أساليب إدارة المشاريع.

Acknowledgments

First of all, I want to thank Allah the Almighty for giving me the strength and courage to overcome all the difficulties and challenges to carry out this work.

I would also like to express my gratitude to my supervisor Mr. Fouad MAHMOUDI firstly for his teaching method which allowed me to flourish on all levels, and secondly for his help, availability, and interest in my research work, follow-up, and orientations.

I would also like to thank all my teachers at the ENSM for the quality of their teachings.

A special and sincere thanks to my dear parents, who have worked all their lives to provide me with everything I need and have given me endless love and support. My mother, Mrs. Aida OUADAH who instilled such good values in me, with her presence, guidance, and love. To my father, Mr. Ben-Abdallah OUADAH, who has been a great example and has taught me that perseverance and the will to succeed are essential elements of life, I would never have gotten where I am today without them.

I would also thank, my best friend, my role model, my dear sister Samira OUADAH for her encouragement, love, and presence Without forgetting all the members of my family Mohamed, Adam, and Serine OUADAH and brother-in-law Mohamed DADOUCH, and my grandmothers who were and always be an inspiration to me.

Finally, I would like to thank all those who, from near or far have supported me morally and encouraged me during the development of this model work, especially EMP Girls, AIESEC, and MEW.

Table of contents

ABSTRACT	I
Acknowledgments.....	III
Tables list.....	VI
Figure list.....	VIII
ABBREVIATIONS LIST	IX
INTRODUCTION	1
1. Context and interest of the theme	2
2. Objective	3
3. Research question.....	4
4. Hypotheses	4
5. Research Area.....	5
6. Purpose of the research.....	5
7. Plan announcement	6
CHAPTER I: THEORY FRAMEWORK.....	7
Section 01: Literature review	8
1.1. Agile Approach	8
1.2 the effect of agile principles on IT projects performance	12
1.3. The similarities between IT and marketing projects.....	17
Section 02: Conceptual model	21
2.1. Approach, Methodology, and Principle	21
2.2. The Principles of Agile	25
2.2.1. Client collaboration.....	25
2.2.2. Team autonomy	26
2.2.3. Project team diversity	27
2.3. Project Agility	28
2.4. Project performance	28
2.4.1 Adaptive performance of the project team	29
2.4.2. Project On-time and On-budget	29
CHAPTER II: METHODOLOGICAL FRAMEWORK	32
1. Methodological approach	33
2. Quantitative methodological approach	33
3. Methods and instruments of data collection	33

3.2. Questionnaire	33
4. Sampling	34
4.1 Sampling method	34
4.2. Sample size.....	34
5. Practical modalities of the survey	35
5.1. Research period.....	35
5.2. Administration mode	35
6. Measurement variables	35
7. Method of data processing and analysis.....	37
CHAPTER III: RESULTS AND DISCUSSION	39
1. Results presentation	40
1.1. Sample description.....	40
1.2. Internal reliability analysis	41
1.3. Agile principles analysis	42
1.3.1 Project team autonomy	42
1.3.2. Project team diversity	43
1.3.3. Client collaboration.....	45
1.4. Project Agility	46
1.5. Project performance	48
1.5.1. On-Time project	48
1.5.2. On-Budget project.....	49
1.5.3. Project team performance	50
1.6. Multiple and linear regression.....	52
1.7. Hypotheses tests	52
1.7.1. Test of Agile principles effect on Project Agility	52
1.7.2. Test of Project Agility effect on Project On-time.....	53
1.7.3. Test of Project Agility effect on Project On-Budget	54
1.7.4. Test of Project Agility effect on Project team performance.....	54
2. Discussion	55
CONCLUSION	57
Bibliography.....	58
ANNEX A- QUESTIONNAIRE.....	62
ANNEX C- SPSS TABLES.....	68

Tables list

Table 1: Key Traditional vs Agile approaches	10
Table 2: Key characteristic differences between agile IT and traditional IT projects	11
Table 3: The methodologies of the Agile Approach	13
Table 4: Review of authors who discuss the relationship between Agile and Project agility and performance	18
Table 5: Shared items studied by the authors in the literature review	20
Table 6: Agile values and traditional values	22
Table 7: The agile principles that demonstrate the client collaboration	25
Table 8: The agile principles that demonstrate the client collaboration	26
Table 9: The agile principles that demonstrate the project team diversity	27
Table 10: Variables mesurent	35
Table 11: Respondents' role position	40
Table 12: Project type	41
Table 13: Cronbach's alpha results on the theoretical model	41
Table 14: Project team autonomy KMO and Barlett's test	42
Table 15: Project team Autonomy correlation matrix	42
Table 16: Project team autonomy total variance explained	43
Table 17: Project team autonomy component matrix	43
Table 18: Project team diversity KMO and Barlett's test	43
Table 19: Project team diversity correlation matrix	44
Table 20: Project team diversity total variance explained	44
Table 21: Project team diversity component matrix	44
Table 22: Client collaboration KMO and Barlett's test	45
Table 23: Client collaboration correlation matrix	45
Table 24: Client collaboration total variance explained	45
Table 25: Client collaboration component matrix	46
Table 26: Project Agility KMO and Barlett's test	46
Table 27: Project Agility correlation matrix	47

Table 28: Project Agility total variance explained	47
Table 29: Project Agility component matrix	47
Table 30: On-Time project KMO and Barlett's test	48
Table 31: Project Agility correlation matrix	48
Table 32: Project Agility total variance explained	48
Table 33: Project Agility component matrix	49
Table 34: On-Budget project KMO and Barlett's test	49
Table 35: On-Budget project correlation matrix	49
Table 36: On-Budget project total variance explained	50
Table 37: On-Budget project component matrix	50
Table 38: Project team performance KMO and Barlett's test	50
Table 39: Project team performance correlation matrix	51
Table 40: Project team performance total variance explained	51
Table 41: Project team performance component matrix	51
Table 42: Agile Principles and Project Agility multiple regression	53
Table 43: Project Agility and Project On-time liner regression	53
Table 44: Project Agility and Project On-budget liner regression	54
Table 45: Project Agility and Project team performance liner regression	54
Table 46: Hypotheses tests summary	55

Figure list

Figure 1: Agile vs Waterfall	9
Figure 2: the factors of project agility	14
Figure 3: the factors that project agility effect	16
Figure 4: Theoretical model	52

ABBREVIATIONS LIST

AP : Agile Principles

PA : Project Agility

PTP : Project Team Performance

PTM : Project Team Members

MP : Marketing Projects

IT : Information Technology

INTRODUCTION

1. Context and interest of the theme

The unpredictable speed of change in business and technology has made it progressively difficult for project teams to determine stakeholder and client requirements. In order to be responsive to the rapid changes in requirements, agile project management practices (Cram & Marabelli, 2018).

According to the latest industry survey, the 15th State of Agile Report (2021), many organizations in North America and Europe have widely implemented Agile Project Management (APM) practices. The report also states that APM also applies to other non-IT projects, such as MP, financial services, manufacturing, engineering, and healthcare (15th State of Agile Report).

However, the Standish Group industry report "Chaos2020 beyond infinity" shows that only 31% of agile projects are successful (Calefato & Lanubile, 2020). The report makes clear that ineffective project team composition (i.e., lack of team diversity and autonomy) and insufficient collaboration with clients can lead to project failure. If organizations adopt APM without a clear understanding of what drives PA and the success of agile projects, they may not reap any benefits (Calefato & Lanubile, 2020).

In addition, academic research on project agile practices has largely focused on agile IT projects. Academic researchers have recently started conducting agile research in non-IT projects (Franco & Landini, 2022)

We haven't found any research on large-scale, empirical, and theory-led agile projects outside of IT. Also, in agile IT projects, many studies are descriptive case studies. Their results are not generalizable and very specific (Beck & al, 2001-2019; Ellis, 2016; Dybå & Dingsøy, 2008).

Conforto et al. (2016) argue that "one of the challenges that researchers must overcome is to accurately identify the most appropriate conditions (key agility factors) and management practices to provide project teams with higher agility performance when faced with different environments". Therefore, more theory-oriented empirical research on PA in different agile projects (non-IT and IT), its underlying determinants, and their effect on project success is highly needed (Radhakrishnan, Zaveri, & David, 2021).

Industry report Chaos 2020 shows that ineffective project team composition (i.e. lack of team diversity and autonomy) and lack of proper collaboration with clients are key reasons why agile

projects fail. Needleman et al. (2018) pointed out that the relationship between PA and project success is not very simple, but rather a network connected by relationships. It is still a black box (Niederman et al. 2018) (Radhakrishnan, Zaveri, & David, 2021).

Organizational science literature points to the mediating role of adaptive performance in assessing team outcomes (Sarangee, Schmidt, & Srinath, 2022). However, this concept has not been tested in the agile project management literature. We argue that adaptive performance may play a mediating role between PA and project success.

2. Objective

The main objective of our study is to measure the degree of adoption of the Agile method principles and the effect of project team characteristics autonomy, diversity, and client collaboration on the PA, and ultimately, project performance (Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022; Mero, Leinonen, Makkonen, & Karjaluo, 2022; Sarangee, Schmidt, & Srinath, 2022; Tyagi, Sibal, & Suri, 2022; Weflen, Mackenzie, & Rivero, 2022) in MP.

However, other secondary and specific objectives can be derived. We quote:

1. It examines project team anatomy and diversity's role in PA in various project types in the Marketing industry, project environments, and project sizes.
2. It examines project team client collaboration's role in project PAagility in various project types in the Marketing industry, project environments, and project sizes.
3. It investigates the mediating role of PA in the relationship between AP and project performance.
4. It investigates the mediating role of PA in the relationship between project team members' adaptive performance and project success. This construct of adaptive performance of the project team is new to project management literature
5. We can use the results of this study to effectively manage human resources for promoting project success in agile projects.
6. We can use the results of this study to adapt the agile project method in marketing projects like scrum, and Kanban.

3. Research question

Based on the context presented above, we formulated the following research question:

Is there a significant relationship between the degree of adoption of agile principles and the performance of marketing projects?

(Radhakrishnan, Zaveri, & David, 2021) (Ciriello, Glud, & Hansen-Schwartz, 2022) (Mero, Leinonen, Makkonen, & Karjaluoto, 2022) (Sarangee, Schmidt, & Srinath, 2022) (Tyagi, Sibal, & Suri, 2022) (Weflen, Mackenzie, & Rivero, 2022) (zielske & Held, 2022)

From this main question are derived the secondary questions which will serve to guide this research work:

1. Do project team autonomy, diversity and effect PA and, ultimately, project performance in marketing projects?
2. Does PA effect project team performance and Project on time On-budget in marketing projects?
3. Does PA represent the relationship between agile principles and project performance in marketing projects?

4. Hypotheses

In order to respond to our research question, and based on the study of (Malik, Sarwar, & Orr, 2021) (Moi & Cabiddu, 2021) (Radhakrishnan, Zaveri, & David, 2021) (Ciriello, Glud, & Hansen-Schwartz, 2022) (Sarangee, Schmidt, & Srinath, 2022) (Tam, Costa Moura, & Oliveira, 2020) (Tyagi, Sibal, & Suri, 2022) (Weflen, Mackenzie, & Rivero, 2022) (zielske & Held, 2022) we highlight four research hypotheses.

these hypotheses indicate the existence of links between agile principles and PA (Malik, Sarwar, & Orr, 2021) (Ciriello, Glud, & Hansen-Schwartz, 2022) and the link between PA and project performance (Weflen, Mackenzie, & Rivero, 2022) (zielske & Held, 2022) and the effect of agile principles on project performance is mediated by PA (Radhakrishnan, Zaveri, & David, 2021).

According to the past studies, and following our reference study (Radhakrishnan, Zaveri, & David, 2021) Their arguments support this Hypothesizes

H.1: There is an effect between Adopting agile principles and project agility.

H1.1: There is an effect between project team autonomy and project agility.

H1.2: There is an effect between project team diversity and project agility.

H1.3: There is an effect between client collaboration and project agility.

H.2: There is an effect between project agility and project on-time.

H.3: There is an effect between project agility and project on-budget.

H.4: There is an effect between project agility and the adaptive performance of the project team.

5. Research Area

Our host agency is DREAM MOTION owned by REDMOTION Group created in 2017, a SARL with a capital of 10 MDA.

Its main projects are (internal document):

- TV commercial creation
- Digital communication
- Events
- Market research

6. Purpose of the research

Our study contributes to the literature in two ways. First, this study provides evidence on the AP that influence PA and their insect on project performance.

Second, most of the studies on Agile are in IT Projects which is the purpose of the creation of it and therefore, outside the MP context.

Given the differences in the results between studies from different types of projects, and the similerters of the domains it seems interesting to us to compare whether our results are similar to those types of projects.

Interesting to compare whether our results are similar to the results reported in previous research especially since the last report on agile showed marketing as the second field that uses agile principles.

7. Plan announcement

This document is organized as follows:

The introductory section provides an overview of the context and interest of the topic. It presents the objectives and identifies the research problem. It also presents the research model developed from the literature and discusses its main concepts and components, then formulates the research hypotheses.

This present memoir is structured into three chapters. The first chapter will be dedicated to the theoretical framework. We will first present the literature review which will present previous work on the Agile Approach and PA. Secondly, we will present the conceptual framework through the variables that constitute it.

The second chapter will be devoted to the methodological framework, we will justify the methodological choices made.

Finally, the third and final chapter will present the main results of the quantitative study as well as their discussion.

Finally, the conclusion summarizes the elements addressed in the thesis and the main contributions of this research. It ends with a description of the limits of the research as well as possible future research.

CHAPTER I: THEORY FRAMEWORK

Section 01: Literature review

In this chapter we will present the literature review, then the conceptual framework of our research with the main concepts used.

1.1. Agile Approach

In 1991, the U.S. manufacturing industry was searching for solutions to the problems of the decline and diminution of competitiveness (Nagel, 1991).

The concept of agility first appeared as a solution in the *"21st Century Manufacturing Enterprise Strategy Report"* published in 1991, in a Project led by Roger Nagel, Operations Director of Lehigh University, Iacocca Institute, *"Agile production"* has been widely discussed as a concept of management systems (Nagel, 1991; Nagel & Dove, 1991).

The report argued that AP can be a powerful competitive advantage, with a non-technical perspective and a synthesis of managerial and social values (Nagel, 1991), defining *AGILE* as the ability to survive and be sustainable in a competitive environment where there are continuous and unpredictable fluctuations, customers can also shape products and services and steer the market according to their needs (Nagel & Dove, 1991; Camarinha-Matos & Afsannanesh, 2000; Nagel & Qian, 2011; Reed, 2021).

Research on the agile role continues to develop in manufacturing (Gunasekaran, Sarhadi, & Yusuf, 1999), defined by (Sharma, 2022) as « *An organized ability to adapt to the rapidly changing requirements of manufacturing flexibility, customers' expectations, competitor's strategies, suppliers' collaborations, and market responsiveness* ».

Extended supply chain management to provide coordination and integration across business functions. key feature: Customer responsiveness, virtual integration, process integration, network integration, allow their links to easily adapt to external conditions and respond to changes in the business environment. and meet its requirements of flexibility and resilience. (Dove, 1996; Yusuf & Gunasekaran, 2004; Oliveira-Dias & Maqueira-Marín, 2022)

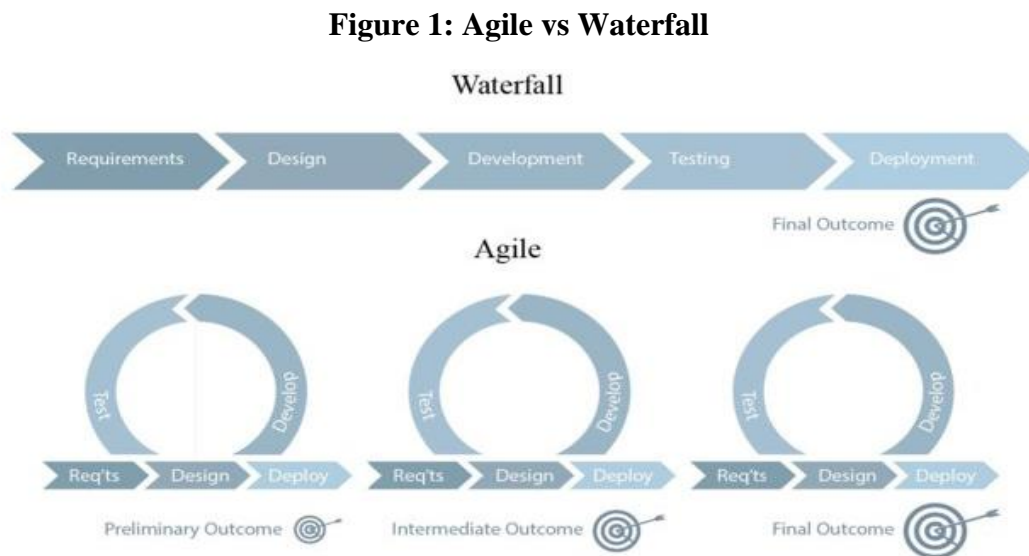
Although initially developed as a production strategy to improve business competitiveness through the concept of agile production, agility has become a concept, perspective, and management method that has evolved in the entire organization. (Camarinha-Matos & Afsannanesh, 2000; Sarangee & Schmidt, 2022)

In the late 1990s, software development teams began using agile methods to improve programming processes by making them more continuous, based on agile concepts such as adaptability, personal and group autonomy, modularity, and self-organized collaboration. (Beck & al, 2001-2019; Kumkale, 2022)

The result of the work of 17 software developers is to correct the limitations and inflexible nature of traditional software production methods, such as the waterfall method, which has been criticized for its lack of responsiveness to change. (Beck & al, 2001-2019)

The Agile approach was formed in *the Agile manifesto* is a document that outlines 4 core values and 12 guiding principles that should inspire agile practices. These values and principles support the various frameworks that belong to Agile, including Scrum, Lean, Kanban, and XP (Beck & al, 2001-2019; Radhakrishnan, Zaveri, & David, 2021)

The purpose of the four values outlined in *the Agile Manifesto* is to create a culture where the needs of customers drive the team actions, skipping traditional tools, processes, and unnecessary documentation, by interacting with people, brainstorming and innovating, and encouraging transparency and collaboration, (Zavyalova, Sokolov, & Lisovskaya, 2019), that demonstrate differences between the two approaches as outlined in **Figure 1**.



source: - (Blackwell, 2018, Applies visual metaphors in organizational Management, p. 410)

Other research indicated that the agile approach outperforms the traditional approach in terms of product quality and development time, however, the specific background and mechanisms of agile project management performance explored the link between agile projects and other organizational factors that could explain the differences in performance of agile approaches in different contexts. (Sarangee, Schmidt, & Srinath, 2022)

Table 1: Key Traditional vs Agile approaches

Matrix	Traditional approach	Agile approach
Fundamental assumptions	The system is fully assignable, Predictable, and buildable through careful and extensive planning	High-quality adaptive software can be developed by a small team Principles of Continuous Design Improved and tested based on Quick feedback and changes
Control	Process centric	People-centric
Management style	Command and control	Leadership and collaboration
Knowledge management	Explicit	Tacit
Communication	Formal	Informal
Customer's role	Important	Critical
Project cycle	Guided by tasks and activities	Guided by product features
Development model	Life cycle model (waterfall, spiral, or some variation)	The evolutionary-delivery model
Organizational form/structure	Mechanistic (bureaucratic with high formalization)	Organic (flexible and participative encouraging cooperative social action)
Technology	No restriction	Favors object-oriented technology

Source: adapted from (,Sokolov, & Lisovskaya, 2019).

Table 1 summarizes that there are many variations between agile and waterfall, but one of the main differences is that agile adapts to change. Development and testing happen concurrently in agile, whereas waterfall requires a stage to be completed before testing. This can be particularly problematic when the correction to be made is important. This causes unnecessary delays compared to short periods of agility (Blackwell, 2018; Ciriello, Glud, & Hansen-Schwartz, 2022).

In Tam, Costa Moura, & Oliveira, (2020) exploratory study he examined the relationship between the success of ongoing agile software development projects and traditional ones and showed the benefits of agile over traditional approaches, grouped into four themes: initiation and adoption, human and social factors, perception of agile methods and comparative case studies. (Dyba & Dingsøy, 2008)

Table 2: Key characteristic differences between agile IT and traditional IT projects

Description	Agile IT Project	Traditional IT Project	References
Documentation	Sufficient documentation	Extensive documentation,	(Cram & Marabelli, 2018)
User Requirements	Active stakeholders and wide user/customer participation in the entire project	Comprehensive user requirements captured in advance start design and development.	(Cram & Marabelli, 2018)
Training and Meetings	Informal knowledge sharing sessions and tacit knowledge sharing.	Formal and facilitated workshop sessions	(Cram & Marabelli, 2018)
Project Controls	Daily standup meetings; Ongoing communication between users and project teams. people-centric	Formal status reports; Direct managerial oversight. More process-centric.	(Cram & Marabelli, 2018)
Trust & empowerment of team	High reliance on project team empowerment and trust	Lower reliance on trust, more on policies and procedures	(Tam, Costa Moura, & Oliveira, 2020)
Product cycle	Guided by product features	Guided by tasks and activities	(Tam, Costa Moura, & Oliveira, 2020)
Development model	Evolutionary model	Life cycle model (waterfall, spiral, and others)	(Tam, Costa Moura, & Oliveira, 2020)
Product Delivery	The project work is delivered to the client in increments	The project gets delivered only one time after the project gets completed	(Tam, Costa Moura, & Oliveira, 2020)
Organizational Structure	Highly organic, more participative	Highly formal, more bureaucratic, and mechanistic	(Tam, Costa Moura, & Oliveira, 2020)

Source: (Radhakrishnan, Zaveri, & David, The impact of project team characteristics and client collaboration on project agility, 2021,P4)

Table 2 presents the results of (Cram & Marabelli, 2018; Tam, Costa Moura, & Oliveira, 2020; Radhakrishnan, Zaveri, & David, 2021) studies by demonstrating that the project that has

adapted the agile principle in its organization and project processes has the best managerial characteristics.

There is a strong correlation between the use of agile processes and project quality, these processes provide improvements in Quality, management, demands of Customers, and team satisfaction, the effect is significant but relatively minor for projects with little change in requirements and project teams with little autonomy (Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022)

The advantages and limitations of agile methods, examined by (Cram & Marabelli, 2018) a longitudinal case study, explored how organizations manage information sharing processes in systems development projects that use both agile and traditional development, findings of these studies are summarized in **Table2**.

Agile methods do not apply to critical projects that require more complete and formal initial specifications. In summary, the studies on agile IT project management emphasize the importance of an organic and flexible approach, less upfront planning, minimal specifications, and close customer involvement for the success of agile projects (Radhakrishnan, Zaveri, & David, 2021)

1.2 the effect of agile principles on IT projects performance

Based on the latest update of the 15th State of Agile Report,(2021) the domains that organizations have adopted AP and practices are Software development/ IT are the top two followed by operations and marketing,

Academics and practitioners are paying increasing attention to the development of IT project performance in a way that counteracts traditional framework models, several research studies offer companies the opportunity to develop performance by adapting agile frameworks that contain several principles on how to manage teamwork and external, internal communication. (Tam, Costa Moura, & Oliveira, 2020; Radhakrishnan, Zaveri, & David, 2021; Weflen, Mackenzie, & Rivero, 2022)

Building on the existing data and studies in this area, we opted to focus on the effect of the agile approach in IT projects.

Exploratory studies of Agile have led to expanding research on multiple fronts, including the practices of different Agile methodologies (i.e., Kanban, Scrum, Extreme Programming (XP), feature-driven on IT projects, agile methods are also able to improve productivity, flexibility, and business alignment. (Tam, Costa Moura, & Oliveira, 2020)

As Radhakrishnan, Zaveri, & David (2021) pointed out in their study the importance of AP and their use in project frameworks, is related to four values proposed in the *Agile Manifesto* and the effect on *agile* software development that are referred to in (the Agile Manifesto, 2001-2019) as:

- *Individuals and interactions.*
- *Development of working software.*
- *A very high level of customer collaboration.*
- *Frequent responses to changes in requirements.*

Table 3: The methodologies of the Agile Approach

Agile Method	Key features	Agile Principles
Scrum	<ul style="list-style-type: none"> • A product owner develops a product backlog that captures all currently known requirements. • The product development team determines the features of each sprint from an evolving product backlog. • The project team creates an increment of potentially shippable software during each sprint 	<ul style="list-style-type: none"> • Autonomous project teams and team members with diverse skill sets are needed
DSDM	<ul style="list-style-type: none"> • It is a framework for rapid application development where development time and resources are constant while adjusting the functionality accordingly. • Development is iterative, incremental, and driven by user feedback 	<ul style="list-style-type: none"> • Project team autonomy is essential for developing a system. • Continuous interactions and cooperation among all project stakeholders, especially clients, help develop the project rapidly
kanban	<ul style="list-style-type: none"> • Just-in-time system for scheduling inventory control and replenishment. • Reduces work-in-progress by identifying bottlenecks. • Use of visual cues to guide replenishment 	<ul style="list-style-type: none"> • Autonomous project teams, project teams with diverse backgrounds, and close collaboration with clients help solve problems that created the bottleneck
crystal	<p>There are several methods based on criticality: Clear, Yellow, Orange, Red, and Blue. The most used agile approach, Clear, focuses on communication in small teams developing software that is not life-critical</p>	<ul style="list-style-type: none"> • Autonomous project teams with diverse skill sets and backgrounds and close customer interaction are essential

Source: (Radhakrishnan, Zaveri, & David, The impact of project team characteristics and client collaboration on project agility, 2021,P3)

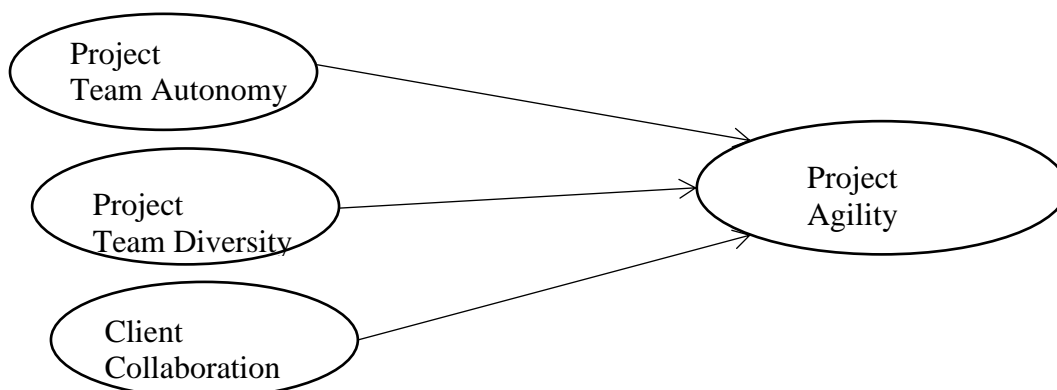
Table 3 summarizes that although agile IT methodologies differ in practice, they share several characteristics, team autonomy, team diversity, continuous interaction with customers, communication, and frequent product delivery which higher the team project Adaptive development and performance (Radhakrishnan, Zaveri, & David, 2021; Malik, & Orr, 2021).

In an agile project, team members work continuously with customers to ensure successful project outcomes. Constant feedback from customers affects the behavior of team members to ensure satisfactory project outcomes. (Tam, Costa Moura, & Oliveira, 2020; Tyagi, Sibal, & Suri, 2022)

The form of interaction can discuss project deliverables' priorities, changing project requirements, and better ways to develop, test, and deploy projects, customer needs in agile projects change frequently (Moi & Cabiddu, 2021), and PTM must continue to respond to these changes, monitoring and tracking are essential to creating the desired project outcome, which links project performance to PTP, and client collaboration. (Radhakrishnan, Zaveri, & David, 2021; Sarangee, Schmidt, & Srinath, 2022; Ciriello, Glud, & Hansen-Schwartz, 2022)

Since requirements are constantly changing in an agile project, a network of relational connections is created due to the constant interactions with other PTM (from different backgrounds) and customers to ensure PA (Calefato & Lanubile, 2020; Tam, Costa Moura, & Oliveira, 2020).

Figure 2: the factors of project agility



source: (Radhakrishnan, Zaveri, & David, The impact of project team characteristics and client collaboration on project agility, 2021,P8)

based on the following statements and the variable in figure 2 that are tested by the following studies. (Cram & Marabelli, 2018; Tam, Costa Moura, & Oliveira, 2020; Radhakrishnan, Zaveri, & David, 2021; Malik, Sarwar, & Orr, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022; Tyagi, Sibal, & Suri, 2022)

the AP used to achieve PA and effect project performance are *Project Team Autonomy, Project Team, Diversity, and Client Collaboration*, which are based on the agile values (Beck & al, 2001-2019) and agile method frameworks referred to in the **figure 3**.

According to Malik, Sarwar, & Orr, (2021), time and cost are used as indicators to evaluate project performance. Both have been applied in a variety of business areas such as engineering and construction, agile software development, IT project management, marketing, and human resource management. Time is defined as on-time delivery while cost focuses on reaching your estimated budget (Tam, Costa Moura, & Oliveira, 2020; Weflen, Mackenzie, & Rivero, 2022). As mentioned, in addition to time and budget delivery, this is what leads to customer satisfaction. it is related to how the client perceives the end product's performance, which means his consent to a set of predefined expectations; if they were lower than actual performance, it would not be achieved. Success largely depends on how well the software solution meets the expectations of the intended customer (Moi & Cabiddu, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022).

As Radhakrishnan, Zaveri, & David, (2021) mentioned PTM negotiate with other team members and customers on change specifications, prioritization of project deliverables, development and testing techniques, and progress on scope, schedule, cost, and quality (Ciriello, Glud, & Hansen-Schwartz, 2022).

Resources can be physical objects or virtual objects. The system will fail in a dynamic flow medium when there is no flow (Weflen, Mackenzie, & Rivero, 2021; Tyagi, Sibal, & Suri, 2022).

In an agile project, PTM constantly exchange tacit knowledge with the client. This transparent communication contributes to the agility of the project and its success by developing an adaptive performance in team communication workflow (Weflen, Mackenzie, & Rivero, 2022; Glud, & Hansen-Schwartz, 2022).

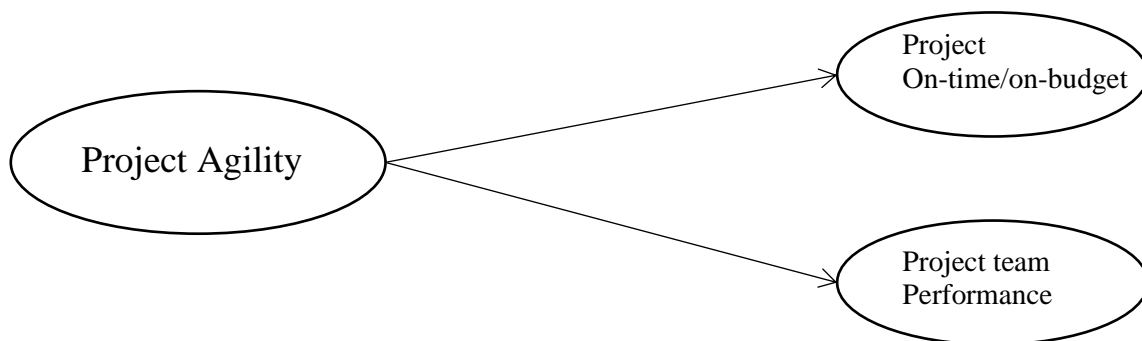
Prior project management literature suggests that ‘on-time project completion,’ ‘on-budget project completion,’ and scope are three essential measures of project success. (Mero, Leinonen, Makkonen, & Karjaluoto, 2022)

However, recent literature suggests that these "iron triangle" measures are insufficient to measure project success. A "project success rating" of clients, sponsors, and project teams should be an additional measure. (Zavyalova, Sokolov, & Lisovskaya, 2019; Calefato & Lanubile, 2020; Malik, Sarwar, & Orr, 2021; Sarangee, Schmidt, & Srinath, 2022; Tyagi, Sibal, & Suri, 2022)

The ability to effectively respond to changing project needs is a key factor differentiating high-performing teams from average teams. Agile methods allow for quick reactions, and project teams can effectively adapt their project plans to the changing needs. to produce high-quality project results. (Blackwell, 2018; Nurdiani, Börstler, Fricker, Petersen, & Chatzipetrou, 2019; Moi & Cabiddu, 2021; Radhakrishnan, Zaveri, & David, 2021; Sarangee, & Srinath, 2022)

The number of additional resources required to manage project changes will be minimal when the responsiveness of "project on time" and "project on budget" is high, and the time and cost of dealing with changes in requirements will also be minimized (Radhakrishnan, Zaveri, & David, 2021; Weflen, Mackenzie, & Rivero, 2022; Mero, Leinonen, Makkonen, & Karjaluoto, 2022)

Figure 3: the factors that project agility effect



source: (Radhakrishnan, Zaveri, & David, The impact of project team characteristics and client collaboration on project agility, 2021, P8)

Based on the following statements in and the variable **figure 4** that are tested by the following studies (Dybå & Dingsøy, 2008; Calefato & Lanubile, 2020; Malik, Sarwar, & Orr, 2021; Moi & Cabiddu, 2021; Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022; Tyagi, Sibal, & Suri, 2022).

PA effects project performance through PTP and project success (on-time; on-budget), which are based on the agile values, and that is what differentiates it from the traditional approach as referred to in the table 1;2.

Also, agile project teams can better meet clients' needs (Tyagi, Sibal, & Suri, 2022), before starting an agile project, they typically outline key specifications (design, functionality, and performance) (Moi & Cabiddu, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022).

Therefore, achieving greater PA helps meet these norms, adapting agility leads clients, sponsors, and project teams to better assess project success as they are all satisfied with the results, which relate PA to the project performance (Calefato & Lanubile, 2020; Tam, Costa Moura, & Oliveira, 2020; Radhakrishnan, Zaveri, & David, 2021; Moi & Cabiddu, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022)

1.3. The similarities between IT and marketing projects

Recent statistics published by the 15th State of Agile Report (2021) that in areas of the organization that have adopted AP and practices, marketing was positioned in the third place after IT and operations.

Recent studies showed there is Comparability between IT and MP in the following points:

1. The team works with different techniques and eventually comes up with the optimal result.
2. In communication is open; everyone can present their ideas to the team.
3. It is more flexible than the other type of project because it can modify the workflow according to each new change request.
4. Customer engagement is crucial to the success of the project.
5. Project work is delivered to the client in several parts, and the continuity of the project needs validation from the clients.
6. Has the concept of joint ownership, each team member is equally responsible for his or her responsibility for their contribution.

7. Is based on progressive deliveries of the product.
8. The structure is lean (flexible and collaborative, supporting cooperation), aimed at small and medium-sized organizations.

Following studies (Moi & Cabiddu, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022)

The results of the research led by Moi & Cabiddu, (2021), showed that *agile* in marketing drives agencies Teams work together to achieve a common goal focused on customer needs, regularly checking for unwanted flaws or gaps Adjusting and optimizing the steps of the operation as required. Increase customer engagement, fidelity and value, respond faster to market demand and be more adaptable to change. (Ciriello, Glud, & Hansen-Schwartz, 2022)

Table 4: Review of authors who discuss the relationship between Agile and Project agility and performance

N°	Authors	Year	Research	Methodology
1	Tripp & Armstrong	2018	Examined the relationship between organizational motive, project management agile practices, agile software development practices, and project success.	Survey methodology
2	Lapp & al	2018	Examined the governance practices in agile projects	A systematic literature review
3	van wassenhove, Sengupta, & Oorschot	2018	Examined the effect of iteration cycle length on project team performance (measured by project quality, labor morale, project completion cost, and project completion time).	System dynamics simulation of agile project settings.
4	Tam, et al	2020	Examined the relationship between team capability, customer involvement, and agile project success	Survey methodology
5	Tam, Costa Moura, & Oliveira	2020	five people factors that influence the success of ongoing agile software development projects, success is measured in terms of cost, time, and customer satisfaction	mixed-methods approach, surveying 216 agile practitioners,
6	(Radhakrishnan, Zaveri, & David)	2021	Examines the project team characteristics' effect on project agility and success	cross-sectional survey data from 292 agile projects

7	(Moi & Cabiddu)	2021	Examines four dimensions (customer-oriented responsiveness, high flexibility, human collaboration, quick and continuous improvement) in a maturity framework for the development of an agile marketing capability	e study based on 16 semi-structured interviews
8	(Malik, Sarwar, & Orr, 2021)	2021	Studying the innovative behavior of agile teams is cast as a project capability that affects project performance, and the relationships between agile practices, psychological empowerment, innovative behavior, and project performance.	The survey was administered using Qualtrics, an online survey platform. The sample frame was agile project managers and agile project team members
9	(Ciriello, Glud, & Hansen-Schwartz)	2022	analyze commissioned software team engagement in customer collaboration during agile adoption	qualitative, interpretive, theory-developing case study followed by interviews
10	Das, Mukhopadhyay, & Suar	2022	Testing workforce agility via increased (decreased) firm performance was associated with a high (low) corporate reputation. Furthermore, transformational leadership of top management and talent management via workforce agility were positively related to firm performance	An empirical survey of 225 IT firms
11	Franco & Landini	2022	report conditional correlations between workforce agility and innovation that are consistent with our framework and contribution of two components: time agility and task agility	Survey, data cover a representative sample of nearly 18,000 non-agricultural establishments employing located in 28 countries

Source: Made by the researcher

the results of the various researches done by (Zavyalova, Sokolov, & Lisovskaya, 2019; Nurdiani, Börstler, Fricker, Petersen, & Chatzipetrou, 2019; Cram & Marabelli, 2018; Gunasekaran, Sarhadi, & Yusuf, 1999; Tam, Costa Moura, & Oliveira, 2020; Calefato & Lanubile, 2020; Moi & Cabiddu, 2021; Radhakrishnan, Zaveri, & David, 2021; Tyagi, Sibal, & Suri, 2022) who are interested in AP *Project* Team Autonomy, Project Team, Diversity, and Client Collaboration, state that these factors have a significant influence on the degree of agility of the project.

Continued by the research done by (Moi & Cabiddu, 2021; Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022; Mero, Leinonen, Makkonen, & Karjaluoto, 2022; Sarangee, Schmidt, & Srinath, 2022; Sarangee, Schmidt, & Srinath, 2022; Tyagi, Sibal, & Suri, 2022; Weflen, Mackenzie, & Rivero, 2022) relating project performance to the agility of the project, indicating that agility effect both project success (on-time, on-budget) and PTP

The following table shows the common agile factors studied by the authors mentioned in the previous table (**Table 4**).

Table 5: Shared items studied by the authors in the literature review

		Articles										
		1	2	3	4	5	6	7	8	9	10	11
Agile principles	Client collaboration		X	X	X	X	X	X	X	X		X
	Team diversity	X	X	X	X	X	X		X	X		X
	Team autonomy	X	X	X	X		X	X	X	X		X
Project agility		X	X				X	X	X	X	X	
Project performance	Project team performance	X		X	X	X	X	X	X		X	X
	On-time				X	X	X				X	X
	On-budget				X	X	X				X	X

Source: Made by the researcher

Section 02: Conceptual model

2.1. Approach, Methodology, and Principle

In actual literature the term methodology is often used to explain types of a concept such as an approach, that may be appropriate for defining management, and a narrow concept like "Principle" might be reasonable to set out the how to do it. (Gemino, Reich, & Serrador, 2020)

- **Approach**

A project management approach is the most advanced level of abstraction used to describe how a project will be designed and managed, the approach is linked to the inner core of the project's administration, for many researchers and institutions, a project management approach is a high-level overview of the guiding principles, perspectives, and characteristics. (Gemino, Reich, & Serrador, 2020)

The definition provided by Gemino, Reich, & Serrador (2020) suggested that:

“a project management approach is a set of principles and guidelines which define the way a specific project is managed.”

- **Agile**

The term "*agile*" is often understood as a series of flexible project methods management, especially effective in situations of high product complexity uncertain, their methods are typically characterized by iterative product development, dynamic demand formation, faster customer feedback, and constant change.

The projects associate management using the traditional *Waterfall* model, their products are consciously planned and only emerge as a result, when customer feedback is no longer as valuable as reworking the entire project product becomes expensive, Summarize the key difference between agile and traditional project management. (Gemino, Reich, & Serrador, 2020)

- **Traditional**

The traditional approach is defined by linear and predictable project planning practices designed to achieve a well-understood, achievable set of objectives.

It's considered a waterfall method that relies on forwarding planning, extensive documentation, and quality gates, agile practices emphasize continuous planning and a results-oriented approach to enable flexibility and change during projects. (Gemino, Reich, & Serrador, 2020)

- **Hybrid**

The combination of traditional and agile methods emerged and has been reported in various areas of the literature by academics and practitioners.

“Hybrid Agile methods are a reality in most Agile implementations ... This happens in part because Agile adoption has been practitioner-led, leading teams to focus on domains they can influence, mainly the team itself. Areas outside of their control ... continue to follow more traditional approaches”. (Weflen, Mackenzie, & Rivero, 2022)

A hybrid project management approach combines methodologies and practices from more than one project management approach at its most general level. In (Gemino, Reich, & Serrador, 2020) the combination is considered that of agile and traditional practices. And had been discussed in the literature on software engineering, information systems, and practitioners. (Gemino, Reich, & Serrador, 2020)

- **Values**

the Agile Manifesto document presents four values, each promoting agility over rigidity, although the more rigid items still retain significant value, these concepts form the nimblest of the major project management methods. (Ellis, 2016)

Table 6: Agile values and traditional values

Values	Agile	Traditional
	Individuals and interactions	Processes and tools
	Working software	comprehensive documentation
	Customer collaboration	contract negotiation
	Responding to change	following a plan

Source: Adapted from (Beck & al, the Agile Manifesto 2001-2019, P1)

Table 6 summarize that the first principle of personal over process shifts project management to transformational leadership, given the general overemphasis on transactional leadership in traditional project management, readers may find this to be logical.

The second principle is the only one of the four that applies only to software, it turns out Internal documentation defines how well the software works, Of course, internal documentation is valuable, but a working interface explains the code better than a thick manual that defines that interface before programming begins.

The third principle extends the first principle from the internal focus to the customer, that the gold standard here is to involve customers in the development process, reviewing each version of the code and providing input for future work.

The fourth principle is consistent with project innovation and mini-batch concepts but supports the concept Go one step further than the other project management methods.

These four values are applied to many aspects of project management to create key practices of agile.

- **Methodology**

Methodologies are more prescriptive and granular than methods, providing project managers with detailed operational guidance on how to manage projects.

The definition of project management methodology is taken from A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Sixth Edition (Project Management Institute [PMI], 2017, p. 28), which states that:

“A methodology is a system of practices, techniques, procedures, and rules used by those that work in a discipline.”

Examples of project management methodologies might include Prince 2, Scrum, Kanban, and Rational Unified Process (Gemino, Reich, & Serrador, 2020; Mero, Leinonen, Makkonen, & Karjaluo, 2022)

- **Scrum**

It is a lightweight framework that helps individuals, teams, and organizations generate value through adaptive solutions to complex problems (Schwaber & Sutherland, 2020)

A framework for people to solve complex adaptive problems while delivering the highest value products productively and creatively (Schwaber, 2004), By using an iterative approach with

sprints, daily synchronous meetings (such as daily standup meetings) (Weflen, Mackenzie, & Rivero, 2022).

The continuous improvement in it through retrospectives, various improvements should be achieved compared to the classical approach. The goal is to increase productivity, encourage continuous feedback, reduce time to market and embrace change. (Schwaber & Sutherland, 2020)

Briefly, Scrum needs a Scrum Master to foster an environment where (Schwaber & Sutherland, 2020):

1. A Product Owner orders the work, to solve a complex problem in the Product Backlog.
2. The Scrum Team transforms a selection of this work into a Value Increment in a Sprint.
3. The Scrum Team and its stakeholders inspect the results and adapt for the next Sprint.
4. Repeat

- **Kanban**

Kanban for software development focuses on implementing lean principles, such as reducing wasted resources, increasing learning, and decision-making as late as possible, it uses workflow visualization, work-in-progress limitation, and continuous optimization to obtain a workflow. (Zielke & Held, 2022)

A framework that creates visibility into an entire process. It is widely used in Agile and DevOps to drive ongoing delivery and improvement, a model helps teams easily design, manage, and improve their workflow while maintaining the transparency of transitioning between work that needs to be done and work that will be done. (Kumkale, 2022)

- **Crystal**

The Crystal Method category includes several diverse methods. Depending on the scope and priority of the project, the most appropriate method should be chosen (Abrahamsson et al., 2002; Cockburn, 2005), However, some rules, features, and values are common to all methods in the Crystal category. These include the element of an additive approach, user participation, and a focus on human communication and collaboration. (Tripp & Armstrong, 2018)

- **Dynamic System Development Method**

Zielske & Held, (2022) define it as a “lightweight” and model-driven software development process. The goal is the frequent delivery of tangible work results., a feature is defined as “*a customer-evaluated functionality that can be implemented in two weeks or less*” (Pang and Blair, 2004, p. 86).

To achieve the frequent delivery of software or small pieces of a product, feature teams and inspections are used among other practices DSDM method contributes to the performance and framework flow of the project. (Das, Mukhopadhyay, & Suar, 2022)

2.2. The Principles of Agile

The Agile Manifesto document presents 12 principles used to work with agile methods, the literature review presents the factors associated with AP that influence the success of the project, these following factors are “*Client collaboration, Team autonomy, Project team diversity*” described below (Beck & al, 2001-2019)

2.2.1. Client collaboration

The agile adoption literature assumes that customers implicitly know their needs, that these needs can be articulated by working with them, and that customers are willing and able to collaborate during agile adoption. A key tenet of agile practices is that customers must be involved in the entire development process. (Moi & Cabiddu, 2021)

Table 7: The agile principles that demonstrate the client collaboration

Study variables	Agile principles
Client collaboration	<p>1-satisfy the customer through early and continuous delivery of valuable software.</p> <p>2-changing requirements, even late in development. Agile processes harness change for the customer’s competitive advantage.</p> <p>3-Deliver working software frequently, in a shorter timescale.</p> <p>4- Business people and developers must work together daily throughout the project.</p>

Source: Adapted from **Source:** Adapted from (Beck & al, the Agile Manifesto 2001-2019, P1

; Radhakrishnan, Zaveri, & David, 2021)

Table 7 present that its requires cooperation with the client. Agile literature assumes the client is responsive, collaborative, knowledgeable, and experienced in agile practices ideally, the client works on-site with the software team throughout the project. (Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022)

Delegated software teams must actively involve customers in the agile implementation process. Passive customer engagement does not provide the feedback needed for self-organization. Therefore, without active customer engagement, software teams may resort to waterfall-like practices. (Ciriello, Glud, & Hansen-Schwartz, 2022)

2.2.2. Team autonomy

Agile projects apply their "*people over process*" philosophy through the mechanism of self-organizing teams, Self-organizing teams are characterized by a high degree of task autonomy in the delegation, selection, and implementation of project work, and good intern communication workflow, showing that the scope of an agile project and the uncertainty of the solution are important drivers of *agile team autonomy*. (Radhakrishnan, Zaveri, & David, 2021)

Table 8: The agile principles that demonstrate the client collaboration

Study variables	Agile principles
Project team autonomy	5-Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
	6-The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
	7- team product is the primary measure of progress
	8- promoting sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

Source: Adapted from (Beck & al, the Agile Manifesto 2001-2019, P1; Radhakrishnan, Zaveri, & David, 2021)

Table8 shoed that Agile project environments often involve complex issues and fast-changing without knowing in advance how to achieve the desired results in the process of the framework.

It relies on agile teams' collective intelligence and creativity to solve and adapt to complex problems. (Malik, Sarwar, & Orr, 2021)

A prerequisite for harnessing the full capabilities of an agile team is the autonomy to choose how the team handles tasks. The literature shows that autonomy in decision-making can identify meaning because it allows individuals to take a self-determined pathway to achieve goals. (Malik, Sarwar, & Orr, 2021)

2.2.3. Project team diversity

In the literature, team diversity has been identified as changes in superficial attributes of a team, such as demographics, or deep attributes, such as education, expertise, or functional background (changes in team attributes at a deep level make a team effective because it affects the availability of information resources) adapting to the fast-changing demands of clients required diverse capacities. (Zielke & Held, 2022)

Scope The diversity structure of agile team project management also includes deep attributes, including differences in teams' functional backgrounds, skills, expertise, and work experience. (Radhakrishnan, Zaveri, & David, 2021)

Table 9: The agile principles that demonstrate the project team diversity

Study variables	Agile principles
Project team diversity	9- Continuous attention to technical excellence and good design enhances agility.
	10- Simplicity – the art of maximizing the amount of work not done – is essential.
	11- The best architectures, requirements, and designs emerge from self-organizing teams.
	12- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Source: Adapted from (Beck & al, the Agile Manifesto 2001-2019, P1; Radhakrishnan, Zaveri, & David, 2021)

Table 9 explain that Human resources literature on team diversity identifies individual cognition as the mediating mechanism linking individual characteristics to team performance. Individual cognitive and psychological processes originate from individual knowledge reserves and team

interaction in the process of knowledge acquisition. Additionally, team processes exhibit cognitive consistency within teams over time. (Malik, Sarwar, & Orr, 2021)

2.3. Project Agility

Radhakrishnan, Zaveri, & David (2021) refers to in their research as:

“The project’s team’s ability to quickly change the project plan as a response to customer or stakeholders’ needs, market or technology demands to achieve better project performance in an innovative and dynamic environment.”

He used this definition because it is not specific to IT projects. This definition is more generic and comprehensive and applies to all agile projects. (Das, Mukhopadhyay, & Suar, 2022)

Agility is the ability to create and respond to changes in profit in a volatile business environment; it is the ability to balance and Stability Agility uses memory and history to adapt, react and adapt to new circumstances, seize unexpected opportunities, and update the experience base for the future. (Das, Mukhopadhyay, & Suar, 2022)

Agility is a quick and flexible response to change. "Agility is the willingness to act or change; it has two dimensions to redesigning the software development process (Franco & Landini, 2022)

- 1) the ability to adapt to changes
- 2) the ability to fine-tune

On-demand, in the context of information systems development, agility can be defined as the organization's ability to identify and respond to it Quickly adapt to technological changes and new business opportunities, it is achieved through exploration-based learning and development-based learning. (Kumkale, 2022)

2.4. Project performance

Radhakrishnan, Zaveri, & David (2021) Defined the various dimensions of adaptive performance of the project team in four factors:

“Reacting to emergencies and unpredictable situations, decisions, solving problems creatively Learning newer work tasks, technologies, and procedures, Interpersonal adaptability, Handling work stress”

2.4.1 Adaptive performance of the project team

- **Reacting to emergencies and unpredictable situations**

This factor reflects how the team members adjust to changes in the environment and the effectiveness with which they change their direction and make reasonable decisions while following principles of agile and in the middle of a fast-changing environment full of risks. (Radhakrishnan, Zaveri, & David, 2021)

- **Solving problems creatively**

This factor referred to the degree to which the PTM were able to solve uncommon, ill-defined, challenging, and complex problems (Kumkale, 2022; Radhakrishnan, Zaveri, & David, 2021)

- **Learning newer work tasks, technologies, and procedures**

This factor is the extent to which team members anticipated future needs and adapted to changing job requirements by rapidly and efficiently learning new technologies, techniques, and skills. (Malik, Sarwar, & Orr, 2021)

- **Interpersonal adaptability**

This factor is based on the ability of team members to adjust their interpersonal style and behavior to maintain effective interactions with the team members and clients. (Ciriello, Glud, & Hansen-Schwartz, 2022)

- **Handling work stress**

This factor refers to the ability of team members to remain calm and effectively direct stress toward positive results. (Franco & Landini, 2022)

2.4.2. Project On-time and On-budget

The ability to effectively respond to changing project needs is a key factor that differentiates high-performing teams from average teams, agile methods facilitate rapid response, enabling project teams to effectively adjust project plans to changing needs, Agile practices lead to high-quality project results, the amount of additional resources required to manage project changes will be minimal, and when responsiveness is high, the time and cost involved in handling

requirements changes will also be minimal (Radhakrishnan, Zaveri, & David, 2021; Malik, Sarwar, & Orr, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022).

Thus, achieving greater PA translates into "complete projects on time" and "complete projects on budget." Additionally, agile project teams can better meet stakeholder needs. Therefore, achieving a higher level of PA can help meet these norms before starting an agile project to better assess the project success of clients, sponsors, and project teams when stakeholders are satisfied with the results (Radhakrishnan, Zaveri, & David, 2021).

CHAPTER II: METHODOLOGICAL FRAMEWORK

In this chapter, we will discuss the pragmatic methodological approach chosen to conduct our study in terms of methods, and instruments for collecting, we will present the population and sample of our study and then, present our measurement variables and the information collected.

1. Methodological approach

In our study, we opted for a quantitative method, which is to explore a larger sample, that the survey will be used to confirm or deny, the underpinned findings in our reference study on AP in the field of no-IT and IT project management by Radhakrishnan, Zaveri, & David, (2021).

2. Quantitative methodological approach

To measure our data generated from the quantitative study and test our hypotheses, we opted for a quantitative approach as a methodology, in line with a positivist epistemological posture of the hypothetico-deductive type. This approach is also adapted to the measurement of the variables considered in our reference study. (Radhakrishnan, Zaveri, & David, 2021)

3. Methods and instruments of data collection

We conducted a questionnaire survey, intending to quantify and measure the relationships between the research variables, Subsequently, we measured the dependent variable of our theoretical model, as a reminder this is the use of AP by project managers and their effect on project performance.

3.2. Questionnaire

The survey was conceived based on pre-established objectives that we deemed fitting to help answer the research questions, to get the most relevant information from our audience, and to be able to quantify the results so we can measure the research theme.

The following is the structure of the questionnaire as well as the measurement scales of the variables retained in this theoretical model,

the survey was conducted by Radhakrishnan, Zaveri, & David (2021) research, the initial web survey collected data from project managers who were members of the Project Management Institute and had at least five years of agile project management experience, they followed the four-stage method proposed by Dillman (2000) to pre-test and pilot test the survey instrument.

- **Stage 1: content validity**

Involved four agile project managers with more than five years of experience and two faculty members with project management professional (PMP) certifications.

- **Stage 2: The clarity, and readability of questions.**

Three agile project management faculty members and four Master of Science in Project Management (MSPM) students participated

- **Stage 3: The pilot study**

employed ten agile project managers who had more than five years of experience with PMP certifications.

- **Stage 4: Correction**

two faculty members and one MSPM student checked grammar and expression.

-The survey was structured into the next five sections:

1. Description.
2. Profile of respondent.
3. Agile principles.
4. Project agility and project success.
5. Project team performance.

the used instrument in the survey is from Lee & Xia (2010) literature that employs a seven-point Likert scale (see Appendix A).

4. Sampling

The studied population is composed of MP managers, of all roles, project types, and durations.

4.1 Sampling method

We have selected the research sample according to a Purposive method, so it is a non-probability sampling, to do so we have a share out the survey online via the Google forms platform.

4.2. Sample size

According to specialists, for the sample to be representative it is necessary to have a large number of respondents, but not too large so the analysis can be done rapidly and the costs are minimized. We set a target of 100 respondents, but we were able to validate them all, we were

able to contact 190 people from LinkedIn we obtained 113 responses, 100 of which were complete and usable, for a response rate of 52,63%.

5. Practical modalities of the survey

In this part, we will present the duration and period of the survey, as well as the administration mode of the selected questionnaire.

5.1. Research period

Data collection took place from 27/04/2022 to 10/05/2022. We also performed a pretest of the questionnaire from 25/04/2022 to 27/04/2022 to make sure everything was clear, according to the feedback from some of the participants in the study, an average response time to the questionnaire of 05 to 10 minutes.

5.2. Administration mode

We administered the questionnaire over the Internet via LinkedIn. Mainly in private direct messages or e-mail, since we are targeting a specific audience. We relied on the Agile variables in the selection of the sample population supported by our estimation.

The entire process was based on our judgment and knowledge of the context and profile of our sample, who are managers with experience in the MP that releases on client collaboration.

6. Measurement variables

In the table 9 we will demonstrate the variables and the items used to measure them based on the study of Radhakrishnan, Zaveri, & David, (2021).

Table 10: Variables mesurent

Variables	Items
Project team autonomy	1. The project team was allowed to freely choose tools and technologies.
	2. The project team had control over what they were supposed to accomplish.
	3. The project team was granted autonomy on how to handle users' requirement changes
	4. The project team was free to assign personnel to the project.
	1. The members of the project team were from different areas of expertise
	2. The members of the project team had skills that complemented each other.
	3. The members of the project team had a variety of different experiences.

Project team diversity	4. The members of the project team varied in functional backgrounds.	
Client collaboration	1. The client and the project team jointly assessed the importance of the functions of the product.	
	2. The client provided frequent feedback about the partially developed product or result.	
	3. The client proposed and evaluated changes to project specifications together with the project team.	
	4. The client participated in the development of test procedures/ methods.	
Project Agility	1. The project team and the customer frequently discussed project-related issues.	
	2. The project team frequently delivered partial results of the project.	
	3. In case of changes in the project scope, the project team immediately analyzed the information and made a quick decision.	
	4. In case of changes in the project scope, the project team immediately updated the project plan and communicated the changes to all stakeholders.	
Project On-time Completion	1. The project was completed on time according to the original schedule	
	2. We never experienced a negative schedule variance as the project progressed.	
Project On-Budget Completion	1. The project was completed on budget according to the original budget.	
	2. We never experienced a negative cost variance as the project progressed.	
Adaptive performance of project team members	Handling Emergencies and unpredictable situations	1. The PTM quickly took effective actions to solve the problem.
		2. The PTM examined the available options and their implications to choose the best solution.
		3. The PTM easily changed plans to deal with the new situation.
		4. The PTM focused on the situation to react quickly.
	Solving problems creatively	1. PTM tried to develop new methods for solving atypical problems.
		2. PTM relied on a wide variety of information to find innovative solutions to problems.
		3. PTM came up with breakthrough ideas to solve problems.
		1. PTM searched for innovations to improve work methods.

Adaptive performance of project team members	Learning newer methods, tasks, and technologies	2. PTM always looked for opportunities (e.g., training, workshops, interactions with experts, to help them increase their job performance.
		3. PTM took action to keep their skills and knowledge up to date.
		4. PTM anticipated changes in their jobs by participating in change management projects.
	Demonstrating interpersonal adaptability	1. PTM changed their way of working based on others' feedback and suggestions.
		2. PTM developed positive relationships with the people they interacted with while doing their jobs.
		3. PTM considered others' viewpoints to better interact with them.
		4. PTM learned new ways of doing their jobs to better cooperate with colleagues.
	Handling work stress	1. PTM stayed calm under circumstances where they had to make crucial decisions related to the project.
		2. PTM sought solutions by talking to more experienced colleagues.
		3. The colleagues of PTM often consulted with them in difficult circumstances.

Source: (Radhakrishnan, Zaveri, & David, The impact of project team characteristics and client collaboration on project agility ,2021, P18-19)

7. Method of data processing and analysis

The elaboration of the results and the interpretation of the data collected through the questionnaire were worked out with the help of IBM SPSS software (statistical data analysis software) (version 25.0). Finally, for reasons of visibility and understanding, we used Microsoft Excel (2010) to simplify and make the graphs more readable. Regarding the analysis methods, we started by checking our manipulations with a Chi-square test. Then, we tested our scales by a principal component analysis (PCA) and a reliability test (alpha de Cronbach), following this, we performed a descriptive analysis. Finally, we tested our hypotheses with linear regressions.

To test our hypotheses, three stages of statistical analysis are conducted. First, descriptive analysis to identify the profiles of the respondents as well as the type of projects and their characteristics (Number of Members and duration) which they manage (Radhakrishnan, Zaveri, & David, 2021).

Second, to examine the variables of AP (Team autonomy, Team diversity, client collaboration) to demonstrate their adaptation to the project, PA and project performance in two parts project success (on-time on-budget completion) and Adaptive performance of project team members.

Next, is an explanatory analysis using multiple regression to examine the relationship between AP and PA and its effect on project performance (Radhakrishnan, Zaveri, & David, 2021).

CHAPTER III: RESULTS AND DISCUSSION

This chapter will be devoted to the analysis obtained from the survey which will reflect the effect of the relation between AP and MP performance.

We would present the overall structure of the sample using descriptive statistics as well as the results of the analyses. We first proceed by exposing methods, processing, and analysis techniques used, then present the profile of respondents and finish with the analysis carried out. These are descriptive, exploratory analyzes for the validation of scales and explanations for hypotheses tests.

1. Results presentation

The processing of the data collected and their analysis was carried out using IBM software SPSS, version 20.0. Regarding the quantitative data for reasons of visibility, understanding, and organization we used the software Microsoft Excel, version 2013 to simplify and make charts more readable. Regarding the analysis strategy, we started by coding the extracted keywords and checking the reliability test of our scales (Cronbach's alpha) followed by a principal component analysis (PCA). After that, we tested our hypotheses using multiple linear regressions.

1.1. Sample description

The respondents' profile in the research presented the below table, shows that most of them are Marketing Senior Managers (38%) as mentioned in Table 11.

Table 11: Respondents' role position

Role position	Effective	Percentage
General Manager	13	13,0
Senior Manager	38	38,0
Junior Manager	17	17,0
Project Manager	24	24,0
Product Manager	8	8,0

Source: Made by the researcher from SPSS outputs

The MP characteristics in the research are presented in the below table, which shows show that most of them are Digital communication with less than 10 members who last for less than -months as mentioned in table12.

Table 12: Project type

Variables	Characteristics of the variables	Effective	Percentage
Project type	Digital communication	30	30,0
	Events	25	25,0
	TV commercial creation	23	23,0
	Market research	22	22,0
Project members	Less than 10 members	52	52,0
	10 - 20 members	40	40,0
	21 - 40 members	8	8,0
Project duration	Less than 6 months	50	50,0
	6–12 months	34	34,0
	>12 months	16	16,0

Source: Made by the researcher from SPSS outputs

1.2. Internal reliability analysis

Internal reliability of the instrument was conducted by finding the Cronbach 's alpha coefficient which is an index of consistency associated, it ranges from 0 to 1 and it may be used to describe the reliability of items obtained from multi-point formatted questionnaires or scales (i.e., rating scale: 1 = very low, 7= very high). (Hair, et al., 2007) Propose that a minimum of 0.6 can be accepted in exploratory research. the reliability is accepted because of $\alpha > 0.6$ in all variables. So, the results and findings of the study could be used for further investigations.

Table 13: Cronbach's alpha results on the theoretical model

Variables	Items	Cronbach's alpha
Team autonomy	4	0,794
Team diversity	4	0,771
Client collaboration	4	0,782
Project agility	3	0,772
On-Time	2	0,785
On-Budget	2	0,9
Team performance	18	0,934

Source: Made by the researcher from SPSS outputs

1.3. Agile principles analysis

We have performed PCRs to verify the validity and reliability of the quality of our measurement scales. We have determined thresholds recommended in the literature. For the correlations, we only accepted correlations greater than 0.5.

1.3.1 Project team autonomy

The KMO index indicates a high correlation between variables, with a value equal to 0.779, The values of KMO between 0.3 and 0.7 represent acceptable solutions. This test, first performed for each variable, must then be repeated with all variables (Hair, et al., 2007) We can then say that all the items selected are moderately consistent, Also, Bartlett's test is insignificant

Table 14: Project team autonomy KMO and Bartlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.		0,779
Test de sphéricité de Bartlett	Khi-carré approx.	116,813
	Ddl	6
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix all the items are well correlated with each other, the strongest correlation obtained is (0.583) between the items Auto2 and Auto3

Table 15: Project team Autonomy correlation matrix

		Auto1	Auto2	Auto3	Auto4
Correlation	Auto1	1,000	0,532	0,398	0,422
	Auto2	0,532	1,000	0,583	0,548
	Auto3	0,398	0,583	1,000	0,483
	Auto4	0,422	0,548	0,483	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the used scale. That is represented by a single factor which explains 62,219% of initial information.

Table 16: Project team autonomy total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% de la variance	% cumulé	Total	% de la variance	% cumulé
1	2,489	62,219	62,219	2,489	62,219	62,219
2	0,616	15,396	77,615			
3	0,520	12,989	90,604			
4	0,376	9,396	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural coefficient from the table relating to the matrix of components, indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 17: Project team autonomy component matrix

	Components 1
Auto1 team autonomy	0,735
Auto2t team autonomy	0,855
Auto3 team autonomy	0,783
Auto4 team autonomy	0,777

Source: Made by the researcher from SPSS outputs

1.3.2. Project team diversity

The KMO index indicates a high correlation between variables, with a value equal to 0.753, The values of KMO between 0.3 and 0.7 represent acceptable solutions. This test, first performed for each variable, must then be repeated with all variables (Hair, et al., 2007).. We can then say that all the items selected are moderately consistent, Also, Bartlett's test is insignificant

Table 18: Project team diversity KMO and Barlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.	0,753	
Test de sphéricité de Bartlett	Khi-carré approx.	102,489
	Ddl	6
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix all the items are well correlated with each other, the strongest correlation obtained is (0.549) between the items Div2 and Div3

Table 19: Project team diversity correlation matrix

		Div1	Div2	Div3	Div4
Correlation	Div1	1,000	0,429	0,501	0,489
	Div2	0,429	1,000	0,549	0,331
	Div3	0,501	0,549	1,000	0,466
	Div4	0,489	0,331	0,466	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale. This unidimensionality is represented by a single factor which explains 59,673% of initial information.

Table 20: Project team diversity total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	2,387	59,673	59,673	2,387	59,673	59,673
2	0,695	17,385	77,059			
3	0,497	12,429	89,487			
4	0,421	10,513	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural coefficient from the table relating to the matrix of components, indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 21: Project team diversity component matrix

	Components 1
Div1 team diversity	0,786
Div2 team diversity	0,744
Div3 team diversity	0,824
Div4 team diversity	0,732

Source: Made by the researcher from SPSS outputs

1.3.3. Client collaboration

The KMO index is equal to 0.781 and approaches 0.8, The values of KMO between 0.3 and 0.7 represent acceptable solutions. This test, first performed for each variable, must then be repeated with all variables (Hair, et al., 2007),. Therefore, the partial correlations between the variables are good, Bartlett's test is also significant.

Table 22: Client collaboration KMO and Barlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.		0,781
Test de sphéricité de Bartlett	Khi-carré approx.	107,295
	Ddl	6
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix all the items are well correlated with each other, the strongest correlation obtained is (0.57) between the items Clien1 and Client3

Table 23: Client collaboration correlation matrix

		Client1	Client2	Client3	Client4
Correlation	Client1	1,000	0,493	0,570	0,492
	Client2	0,493	1,000	0,445	0,453
	Client3	0,570	0,445	1,000	0,432
	Client4	0,492	0,453	0,432	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale its represented by a single factor which explains 61,124% of initial information.

Table 24: Client collaboration total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	2,445	61,124	61,124	2,445	61,124	61,124
2	0,589	14,734	75,858			
3	0,546	13,648	89,506			
4	0,420	10,494	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural coefficient from the table relating to the matrix of components, indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 25: Client collaboration component matrix

	Components 1
Client1 client collaboration	0,826
Client2 client collaboration	0,760
Client3 client collaboration	0,785
Client4 client collaboration	0,755

Source: Made by the researcher from SPSS outputs

1.4. Project Agility

The variable PA is based on 4 items, the results of our first analysis showed that the item1(Agility1) is below 0.6 which is a reference, this led us to re-analyze this variable and we will not retain the item1 in our analysis that representant 0,584 .

The KMO index is equal to 0.661, The values of KMO between 0.3 and 0.7 represents acceptable solutions. This test is performed for each variable, (Hair, et al., 2007), We can then say that all the items selected are moderately consistent we can say that all the selected items are consistent. Therefore, the partial correlations between the variables are good. Bartlett's test is significant.

Table 26: Project Agility KMO and Bartlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.	0,661	
Test de sphéricité de Bartlett	Khi-carré approx.	111,632
	Ddl	3
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix all the items are well correlated with each other, the strongest correlation obtained is (0.734) between the items Agility3 and Agility4

Table 27: Project Agility correlation matrix

		Agility 1	Agility 2	Agility 3	Agility 4
Correlation	Agility 1	1,000	0,384	0,390	0,252
	Agility 2	0,348	1,000	0,550	0,471
	Agility 3	0,390	0,550	1,000	0,734
	Agility 4	0,252	0,471	0,734	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale. This unidimensionality is represented by a single factor which explains 61,124% of initial information.

Table 28: Project Agility total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	2,177	72,579	72,579	2,177	72,579	72,579
2	0,565	18,831	91,410			
3	0,258	8,590	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural coefficient from the table relating to the matrix of components, indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 29: Project Agility component matrix

	Components 1
Agility2 Project Agility	0,772
Agility3 Project Agility	0,905
Agility4 Project Agility	0,873

Source: Made by the researcher from SPSS outputs

1.5. Project performance

1.5.1. On-Time project

The KMO index is equal to 0.5, The values of KMO between 0.3 and 0.7 represent acceptable solutions (Hair, et al., 2007) , We can then say that all the items selected are moderately consistent we can say that all the selected items are consistent. Therefore, the partial correlations between the variables are acceptable, Bartlett's test is also significant.

Table 30: On-Time project KMO and Bartlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.		0,500
Test de sphéricité de Bartlett	Khi-carré approx.	55,844
	Ddl	1
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix the items are well correlated with each other, the correlation obtained is (0.66) between the items

Table 31: Project Agility correlation matrix

		Ontime1	Ontime2
Correlation	Ontime1	1,000	0,660
	Ontime2	0,660	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale. This unidimensionality is represented by a single factor which explains 83,016% of initial information.

Table 32: Project Agility total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	1,660	83,016	83,016	1,660	83,016	83,016
2	0,340	16,984	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural, it indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 33: Project Agility component matrix

	Components 1
On-Time1	0,911
On-Time2	0,911

Source: Made by the researcher from SPSS outputs

1.5.2. On-Budget project

The KMO index is equal to 0.5, The values of KMO between 0.3 and 0.7 represents acceptable solutions, (Hair, et al., 2007), we can say that all the selected items are consistent. Therefore, the partial correlations between the variables are acceptable, Bartlett's test is also significant.

Table 34: On-Budget project KMO and Barlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.		0,500
Test de sphéricité de Bartlett	Khi-carré approx.	109,136
	Ddl	1
	Signification	0,000

Source: Made by the researcher from SPSS outputs

From the component matrix the items are well correlated with each other, the correlation obtained is (0.821) between the items

Table 35: On-Budget project correlation matrix

		Onbudget1	Onbudget2
Correlation	Onbudget1	1,000	0,821
	Onbudget2	0,821	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale. This unidimensionality is represented by a single factor which explains 91,034% of initial information.

Table 36: On-Budget project total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% of variance	% cumulative	Total	% of variance	% cumulative
1	1,821	91,034	91,034	1,821	91,034	91,034
2	0,179	8,966	100,000			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural, it indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 37: On-Budget project component matrix

	Components 1
On-Budget1	0,954
On-Budget2	0,954

Source: Made by the researcher from SPSS outputs

1.5.3. Project team performance

The KMO index indicates a high correlation between variables, with a value equal to 0.865, which is greater than 0.5. We can then say that all the items selected are moderately consistent. Also, Bartlett's test is insignificant

Table 38: Project team performance KMO and Barlett's test

Indice KMO et test de Bartlett		
Indice de Kaiser-Meyer-Olkin pour la mesure de la qualité d'échantillonnage.		0,865
Test de sphéricité de Bartlett	Khi-carré approx.	270,7
		14
	Ddl	10
	Signification	,000

Source: Made by the researcher from SPSS outputs

From the component matrix all the items are well correlated with each other, the strongest correlation obtained is (0.740) between the items Learning and Problem-solving.

Table 39: Project team performance correlation matrix

		Emrg	Prob	Learn	Inter	Stress
Correlation	Emergency Handling	1,000	0,603	0,691	0,552	0,584
	Problem Solving	0,603	1,000	0,740	0,633	0,525
	Learning	0,691	0,740	1,000	0,644	0,655
	Inter-personal Adaptability	0,552	0,633	0,644	1,000	0,571
	Stress Handling	0,584	0,525	0,655	0,571	1,000

Source: Made by the researcher from SPSS outputs

A principal component analysis based on the items of the measurement scale the perceived ease of use, allowed us to confirm the unidimensionality of the used scale. This unidimensionality is represented by a single factor which explains 69,708% of initial information.

Table 40: Project team performance total variance explained

Component	Initial eigenvalues			Extraction sums of squared loading		
	Total	% de la variance	% cumulé	Total	% de la variance	% cumulé
1	3,485	69,708	69,708	3,485	69,708	69,708
2	0,490	9,810	79,517			
3	0,448	8,960	88,477			
4	0,351	7,027	95,504			
5	0,225	4,496	100			

Source: Made by the researcher from SPSS outputs

The component matrix indicates that all items have an excellent structural coefficient from the table relating to the matrix of components, indicates that all items have an excellent structural coefficient, so we will retain all items in our analysis.

Table 41: Project team performance component matrix

	Components 1
Emergency Handling	0,822
Problem Solving	0,842
Learning	0,900
Inter-personal Adaptability	0,813
Stress Handling	0,795

Source: Made by the researcher from SPSS outputs

1.6. Multiple and linear regression

The multiple regression analysis will be applied to the next theoretical model

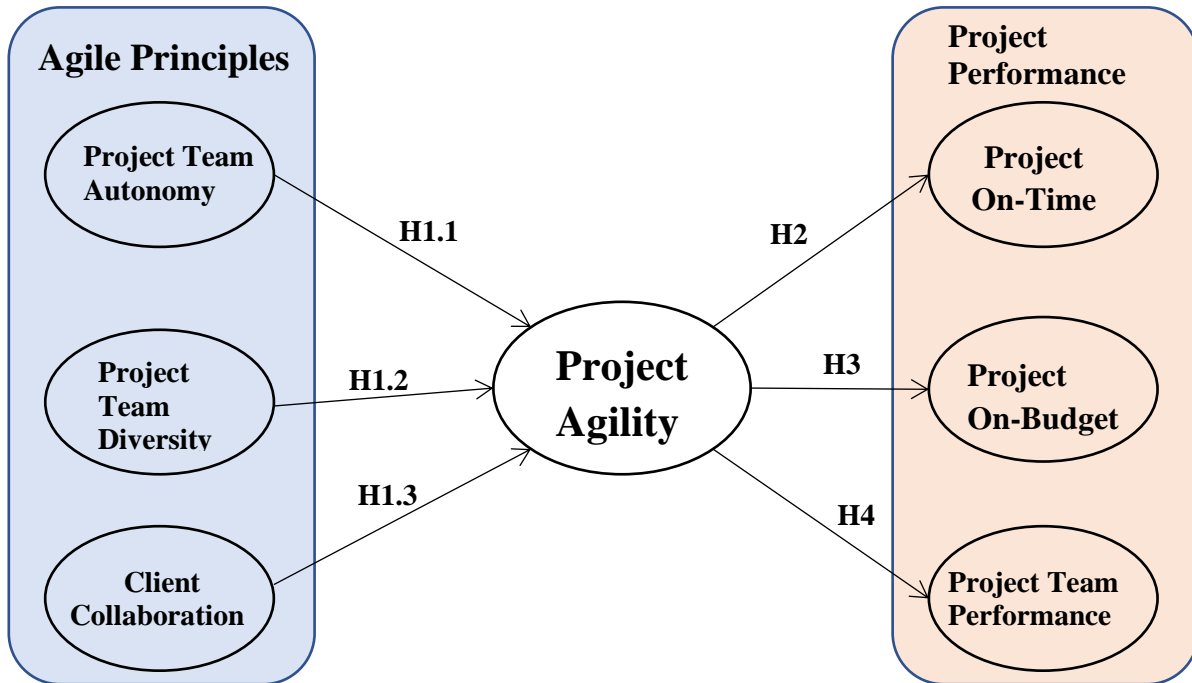


Figure 4: Theoretical model

Source: Made by the researcher

1.7. Hypotheses tests

We tested the hypotheses of our research by performing multiple and linear regression analyses. The nature of the variables of the theoretical model allows us to perform these analyses. The threshold recommended in the literature for this type of analysis is the degree of significance of ANOVA which must be less than 0.05 as well as R² adjusted which explains the validity of the model and which must exceed 10%.

1.7.1. Test of Agile principles effect on Project Agility

Hypothesis 1 was tested using a multiple linear regression between the sub-hypotheses (H1a, H1b, H1c.)

We will proceed to the analysis between the independent variables Project team autonomy, team diversity, and Client collaboration, and the dependent variable PA.

We observe from the table that R² is equal to 0,553%, which gives us an acceptable linear model, on the results presented in the table there is a significant relationship between the dependent

variable «Project Agility» and the next independent variable: perceived ease of use and perceived usefulness with ($\beta=0,496$, Sig = 0.00) which means that the more client collaboration is high, the more PA is stronger. The second significant relationship is between PA and team diversity ($\beta=0,220$, Sig = 0.004) which also means that the less team is diverse, the more PA is higher. The last variable to have as well a significant effect on the project is team autonomy with a result of ($\beta=0,188$, Sig = 0.033) respectively, and the more it low, the PA is low.

Table 42: Agile Principles and Project Agility multiple regression

Independent variable	Dependent variable	R2	Adjusted R2	F	B	t	sig	Hypotheses
Project team autonomy	Project Agility	0,553	0.539	39,624	0,556	2,162	0,033	H1.1(a)
Project team diversity					0,469	2,959	0,004	H1.2(b)
Client collaboration					0,698	5,478	0,00	H1.3(c)

Source: Made by the researcher from SPSS outputs

The results presented in the table above show a significant effect on the agility of the project with a significance level (Sig) lower than 0.05. Therefore, there is a relationship between the four variables, and hypothesis H1 on "the effect of AP on the PA is validated.

1.7.2. Test of Project Agility effect on Project On-time

Hypothesis 2 was tested using a simple linear regression between the independent variable PA and the dependent variable Project On-time. The results obtained from the correlation coefficients are presented in **table 43** below:

Table 43: Project Agility and Project On-time linear regression

Independent variable	Dependent variable	R2	Adjusted R2	F	β	t	sig	Hypotheses
Project Agility	On-Time Project	0,140	0.132	15,997	0,375	4,00	0,000	H4

Source: Made by the researcher from SPSS outputs

The results presented in the table above show a significant effect on the agility of the project with a significance level (Sig) lower than 0.05. Therefore, there is a relationship between the four variables, and hypothesis H1 on "the effect of AP on the PA is validated.

1.7.3. Test of Project Agility effect on Project On-Budget

Hypothesis 5 was tested using a simple linear regression between the independent variable PA and the dependent variable Project budget. The results obtained from the correlation coefficients are presented in **table N44** below:

Table 44: Project Agility and Project On-budget linear regression

Independent variable	Dependent variable	R2	Adjusted R2	F	β	t	sig	Hypotheses
Project Agility	On-Budget Project	0,310	0.303	44,056	0,557	6,63*	0,000	H5

Source: Made by the researcher from SPSS outputs

The results presented in the table above show a significant effect on the agility of the project with a significance level (Sig) lower than 0.05. Therefore, there is a relationship between the four variables, and hypothesis H1 on "the effect of AP on the PA is validated.

1.7.4. Test of Project Agility effect on Project team performance

Hypothesis 6 was tested using a simple linear regression between the independent variable PA and the dependent variable PTP. The results obtained from the correlation coefficients are presented in **table 45** below:

Table 45: Project Agility and Project team performance liner regression

Independent variable	Dependent variable	R2	Adjusted R2	F	β	t	sig	Hypotheses
Project Agility	Project team performance	0,492	0.486	94,742	0,701	9,734	0,000	H6

Source: Made by the researcher from SPSS outputs

The results presented in the table above show a significant effect on the agility of the project with a significance level (Sig) lower than 0.05. Therefore, there is a relationship between the four variables, and hypothesis H1 on "the effect of AP on the PA is validated.

Table 46: Hypotheses tests summary

Varibales' hypotheses			Confirmation	
H1	H1.a	There is a direct positive effect between project team autonomy and project agility.	Yes	Supported
	H1.b	There is a direct positive effect between project team diversity and project agility.	Yes	
	H1.c	There is a direct positive effect between client collaboration and project agility.	Yes	
H2		There is a direct positive effect between project agility and project on time.	Yes	Supported
H3		There is a direct positive effect between project agility and project on-budget.	Yes	Supported
H4		There is a direct positive effect between project agility and the adaptive performance of project team.	Yes	Supported

Source: Made by the researcher

2. Discussion

The analysis of the results of our research allows us to make some observations in the first part the effect of Project team autonomy, team diversity, and Client collaboration on PA and, ultimately in the second part, PA on project on time, project on budget, and the adaptive performance of project team in MP.

In part one and according to our results, marketing managers used AP in managing their projects, which brings us to note that project team characteristics (team autonomy and team diversity) and client collaboration have positive effect on PA.

Supported by the empirical studies made by (Moi & Cabiddu, 2021; Radhakrishnan, Zaveri, & David, 2021; Ciriello, Glud, & Hansen-Schwartz, 2022; Tyagi, Sibal, & Suri, 2022) which demonstrated the relationship between AP adaption and PA in no-it project including marketing industry.

Our quantitative results and quantitative studies point out appositive relationship between the two, therefore we can say that this tree principles are useful and effective for MP as classed in

our analyzing client collaboration had the strongest effect followed up with team diversity and autonomy.

In part two and according to our results, MP are agile projects as mentioned in ([15th State of Agile Report, 2021](#)), which brings us to note that PA have positive effect on project on time, project on budget, and the adaptive performance of project team which demonstrate project performance.

Supported by the study made by ([Radhakrishnan, Zaveri, & David, 2021](#); [Tyagi, Sibal, & Suri, 2022](#); [zielske & Held, 2022](#)) which demonstrated the relationship between Agile adaption and PA in marketing industry.

our quantitative results and reference studies point out appositve relationship between the two, therefore we can say that PA is the key to have high performance in MP as classed in our analyzing the Adaptive performance (Handling Emergencies and

unpredictable situations, solving problems creatively, learning newer methods, tasks, technologies, demonstrating interpersonal adaptability, handling work stress) of the project team is the most effected followed up with Project on-budget and Project on-Time.

Finally, the results indicate a relationship between all our variables which validate that there is a significant relationship between AP and project performance in MP and that the PA is the link between team autonomy, diversity, client collaboration and project on-time, on-budget and its team performance.

CONCLUSION

We conclude our work by recalling its objectives, the methodology adopted to respond to research questions, findings and formulated recommendations. We will also present the study limits as well as the future aspects of research.

The objective of this research was to measure the effect of AP (project team autonomy, team diversity, and client collaboration) PA and project performance measures (on-time project completion, on-budget project completion, and the adaptive performance of the project team) in the marketing project.

To do so, we adopted a quantitative approach with respondents who have Project Managers who managed MP, our results allowed us to validate the next hypotheses:

- Marketing project managers use Agile principles in their project process.
- AP (project team autonomy, team diversity, and client collaboration) have a significant direct relationship with PA.
- PA has a significant direct relationship with the adaptive performance of the project team. PA also has a significant direct relationship with project success measures (on-time project completion, on-budget project completion,
- We also found that PA mediates the relationship use of Agile principles and project performance in MP.

Contributions of this study:

- This study makes four significant contributions to the literature: First, prior agile project management literature is on agile IT projects only. Many of these are mainly descriptive. Theory-driven empirical research is mostly lacking.
- Researchers have called for structured, rigorous, theory-driven, empirical studies on PA that apply to various project types and marketing industry the present study addresses this need.

Despite the results we have obtained, our research has also seen some limits including The limited sample (100 respondents to our questionnaire) for a sector such as Marketing which is a

large domain, and the lack of literature in the area of MP and the large-scale, theory-based empirical study that addresses the PA.

This study has some limitations, which leaves a scope for future researchers to work on and to study based on all the factors included in project like PTM and clients, First explore the types of communication workflows and tools used, investigation the relation between information transforming and knowledge creation between the team (Radhakrishnan, Zaveri, & David, 2021).

Second, management style used by projects managers and organizational culture that might have a significant effect on PA (Sharma, 2022) not only in marketing project but all types.

Bibliography

- Kumkale , i. (2022). Organizational Agility. In i. Kumkale, *Organizational Mastery;Accounting, Finance, Sustainability, Governance & Fraud: Theory and Application.* (pp. 37-52). Singapore.: Springer, Singapore. doi:https://doi.org/10.1007/978-981-16-7582-9_3
- Nurdiani, I., Börstler, J., Fricker, S., Petersen, K., & Chatzipetrou, P. (2019). Understanding the order of agile practice introduction: Comparing. *The Journal of Systems and Software* 159, 1-20.
- (2021). *15th State of Agile Report.* Digital.ai.
- Beck, K., & al, e. (2001-2019). *the Agile Manifesto.* Agile Alliance.
- Blackwell, j. (2018). Applies visuel metaphors in organizational Management.
- Calefato, F., & Lanubile, f. (2020). A Case Study on Tool Support for Collaboration in. *ICGSE '20.*
- Camarinha-Matos, L., & Afsannanesh. (2000). FRAMEWORKS FOR AGILE VIRTUAL ENTERPRISES IN MANUFACTURING. *IFAC Manufacturing. Modeling. Management,* 89-94.
- Ciriello, R. F., Glud, J. A., & Hansen-Schwartz, K. H. (2022). Becoming agile together: Customer influence on agile adoption within. *Information & Management,* 13. doi:https://doi.org/10.1016/j.im.2022.103645
- Cram, W. A., & Marabelli, M. (2018). Have your cake and eat it too? Simultaneously pursuing the knowledgesharing benefits of agile and traditional development approaches. *Information & Management* 55, 322-339.
- Das, K. P., Mukhopadhyay, S., & Suar, D. (2022). Enablers of workforce agility, firm performance, and corporate reputation. *Asia Pacific Management Review* .
- Dove, r. (1996). Agile supply-chain Managment . *Paradigm shift international* , 9/97.

- Dybå, & Dingsøy. (2008). "Empirical studies of agile software development: a systematic. *Information and Software Technology*, 833-859.
- Dyba, T., & Dingsøy, T. (2008). Empirical studies of agile software development: A systematic review. *Information and Software Technology* 50, 833-589.
- Ellis, G. (2016). Agile Project Management:. doi:10.1016/B978-0-12-802322-8.00008-5
- Franco, C., & Landini, F. (2022). Organizational drivers of innovation: The role of workforce agility. *Research Policy*, 51.
- Gemino, A., Reich, B. H., & Serrador, P. M. (2020). Agile, Traditional, and Hybrid Approaches. *Project Management Journal*. doi:DOI: 10.1177/8756972820973082
- Gunasekaran, A., Sarhadi, M., & Yusuf, Y. (1999). Agile manufacturing:The drivers, concepts and attributes. *International Journal of Production Economics*, 34-43.
- Hair, j., Arthur, m., MIke, p., phillip, samouel, Sons, o. W., & Sussex, W. (2007). ResearchMethods for Business. *The International Journal of Accounting*, 448. doi:http://dx.doi.org/10.1016/j.intacc.2008.04.006
- Lapp, T., & al, e. (2018). Toward an Improved Understanding of Agile Project Governance: A Systematic. *Project Management Journal*, Vol. 49(6) 39–63. doi:DOI: 10.1177/8756972818803482
- Lee, G., & Xia, W. (2010, march). Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility. *MIS Quarterly*, 34, 87-1444. doi:https://doi.org/10.2307/20721416
- Malik, M., Sarwar, S., & Orr, S. (2021). Agile practices and performance: Examining the role of psychological. *International Journal of Project Management*. doi:https://doi.org/10.1016/j.ijproman.2020.09.002
- Mero, J., Leinonen, M., Makkonen, H., & Karjaluoto, H. (2022). Agile logic for SaaS implementation: Capitalizing on marketing automation. *Journal of Business Research*, 583-594.

- Moi, L., & Cabiddu, F. (2021). An agile marketing capability maturity framework. *Tourism Management* 86, 104347.
- Nagel, R. (1991). *21ST Century Manufacturing Enterprise Strategy Report*. Arlington VA: Naval research.
- Nagel, R., & Dove, r. (1991). *21st Century Manufacturing Enterprise Strategy-an Industry led View*. arlington: Naval research.
- Nagel, R., & Qian, l. (2011). Migrating to Agility 2.0: How social computing creates strategic value. *Organizational Dynamics*. doi:http://dx.doi.org/10.1016/j.orgdyn.2011.01.006
- Oliveira-Dias, & Maqueira-Marín. (2022). The link between information and digital technologies of industry 4.0 and. *Computers & Industrial Engineering*, 20. doi:https://doi.org/10.1016/j.cie.2022.108000
- Radhakrishnan, A., Zaveri, J., & David, D. (2021). The impact of project team characteristics and client collaboration on project agility. *European Management Journal*, 20. doi:https://doi.org/10.1016/j.emj.2021.09.011
- Reed, J. (2021, August). Strategic Agility in the SME: Use It Before You Lose It. *Journal of small business strategy*, 14. doi:http://dx.doi.org/10.53703/001c.29734
- Sarangee, K., Schmidt, J. B., & Srinath, P. B. (2022). Agile transformation in dynamic, high-technology markets: Drivers,. *Industrial Marketing Management*.
- Schwaber, k., & Sutherland, J. (2020). Le Guide Scrum,Le guide de Référence de Scrum : Les règles du jeu. In *Le guide de Référence de Scrum : Les règles du jeu*.
- Sharma, S. (2022). Effect of agility in different dimensions of manufacturing systems. *Materials Today: Proceedings*, 4. doi:https://doi.org/10.1016/j.matpr.2022.03.054
- Tam, C., Costa Moura, E. J., & Oliveira, T. (2020). The factors influencing the success of on-going agile software development. *International Journal of Project Management*, 165-176.
- Tripp, j., & Armstrong , D. (2018, oct 04). Agile Methodologies: Organizational Adoption. *Journal of Computer Information Systems*. doi:DOI: 10.1080/08874417.2016.1220240

- Tyagi, S., Sibal, R., & Suri, B. (2022). Empirically developed framework for building trust in distributed agile teams. *Information and Software Technology* 145, 106828.
- van wassenhove, I., Sengupta, k., & Oorschot, k. (2018). Under Pressure: The Effects of Iteration Lengths on Agile Software Development Performance. *Project Management Journal*.
- Weflen, E., Mackenzie, C., & Rivero, I. (2022). An influence diagram approach to automating lead time estimation in Agile. *Expert Systems With Applications* 187, 115866.
- Yusuf, & Gunasekaran. (2004). Agile supply chain capabilities: Determinantsof competitive objectives. *European Journal of Operational Research* 159 (2004) 379–392, 381-392.
- Zavyalova, E., Sokolov, D., & Lisovskaya, A. (2019). Agile vs traditional project. *Human*, 18.
- zielske, M., & Held, T. (2022). Agile methods used by traditional logistics companies and logistics. *Journal of Systems and Software*, volume 190. doi:<https://doi.org/10.1016/j.jss.2022.111328>

ANNEX A- QUESTIONNAIRE

The effect of Agile principles on marketing Projects performance

Description

[EN]

This survey is conducted as part of empirical research for the realization of an end-of-study project for Master 2 Entrepreneurship and Project Management at the National Higher School of Management. This research aims to determine "the effect of agile principles on performance of the project team ".It contains 4 parts, which you can answer in about 5-10 minutes. Your answers will be treated confidentially (for academic purposes only). Your cooperation in spending time and effort to answer this questionnaire is greatly appreciated. We thank you for your cooperation.

[AR]

تجرى هذه الدراسة الاستقصائية كجزء من البحوث التجريبية الرامية إلى إنجاز مشروع التخرج المتعلق بالماجستير 2 . المقاولاتية وإدارة المشاريع في المدرسة الوطنية العليا للمناجمنت .يهدف هذا البحث إلى تحديد «اثر المبادئ المرنة على أداء المشروع والتأثير الواقع على فريق المشروع .يحتوي الاستبيان على 4 أجزاء يمكن الإجابة عليهم في حوالي 5-10 دقيقة سيتم التعامل مع جميع الإجابات بسرية تامة)للأغراض الأكاديمية فقط إن تعاونكم في قضاء الوقت والجهد للإجابة على هذا الاستبيان موضع تقدير كبير .نشكركم على تعاونكم

[FR]

Cette enquête est réalisée dans le cadre d'une recherche empirique pour la réalisation d'un projet de fin d'études de master 2 entrepreneuriat et Management de projet à l'École Nationale Supérieure de Management. Cette recherche vise à déterminer "l'effet de les principes agiles sur la performance de l'équipe du projet".Elle contient 4 parties, aux quelles vous pouvez répondre en 05-10 minutes . Vos réponses seront traitées de manière confidentielle (à des fins purement académiques).Votre collaboration en consacrant du temps et des efforts pour répondre à ce questionnaire est très appréciée.Nous vous remercions pour votre collaboration fructueuse.

1)Profile Characteristics

Which role describes your current position?

- General manager
- Manager senior
- Manager junior
- Project manager
- Product manager

What type of marketing projects do you frequently manage?

- TV commercial creation
- Digital communication
- Events
- Market research

Number of Project Members

- Members than 10
- 10 - 20 members
- 21 - 40 members
- >40 members

Project Duration

- Less than 6 months
- 6–12 months
- >12 months

2)The relationship between Agile principles and project Agility

Project team autonomy (1 = strongly disagree; 7 = strongly agree) (Lee & Xia, 2010).

1. The project team was allowed to freely choose tools and technologies.
2. The project team had control over what they were supposed to accomplish.
3. The project team was granted autonomy on how to handle user requirement changes.
4. The project team was free to assign personnel to the project.

Project team diversity (1 = strongly disagree; 7 = strongly agree) (Lee & Xia, 2010).

1. The members of the project team were from different areas of expertise.

2. The members of the project team had skills that complemented each other.
3. The members of the project team had a variety of different experiences.
4. The members of the project team varied in functional backgrounds.

Client collaboration (1 = strongly disagree; 7 = strongly agree) (Stare, 2014).

1. The client and the project team jointly assessed the importance of the functions of the product.
2. The client provided frequent feedback about the partially developed product or result.
3. The client proposed and evaluated changes to project specifications together with the project team.
4. The client participated in the development of test procedures/ methods.

Project Agility (adapted from Conforto et al., 2016) (1 = strongly disagree; 7 = strongly agree):

1. The project team and the customer frequently discussed project-related issues.
2. The project team frequently delivered partial results of the project.
3. In case of changes in the project scope, the project team immediately analyzed the information and made a quick decision.
4. In case of changes in the project scope, the project team immediately updated the project plan and communicated the changes to all stakeholders.

3)The effect on the performance of project team members

Adaptive performance of PTM (1 = strongly disagree; 7 = strongly agree) (Radhakrishnan, Zaveri, & David, 2021)

Handling Emergencies and unpredictable situations:

1. The PTM quickly took effective actions to solve the problem.
2. The PTM examined the available options and their implications to choose the best solution.
3. The PTM easily changed plans to deal with the new situation.
4. The PTM focused on the situation to react quickly.

Solving problems creatively:

1. The PTM tried to develop new methods for solving atypical problems.
2. The PTM relied on a wide variety of information to find innovative solutions to problems.
3. The PTM came up with breakthrough ideas to solve problems.

Learning newer methods, tasks, and technologies:

1. The PTM searched for innovations to improve work methods.
2. The PTM always looked for opportunities (e.g., training, workshops, interactions with experts, colleagues, etc.) to help them increase their job performance.
3. The PTM took action to keep their skills and knowledge up to date.
4. The PTM anticipated changes in their jobs by participating in change management projects.

Demonstrating interpersonal adaptability:

1. The PTM changed their way of working based on others' feedback and suggestions.
2. The PTM developed positive relationships with the people they interacted with while doing their jobs.
3. The PTM considered others' viewpoints to better interact with them.
4. The PTM learned new ways of doing their jobs to better cooperate with colleagues.

Handling work stress:

1. The PTM stayed calm under circumstances where they had to make crucial decisions related to the project.
2. The PTM sought solutions by talking to more experienced colleagues.
3. The colleagues of PTM often consulted with them in difficult circumstances.

4)The effect on project success

Project On-time Completion (adapted from Lee & Xia, 2010).

Objective measure: project start date (mm/dd/yyyy), planned completion date: mm/dd/yyyy and actual completion date: (mm/dd/yyyy).

Subjective measures (1 = strongly disagree; 7 = strongly agree):

1. The project was completed on time according to the original schedule.
2. We never experienced a negative schedule variance as the project progressed.

Project On-Budget Completion (adapted from Lee & Xia, 2010).

Objective measure: Planned Project Cost (in dollars) and Actual Project Cost (in dollars).

Subjective measures (1 = strongly disagree; 7 = strongly agree):

1. The project was completed on budget according to the original budget.
2. We never experienced a negative cost variance as the project progressed.

ANNEX C- SPSS TABLES

1. Agile principles and project agility

Table: Agile principles and project agility correlation

Correlation					
		Project Agility	Autonomy	Diversity	Collaboration
Correlation de Pearson	Project Agility	1,000	,556	,469	,698
	Autonomy	,556	1,000	,285	,616
	Diversity	,469	,285	1,000	,394
	Collaboration	,698	,616	,394	1,000
Sig. (unilateral)	Project Agility	.	,000	,000	,000
	Autonomy	,000	.	,002	,000
	Diversity	,000	,002	.	,000
	Collaboration	,000	,000	,000	.
N	Project Agility	100	100	100	100
	Autonomy	100	100	100	100
	Diversity	100	100	100	100
	Collaboration	100	100	100	100

Source: SPSS outputs

2. Project agility and project on-time, on-budget

Table: Project agility and on-budget correlation

Correlation			
		Project On-budget	Project Agility
Correlation de Pearson	Project On-budget	1,000	,557
	Project Agility	,557	1,000
Sig. (unilateral)	Project On-budget	.	,000
	Project Agility	,000	.
N	Project On-budget	100	100
	Project Agility	100	100

Source: SPSS outputs

Table: Project agility and on-time correlation

Correlation's			
		Project On-time	Project Agility
Correlation de Pearson	Project On-time	1,000	,375
	Project Agility	,375	1,000
Sig. (unilateral)	Project On-time	.	,000
	Project Agility	,000	.
N	Project On-time	100	100
	Project Agility	100	100

Source: SPSS outputs

3. Project agility and Project team performance

Table: Project agility and Project team performance correlation

Correlation			
		Adaptive Performance of Project Team	Project Agility
Correlation de Pearson	Adaptive Performance of Project Team	1,000	,701
	Project Agility	,701	1,000
Sig. (unilateral)	Adaptive Performance of Project Team	.	,000
	Project Agility	,000	.
N	Adaptive Performance of Project Team	100	100
	Project Agility	100	100

Source: SPSS outputs