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Scrum in the Digital Marketplace: Assessing Agile Methodologies in E-commerce Project Execution

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Nothing is particularly hard if you divide it into small jobs.

– Henry Ford

Abstract

This thesis examines the application of the Scrum framework in a data-driven e-commerce project, assessing its effectiveness in improving efficiency, adaptability, and collaboration. The study first explores Scrum's theoretical foundations through a literature review, focusing on its core principles: roles, events, and artifacts. A modified version of Scrum is then applied to a real-world case study, analyzing its alignment with the Scrum Guide and the necessary adaptations for a market research and analysis project. The findings show that while Scrum's iterative planning, continuous feedback, and stakeholder involvement enhance project outcomes, certain deviations from the standard framework are required in non-software environments. This research contributes to the broader understanding of Scrum's practical applicability beyond software development, providing insights into optimizing agile practices for data-intensive projects.

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Introduction

The fast-paced evolution of digital commerce has caused new challenges in project management, requiring economical, flexible, and adjustive methodologies to stay up with the technology advancements. In the e-commerce sector, businesses should address the client's demands and enhance user expertise whereas executing the project effectively. Traditional project management approaches usually struggle to accommodate the dynamic nature of e-commerce, resulting in inefficiencies, delays, and deviation with business goals.

Scrum, a wide adopted Agile framework, presents a possible solution to those challenges. The Scrum Guide (Schwaber & Dame Joan Sutherland, 2020) offers an initial understanding of this methodology that allows step-by-step progress through structured roles, events, and artifacts. By fostering transparency, inspection, and adaptation, Scrum teams stay alert to changes, using collaboration and delivering progressive value within Sprint cycles. Originally developed for software development, Scrum has since been effective during a sort of domains, together with e-commerce project management.

In this context, the objective of this thesis is to use Scrum methodology to an e-commerce project and check its effectiveness in rising efficiency, collaboration, and adaptableness. This research can analyse the alignment of the case study with the Scrum Guide, distinguishing which principles are followed, or deviated, and also the impact on project outcomes. Through a structured analysis, this thesis seeks to see how Scrum influences within the e-commerce landscape.

The following chapters will dig into the theoretical background, research methodology, case study analysis, results, and conclusions to address these objectives.

1. Theoretical Background

1.1 Scrum: The Agile Approach That Transforms teamwork and efficiency

Imagine engaging in a project where everything flows seamlessly, where collaboration is natural, changes are embraced, and progress happens steady without the chaos of last-minute scrambles. That's what of Scrum does.

Scrum is much more than just a project management framework; it's a mental attitude that encourages efficiency, teamwork, and flexibility. It's particularly valuable in industries like e-commerce, where customer preferences shift uncontrollably, market trends evolve quickly, and where companies must continuously fine-tune their ways to stay ahead. Traditional project management methodologies may struggle in such fast-moving environments, resulting in delays, and maybe lost opportunities. Scrum, however, offers a solution—one that keeps teams focused, responsive, and aligned with the company goals.

What Makes Scrum thus Effective?

At its core, scrum operates on an iterative cycle. rather than trying to finish everything in one large, overwhelming push, teams break their work into structured, time-boxed segments called Sprints. this allows them to adapt as they are going, incorporating feedback, making necessary improvements, and steadily delivering value.

- Simple yet structured: scrum provides a clear framework without the burden of excessive work.
- Driven by real-world insights: decisions aren't made in isolation, but they're guided by continuous feedback and real user desires.
- Steady, progress: large projects are broken down into smaller, testable components, making improvements easier and a lot more manageable.
- Empowered, self-organizing teams: rather than waiting on top-down directives, scrum teams take ownership of their work, making certain smoother execution and stronger collaboration.

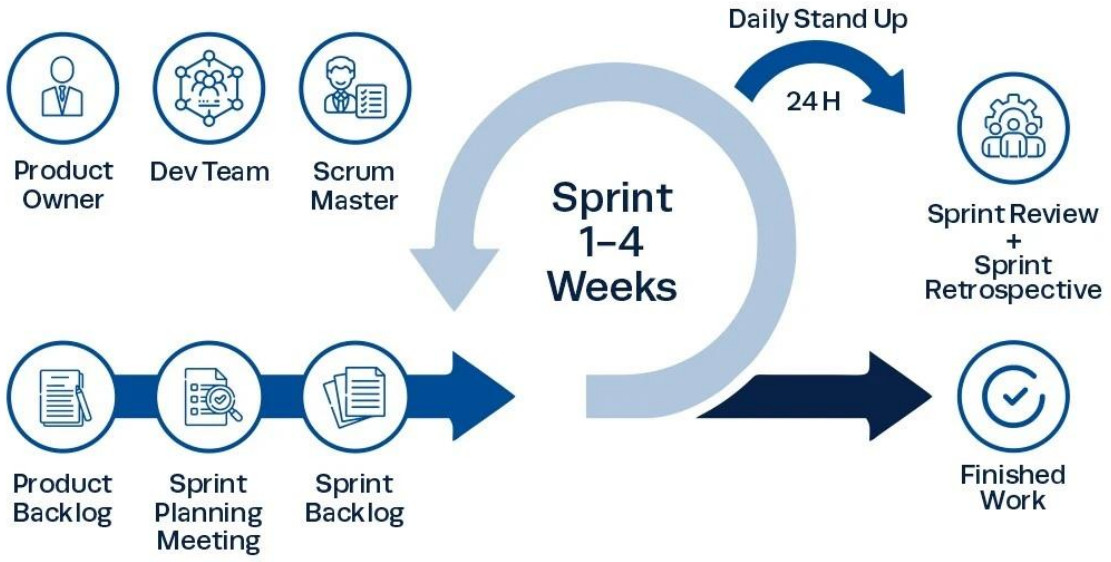


Figure 1 Scrum Framework Overview

1.2 Principles of Scrum

Scrum is built on three fundamental principles that define its effectiveness in complex project environments.

Transparency

All aspects of the Scrum process must be visible to ensure clear communication, accountability, and alignment.

Visibility of work: The Product Backlog, Sprint Backlog, and Increment must be accessible to all team members and stakeholders.

- Definition of Done (DoD): Ensures everyone understands when a task is complete.
- Open communication: Progress and challenges are openly shared during Scrum events.

Inspection

Frequent evaluation of work is essential for identifying potential risks and inefficiencies early in the development process. Scrum addresses this need through a set of structured events specifically designed to facilitate regular inspection. The Daily Scrum allows the team to review ongoing progress, discuss what has been accomplished, and identify any immediate obstacles that could hinder delivery. The Sprint Review brings together the team and stakeholders to inspect the completed work, ensuring it aligns with expectations and gathering feedback for future iterations. Finally, the Sprint

Retrospective provides an opportunity for the team to reflect on the process itself—analyzing what went well, what didn't, and how the team can improve in the next Sprint. Together, these events help maintain transparency, foster continuous learning, and support proactive problem-solving.

Adaptation

Scrum is designed to be inherently flexible, enabling teams to adapt quickly when inspection reveals issues that could jeopardize the project. If a feature does not meet user expectations, it can be refined or reworked in the following Sprint, allowing for continuous improvement. When an obstacle is slowing down progress, the Scrum Master intervenes to identify and remove it, ensuring the team stays on track. If market conditions shift, the Product Owner can reprioritize the backlog to align with new business objectives or consumer demands. These principles of responsiveness and adaptability help reduce risk and are especially critical in the context of e-commerce, where platforms must constantly adjust to fluctuating consumer behavior and intense market competition.

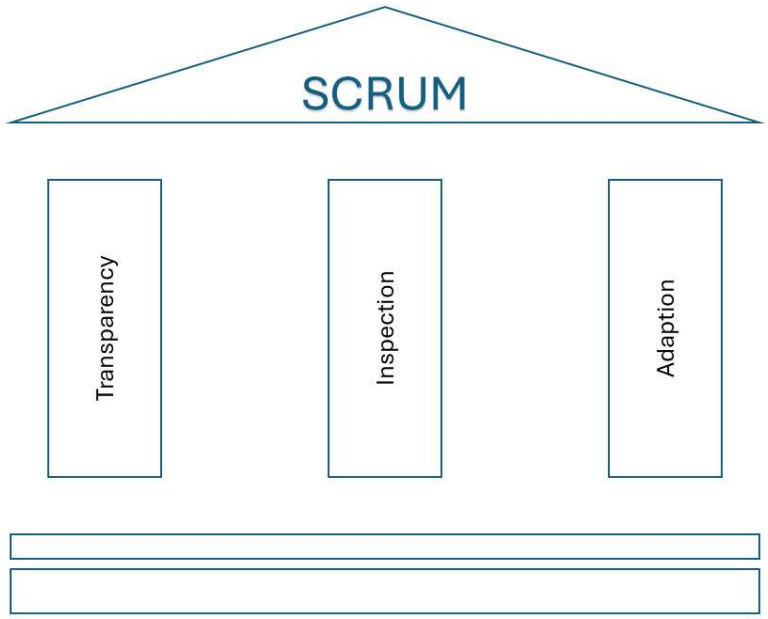


Figure 2 Scrum Pillars

1.3 Scrum Roles

Scrum defines three distinct roles, each with specific responsibilities. These roles ensure clear ownership of tasks and effective team collaboration.

Product Owner

The Product Owner (PO) plays a key role in making sure that the Scrum Team delivers the highest possible business value. Serving as a link between stakeholders and the development team, the PO is responsible for managing the Product Backlog by

prioritizing tasks based on business needs and strategic goals. An important part of this role is to define and clearly communicate the Product Goal, ensuring that the team's work supports the overall direction of the organisation. The Product Owner also collaborates closely with a range of stakeholders such as users, executives, and customers to gather feedback and stay informed about changing requirements. Using this input, the PO makes well-informed decisions about which features or improvements should be addressed next, helping the team focus on delivering results that matter.

Scrum Master

The Scrum Master acts as a facilitator and coach, supporting the team in applying Scrum principles effectively throughout the project. One of their main responsibilities is to remove impediments by identifying and addressing anything that may be slowing down the team's progress. They also facilitate key Scrum events such as Sprint Planning and Daily Scrum, ensuring that these meetings remain focused, efficient, and valuable. In addition, the Scrum Master provides ongoing coaching to help the team refine their processes and stay aligned with Agile values. By encouraging regular reflection and learning through Sprint Retrospectives, the Scrum Master promotes a culture of continuous improvement, helping the team evolve and deliver better results over time.

Developers

The Developers are responsible for delivering high-quality increments of the project during each Sprint. They work in a self-organizing way, which means they take ownership of how the work is carried out and collaborate to achieve the goals set by the team. During Sprint Planning, they decide how the Sprint Goal will be reached and what tasks need to be completed to get there. Throughout the Sprint, the Developers ensure that their work meets the required standards by following the Definition of

Done, which outlines the quality criteria for each deliverable. This autonomy allows the team to remain flexible, efficient, and accountable for delivering valuable outcomes.

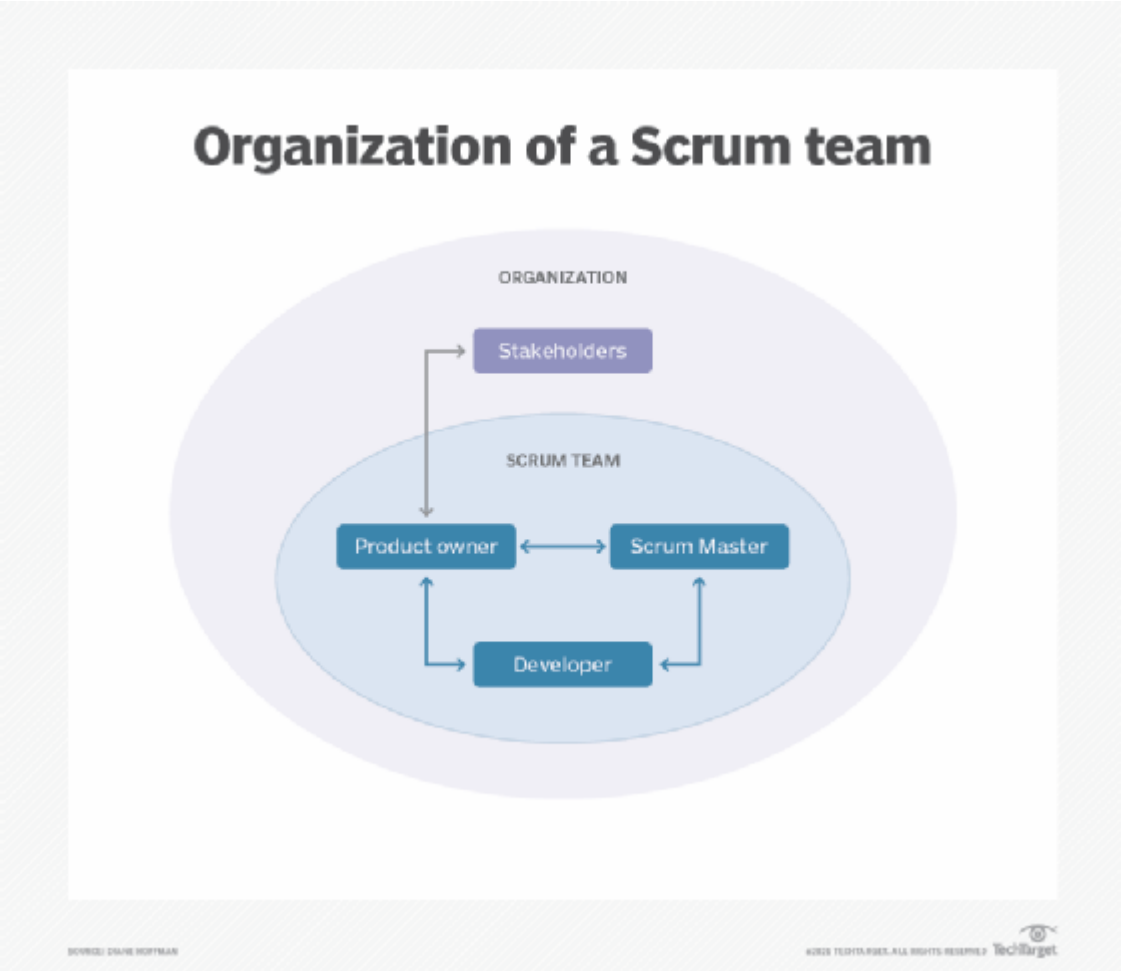


Figure 3 Scrum Structure

1.4 Scrum Events

Scrum consists of structured events designed to enhance collaboration, inspect progress, and enable continuous improvement.

Sprint Planning

- Defines the Sprint Goal and selects backlog items to work on.
- Developers break down backlog items into actionable tasks.
- Time-boxed to a maximum of 8 hours for a 1-month Sprint.

Daily Scrum

- A 15-minute stand-up meeting held daily.
- Developers discuss progress and identify blockers.
- Helps keep the Sprint on track and aligned with the Sprint Goal.

Sprint Review

- A meeting where the team demonstrates the completed work to stakeholders.
- Stakeholders provide feedback, which informs future backlog priorities.

Sprint Retrospective

- A self-reflection meeting to assess what went well and what could improve.
- Ensures continuous learning and enhancement of the Scrum process.

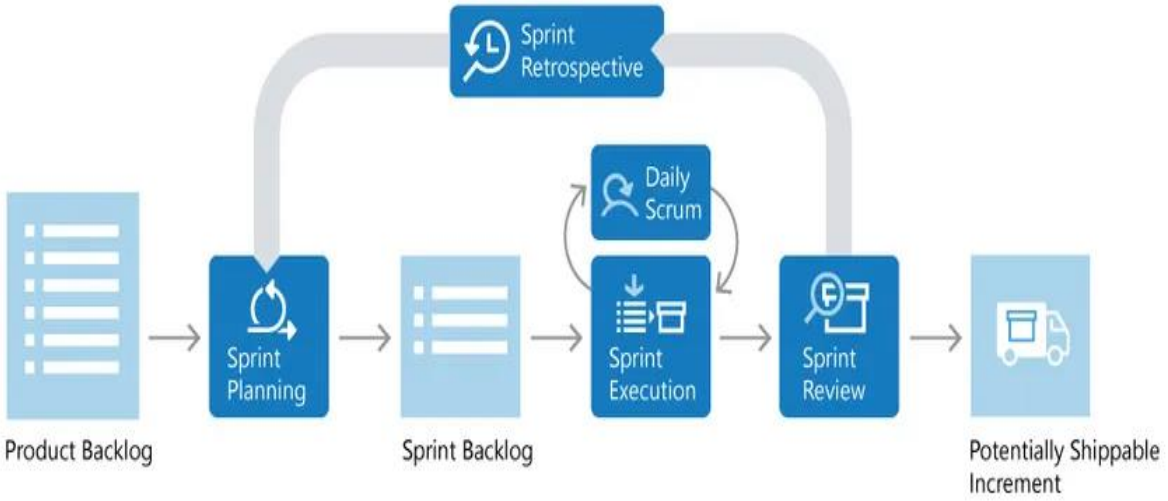


Figure 4 Scrum Event Cycle

1.5 Scrum Artifacts

Scrum defines three key artifacts that serve as the foundation for transparency, alignment, and progress tracking. These artifacts help teams structure their work, communicate effectively, and ensure a shared understanding of deliverables.

Product Backlog

The Product Backlog is a continuously evolving, prioritised list of all the work required to improve the product. It serves as the single source of tasks for the Scrum Team, ensuring that everyone is aligned on what needs to be delivered and why.

One key characteristic of the Product Backlog is that it is dynamic, meaning it changes regularly to reflect shifting business needs, stakeholder input, and market developments. It is also ordered by priority, with the most valuable and urgent items placed at the top, so they are addressed first. This ensures that the team consistently focuses on delivering the highest-value features.

The backlog is refined continuously through an activity known as Product Backlog Refinement, during which items are clarified, broken down into smaller tasks, and estimated. This helps the team understand upcoming work and plan future Sprints more effectively. The Product Owner is responsible for maintaining the backlog, making sure that all items are clearly defined, well-structured, and aligned with the overall product strategy and business objectives.

Sprint Backlog

The Sprint Backlog is a focused, short-term plan that includes the specific items selected from the Product Backlog for the current Sprint, along with a clear outline of how the team intends to deliver them. It is created during Sprint Planning, where the Scrum Team chooses tasks that they believe can be completed within the Sprint's timeframe. Each Sprint Backlog includes a Sprint Goal, which provides a shared objective and keeps the team aligned on what they are aiming to achieve.

Throughout the Sprint, the Sprint Backlog is updated regularly, often on a daily basis, to reflect progress, new insights, or changes in priorities. This ensures the team remains adaptive and transparent about what is being worked on. By providing a clear and up-to-date view of the team's commitments, the Sprint Backlog helps maintain focus and accountability, allowing every team member to understand what needs to be done and how their work contributes to the Sprint Goal.

Increment

An Increment is the result of all the work completed during a Sprint that meets the Definition of Done. It represents a concrete step forward in achieving the Product Goal and must be usable and functional, even if it is not released to customers right away. Each Increment is cumulative, building on previous ones to ensure that the product evolves in a consistent and coherent way.

Maintaining strict quality standards is essential, as only work that fully meets the agreed-upon Definition of Done can be considered part of the Increment. This ensures that every addition to the product is reliable, tested, and ready for integration. Increments support continuous delivery and iterative improvement, helping teams reduce risk and respond more effectively to changing needs or feedback.

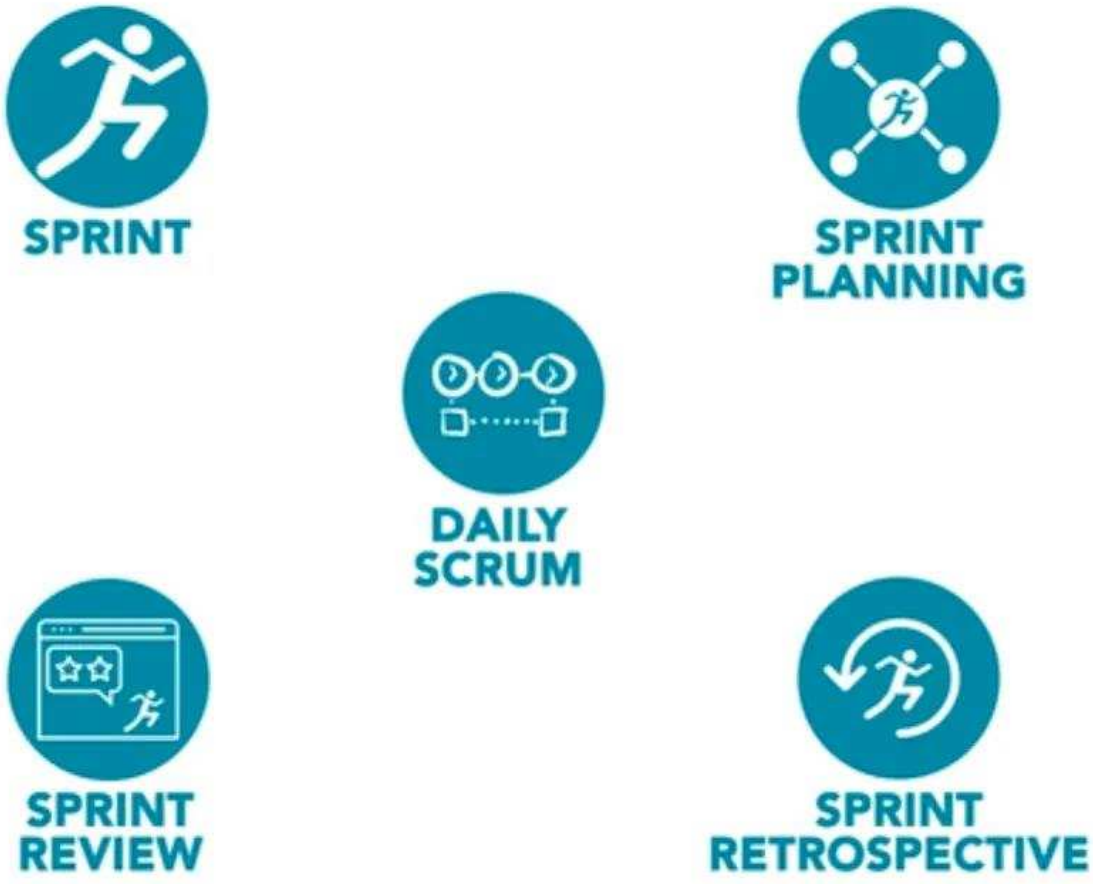


Figure 5 Scrum Artifacts Overview

1.6 Scrum Values

Scrum's effectiveness depends on teams embodying five core values:

- Commitment: Each team member is dedicated to achieving Sprint and Product Goals. Commitment also extends to self-improvement, continuous learning, and collaboration.
- Focus: Teams concentrate on the Sprint Goal, minimizing distractions and ensuring that deliverables meet high standards within each iteration. This focus helps optimize team productivity and ensures steady progress.
- Openness: Open communication is encouraged within Scrum teams. Challenges, risks, and feedback are discussed transparently to promote collaboration and innovation.
- Respect: Scrum fosters an environment of mutual respect, ensuring that each team member's contributions are valued. Respect also extends to stakeholders and customers, as their input is crucial for product success.

- Courage: Teams must have the courage to challenge assumptions, embrace feedback, and make difficult decisions when necessary.

1.7 The Sprint: The Heartbeat of Scrum

A Sprint is a time-boxed iteration (typically 1–4 weeks) in which a Scrum Team works toward a predefined Sprint Goal. All Scrum events occur within the Sprint, ensuring a structured workflow that fosters adaptability.

Key Characteristics of a Sprint

- Fixed Duration: Sprints have a consistent length to establish a predictable rhythm. The duration is determined based on the complexity of the work and the team's ability to deliver increments.
- No Mid-Sprint Changes: Once a Sprint begins, its scope remains stable. Any changes that could compromise the Sprint Goal must wait for the next Sprint.
- Continuous Feedback: Stakeholder feedback is integrated at the end of each Sprint, ensuring that deliverables align with business needs.
- Sprint Cancellation: A Sprint may only be cancelled if the Sprint Goal becomes obsolete (e.g., a major shift in business strategy). This decision is made solely by the Product Owner.

Sprint Workflow

- Sprint Planning: The Scrum Team selects backlog items to work on and defines the Sprint Goal.
- Daily Scrum: A 15-minute stand-up meeting where the team synchronizes progress, identifies blockers, and adjusts plans.
- Sprint Execution: The team works on backlog items, delivering increments of value.
- Sprint Review: The team presents completed work to stakeholders for feedback and validation.
- Sprint Retrospective: The team reflects on the Sprint and identifies ways to improve future iterations.

2. Literature review

2.1 Understanding Scrum's Core Strengths: Why Organizations Adopt Agile Methods

Scrum has become the most widely adopted Agile framework due to its structured adaptability, emphasis on collaboration, and iterative nature, which make it highly effective for dynamic and complex environments. Originally designed for software development, Scrum's core strengths allow organizations to improve efficiency, accelerate time-to-market, and enhance responsiveness to change.

While its roots lie in software engineering, Scrum has gained widespread adoption across various industries because it enables teams to quickly respond to shifting business priorities and optimize project execution. The following sections highlight the key factors driving Scrum's popularity and why it continues to be the framework of choice for Agile organizations.

Adaptability and Flexibility

A major reason for Scrum's success is its capacity to adapt to evolving requirements throughout the course of a project. Unlike traditional project management methods, which rely heavily on fixed, long-term planning, Scrum promotes continuous adjustment based on stakeholder feedback and real-time insights (Dixit & Bhushan, 2019). By working in iterative Sprints, teams are able to reassess priorities at regular intervals without disrupting the overall project flow. Each Sprint cycle offers the opportunity to refine goals, integrate new information, and respond effectively to changes in the market environment. The dynamic nature of the Product Backlog supports this flexibility, as it allows the team to focus on high-priority features that provide the greatest value. This ensures that development efforts remain consistently aligned with both business objectives and customer expectations. Scrum's adaptability is especially valuable in industries that demand rapid decision-making, such as e-commerce, finance, and digital marketing.

Structured Communication and Collaboration

Scrum's emphasis on structured communication improves team coordination and minimizes inefficiencies in collaborative work environments (Heibges et al., 2023). Unlike traditional models, where teams often work isolated, Scrum fosters cross-functional interaction and ensures regular alignment between stakeholders.

Daily Stand-ups promote real-time updates, helping teams address challenges proactively and keeping all members aligned on project goals. Sprint Planning and Sprint Reviews create structured touchpoints where developers, product owners, and business leaders can align priorities and ensure that expectations are clear (Heibges et al., 2023). Sprint Retrospectives reinforce continuous learning, enabling teams to

reflect on what worked well and what can be improved for future iterations. For organizations with remote or distributed teams, Scrum provides a clear framework for maintaining transparency and ensuring seamless collaboration, making it particularly valuable for multinational companies and hybrid work environments (Ekechi et al., 2024).

Empirical Support and Measurable Impact

Numerous studies have demonstrated that Scrum adoption leads to tangible performance improvements, reinforcing its effectiveness as an Agile framework. Research has highlighted several key benefits:

1. Faster time-to-market: Scrum teams are able to release products incrementally, leading to earlier customer feedback and reducing the risk of launching an unsuccessful product (Hanslo et al., 2019).
2. Higher product quality: Continuous testing and iterative refinements minimize defects, ensuring that software or products meet high-quality standards before release (Dixit & Bhushan, 2019).
3. Improved productivity: Scrum's structure enhances team efficiency by eliminating unnecessary work, prioritizing high-value tasks, and promoting cross-functional teamwork.

Additionally, Scrum incorporates quantitative performance tracking, using tools such as:

1. Velocity metrics: Helps teams measure how much work they can complete in a Sprint.
2. Cycle time analytics: Provide insights into bottlenecks and areas for optimization.

2.2 Applications of Scrum in Non-Software Domains

Although Scrum was originally developed for software development, it has proven beneficial across a wide range of industries. Many sectors outside IT have successfully adopted Scrum to streamline processes, improve team coordination, and increase efficiency in project execution. Research highlights that Scrum's adaptability makes it an effective framework for managing complex, fast-changing environments where traditional project management methods often struggle.

The following sections explore how Scrum has been applied in construction safety, business services, and education, demonstrating its versatility and impact in non-software domains.

Scrum in Construction Safety

The construction industry, particularly in the area of safety management, has increasingly adopted Agile methodologies such as Scrum to strengthen workplace safety, enhance risk assessment processes, and reduce operational hazards (Sudiarno et al., 2024). A study conducted in the Indonesian construction sector showed that the integration of Scrum led to a reduction in workplace incidents by more than 50%. This research applied a System Dynamics approach to model the relationship between Scrum principles and safety practices, revealing that regular stand-up meetings and Sprint Reviews played a key role in identifying hazards early and implementing corrective actions promptly. The structured and iterative nature of Scrum allowed teams to stay responsive in large-scale construction projects, where working conditions can shift rapidly. By promoting real-time communication and adaptive problem-solving, Scrum helped improve compliance with safety regulations and supported more effective management of project-related risks.

Agile Frameworks in Business Services

Beyond IT and construction, Scrum has also gained traction in business services, particularly in service development and operational efficiency. A large-scale empirical study examined the application of Agile frameworks, including Scrum and Kanban, in non-technical business settings (Stettina & Knoop, 2024). The findings revealed that:

- Scrum enhanced teamwork quality by breaking down silos between departments and improving alignment between cross-functional teams.
- The framework's emphasis on task visibility and time-boxed iterations enabled businesses to reduce bottlenecks and accelerate decision-making.
- Organizations using Scrum reported improved customer responsiveness, as the iterative process allowed for continuous adaptation to market feedback.

Educational Applications of Scrum

Scrum has also demonstrated significant benefits in education, particularly in project-based learning environments. Research conducted by (Fernandes et al. 2021) examined the use of Scrum in higher education and found that:

- Scrum improved student engagement and teamwork dynamics, as it provided a clear structure for assigning tasks, monitoring progress, and integrating peer feedback.
- The iterative nature of Scrum helped students develop problem-solving skills, as they had to adapt and refine their projects based on real-time feedback from professors and peers.
- Students reported that Scrum enhanced project organization, reducing confusion and allowing for more effective collaboration in group work.

Scrum's Flexibility Compared to Traditional Project Management Methods

Scrum's flexibility is one of its defining characteristics, distinguishing it from traditional project management approaches such as Waterfall. Unlike linear, predictive models, Scrum operates through iterative cycles, fostering team collaboration and adaptability to change. These features make it particularly effective in fast-paced environments, where requirements evolve continuously.

While traditional methodologies often rely on detailed upfront planning and rigid workflows, Scrum provides a framework that allows for continuous reassessment and refinement. This adaptability is particularly valuable in industries like e-commerce, software development, and product innovation, where market conditions, user expectations, and technological advancements shift rapidly. The following sections outline the key factors that contribute to Scrum's flexibility.

Iterative Development

A fundamental aspect of Scrum's flexibility lies in its iterative approach to development. Instead of completing an entire project before delivering results, Scrum breaks work down into short development cycles known as Sprints, allowing teams to deliver incremental improvements (Avancha et al., 2024).

Frequent iterations enable teams to assess progress regularly, making it easier to identify risks and adjust goals before committing to large-scale changes. Each Sprint ends with a review session, where stakeholders provide feedback, ensuring that the project remains aligned with business needs. Unlike traditional models, where changes can be costly and time-consuming, Scrum incorporates change as a natural part of the process, allowing teams to course-correct efficiently.

Collaboration and Communication

Another key driver of Scrum's flexibility is its strong emphasis on cross-functional collaboration and structured communication. Unlike traditional models, where different teams operate in isolation and interact only at designated project milestones, Scrum encourages continuous engagement among team members (Avancha et al., 2024). Daily stand-up meetings provide a structured opportunity for teams to align their priorities, address any obstacles, and maintain transparency throughout the project lifecycle (Andreeva & Sinyaeva, 2018). This regular communication fosters a culture of shared responsibility, ensuring that decisions are made collectively rather than imposed by a central authority. The Scrum Master plays a crucial role in facilitating these interactions, helping the team remain focused on their objectives while identifying and removing potential impediments to progress.

Adaptability to Change

One of Scrum's greatest strengths is its ability to accommodate changes in project scope or direction without disrupting overall progress. Traditional project management approaches often struggle with unexpected shifts, as they typically require extensive re-planning, which can result in delays and increased costs (Faichak, 2024). Scrum, by contrast, is built to support adaptability. The Product Backlog remains dynamic, allowing tasks to be reprioritized as new requirements emerge. Sprint cycles enable frequent reassessment, giving teams the flexibility to pivot quickly when necessary (Avancha et al., 2024). In addition, real-time feedback from stakeholders and end-users allows teams to refine their work continuously without major disruptions, making Scrum particularly effective in fast-moving environments where responsiveness is essential.

2.3 Benefits of Implementing Scrum in Fast-Changing Digital Marketplaces

The digital marketplace is characterized by rapid technological advancements, shifting consumer behaviors, and evolving competitive landscapes, all of which demand agility and adaptability from businesses. Traditional project management frameworks, which rely on long-term planning and fixed workflows, often struggle to keep pace with the dynamic nature of digital commerce. Scrum, with its iterative development cycles, customer-centric approach, and structured collaboration, provides organizations with the agility needed to respond quickly to change while maintaining efficiency and innovation.

By breaking projects into manageable iterations, facilitating continuous feedback loops, and fostering cross-functional collaboration, Scrum helps businesses deliver value more efficiently and stay competitive. The following sections highlight the key advantages of implementing Scrum in digital marketplaces, particularly in e-commerce, SaaS (Software as a Service), fintech, and digital marketing.

Enhanced Flexibility and Responsiveness

One of the most significant advantages of Scrum is its ability to support businesses in fast-changing industries, where market trends, consumer behaviours, and technological advancements are in constant flux. In digital marketplaces, companies must be able to pivot quickly, update their offerings frequently, and test new strategies to stay competitive. Scrum's short Sprints and iterative planning cycles enable organisations to make incremental adjustments based on real-time data and feedback, helping them remain both relevant and adaptable (Balasubramaniam et al., 2022). Short development cycles provide the flexibility needed to respond swiftly to change, allowing teams to adjust products and services with minimal disruption. At the same

time, dynamic backlog prioritisation ensures that the most urgent and valuable tasks are addressed first, keeping product development and marketing efforts aligned with evolving customer expectations and strategic business objectives.

Improved Collaboration and Communication

Digital businesses often rely on cross-functional teams, where departments such as marketing, product development, customer support, and technology must collaborate closely to achieve common objectives. However, maintaining effective communication and coordination across these teams can present notable challenges. Scrum addresses these issues by offering a structured collaboration framework that strengthens alignment, transparency, and operational efficiency.

Daily Stand-up meetings facilitate open and consistent communication, giving team members the opportunity to share progress updates, raise concerns, and align on priorities. Sprint Reviews and Retrospectives provide dedicated space for teams to reflect on recent performance, identify successful practices, and implement targeted improvements for the next cycle (Ekechi et al., 2024). Within this framework, cross-functional teams collaborate holistically, ensuring that decisions take into account input from various business functions and are aligned with shared goals.

In practice, this approach proves highly effective. For example, in digital marketing campaigns, Scrum enables marketers, designers, data analysts, and developers to work together efficiently, continuously refining advertising strategies based on real-time campaign data and customer engagement insights.

Increased Customer Engagement and Satisfaction

Customer expectations in digital marketplaces are constantly evolving, making it essential for businesses to continuously refine their offerings based on user feedback and behavioral trends. Scrum is inherently customer-driven, ensuring that product and service development aligns with real-time consumer needs (Ravindran et al., 2024).

- Continuous feedback cycles allow businesses to refine their offerings, ensuring that products and services stay aligned with customer demands.
- Agile methodologies encourage iterative testing and feature rollouts, reducing the risk of launching products that fail to meet customer expectations (Balasubramaniam et al., 2022).
- Scrum’s adaptive structure makes it easier for companies to personalize digital experiences, incorporating customer feedback into new updates and service enhancements.

This customer-centric approach not only strengthens brand loyalty but also enhances user experience, making Scrum an ideal framework for businesses aiming to optimize customer engagement in digital marketplaces.

Accelerated Project Delivery

Speed is a crucial factor in digital marketplaces, where the ability to bring new products, services, or marketing campaigns to market quickly can define success or failure. Unlike traditional project management methodologies, which require extensive upfront planning and rigid deadlines, Scrum's iterative approach allows organizations to deliver value incrementally, ensuring faster execution and improved efficiency (Ekechi et al., 2024). Scrum's iterative structure enables businesses to accelerate delivery by working in shorter development cycles, allowing for more frequent releases of product updates, marketing initiatives, or service enhancements. These incremental launches provide opportunities to gather early user feedback, which can be used to make necessary adjustments before a full rollout, reducing the risk of misaligned offerings (Ravindran et al., 2024). Additionally, Scrum's built-in prioritization process ensures that the most impactful tasks are addressed first, helping teams optimize their efforts, improve operational efficiency, and reduce overall time-to-market. For example, in digital product companies such as mobile apps and gaming platforms, frequent updates and new feature releases are necessary to maintain customer engagement and competitive advantage. Scrum ensures that critical product improvements are implemented quickly, rather than waiting for a long, drawn-out development cycle. Similarly, in e-commerce and digital advertising, where speed and adaptability are essential, Scrum enables teams to respond immediately to market trends, competitor actions, and customer demands. By embracing faster project execution, reduced turnaround times, and iterative refinement, Scrum empowers businesses in fast-changing digital markets to remain competitive and maximize return on investment.

Scalability and Efficiency in Large-Scale Digital Operations

As digital businesses expand, scaling Agile methodologies across multiple teams and business units becomes increasingly complex. Large enterprises operating in global digital markets must ensure that Scrum practices remain effective even at scale, without sacrificing team autonomy or operational efficiency. To support this, frameworks such as SAFe (Scaled Agile Framework) and LeSS (Large-Scale Scrum) offer structured methods for coordinating Scrum implementation across various teams and geographical locations. These frameworks help maintain alignment while allowing each team to remain focused and agile in their delivery.

In addition to structured frameworks, enterprise-wide collaboration platforms like Jira, Asana, and Microsoft Teams play a key role in enabling real-time tracking of Agile workflows. These tools help standardize processes, ensure transparency, and promote consistency across globally distributed operations. By upholding Agile best practices at scale, organizations can enhance efficiency, maintain responsiveness, and adapt more quickly to changing market demands.

Examples from multinational e-commerce companies and SaaS providers show that Scrum can be successfully scaled across complex digital ecosystems. These

organizations have managed to integrate enterprise-level Agile strategies while preserving the flexibility and iterative delivery that make Scrum effective, demonstrating that Agile methodologies are not limited to small, co-located teams but are fully applicable in large-scale environments.

2.4 Challenges of Applying Scrum in E-Commerce Projects

The adoption of Scrum in e-commerce project management presents several distinct challenges, primarily due to the fast-paced and operationally diverse nature of the industry. Unlike software development, where deliverables are mostly code-based and technical, e-commerce projects encompass multiple functions, including marketing campaigns, inventory management, supply chain logistics, and customer service operations. These areas require quick decision-making, real-time adjustments, and seamless coordination across different departments. As a result, directly applying Scrum without modifications can lead to inefficiencies, misalignment, or resistance from teams accustomed to traditional workflows.

Various studies have explored the barriers that organizations face when integrating Scrum into non-software environments, particularly in e-commerce. (Ekechi et al. 2024) identify organizational resistance, misaligned workflows, and stakeholder skepticism as major hurdles. (Budiman et al. 2022) emphasize team collaboration difficulties and communication gaps, while (Cui 2022) highlights the necessity of customizing Scrum practices to accommodate the fast-changing, cross-functional nature of the industry.

To better understand these challenges, the following sections analyze organizational and employee resistance, and how companies can address these issues to increase the effectiveness of Scrum in e-commerce projects.

Resistance to Change in Organizations

Rigid Organizational Structures and Fixed Mindsets

One of the biggest obstacles to adopting Scrum in non-software industries is the resistance to Agile transformation. Many companies, particularly those with hierarchical decision-making structures, struggle to transition from rigid, sequential workflows to adaptive, iterative processes (Ekechi et al., 2024). This resistance is often driven by deeply embedded project management cultures that prioritize predictability and long-term planning over flexibility.

In e-commerce, projects are typically planned around seasonal trends, sales cycles, and large-scale marketing campaigns, which require structured long-term strategies. Scrum, on the other hand, promotes short-term goals and incremental progress, which may conflict with traditional business planning approaches. Executives and managers who are accustomed to using Gantt charts, strict deadlines, and budget forecasts may see Scrum’s adaptability as a risk rather than an advantage (Ekechi et al., 2024).

Leadership Skepticism and Lack of Buy-In

For Scrum to be successful, strong leadership buy-in is essential. However, in non-software environments, executives may be hesitant to adopt Agile methodologies because of misconceptions about control, predictability, and accountability (Rigby et al., 2016). Traditional project management provides a clear structure, while Scrum relies on iterative decision-making, which may appear disorganized to those unfamiliar with its principles.

Additionally, many executives demand immediate financial returns and expect rigid forecasting, making it difficult to align Scrum's flexibility with business objectives. Without clear leadership support, teams may struggle to implement Agile principles effectively, leading to inconsistent adoption across departments.

At the same time, some department heads and project managers may view Scrum as a threat to their authority, since it shifts decision-making power to self-managing teams. This loss of control can create internal resistance, leading to conflicts between traditional management structures and Agile practitioners (Denning, 2018).

Employee Resistance and Fear of Increased Workload

While leadership hesitation creates a top-down challenge, employee resistance represents a bottom-up barrier to Scrum adoption. Employees who are accustomed to fixed job roles and structured workflows may find Scrum's collaborative and self-managing approach overwhelming. (Putrianasari et al. 2024) found that in non-software industries, employees often struggle with Agile adoption due to the increased level of decision-making involvement and accountability.

For example, in e-commerce marketing teams, pre-planned strategies define content calendars, promotional campaigns, and product launches months in advance. Transitioning to Scrum—where plans are continuously refined based on feedback—can be seen as disruptive or chaotic. Employees may also fear increased workloads, as Agile frameworks often require regular meetings, backlog grooming, and continuous collaboration (Ekechi et al., 2024).

Furthermore, organizations that fail to provide adequate Agile training risk misinterpreting Scrum principles, leading to frustration and disengagement among employees. If Scrum is poorly implemented, teams may feel as though they are working within an incomplete or inconsistent system, further reducing its effectiveness.

Overcoming Organizational and Employee Barriers

To improve Scrum adoption in e-commerce settings, businesses must implement strategies that address both leadership and employee concerns. The following key approaches have been identified:

Agile Education and Leadership Training

1. Providing executives and managers with Agile training to clarify Scrum principles and demonstrate how they align with business objectives.
2. Setting clear expectations about Scrum's impact on operations, budgeting, and forecasting (Denning, 2018).

Gradual Implementation and Hybrid Models

1. Rather than enforcing full Scrum adoption immediately, organizations can start with hybrid models, incorporating Scrum principles into existing workflows (Rigby et al., 2016).
2. Introducing Scrum incrementally, allowing teams to adapt at a manageable pace without overwhelming their current processes.

3. Change Management and Employee Engagement

1. Involving employees in Scrum planning discussions, ensuring they understand the value of Agile adoption and how it impacts their roles.
2. Establishing transparent communication channels so that employees feel informed and empowered, rather than forced into an unfamiliar system.
3. Encouraging cross-functional collaboration between marketing, IT, and operations teams to align objectives and improve Scrum adoption across departments (Putrianasari et al., 2024).

2.5 Challenges in Implementing Scrum in E-Commerce Organizations

While Scrum provides numerous advantages for e-commerce organizations, its implementation is often met with structural, operational, and cultural challenges. Unlike software development teams, which typically operate within well-defined Agile environments, e-commerce teams are composed of diverse functional groups, including marketing, logistics, IT, and customer support, each with their own unique workflows and objectives. Integrating Scrum into such an environment requires strategic adaptations to ensure smooth adoption and long-term success.

The following sections explore the key obstacles e-commerce organizations face when implementing Scrum and discuss strategies to mitigate these challenges.

Organizational Resistance

Leadership Hesitation and Hierarchical Structures

One of the primary barriers to Scrum adoption in e-commerce businesses is resistance to change, particularly from leadership and management teams accustomed to traditional methodologies (Ekechi et al., 2024). Many e-commerce organizations rely on long-term planning cycles, fixed deadlines, and structured decision-making hierarchies, which can conflict with Scrum's iterative and decentralized approach.

- Executives accustomed to waterfall-style planning may be reluctant to shift towards incremental product development and continuous feedback cycles.
- Managers may feel that Scrum diminishes their control, as decision-making becomes more distributed across self-organizing teams.
- There is often skepticism about Scrum's scalability, particularly in fast-moving, high-volume operations, where stakeholders worry about losing predictability in execution and forecasting.
- To address these concerns, organizations must implement targeted Agile education programs, demonstrating how Scrum can coexist with long-term strategic planning while providing the flexibility needed to remain competitive in e-commerce.

Communication and Coordination Challenges

E-commerce businesses often have multiple interdependent teams, operating across various locations, time zones, and functional domains. Maintaining effective communication and alignment across these teams is a major challenge, especially when Scrum requires frequent, structured interactions.

- Time zone differences make it difficult to conduct daily Scrum meetings, leading to delays in decision-making and feedback cycles.
- Cross-departmental collaboration can be misaligned, as marketing, IT, and operations teams often have different priorities and work at different paces.
- A lack of real-time project visibility can create inefficiencies, making it harder for leadership to track progress and ensure alignment with business goals.
- To improve coordination, organizations should invest in advanced collaboration tools such as Jira, Asana, Microsoft Teams, and Trello, enabling teams to track tasks asynchronously and communicate effectively across locations.

Customization of Scrum Practices

Unlike software projects, where Scrum follows a predictable feature-development cycle, e-commerce businesses operate in fluid, sales-driven environments, requiring modifications to standard Scrum workflows (Ekechi et al., 2024; Putrianasari et al., 2024).

Sprint durations must be adapted to align with marketing schedules, product launches, and seasonal fluctuations. Backlog prioritization is more complex, as e-commerce organizations need to balance customer experience improvements, supply chain optimizations, and promotional campaigns simultaneously. Product Owner responsibilities expand, requiring them to coordinate input from multiple departments, including customer support, finance, and fulfillment teams, to ensure strategic alignment. Successful implementation of Scrum in e-commerce requires flexibility, allowing teams to modify key Scrum components without compromising its core principles of iterative development and continuous feedback.

Resource Limitations in Smaller E-Commerce Organizations

While large corporations may have the budget and infrastructure to support dedicated Scrum teams, smaller e-commerce businesses often face constraints that hinder effective Agile adoption (Putrianasari et al., 2024). Lack of trained Scrum Masters can lead to poor implementation and inconsistent adherence to Agile best practices. Limited staff requires employees to juggle multiple roles, making it difficult to follow strict Scrum guidelines while managing day-to-day operations. Budget constraints restrict investment in Agile training, collaboration tools, and process improvements, making it harder to scale Scrum effectively. For smaller businesses, a gradual, hybrid approach to Scrum adoption can help ease the transition. By starting with a lightweight Agile framework and scaling incrementally, organizations can gain Agile benefits without overburdening limited resources.

Adaptation Strategies for E-Commerce Organizations

To ensure a successful transition to Scrum, e-commerce organizations must actively address common barriers such as resistance to change, coordination difficulties, and the need for customized workflows. This can be achieved through well-structured adaptation strategies tailored to the unique demands of digital commerce environments.

The first step involves providing continuous Agile training and ensuring leadership alignment. Regular training sessions for executives, managers, and team members help build a shared understanding of Scrum’s value and application in business contexts. Starting with pilot projects allows leadership to observe Scrum’s practical benefits before committing to broader adoption. Aligning Scrum practices with strategic objectives also helps reduce concerns about loss of control or unpredictability.

The second area focuses on enhancing collaboration and communication, especially in distributed or remote teams. Tools like Slack, Jira, Asana, and Microsoft Teams improve real-time visibility and coordination. For teams in different time zones,

recorded updates from Daily Stand-ups ensure that everyone remains informed. A centralized backlog helps cross-functional teams track progress, prioritize tasks, and give feedback asynchronously, supporting alignment even without constant synchronous communication.

Next, organizations should concentrate on tailoring Scrum to suit e-commerce workflows. Sprint cycles may need to be adjusted to accommodate seasonal peaks and campaign schedules. Clearly defined cross-functional roles within Scrum teams—spanning marketing, logistics, IT, and customer support—ensure balanced input during backlog refinement. In some cases, hybrid models combining Scrum with Kanban may be more suitable for teams requiring continuous delivery rather than time-boxed iterations.

Finally, for small and medium-sized enterprises (SMEs), scalable and cost-effective Scrum implementation is key. Beginning with a minimal Agile framework allows for gradual adoption without disrupting daily operations. Low-cost training solutions, such as internal coaching or free online courses, can help build Agile capabilities without financial strain. Hiring external Agile consultants on a project basis offers access to expert support without long-term budget commitments.

By adapting Scrum practices to fit the specific realities of e-commerce, organizations can successfully overcome adoption barriers and fully realize the benefits of Agile. This includes greater operational efficiency, improved collaboration across departments, and increased responsiveness in a rapidly evolving market.

2.6 Limitations of Existing Studies on E-Commerce and Scrum Implementation

Despite the growing interest in applying Scrum to e-commerce and other non-software industries, existing research faces several limitations that hinder the development of comprehensive, real-world case studies. Many studies lack diverse data sources, rely on inconsistent methodologies, and fail to establish scalable strategic frameworks for analyzing Scrum's effectiveness in fast-paced business environments.

These limitations create gaps in academic research, making it challenging for organizations to derive practical insights from existing literature. The following sections highlight the key research shortcomings, emphasizing the need for more rigorous, industry-specific studies on Scrum's role in e-commerce project management.

Limited Data Sources

A significant issue in Scrum research, especially in non-software contexts, is the heavy reliance on narrow and limited datasets. Many studies are based on specific market segments, single-case studies, or geographically restricted samples, which reduces the generalizability and applicability of their findings to a broader range of industries. Some research, for instance, draws conclusions from a single data source, making it

difficult to extend insights beyond that particular context. One such example is a study on the Polish e-commerce market that relied solely on data from Pointpack, limiting the relevance of its findings to other regions with different digital infrastructures and consumer behaviours (The E-Commerce Market in Conditions of Uncertainty – Development Perspectives. Case Study, 2023).

Moreover, existing research often overlooks the diversity of e-commerce business models. Direct-to-consumer brands, third-party marketplaces, and omnichannel retailers each operate under distinct conditions and constraints, which influence how Agile frameworks like Scrum are implemented and adapted. Despite these differences, many studies apply a one-size-fits-all perspective, failing to capture the nuances of Agile adoption in these varied settings.

Additionally, due to concerns around data privacy and confidentiality, companies are often unwilling to share internal performance metrics. As a result, researchers must rely on publicly available reports, which may offer only a partial view of how Scrum is applied in practice. This lack of transparency and depth makes it difficult to understand the real-world challenges and outcomes of Scrum adoption in e-commerce environments.

Without broader, more diverse, and representative datasets, it becomes challenging to evaluate how effectively Scrum integrates across different e-commerce models or to develop tailored strategies for optimizing Agile methodologies in scalable, real-world applications.

Methodological Challenges

The rapid evolution of e-commerce technologies and consumer behaviors creates difficulties in establishing standardized research methodologies. Many existing studies face challenges in data collection, experimental design, and replicability (Liu et al., 2017).

A/B testing, a common research method in e-commerce, often suffers from small sample sizes, leading to inconclusive findings. This makes it difficult to determine the true impact of Scrum methodologies on business performance.

Longitudinal studies on Scrum adoption are rare, meaning that research often fails to capture the long-term effects of Agile transformation in digital commerce. Most studies analyze short-term process improvements without assessing how Scrum impacts growth, profitability, or operational efficiency over extended periods.

The lack of industry-wide benchmarks for measuring Scrum success in e-commerce leads to inconsistencies across studies, making it difficult to compare research findings effectively (Joshi, 2013).

These methodological weaknesses limit the practical application of research insights, making it harder for organizations to develop evidence-based Agile strategies.

Lack of Strategic Frameworks for E-Commerce and Agile Integration

While numerous studies have examined Agile methodologies in general, many lack a structured, industry-specific framework to support the adoption of Scrum in e-commerce contexts. Academic literature frequently presents theoretical models that are not supported by empirical data, making it difficult for businesses to apply Agile principles in a practical, outcome-driven manner. This gap between theory and practice creates uncertainty, especially in sectors unfamiliar with Agile implementation.

For instance, a study on e-commerce integration within car dealerships revealed that executives were unsure how to assess the success of their digital transformation efforts, underlining the absence of standardized frameworks for Agile adoption in non-software industries (Marshall et al., 2013). While software engineering benefits from well-established Scrum metrics such as velocity, sprint burndown charts, and cycle time, e-commerce businesses lack equally defined indicators to evaluate the impact of Agile workflows on key performance areas such as customer experience, logistics coordination, and revenue generation.

This absence of clear and scalable frameworks makes it challenging for organizations to effectively adopt, measure, and refine Scrum practices. As a result, the potential of Agile methodologies in large-scale digital commerce operations may remain underutilized, limiting their effectiveness in driving business performance and adaptability.

Implications for Future Research

Given the limitations identified in existing studies, future research should aim to strengthen the evidence base for Scrum adoption in e-commerce by expanding data sources, refining methodological approaches, and creating industry-specific Agile frameworks. One critical step is the development of multi-source datasets that capture a broad spectrum of e-commerce business models, geographic regions, and organizational sizes. This would ensure that findings are more representative and applicable across various contexts.

Additionally, there is a need for long-term studies that assess the sustained impact of Scrum on key business outcomes such as growth, scalability, and profitability. These studies would provide valuable insights into how Agile methodologies perform over time, beyond short-term implementation effects.

Another area for improvement is the establishment of standardized performance metrics tailored to e-commerce. Clear key performance indicators are essential for evaluating Agile efficiency in areas like customer satisfaction, operational speed, and supply chain responsiveness. These are metrics that differ significantly from those commonly used in software development.

Finally, future research should focus on bridging the gap between theory and practice by collaborating directly with e-commerce companies. Through applied research and

iterative testing, scholars can help develop and refine practical, evidence-based Scrum frameworks that reflect the complexities of digital business environments.

By addressing these gaps, future studies can deliver more actionable and relevant insights, enabling e-commerce organizations to better implement, evaluate, and evolve their Scrum practices in increasingly competitive and fast-moving markets.

3. Methodology

3.1 Research Design and Justification

This study employs a case study approach to examine the application of Scrum methodology in an e-commerce market analysis project. A case study is well-suited for this research as it provides an in-depth exploration of a real-world project, allowing for a detailed examination of both the process and outcomes (Yin, 2009). Unlike other research methods such as surveys or controlled experiments, which often focus on broad patterns or isolated variables, a case study enables an immersive investigation of how Scrum was implemented, adapted, and its impact on the project's success.

The decision to use a single case study rather than multiple cases was based on the unique characteristics of the selected project. The focus on a single e-commerce market analysis project allows for a detailed understanding of the interactions between Scrum principles and industry-specific challenges, rather than spreading resources across multiple cases, which might dilute the depth of analysis. Since the application of Scrum in non-software settings is still underexplored, this study aims to provide rich, qualitative insights that contribute to both academic literature and practical business applications.

Additionally, the research follows an exploratory and descriptive approach, given that Scrum's use in data-driven market research has not been widely documented. By exploring how Scrum principles were adapted to fit the needs of an e-commerce strategy project, this study provides practical insights into Agile adoption outside software development, shedding light on its effectiveness, challenges, and required modifications in a non-traditional domain.

3.2 Case Study Selection and Context

The case study focuses on Remazing, a company specializing in e-commerce growth strategies and brand positioning on online marketplaces. The selected project involved the application of Scrum methodology to conduct a comprehensive market analysis across five major European e-commerce markets: Germany, the United Kingdom, France, Italy, and Spain. The objective of the project was to evaluate key competitors, identify leading brands across multiple product categories, and assess strategic positioning opportunities for Remazing.

The case study was chosen based on its relevance to Agile applications beyond software development. While Scrum is traditionally associated with software engineering, its application in market research and data-driven strategy formulation is still an emerging area of study. This project serves as an ideal example of how Scrum can be adapted to non-software domains, offering insights into its flexibility, efficiency, and challenges in e-commerce business environments.

The study examined Scrum implementation across several key processes:

1. Market Data Collection: The project utilized Remazing's proprietary software, Remdash, to gather and structure data on market performance and brand visibility in four product categories: beauty, electronics, fashion, and home & appliances.
2. Sprint Planning and Backlog Management: The research team organized work in iterative Sprints, prioritizing tasks based on data availability, stakeholder input, and evolving project requirements.
3. Collaboration and Role Distribution: The project followed a Scrum-inspired workflow, where tasks were divided among team members, with roles loosely aligning to Product Owner, Scrum Master, and Development Team responsibilities.
4. Challenges Encountered: Issues such as misclassified brands in data sets, incomplete market insights, and the need for adaptive analysis methods were managed using Scrum's iterative approach, allowing the team to refine methodologies and continuously improve the research process.

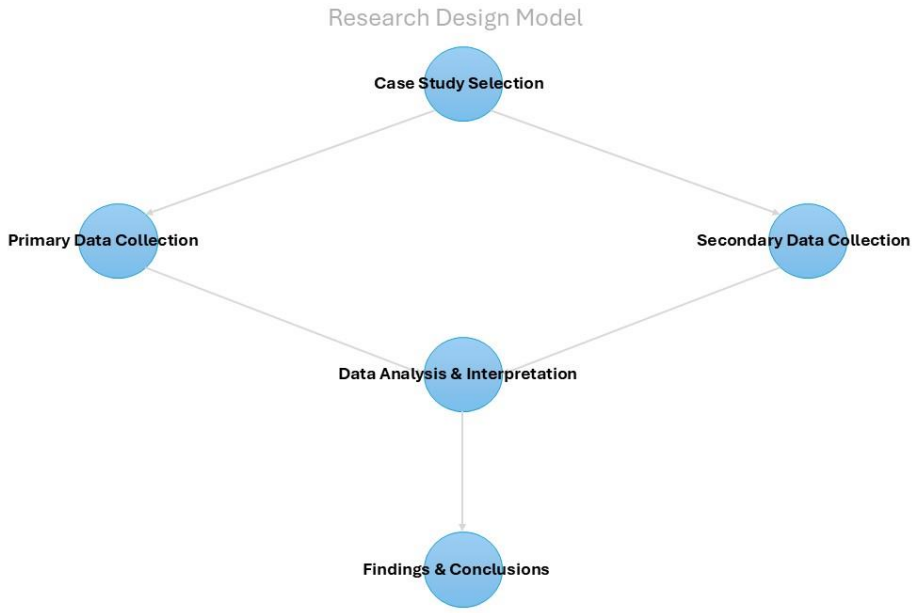


Figure 6 Research Design Model

3.3 Data Collection Methods

The data collection for this study was conducted using a combination of primary and secondary sources, allowing for a comprehensive analysis of Scrum's application in an e-commerce market analysis project. Given the real-world nature of the study, data

was gathered in an iterative manner, reflecting Scrum's emphasis on continuous feedback and adaptation.

Primary Data Sources

Primary data was obtained through direct involvement in the project, providing first-hand insights into Scrum implementation, team workflows, and iterative decision-making. The primary data collection methods included:

- Direct Project Involvement: Active participation in the execution of the project allowed for an insider's perspective on how Scrum was applied, adapted, and modified in response to challenges.
- Observation of Scrum Practices: Field notes were maintained on Sprint planning, backlog refinement, Daily Stand-ups, and retrospective meetings, capturing how Scrum facilitated collaboration, problem-solving, and adjustments to research priorities.
- Review of Internal Project Documentation: Access to task boards, Sprint logs, backlog items, and research reports provided a structured record of how work was prioritized and iterated upon throughout the project.

Secondary Data Sources

Secondary data was used to complement first-hand observations and provide additional context for the study. These sources included:

- Remdash Data Extracts: Market research was conducted using Remazing's proprietary software, Remdash, which provided structured e-commerce performance data on various brands, categories, and competitors.
- Company Reports and Internal Market Research: Reviewing existing methodologies and historical reports helped compare how Scrum-based research processes differed from previous approaches.
- Academic Literature and Industry Publications: Relevant peer-reviewed studies on Agile adoption in non-software settings, Scrum methodologies, and e-commerce strategy were analyzed to frame the study within existing research.

Iterative Data Collection Approach

In line with Scrum's adaptive methodology, data collection was not conducted in a fixed, sequential manner but evolved throughout the study. This allowed for progressive refinement of insights and methodology:

- Initial Data Collection – The project began with a broad exploratory phase, where market data was gathered using Remdash, and early insights shaped the research backlog.
- Sprint-Based Adjustments – As analysis progressed, issues such as data inconsistencies, misclassified brands, and gaps in competitor insights were identified and addressed in iterative Sprints.
- Stakeholder-Driven Prioritization – Continuous input from project stakeholders influenced backlog priorities, ensuring that research efforts aligned with business objectives and evolving market conditions.
- This flexible, feedback-driven approach ensured that the study captured the nuances of applying Scrum to a data-driven research environment, providing a realistic and detailed evaluation of Agile adoption in e-commerce strategy development.

3.4 Literature Review and Reference Selection Process

The literature review for this study was conducted using a structured and systematic approach to identify, evaluate, and synthesize relevant research on Scrum methodology, its application beyond software development, and its effectiveness in e-commerce environments. Given that Scrum's use in non-software industries remains an emerging area of study, a diverse range of academic sources was examined to establish a strong theoretical foundation for the research.

Search Strategy and Source Selection

To ensure a comprehensive and reliable selection of academic literature, the following search strategy was implemented:

Academic Databases Used:

- Google Scholar
- Scopus
- IEEE Xplore
- ResearchGate
- ACM Digital Library
- SpringerLink
- Business and management journals focused on Agile methodologies

Keywords and Search Terms:

- Scrum in non-software industries
- Agile methodologies in e-commerce

- Case study research in Agile project management
- Scrum adoption challenges in business operations
- Agile frameworks for data-driven decision-making

Inclusion Criteria:

- Peer-reviewed journal articles, conference papers, and books published within the last 15 years (unless foundational Agile literature was required).
- Studies that explored Scrum adoption beyond IT, including business, marketing, and operations research.
- Empirical case studies analyzing Scrum's effectiveness in practical business settings.

Exclusion Criteria:

- Papers solely focused on Scrum in software development without broader business applications.
- Studies with outdated Agile methodologies that predate major Scrum evolutions (e.g., pre-2000 Agile literature unless foundational).
- Research lacking empirical validation or real-world case study applications.

Categorization and Thematic Analysis

Once relevant sources were identified, they were categorized into three primary themes to align with the research objectives:

- Scrum's Theoretical Foundations
- Scrum Beyond Software Development
- Scrum in E-Commerce and Data-Driven Research

3.5 Data Analysis and Interpretation

The data collected during the case study was analyzed using qualitative methods, focusing on Scrum's impact on project efficiency, collaboration, and adaptability in an e-commerce research environment. The analysis followed an iterative approach, aligning with Scrum's principles of continuous evaluation and refinement.

Scrum's effectiveness in managing the e-commerce research process was assessed by evaluating how Sprint outcomes influenced project execution, how backlog prioritization evolved over time, and how stakeholder feedback shaped adjustments throughout the study. A thematic analysis was conducted to identify patterns and trends in the application of Scrum, emphasizing both the advantages and challenges encountered.

Comparisons were made between the case study findings and existing literature on Scrum in non-software environments, allowing for an evaluation of how well theoretical Agile principles translated into real-world applications. The insights gained from this analysis provide a practical understanding of Scrum's adaptability and highlight key modifications necessary for its successful implementation in an e-commerce strategy project.

3.6 Role of AI in Thesis Development

AI tools were only used to enhance writing clarity, and structural consistency.

- Writing Enhancement: AI assisted with grammar and clarity tools improving sentence structure, and readability.
- Logical Flow: AI-assisted structuring improved section transitions and coherence, ensuring a clear and well-structured thesis.

AI-assisted content was manually reviewed to preserve the originality of this thesis.

3.7 Limitations of the Methodology

While this study provides valuable insights into Scrum's application in an e-commerce market analysis project, certain methodological limitations must be acknowledged.

One primary limitation is the use of a single case study, which, while allowing for an in-depth analysis, may limit the generalizability of findings to other organizations or industries. The study is also specific to Remazing's internal processes and proprietary tools, such as Remdash, meaning that some methodologies and outcomes may not be directly transferable to other e-commerce businesses.

Additionally, the data collection relied heavily on internal project documentation and researcher observations, without external stakeholder interviews, which may have introduced subjectivity in interpreting Scrum's impact. While efforts were made to maintain objectivity through thematic analysis and literature comparisons, future studies could benefit from a broader range of perspectives, such as input from multiple companies, external experts, or client feedback.

Finally, the study was conducted within a specific timeframe, meaning that long-term effects of Scrum adoption in e-commerce research remain unexplored. Future research could expand on this by conducting longitudinal studies to assess the sustained impact of Agile methodologies over extended periods.

4. Case Study

4.1 Introduction

The e-commerce industry in Europe is a rapidly evolving sector, with numerous brands and marketplaces competing for dominance. As businesses increasingly turn to digital platforms to reach consumers, understanding market dynamics and positioning becomes essential for growth. This study focuses on a market analysis conducted by Remazing, a digital services company specializing in e-commerce growth strategies, to understand the competitive landscape in key European markets. The scope of this analysis centered on five major European countries—Germany, the United Kingdom, France, Italy, and Spain—and examined the performance of leading brands in four major product categories: beauty, electronics, fashion, and home & appliances.

Remazing's goal was to gain insights into market trends and identify strategic opportunities for the company's own positioning within the industry. A key aspect of the project was not only analyzing the e-commerce landscape but also applying the Scrum methodology to structure the analysis, manage workflows, and ensure iterative, feedback-driven delivery. Scrum, a widely adopted Agile project management framework, is traditionally used in software development but has gained traction in other domains for its focus on collaboration, transparency, and continuous improvement.

This case study explores the application of Scrum within the context of market research and data analysis, specifically for Remazing's e-commerce project. The study examines how Scrum principles were applied to manage tasks such as data collection, categorization, and market analysis across multiple countries and categories. The outcomes of this study aim to contribute to the growing body of knowledge on how Scrum can be leveraged in non-software contexts, particularly in data-intensive research projects. Furthermore, the study evaluates the results of the analysis, identifies key findings, and offers recommendations based on the application of Scrum methodology to the project.

By investigating the interplay between Scrum and e-commerce market research, this case study provides valuable insights into the potential for Agile frameworks to optimize processes, increase efficiency, and enhance decision-making in complex, data-driven projects.

4.2 Case Study Analysis

This section presents an in-depth analysis of the application of Scrum methodology within the e-commerce market analysis project conducted during the internship at Remazing. The analysis is structured according to the key components of the Scrum framework as defined by Schwaber and Sutherland (2020): roles, events, and artifacts. For each domain, the study evaluates the degree of adherence to the Scrum Guide, identifies areas of deviation, and discusses the impact of these practices on project outcomes.

4.2.1 Scrum Roles

Product Owner:
In this project, the Product Owner role was assumed by a senior stakeholder responsible for setting the strategic direction and ensuring alignment between the business objectives and the analysis tasks. The Product Owner established high-level goals—such as understanding the competitive landscape across key European markets—and maintained the Product Backlog with relevant tasks. This role was executed in line with Scrum principles, providing clear prioritization and business context throughout the project.

Scrum Master:
The Scrum Master role, typically responsible for facilitating Scrum ceremonies and removing impediments, was only partially formalized during the project. Although a team lead or project manager was not distinctly assigned, the responsibilities were informally managed through ad hoc facilitation of communication and obstacle resolution. This informal approach meant that while some impediments were removed efficiently, the structured facilitation of Scrum events was not consistently observed.

Development Team:
In this project, I functioned as the sole member of the Development Team. As the individual responsible for data extraction from Remdash, categorization of e-commerce brands, and the calculation of the maturity index, I operated with a high degree of autonomy. This self-organizing approach aligns with Scrum's emphasis on team autonomy, though the scale was smaller than typical Scrum teams.

4.2.2 Scrum Events

Sprint Planning: At the outset, the team initiated a planning phase to define high-level objectives, such as raising brand awareness and repositioning within the industry. During this phase:

Project Scope Definition: The team outlined the need to understand the European e-commerce landscape by analyzing revenue data from leading markets (Germany, UK, France, Italy, Spain) and identifying key marketplaces.

Task Breakdown: High-level features were decomposed into actionable tasks, including data collection using Remdash across four categories (beauty, electronics, fashion, home & appliances), data manipulation in Excel, and subsequent analysis.

Prioritization: Although the eventual output—a maturity index—was not initially anticipated, the iterative planning process allowed the team to select tasks based on immediate business priorities and emerging insights.

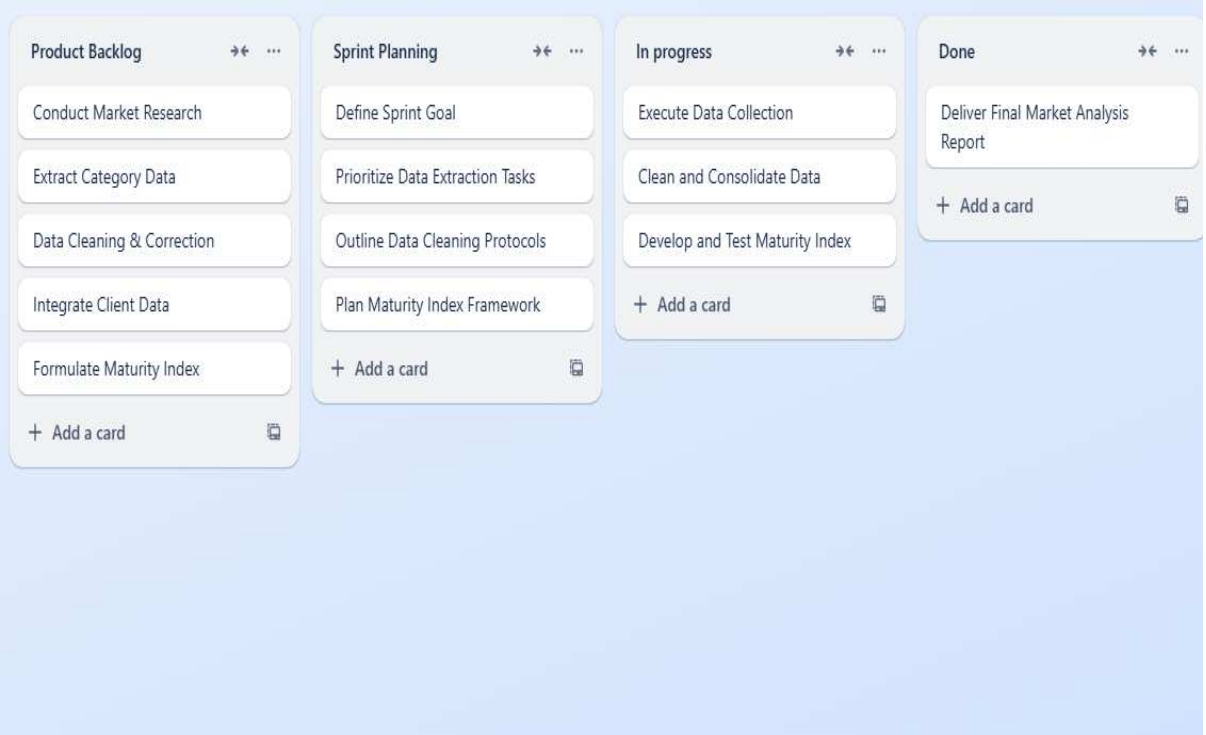


Figure 7 Trello Board

Daily Scrum

Daily check-ins were conducted to maintain alignment and resolve emerging challenges. During these brief meetings:

- Progress Updates: Team members provided status reports on tasks such as data extraction, cleaning, and initial analyses.
- Issue Resolution: Challenges, like misclassified brands due to inaccurate keyword data or discrepancies in categorization, were promptly discussed and addressed.
- Iterative Adjustments: The team continuously refined their approach based on real-time feedback, ensuring that tasks were re-prioritized if necessary.

Sprint Execution and Increment Delivery

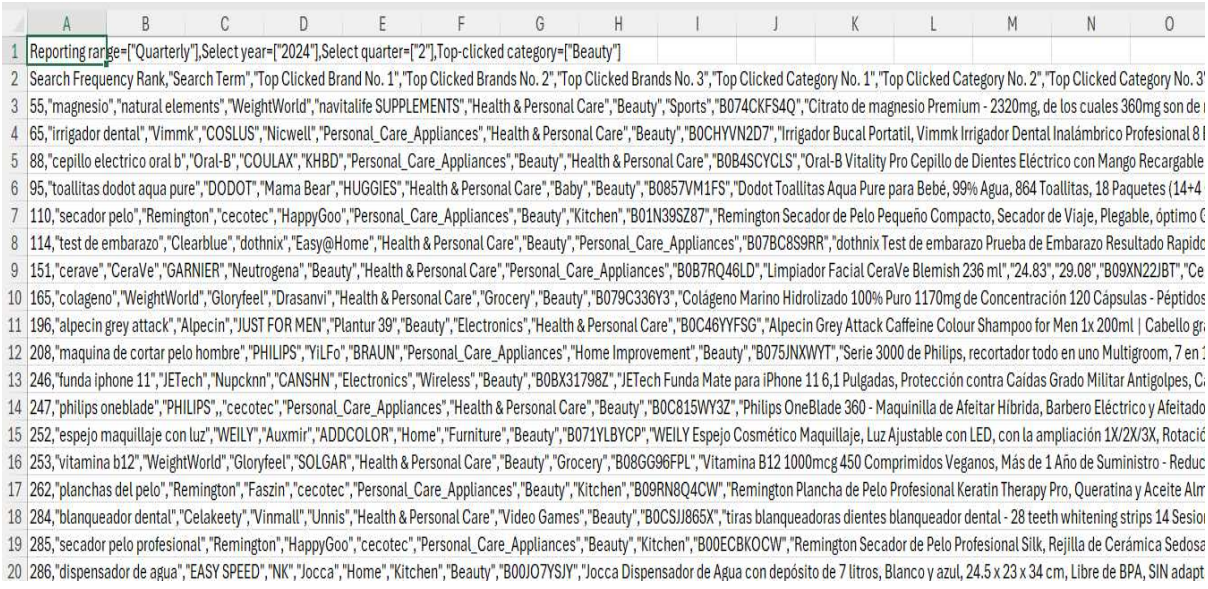
The core of the project involved iterative execution of tasks that gradually evolved the analysis:

- Data Collection and Consolidation: Using Remdash, the team gathered data on the top brands across multiple categories from the five EU countries. Data issues, such as brands appearing under incorrect categories, were systematically resolved.
- Data Refinement: The team manipulated data in Excel to construct comprehensive tables. This process included:
    - Identifying parent and child company relationships to streamline outreach.
    - Integrating additional files to capture data on existing Remazing clients.
- Emergence of the Maturity Index: Initially, the team set out to analyze market data. However, through iterative data consolidation and analysis, an innovative maturity index emerged. This index was calculated using three key factors:
    - F1: Proportional representation of brands scaled to a maximum of 5.
    - F2: Number of services used, weighted appropriately.
    - F3**:** A repetition of the factor to maintain the maximum cap.

The final index was computed using the formula:

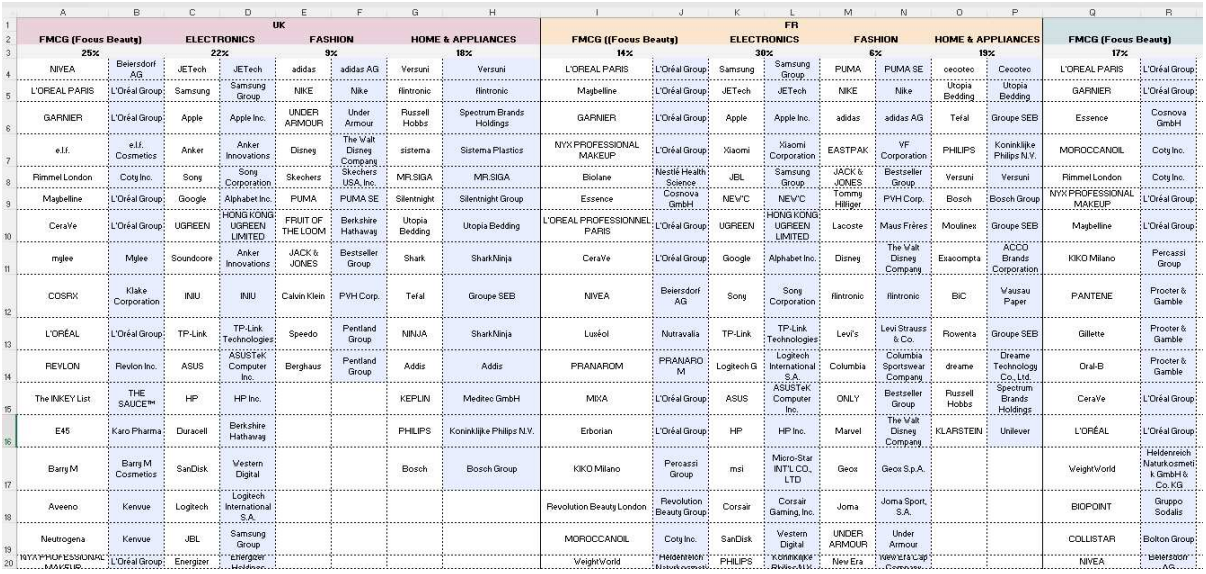
Maturity Index = (F1 * 0.5) + (F2 * 0.3) + (F3 * 0.2)

Giving importance to F1 as a company policy. Additional analysis was conducted to classify brands as high, medium, or low in maturity, alongside metrics such as client share and revenue proportions.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Reporting range=["Quarterly"],Select year=["2024"],Select quarter=["2"],Top-clicked category=["Beauty"]														
2	Search Frequency Rank,"Search Term","Top Clicked Brand No. 1","Top Clicked Brands No. 2","Top Clicked Brands No. 3","Top Clicked Category No. 1","Top Clicked Category No. 2","Top Clicked Category No. 3														
3	55,"magnesio","natural elements","WeightWorld","navitalife SUPPLEMENTS","Health & Personal Care","Beauty","Sports","B074CKFS4Q","Citrato de magnesio Premium - 2320mg, de los cuales 360mg son de														
4	65,"irrigador dental","Vimmk","COSLUS","Nicwell","Personal_Care_Appliances","Health & Personal Care","Beauty","B0CHYVN2D7","Irrigador Bucal Portatil, Vimmk Irrigador Dental Inalámbrico Profesional 8 I														
5	88,"cepillo electrico oral b","Oral-B","COULAX","KHBD","Personal_Care_Appliances","Beauty","Health & Personal Care","B0B4SCYCLS","Oral-B Vitality Pro Cepillo de Dientes Eléctrico con Mango Recargable														
6	95,"toallitas dodot aqua pure","DODOT","Mama Bear","HUGGIES","Health & Personal Care","Baby","Beauty","B0857VM1FS","Dodot Toallitas Aqua Pure para Bebé, 99% Agua, 864 Toallitas, 18 Paquetes (14+4														
7	110,"secador pelo","Remington","cecotec","HappyGoo","Personal_Care_Appliances","Beauty","Kitchen","B01N39SZ87","Remington Secador de Pelo Pequeño Compacto, Secador de Viaje, Plegable, óptimo C														
8	114,"test de embarazo","Clearblue","dothnix","Easy@Home","Health & Personal Care","Beauty","Personal_Care_Appliances","B07BC8S9RR","dothnix Test de embarazo Prueba de Embarazo Resultado Rapidc														
9	151,"cerave","CeraVe","GARNIER","Neutrogena","Beauty","Health & Personal Care","Personal_Care_Appliances","B0B7RQ46LD","Limpiador Facial CeraVe Blemish 236 ml","24.83","29.08","B09XN22JBT","Ce														
10	165,"colageno","WeightWorld","Gloryfeel","Drasanvi","Health & Personal Care","Grocery","Beauty","B079C336Y3","Colágeno Marino Hidrolizado 100% Puro 1170mg de Concentración 120 Cápsulas - Péptidos														
11	196,"alpecin grey attack","Alpecin","JUST FOR MEN","Plantur 39","Beauty","Electronics","Health & Personal Care","B0C46YYFSG","Alpecin Grey Attack Caffeine Colour Shampoo for Men 1x 200ml | Cabello gr														
12	208,"maquina de cortar pelo hombre","PHILIPS","YiLFo","BRAUN","Personal_Care_Appliances","Home Improvement","Beauty","B075JNXWYT","Serie 3000 de Philips, recortador todo en uno Multigroom, 7 en 1														
13	246,"funda iphone 11","JETech","Nupcknn","CANSHN","Electronics","Wireless","Beauty","B0BX31798Z","JETech Funda Mate para iPhone 11 6,1 Pulgadas, Protección contra Caídas Grado Militar Antigolpes, C														
14	247,"philips oneblade","PHILIPS",,"cecotec","Personal_Care_Appliances","Health & Personal Care","Beauty","B0C815WY3Z","Philips OneBlade 360 - Maquinilla de Afeitar Híbrida, Barbero Eléctrico y Afeitado														
15	252,"espejo maquillaje con luz","WEILY","Auxmir","ADDCOLOR","Home","Furniture","Beauty","B071YLBYCP","WEILY Espejo Cosmético Maquillaje, Luz Ajustable con LED, con la ampliación 1X/2X/3X, Rotació														
16	253,"vitamina b12","WeightWorld","Gloryfeel","SOLGAR","Health & Personal Care","Beauty","Grocery","B08GG96FPL","Vitamina B12 1000mcg 450 Comprimidos Veganos, Más de 1 Año de Suministro - Reduc														
17	262,"planchas del pelo","Remington","Faszin","cecotec","Personal_Care_Appliances","Beauty","Kitchen","B09RN8Q4CW","Remington Plancha de Pelo Profesional Keratin Therapy Pro, Queratina y Aceite Alm														
18	284,"blanqueador dental","Celakeety","Vinmall","Unnis","Health & Personal Care","Video Games","Beauty","B0CSJJ865X","tiras blanqueadoras dientes blanqueador dental - 28 teeth whitening strips 14 Sesio														
19	285,"secador pelo profesional","Remington","HappyGoo","cecotec","Personal_Care_Appliances","Beauty","Kitchen","B00ECBKOCW","Remington Secador de Pelo Profesional Silk, Rejilla de Cerámica Sedosa														
20	286,"dispensador de agua","EASY SPEED","NK","Jocca","Home","Kitchen","Beauty","B00JO7YSJY","Jocca Dispensador de Agua con depósito de 7 litros, Blanco y azul, 24.5 x 23 x 34 cm, Libre de BPA, SIN adapt														

Figure 8 Raw Data



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1					UK							FR						
2	FMCG (Focus Beauty)		ELECTRONICS		FASHION		HOME & APPLIANCES		FMCG ((Focus Beauty)		ELECTRONICS		FASHION		HOME & APPLIANCES		FMCG (Focus Beauty)	
3	25%		22%		9%		18%		14%		30%		6%		19%		17%	
4	NIVEA	Beiersdorf AG	JETech	JETech	adidas	adidas AG	Versuni	Versuni	L'OREAL PARIS	L'Oréal Group	Samsung	Samsung Group	PUMA	PUMA SE	cecotec	Cecotec	L'OREAL PARIS	L'Oréal Group
5	L'OREAL PARIS	L'Oréal Group	Samsung	Samsung Group	NIKE	Nike	flintronic	flintronic	Maybelline	L'Oréal Group	JETech	JETech	NIKE	Nike	Utopia Bedding	Utopia Bedding	GARNIER	L'Oréal Group
6	GARNIER	L'Oréal Group	Apple	Apple Inc.	UNDER ARMOUR	Under Armour	Russell Hobbs	Spectrum Brands Holdings	GARNIER	L'Oréal Group	Apple	Apple Inc.	adidas	adidas AG	Tefal	Groupe SEB	Essence	Cosnova GmbH
7	e.l.f.	e.l.f. Cosmetics	Anker	Anker Innovations	Disney	The Walt Disney Company	sistema	Sistema Plastics	NYX PROFESSIONAL MAKEUP	L'Oréal Group	Xiaomi	Xiaomi Corporation	EASTPAK	VF Corporation	PHILIPS	Koninklijke Philips N.V.	MOROCCANOIL	Coty Inc.
8	Rimmel London	Coty Inc.	Song	Song Corporation	Skechers	Skechers USA, Inc.	MR.SIGA	MR.SIGA	Biolane	Nestlé Health Science	JBL	Samsung Group	JACK & JONES	Bestseller Group	Versuni	Versuni	Rimmel London	Coty Inc.
9	Maybelline	L'Oréal Group	Google	Alphabet Inc.	PUMA	PUMA SE	Silentnight	Silentnight Group	Essence	Cosnova GmbH	NEW'C	NEW'C	Tommy Hilfiger	PVH Corp.	Bosch	Bosch Group	NYX PROFESSIONAL MAKEUP	L'Oréal Group
10	CeraVe	L'Oréal Group	UGREEN	HONG KONG UGREEN LIMITED	FRUIT OF THE LOOM	Berkshire Hathaway	Utopia Bedding	Utopia Bedding	L'OREAL PROFESSIONNEL PARIS	L'Oréal Group	UGREEN	HONG KONG UGREEN LIMITED	Lacoste	Maus Frères	Moulinex	Groupe SEB	Maybelline	L'Oréal Group
11	mylee	Mylee	Soundcore	Anker Innovations	JACK & JONES	Bestseller Group	Shark	SharkNinja	CeraVe	L'Oréal Group	Google	Alphabet Inc.	Disney	The Walt Disney Company	Exacompta	ACCO Brands Corporation	KIKO Milano	Percassi Group
12	COSRX	Klake Corporation	INIU	INIU	Calvin Klein	PVH Corp.	Tefal	Groupe SEB	NIVEA	Beiersdorf AG	Sony	Sony Corporation	flintronic	flintronic	BIC	Wausau Paper	PANTENE	Procter & Gamble
13	L'ORÉAL	L'Oréal Group	TP-Link	TP-Link Technologies	Speedo	Pentland Group	NINJA	SharkNinja	Luséol	Nutravalia	TP-Link	TP-Link Technologies	Levi's	Levi Strauss & Co.	Rowenta	Groupe SEB	Gillette	Procter & Gamble
14	REVLON	Revlon Inc.	ASUS	ASUSTeK Computer Inc.	Berghaus	Pentland Group	Addis	Addis	PRANAROM	PRANAROM	Logitech G	Logitech International S.A.	Columbia	Columbia Sportswear Company	dreame	Dreame Technology Co., Ltd.	Oral-B	Procter & Gamble
15	The INKEY List	THE SAUCE™	HP	HP Inc.			KEPLIN	Meditec GmbH	MIXA	L'Oréal Group	ASUS	ASUSTeK Computer Inc.	ONLY	Bestseller Group	Russell Hobbs	Spectrum Brands Holdings	CeraVe	L'Oréal Group
16	E45	Karo Pharma	Duracell	Berkshire Hathaway			PHILIPS	Koninklijke Philips N.V.	Erborian	L'Oréal Group	HP	HP Inc.	Marvel	The Walt Disney Company	KLARSTEIN	Unilever	L'ORÉAL	L'Oréal Group
17	Barry M	Barry M Cosmetics	SanDisk	Western Digital			Bosch	Bosch Group	KIKO Milano	Percassi Group	msi	Micro-Star INT'L CO., LTD	Geox	Geox S.p.A.			WeightWorld	Heidenreich Naturkosmetik GmbH & Co. KG
18	Aveeno	Kenvue	Logitech	Logitech International S.A.					Revolution Beauty London	Revolution Beauty Group	Corsair	Corsair Gaming, Inc.	Joma	Joma Sport, S.A.			BIOPOINT	Gruppo Sodalis
19	Neutrogena	Kenvue	JBL	Samsung Group					MOROCCANOIL	Coty Inc.	SanDisk	Western Digital	UNDER ARMOUR	Under Armour			COLLISTAR	Bolton Group
20	NYX PROFESSIONAL MAKEUP	L'Oréal Group	Energizer	Energizer Holdings					WeightWorld	Heidenreich Naturkosmetik GmbH & Co. KG	PHILIPS	Koninklijke Philips N.V.	New Era	New Era Cap Company			NIVEA	Beiersdorf AG

Figure 8 Cleaned Data

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	EU5 FMCG BEAUTY												
2	COMPANY	Revenue	IPC (> 250 M)	Clients Remazing	(Brands Ratio) Brands owned/ brands total	(Services Used) 1-4	(Countries Operated) 1-5	F1(Brands % x 5)	F2(Services x 1,25)	F3(Internazionalità)	Indice di maturità del cliente	Stato di Maturità	Percentuale di maturità
3	Beiersdorf AG	20,000,000,000	Yes	Yes	1.00	3.00	5.00	5	3.75	5.00	4.63	High	92.50%
4	L'Oréal Group	38,000,000,000	Yes	Yes	0.04	1	5	0.185185185	1.25	5	1.47	Low	29.35%
5	e.l.f. Cosmetics	546,000,000	Yes	No				0	0	0	0.00		
6	Coty Inc.	3,640,000,000	Yes	No				0	0	0	0.00		
7	mylee	14,700,000	No	No				0	0	0	0.00		
8	Klake Corporation	5,500,000	No	No				0	0	0	0.00		
9	Revlon Inc.	2,366,000,000	Yes	No				0	0	0	0.00		
10	Karo Pharma	1,500,000,000	Yes	No				0	0	0	0.00		
11	Barry M Cosmetics	17,000,000	No	No				0	0	0	0.00		
12	Kenvue	10,920,000,000	Yes	Yes	1.00	4	5	5	5	5	5.00	High	100.00%
13	Unilever	60,000,000,000	Yes	Yes	0.05	2	4	0.238095238	2.5	4	1.67	Low	33.38%
14	PVH Corp.	9,100,000,000	Yes	No				0	0	0	0.00		
15	Henkel AG & Co.	22.000.000.000	Yes	Yes	1.00	3	5	5	3.75	5	4.63	High	92.50%

Figure 9 Maturity Index

Sprint Review

At the conclusion of each iterative cycle, the team conducted review sessions with key stakeholders. In these sessions:

- Presentation of Findings: The team demonstrated progress by presenting the structured data tables, analyses, and the emergent maturity index.
- Stakeholder Feedback: Discussions focused on data quality, the accuracy of categorizations, and the strategic implications of the analysis.
- Backlog Refinement: Feedback was used to update the Product Backlog, re-prioritizing tasks and refining the analysis further.

Sprint Retrospective

Following each review, the team held retrospective meetings to reflect on the process and identify opportunities for improvement:

- Process Evaluation: The team assessed what worked well (e.g., effective data consolidation and the utility of Remdash) and what challenges needed addressing (e.g., handling misclassified data).
- Actionable Insights: Lessons learned were documented, and concrete adjustments were proposed for subsequent cycles, such as improved data cleaning protocols and enhanced coordination between team members.
- Continuous Improvement: These insights were integrated into the planning for the next iteration, reinforcing the team's commitment to continuous improvement.

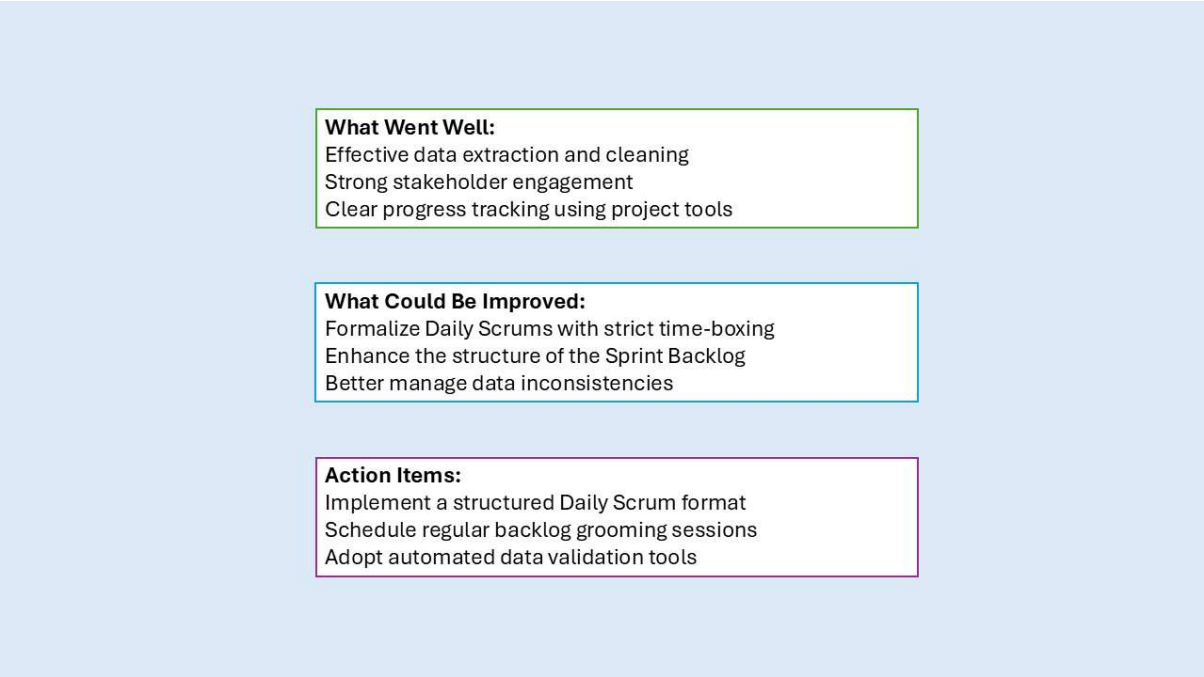


Figure 10 Sprint Retrospective

4.2.3 Scrum Artifacts

Product Backlog:

Definition & Scope:
A comprehensive Product Backlog was established at the outset to capture all tasks required for the project. It included items such as:

Data Gathering: Collecting market data across key EU countries using Remdash.

Data Categorization: Organizing information by categories (beauty, electronics, fashion, home & appliances) and ensuring accurate classification.

Emergent Analysis Tasks: Developing analytical models, which ultimately led to the creation of a maturity index.

Maintenance & Prioritization:
The Product Backlog was maintained rigorously, with tasks prioritized based on business value and strategic importance. This approach ensured that the most critical activities received attention first, even as new insights emerged through iterative work cycles.

Sprint Backlog

Task Allocation:
Tasks from the Product Backlog were selected and allocated to iterative work cycles. Although the process of creating a formal Sprint Backlog was partially implemented, key activities were grouped into sprints that guided the team's focus.

Progress Tracking:
Instead of using a dedicated Sprint Backlog tool exclusively, progress was monitored using internal tools and spreadsheets. This method proved effective for tracking day-to-day activities and making necessary adjustments.

Adaptation in Practice:
The informal nature of the Sprint Backlog allowed for flexibility. Tasks were dynamically updated and re-prioritized as new information emerged during the iterative process.

Increment

Definition & Delivery:
The Increment represents the final deliverable: a comprehensive analysis of e-commerce brands culminating in the maturity index. This output was built iteratively over the course of the project.

Incremental Development:
Although the project did not produce clearly demarcated increments at the end of each sprint, each cycle contributed valuable components—data sets, cleaned data, analytical insights—that were eventually consolidated into the final deliverable.

Integration of Components:
The process showcased an emergent quality: while the initial aim was to analyze market data, the iterative cycles led to the unexpected development of a maturity index, providing deeper insights into market positioning.

Visual Suggestion:
Include a timeline or series of snapshots that capture the evolution of the deliverable. Visuals could display intermediate stages of data analysis, charts of the maturity index development, or final summary dashboards that illustrate key metrics.

5. Results

This chapter presents the main findings that emerged from the application of Scrum during the project. Each observation is discussed in relation to existing literature, highlighting where theoretical expectations were confirmed, partially implemented, or challenged.

The initial project goal was to assess the scale of e-commerce activity in the top five EU countries based on revenue, with the aim of supporting brand repositioning decisions. However, the focus shifted early on. Through ongoing discussions with team members and stakeholders, the analysis moved toward building a qualified lead database across four key product categories. Rather than causing disruption, this pivot was absorbed smoothly, and resources were redirected with minimal friction. The iterative structure of Scrum allowed the team to embrace the evolving scope without needing to restart or overhaul previous work. As highlighted by (Balasubramaniam et al. 2022) and (Ravindran et al. 2024), this kind of flexibility is a core strength of Agile approaches in fast-moving project environments.

Team roles were handled in a mixed way. The Head of International Development formally took on the role of Product Owner and actively steered the project's priorities, aligning the backlog with business goals. On the other hand, the Scrum Master role was never officially assigned. Instead, the team lead stepped in informally to guide meetings and help resolve blockers. While this allowed for some flexibility, it also meant that Scrum events like Sprint Planning and Retrospectives lacked consistency. Sometimes they were skipped altogether, and when held, they often varied in structure and purpose. This created uneven follow-through on improvements and feedback. According to (Ekechi et al. 2024) and (Denning 2018), such partial implementation is common when organizations adopt Agile methods without adapting their internal culture or investing in structured training.

Despite the informal team structure, communication worked well. A member from business development, who had no standard approach to lead generation, shared valuable insight into how potential clients were usually identified. Another colleague from Team Italy offered practical examples of how existing client data was handled. These contributions helped the analysis reflect real-world practices. The small size of the team and the regular check-ins made coordination relatively easy. Shared boards and informal updates were enough to keep everyone aligned. While (Almeida 2023) warns of misalignment risks in cross-functional teams, this project benefited from clear and continuous communication, which helped integrate diverse perspectives without conflict.

In terms of tools, the team relied on Trello and Excel. These lightweight options lacked automation or advanced tracking features, but they were familiar and flexible. More importantly, they didn't create friction, the team adapted by updating boards manually

and sharing changes in real time. This setup worked within the scope of the project. (Putrianasari et al. 2024) point out that smaller teams often use simplified tools effectively when resources are limited, as long as core Agile principles like transparency and collaboration are maintained.

However, not all elements of Scrum were fully realized. Deliverables were not released incrementally at the end of each Sprint. Instead, the team presented a final output once the entire process was complete. While the work itself was done in iterations, results were not packaged or reviewed step-by-step. This meant fewer chances for early feedback or mid-course correction from external stakeholders. (Rigby et al. 2016) observe that this is typical in non-software settings, where teams are used to delivering full reports or completed solutions rather than working versions.

Another challenge was data quality. The dataset included several misclassified or incomplete entries. Much of the information had to be cleaned manually, which delayed progress in the early phases. Some analysis tasks were postponed or re-scoped because of this. These issues are consistent with the limitations discussed in section 2.6 of the literature, where researchers point to the lack of standardized data formats and high-quality sources in e-commerce research. In an Agile context, this becomes even more limiting, as it slows down the pace of iteration and reduces the clarity of what's "ready" for analysis.

Finally, measuring the success of the process itself was difficult. Without code deployments or working features, common Agile metrics like velocity or story points didn't apply. The team assessed progress based on whether the project stayed on schedule, met expectations, and produced insights that stakeholders found valuable. These were subjective indicators, but they were appropriate given the nature of the work. As noted by (Liu et al. 2017) and (Joshi 2013), this lack of performance benchmarks is a known gap in Agile literature outside of software engineering.

6. Conclusion

Applying Scrum to this e-commerce market analysis project proved to be both practical and effective. The initial goal was to assess the market size of five leading European countries, but over time, the focus shifted toward building a database of potential leads in key product categories. Scrum allowed the project to evolve without losing momentum or clarity. The framework's flexibility supported real-time adjustments while maintaining alignment with the overall objectives.

Scrum also helped bring order to a research-heavy, non-software context. Even without technical development, the team benefited from structured planning, shared task ownership, and regular feedback. Sprints encouraged progress in manageable steps. Tools like Trello and Excel, though basic, allowed for consistent tracking and task coordination. Communication across team members and external contributors remained strong throughout the project.

However, some key Scrum elements were only partially implemented. The team lacked a formally designated Scrum Master, and core ceremonies such as Retrospectives and Sprint Planning were often improvised. As a result, opportunities for structured reflection and process improvement were sometimes missed. Additionally, most of the work was delivered at the end, rather than incrementally, which limited the benefits of early validation.

Data quality posed another challenge. Several datasets were incomplete or misclassified, requiring significant manual cleaning. This not only delayed progress but also highlighted the importance of clean, consistent data when applying Agile methods to analytical projects.

6.1 Recommendations

Several recommendations emerge from the experience of this project. They are aimed at improving the effectiveness and consistency of Scrum in similar analytical and cross-functional environments. One of the most impactful changes would be to strengthen the backlog refinement process. Involving stakeholders, particularly the Product Owner, early in backlog discussions helps set priorities that reflect both strategic intent and operational constraints. When this alignment happens early, the team has a clearer path. Without it, Sprints can begin with tasks that are not fully relevant or ready.

It would also be beneficial to refine Sprint Planning practices. In this project, Sprint goals were sometimes set based on broad estimates and loosely defined outputs. Breaking complex activities into smaller, more manageable tasks can help the team assess difficulty more accurately. This matters, especially when working with uncertain data quality or shifting scopes. For example, data cleaning, categorization, and verification could have been defined as separate backlog items, each with clearer deliverables. Reviewing past Sprint performance before planning new ones also supports more realistic expectations.

Daily communication worked well overall, but it lacked structure. The Daily Scrum should be more focused and time-limited. It does not need to be formal or rigid, but following a simple structure every day helps avoid missed updates and repeated blockers. Sprint Reviews and Retrospectives were held occasionally, though they varied greatly in format and purpose. In future projects, these meetings should include defined agendas and documented feedback. Even a few notes shared after each session could help track lessons learned and ensure that the same issues are not repeated across Sprints.

Data quality also needs to be addressed more proactively. Much of the rework during this project was caused by misclassified or incomplete entries. These issues slowed the analysis and required manual corrections at critical stages. Starting the project with a basic set of validation checks, either manual or automated, would reduce the risk of errors. In a data-heavy project, clean input is essential. Time spent improving the foundation early on can save far more time later.

6.2 Limitations

Despite the strengths of this project, several limitations affected its efficiency and consistency. The most significant issue was the quality of the available data. Information sourced from internal platforms, particularly Remdash, often included missing fields, inconsistent formats, or misclassified brands. These errors were not always obvious at first, which meant that they were discovered later in the process, requiring backtracking and manual correction. Integrating data from different sources introduced additional challenges, including naming conflicts and duplicated entries. This made it difficult to maintain a clean and stable dataset throughout.

Another limitation was the partial implementation of Scrum. While the team followed its core principles, such as iterative progress and task ownership, several practices were handled informally. There was no formally assigned Scrum Master, and key ceremonies were often improvised. For example, Retrospectives were not consistently documented, and Sprint Planning sessions did not always include detailed task decomposition or effort estimation. These gaps reduced the potential for continuous improvement and made it harder to identify systemic issues.

Time also presented a constraint. Some tasks took longer than expected, particularly those related to data processing and the development of the maturity index. Fixed Sprint durations encouraged progress, but they occasionally limited the depth of analysis that could be completed within each cycle. When the project scope shifted mid-way to focus more heavily on lead qualification, several originally planned tasks had to be re-scoped or delayed. This shift was managed effectively, but it did impact the overall timeline and deliverable coverage.

Finally, while the team collaborated well, the lack of a unified tracking system meant that progress updates and backlog changes were sometimes handled inconsistently. Tools like Trello and Excel were functional, but they lacked features for integrating comments, recording Sprint metrics, or maintaining traceable histories of task changes. These limitations made it more difficult to evaluate performance and reflect on workflow patterns in hindsight.

Although these issues created obstacles, they did not prevent the project from achieving its main objectives. On the contrary, they helped surface valuable insights into what is required to make Scrum fully effective in a non-software, research-driven environment. Future projects can use these lessons to apply the methodology more deliberately, with better support for process consistency and data reliability.

References

Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. Journal of Systems and Software, 119, 87–108. https://doi.org/10.1016/j.jss.2016.06.013

Dingsøyr, T., Nerur, S., Balijepally, V., & Moe, N. B. (2012). A decade of agile methodologies: Towards explaining agile software development. Journal of Systems and Software, 85(6), 1213–1221. https://doi.org/10.1016/j.jss.2011.10.039

Moe, N. B., Smite, D., Ågerfalk, P. J., & Jørgensen, M. (2012). Understanding the dynamics of distributed agile teams: A case study of a large distributed agile project. Empirical Software Engineering, 17(6), 700–734. https://doi.org/10.1007/s10664-011-9161-9

Ramesh, B., Cao, L., & Baskerville, R. (2010). Agile requirements engineering practices and challenges: An empirical study. European Journal of Information Systems, 19(1), 5–18. https://doi.org/10.1057/ejis.2009.39

Schwaber, K., & Beedle, M. (2002). Agile Software Development with Scrum. Prentice Hall. https://www.pearson.com/en-us/subject-catalog/p/agile-software-development-with-scrum/P200000002197/9780130676344

Sutherland, J., & Schwaber, K. (2020). The Scrum Guide. https://scrumguides.org/scrum-guide.html

Serrador, P., & Pinto, J. K. (2015). Does Agile work? — A quantitative analysis of agile project success. *International Journal of Project Management, 33*(5), 1040-1051. https://doi.org/10.1016/j.ijproman.2014.09.006

Dixit, R., & Bhushan, B. (2019). Scrum: An Agile Software Development Process and Metrics. 7(1), 73–87. https://doi.org/10.15415/JOTITT.2019.71005

Andreeva, R., & Sinyaeva, O. (2018). Scrum: Flexibility within strict limits. 2, 13–20. https://doi.org/10.26425/1816-4277-2018-2-13-20

Budiman, R., Raharjo, T., & Suhanto, A. (2022). Scrum Project Management Challenges and Solutions: Systematic Literature Review. International Conference Computing Engineering and Design, 1–6. https://doi.org/10.1109/icced56140.2022.10010471

Cui, Z. (2022). Risks and Challenges of Scrum: A Systematic Literature Review (pp. 181–196). Springer eBooks. https://doi.org/10.1007/978-3-031-07626-8_9

Denning, S. (2018). The Age of Agile: How Smart Companies Are Transforming the Way Work Gets Done. Harper Business. https://www.harpercollins.com/products/the-age-of-agile-stephen-denning

Rigby, D., Sutherland, J., & Takeuchi, H. (2016). Embracing Agile: How to master the process that's transforming management. Harvard Business Review, 94(5), 40-50. https://hbr.org/2016/05/embracing-agile

Ekechi, C. C., Okeke, C. D., & Adama, H. E. (2024). Enhancing agile product development with scrum methodologies: A detailed exploration of implementation practices and benefits. https://doi.org/10.51594/estj.v5i5.1108

The e-commerce market in conditions of uncertainty – development perspectives. Case study. (2023). Zeszyty Naukowe, 2023(170), 735–748. https://doi.org/10.29119/1641-3466.2023.170.45

Faichak, A. (2024). Flexibility over conservatism: a review of agile methodologies in it project team management. Actual Problems of Economics, 1(274), 130–140. https://doi.org/10.32752/1993-6788-2024-1-274-130-140

Joshi, D. (2013). An Analysis of the Existing Literature on B2C E-commerce. Indian Journal of Marketing, 43(12), 34–46. https://doi.org/10.17010/IJOM/2013/V43/I12/80512

Putrianasari, R., Budiardjo, E. K., Mahatma, K., & Raharjo, T. (2024). Problems in The Adoption of Agile-Scrum Software Development Process in Small Organization: A Systematic Literature Review. https://doi.org/10.33395/sinkron.v9i1.13271

Sudiarno, A., Abdillah, O., Yusdin, H. D., Ummatin, K. K., & Murti, I. W. (2024). Effectivity analysis of the scrum framework adaptation in safety performance improvement: A system dynamics approach. *Journal of Infrastructure, Policy and Development*, *8*(9), 7386. https://doi.org/10.24294/jipd.v8i9.7386

Hanslo, R., Mnkandla, E., & Vahed, A. (2019). Factors that contribute significantly to Scrum adoption. https://doi.org/10.15439/2019F220

Heibges et al., (2023) Scrum https://doi.org/10.14361/9783839463475-036

Balasubramaniam et al., (2024) Optimizing Cross Functional Team Collaboration in IT Project Management. https://doi.org/10.36676/dira.v12.i1.110

Marshall et al., (2013). An industry case study of the impacts of electronic commerce on car dealerships in western Australia. Journal of Electronic Commerce Research. https://doi.org/10.12966/JECR.05.01.2013

Fernandes et al., (2021). Improving the performance of student teams in project-based learning with Scrum. https://doi.org/10.3390/EDUCSCI11080444

Ravindran et al., (2024). Agile Methodologies in Digital Marketing for Growing Businesses. Advances in Logistics, Operations, and Management Science Book Series. https://doi.org/10.4018/979-8-3693-6274-7.ch023

Stettina, C. J., & Knoop, M. A. (2024). Scrumming Frontiers: Agile Frameworks Across Business Disciplines outside of IT, and the Impact of Agile Mindset on Team Performance. https://doi.org/10.1109/ice/itmc61926.2024.10794343

Liu et al,. (2017). Issues with conducting controlled on-line experiments for E-Commerce. Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing. https://doi.org/10.1109/SNPD.2017.8022721

Avancha et al,. (2024). Agile Project Planning and Execution in Large-Scale IT Projects. Deleted Journal. https://doi.org/10.36676/dira.v12.i3.80

Almeida, F. (2023). Communication and Coordination Issues in Managing Distributed Scrum Teams. Advances in Human Resources Management and Organizational Development Book Series, 193–212. https://doi.org/10.4018/978-1-6684-7353-5.ch012