

FRAMEWORK STUDY FOR SOFTWARE DEVELOPMENT VIA SCRUM, AGILE AND KANBAN

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ABSTRACT

This current research study compares all the three IT methodologies SCRUM, Agile and Kanban for development projects. SCRUM framework is developing projects by dividing bigger development tasks into small development stages known/referred as sprints, whereas Kanban framework is used to schedule the system to manage the flow of work of the software development project solely through visual signals. All three methodologies were examined in this research study to determine their similarities and differences. The study conducted a survey to specify the most preferred methodology by IT professionals based on many parameters in the software development project environment, such as project complexity, levels of uncertainty in the entire project and work load sizes with considerations of various output factors like quality of product, productivity, and delivery of product. The research study shows the flexibility of all the three methodologies, approaching with objectives of Agile, whereas SCRUM methodology has emphasized on the corporation of customers, all the development project teams focus on skills of planning, organization skills, skills of presentation and the review of each module of project that has made it perfect for all new and extreme complex development products of software projects, the involvements of the customers is continuously required, in Kanban methodology it is functioning if in continuous workflow environment within a stable approach towards the software system improvements.

Keywords: Agile, SCRUM, KANBAN, Methodologies, IT professionals.

Introduction

The main focus of any methodology in a software development environment is customers' satisfaction and delivery of a full working product. The agile methodology focuses towards customer's satisfaction through continuous delivery of products in software development projects. The organizations that use or have implemented agile methodology always produce very high quality products and in software development environments. In the software development environment, SCRUM methodology is known as an iterative methodology that depends on principles of agile methods that is included in Agile Manifesto. SCRUM is known as a very light development method in the industry. It provides complete insight of a product and has a capability to adapt quickly, working in small teams; it has tremendous dedicated and very well self-organized teams for software product development. SCRUM methodology has a very strong position which can be seen in terms of visibility, extremely effective processes, and fast phases of development of products, specific roles, collaboration emphasis and mutual understandings among all individuals in all SCRUM teams working for the specific project. Team SCRUM has few roles which are SCRUM master, product owner and team member. KANBAN methodology is known as visual method in software development environment where everything is on the board and that board is known as KANBAN board that shows the entire task of the product to be completed, resources that are required and acquired by the teams and the task completed and pending of each team member is clearly seen on board so the team comes to know who is lacking behind and how to help and motivate them. In the IT industry many organizations have taken advantage of SCRUM, Agile and KANBAN methodologies because it has enhanced the quality and efficiency of the software products. Hence SCRUM is the mainstream of agile methodology in the software development industry. The organizations that have adopted SCRUM, Agile and KANBAN, are gaining extreme benefits in the software development environment, collaboration and correspondence, effectiveness, increased self-confidence in individuals working in a specific team, then improvement in complete groups and product management processes and participation of all the development groups in the organization. In this study, efforts have been made to address the following questions: What are the most influencing factors for the implementation of Agile, SCRUM and KANBAN methodologies from the perspective of the software development environment in the IT industry? Comparisons of Agile, SCRUM and KANBAN methodology?

Literature Review

Callahan (2000), that a tire retailer based in Minnesota, known as Tires Plus specially established a university for organization employees to increase retainer ship rate of organization employees at all stores, to increase organization recruitment and fill managerial and technical positions and improve the employee's performance and career growth.

Mel (2000), the factors that are worthy in employee training sessions and that sessions are constructed on these factors as follows: orientation, management skills and operational skills of individuals to be enhanced. The theories described in this theory are the basic groundwork of any employee development programs of any sectors of industries.

Tore , Torgeir (2008), accepts the requirement changes by users and defines the features of the products by users and developers. The software development team members divide the project's entire tasks into small iterations in order to generate a specific release plan for working phases, which defines each iteration plan to drive their progress. It is famous as agility is extremely flexible and simple.

Ambler (2010), the efficiency of all the resources used to create the product and the needs of every team to provide value to the owner are clearly prioritized in software development. By utilizing several techniques, this strategy aids in the elimination of all waste. It also entails the selection of all essential elements for a product and their timely delivery in small quantities in a functional form.

Moran (2014), its emphasis is on workflow development speed and efficiency, and it depends on trustworthy and prompt feedback from stakeholders to the development team. This approach consistently emphasizes the power of individuals and small teams to make decisions, which has improved the efficacy and efficiency of all operations. All agile initiatives use the DSDM methodology as a standard. It indicates organizational knowledge that increases focus on product quality and risk management.

Mike (2014), achieved enormous popularity in the creation of agile software because it serves as a protective shell for a variety of techniques that other agile methodologies allow. To classify and prioritize all system functionality in a product backlog and sprint backlog, the Product Owner collaborates closely with the SCRUM Master and developers who are SCRUM team members.

Waters (2014), this approach, which has evolved and matured since its inception, provides a thorough foundation for planning, scaling, executing, and managing agile processes. It is based on a few guiding principles, including the need for business collaborations with stakeholders, integrated testing, continuous delivery, focused and empowered teams, and active involvement of story users. SCRUM, Lean Software Development, Dynamic Systems Development Method (DSDM), and XP are a few popular techniques..

Werner, Tytkowska & Bach (2015), approaches based on incremental-iterative programming, the device that enables project teams to develop software using the Agile methodology, and the reason Scrum technique is utilized.

Sikender (2017), DevOps as a cease-to-cess automation in growing and turning in software programs. Even though agile software program improvement methodologies are an increasing number of common, many businesses have discovered that they have now no longer reached a common launch rate, largely due to the diverse departmental capabilities in silos.

Gerbman (2000), all of the goals of individuals and employee's development programs that will deliver the organization's mission and assist workers in learning the organization's culture and work ethics. Williams (2007), Agile methodologies is collection of evolutionary and iterative methods, based on the typical iterative enhancements processes of software projects. Wilfried ,Vogelzang,Jan & Driel (2019), two views that argue about Scrum technique, undertaking control frameworks and promising candidates. First of all its functions are defined, finally related with 6 famous scaffolds from motivational literature.

Objectives

1. To understand the similarities and differences among the three methodologies Scrum, Agile and Kanban in the software development environment.
2. To measure the level of satisfaction of the IT professional, organization and customers when the three methodologies Scrum, Agile and Kanban are used in software development projects in IT organizations.
3. Advantages and Disadvantages of three methodologies Scrum, Agile and Kanban.

Research Methodology

For the research investigation, both qualitative and quantitative methodologies were employed. Primary data for this study was collected using survey questions that were designed for data gathering. The participants or respondents were required to respond to 12 questions, and the questions related to how individuals and IT

organizations used the SCRUM, Agile, and Kanban approaches. Before completing the questionnaire, the respondents had enough time to understand it and ask any questions they might have had concerning the study or the questionnaire. The 200 responders who were targeted were both individuals and staff members of IT firms. The study's response rate was 100% throughout.

SCRUM Methodology

Product Backlog

The SCRUM product backlog is a list of all things that needs to be done within the project.

SCRUM product backlog replaces the traditional software requirement specification (SRS) artifacts. Items in SCRUM product backlog can be user centric examples in the form of user stories. The owner of SCRUM product backlog is SCRUM Product Owner. SCRUM product backlog is a living document and all entries are estimated.

Sprint backlog

The activities in Sprint backlog are entered from SCRUM Product Backlog and Sprint backlog activities should be completed in the period of the sprint as committed by the SCRUM team. Sprint backlog tasks have to be estimated on a per hour basis in order to track progress and remaining efforts. Sprint backlog is a living artifact and is updated on a daily basis. There is a Sprint task board for the team to see their progress on daily bases.

SCRUM Burndown chart

The SCRUM burn down chart is a displayed chart showing the completed work per day against the projected rate of completion for the current project product release date. The main purpose is to enable the project to deliver the expected product within the estimated schedule. It also provides quick visualizations for reference.

SCRUM Roles are PRODUCT OWNER, SCRUM MASTER, and SCRUM team.

Product Owner

SCRUM framework, central role is SCRUM Product Owner. SCRUM Product Owner performs two roles of classic product manager and project manager. SCRUM Product Owner represents the end customer or we can say he/she is a customer representative and also represents stakeholders and takes care of them. SCRUM Product Owner is responsible to maximize the profit of the product by ensuring the right work is done at the right time. SCRUM Product Owner maintains the product backlog and works very closely with the SCRUM team. No one else is allowed to instruct the SCRUM team to work from a different set of priorities. Many SCRUM Masters can report to a single SCRUM Product Owner and different teams SCRUM Product Owners working on the same project can report to the Chief SCRUM Product Owner that is selected by the management for the dedicated project.

SCRUM Master

SCRUM Master ensures that the SCRUM team adheres to SCRUM theories and SCRUM practices and rules. He/she helps the SCRUM team members and is responsible for removing obstacles from their way to complete the development of the product. SCRUM Master guards the SCRUM team from all the external requests and disruptions in the project. SCRUM Master is a part of the SCRUM team and has a role as servant – leader for the SCRUM team. He/she is responsible for managing the process. SCRUM Master is the only responsible person to conduct the daily scrum meetings and sprint planning meetings for the team members. SCRUM Master maintains the sprint backlog and all the required documentation.

SCRUM Team

SCRUM team is a collection of dedicated individuals working together to achieve a single goal dedicated to their team to deliver the requested and committed product on time in given increments. The SCRUM team includes 5 to 7 people in a particular SCRUM team. All members follow a common goal and adhere to the same norms and rules and show respect to each other in the team. SCRUM Team members can be Programmers, testers, user experience designers, etc. Every team player in the SCRUM team contributes their best for each sprint as they are responsible for failure or success of the product that they are responsible to deliver. Different kinds of teams are there, like component teams and feature teams.

Agile Methodology

Agile methodology is used to manage huge projects in software development environments by breaking down into several phases of a product. This methodology always includes constant collaboration with stakeholders of the specific project and continuous improvement at every phase of the project. As the work of the project begins

the team cycle starts with the process of planning, executing, and evaluating. Continuous collaboration plays a vital role for both team members and stakeholders of the software development project.

Principles of Agile

1. Individuals and interactions among teams are more important than processes and tools.
2. Software that works is more important for the team over comprehensive documentation of the software project.
3. Customer collaboration is more important over contract negotiation of the project.
4. Responding to continuous changes over following a plan of a software development project.

3 C's of Agile

1. First C of Agile methodology is user story that is in raw format, inform of **Card**. User's stories are always handwritten and manually informed of index "cards" to maintain them small and sweet. User Story basic standard format has only 3 basic components that are; as a [user type], I want [goal] so that I can accomplish [business value]. Card is merely a placeholder.
2. Second C of Agile methodology known to the world is **Conversation**. The second C is required to obtain all of the Card additional information. It is used to foster the incremental and continuous processes of collaboration among the agile teams and project stakeholders in order to develop a shared understanding of the problems and potential solutions for developing projects.
3. Third C of Agile methodology stands for **Confirmation**. The acceptance criterion captures all of the essential requirements of the user's story to translate them all into the test criteria so that the team knows when the user story has been successfully delivered.

Kanban Methodology

Kanban came from a Japanese word: 看板, which means billboard or signboard. Kanban method origin came from lean manufacturing methodology, which was introduced by the Toyota Company Automotive Production System in the late 1940s when the company implemented a production system known as just-in-time, which only objective was of producing according to the customers demand and identifying each and every possible raw and semi raw material shortages within the production lines of the company units.

Microsoft organization engineer David J. Anderson who had realized how this methodology that is devised by Toyota Company can become a process applicable to any type of organizational processes. Then Kanban came into existence by David J. Anderson. In a software development environment the main goal is to provide a visualization process management system which helps in decision-making about what, when, and how much products to produce. Kanban methodology is used in software development environments with other methods and frameworks such as Scrum in combination.

Kanban Board

Kanban is a visual methodology of PM that is used to monitor all assignments and minimize all the shortfalls in a developing software product. Kanban methodology heart is the **Kanban board** that can be in a physical or digital form for the team.

Kanban board is a board where phases of the developing software project are divided into columns. Tasks are written down on cards by the team members that progress from one column to the other, until the entire task is completed.

Kanban board has increased the transparency in any project as it visually clarifies what tasks need to be completed and where tasks are being piled up. The board visualizing aid has made it easier to delegate all the resources where they need to go and try to reduce all inefficiencies in the project.

Definition of Workflow (DoW)

DoW identifies all of the key components of Kanban method workflow, like which units of the project are moving through the board, what have "started" or has "finished" tends to means, and how long that should really take for an item of a product of current project to proceed through all the columns on the Kanban.

Work in progress (WIP) limits

WIP limits could be set by teams inside a column, then groups of columns or even on the whole board of Kanban. It indicates that a column which has a WIP limit of four cannot have far more than four cards in it at a particular time. In the case of just four, the team must complete all four tasks in that column before adding new ones. Work In Progress limits aids in identification of bottlenecks in the project's production process.

Impact of SCRUM, Agile and KANBAN methodologies on IT organizations, Employees and Customer Satisfaction

ROI

ROI for a SCRUM or Agile product project is calculated by the total revenue generated from a specific product versus the expenses of the sprints required to develop that specific product of a project. Scrum, Agile and Kanban methodologies have very high potential to generate return on investment (ROI) much faster than all the traditional development methodologies, as working software products can be delivered to the right source of consumers at the right time as the markets need all over the world . SCRUM Agile and Kanban the dedicated teams develop various types of features in the product that are translated into major sources of growth in revenues of any IT organization in the industry.

Employee

SCRUM, Agile and Kanban methodologies have improved individual's performances and have increased the team morale and team performance and have made workload less on each team player of a specific team in software development environment and has increased employee retention rate in organizations that have implemented these methodologies. SCRUM methodology has taught team ethics to employees in IT organizations that have adopted SCRUM methodology. Kanban methodology has taught teams to deliver products faster to customers and proper use of resources as everything is on visual display on the Kanban board.

Customer Satisfaction

There are many known metrics that are used to measure customer satisfaction of software products. Net Promoter Score (NPS) is one of metrics which measures if the users would recommend the software product to other users or do nothing or recommend against using it. Hence using a stable customer satisfaction metric and therefore it should measure for every release and then it indicates whether the SCRUM teams are meeting their end goals to provide value products to customers.

Data Analysis

Does your organization practice SCRUM/Agile/Kanban Methodology?

Opinion	Respondents	Percentage
Yes	128	64
No	72	36
Total	200	100

Table 1: Organization practice SCRUM/Agile/Kanban Methodology

Sample Standard Deviation, s	39.597979746447
Variance (Sample Standard), s^2	1568
Population Standard Deviation, σ	28
Variance (Population Standard), σ^2	784
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	28

Table 2: Mean and Standard Deviation of organization practice SCRUM/Agile/Kanban Methodology

64% of the respondents have said yes that their organization practices SCRUM/Agile/Kanban Methodology and 36% respondents have said that their organization does not practice SCRUM Agile/Kanban Methodology.

Are you a part of the SCRUM/Agile/Kanban team?

Opinion	Respondents	Percentage
Yes	128	64
No	72	36
Total	100	100

Table 3: Are you a part of SCRUM/Agile/Kanban team

Sample Standard Deviation, s	39.597979746447
Variance (Sample Standard), s^2	1568
Population Standard Deviation, σ	28
Variance (Population Standard), σ^2	784
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	28

Table 4: Mean and Standard Deviation of SCRUM/Agile/Kanban team

64% of the respondents have said yes they are part of the SCRUM/Agile/Kanban team and 36% respondents have said that they are not part of the SCRUM/Agile/Kanban team.

Have you attended SCRUM meetings like daily sprint meetings, sprint review meetings and sprint retrospective meetings?

Opinion	Respondents	Percentage
Yes	48	24
No	152	76
Total	200	100

Table 5: Have you attended SCRUM meetings like daily sprint meeting, sprint review meeting and sprint retrospective meeting

Sample Standard Deviation, s	73.539105243401
Variance (Sample Standard), s^2	5408
Population Standard Deviation, σ	52
Variance (Population Standard), σ^2	2704
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	52

Table 6: Mean and Standard Deviation of attending SCRUM meetings like daily sprint meeting, sprint review meeting and sprint retrospective meeting

24% of the respondents have said yes they have attended SCRUM meetings like daily sprint meeting, sprint review meeting and sprint retrospective meeting and 76% respondents have said that they have not attended SCRUM meetings like daily sprint meeting, sprint review meeting and sprint retrospective meeting.

What role do you play in the SCRUM team in your organization?

Opinion	Respondents	Percentage
SCRUM Product Owner	4	2
SCRUM Master	4	2
SCRUM Team Member	40	20
None of the Above	152	76
Total	200	100

Table 7: Role you play in SCRUM team in your organization

Sample Standard Deviation, s	70.085661871741
Variance (Sample Standard), s^2	4912
Population Standard Deviation, σ	60.695963621974
Variance (Population Standard), σ^2	3684
Total Numbers, N	4
Sum:	200
Mean (Average):	50
Standard Error of the Mean ($SE\bar{x}$):	35.04283093587

Table 8: Mean and Standard Deviation of role you play in SCRUM team in your organization

2% of the respondents have said they are SCRUM Product Owner and another 2% of the respondents have said they are SCRUM Master, 20% of the respondents have said they are SCRUM team members and rest 76% of the respondents have said they do not play any role in SCRUM teams.

SCRUM Product Owner and SCRUM Master play an important role while handling the project?

Opinion	Respondents	Percentage
Yes	152	76
No	48	24
Total	200	100

Table 9: SCRUM Product Owner and SCRUM Master play an important role while handling the project

Sample Standard Deviation, s	73.539105243401
Variance (Sample Standard), s^2	5408
Population Standard Deviation, σ	52
Variance (Population Standard), σ^2	2704
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	52

Table 10: Mean and Standard Deviation of an important role while handling the project

76 % of the respondents have said yes SCRUM Product Owner and SCRUM Master Play an important role while handling the project and 24% of the respondents feel that SCRUM Product Owner and SCRUM Master do not play an important role while handling the project.

Have you ever used Kanban tools like Jira, Click Up, Asana, Trello, Smartsheet and many more?

Opinion	Respondents	Percentage
Yes	68	34
No	132	66
Total	200	100

Table 11: Have you ever used Kanban tools like Jira, ClicUp, Asana, Trello, Smartsheet and many more

Sample Standard Deviation, s	45.254833995939
Variance (Sample Standard), s^2	2048
Population Standard Deviation, σ	32
Variance (Population Standard), σ^2	1024
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	32

Table 12: Mean and Standard Deviation of having used Kanban tools like Jira, Click Up, Asana, Trello, Smartsheet and many more

34% of the respondents have said yes they have used Kanban tools like Jira, Click Up, Asana, Trello, Smartsheet and many more and 66% of the respondents have said no they have not used Kanban tools like Jira, Click Up, Asana, Trello, Smartsheet

Does Kanban software tools enable IT professionals to visualize, organize, and manage work in the most efficient way?

Opinion	Respondents	Percentage
Yes	200	100
No	0	0
Total	200	100

Table 13: Does Kanban software tools enable IT professionals to visualize, organize, and manage work in the most efficient way

Sample Standard Deviation, s	141.42135623731
Variance (Sample Standard), s^2	20000
Population Standard Deviation, σ	100
Variance (Population Standard), σ^2	10000
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	100

Table 14: Mean and Standard Deviation of Kanban software tools enable IT professionals to visualize, organize, and manage work in the most efficient way

100% of the respondents have said yes that Kanban software tools enable IT professionals to visualize, organize, and manage work in the most efficient way.

Are you a part of the Agile team in your organization?

Opinion	Respondents	Percentage
Yes	60	30
No	140	70
Total	200	100

Table 15: Are you a part of agile team in your organization

Sample Standard Deviation, s	56.568542494924
Variance (Sample Standard), s^2	3200
Population Standard Deviation, σ	40
Variance (Population Standard), σ^2	1600
Total Numbers, N	4
Sum:	100
Mean (Average):	25
Standard Error of the Mean ($SE\bar{x}$):	40

Table 16: Mean and Standard Deviation of Agile team in your organization

30% of the respondents have said yes they are part of the Agile team in their organization and 70% respondents have said that they are not part of the Agile team in their organization.

Do you know 3c's of agile methodology?

Opinion	Respondents	Percentage
Yes	200	100
No	0	0
Total	200	100

Table 17: Do you know 3c's of agile methodology

Sample Standard Deviation, s	141.42135623731
Variance (Sample Standard), s^2	20000
Population Standard Deviation, σ	100
Variance (Population Standard), σ^2	10000
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	100

Table 18: Mean and Standard Deviation of 3c's of agile methodology

100% of the respondents have said yes that know 3c's of Agile methodology.

Do you think SCRUM/Agile/Kanban Methodology is beneficial for employees and IT organizations?

Opinion	Respondents	Percentage
Yes	200	100
No	0	0
Total	200	100

Table 19: Do you think SCRUM/Agile/Kanban Methodology is beneficial for employees and IT organizations

Sample Standard Deviation, s	141.42135623731
Variance (Sample Standard), s^2	20000
Population Standard Deviation, σ	100
Variance (Population Standard), σ^2	10000
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	100

Table 20 : Mean and Standard Deviation of SCRUM/Agile/Kanban Methodology is beneficial for employees and IT organizations

100% of the respondents have said yes that SCRUM/Agile/Kanban Methodology is beneficial for employees and IT organizations.

SCRUM/Agile/Kanban Methodologies do not compromise on Functionality, Time, Budget and Quality?

Opinion	Respondents	Percentage
Strongly Agree	150	75
Agree	50	25
Disagree	0	0
Strongly Disagree	0	0
Total	200	100

Table 21: SCRUM/Agile/Kanban Methodologies do not compromises on Functionality, Time, Budget and Quality

Sample Standard Deviation, s	70.710678118655
Variance (Sample Standard), s^2	5000
Population Standard Deviation, σ	50
Variance (Population Standard), σ^2	2500
Total Numbers, N	4
Sum:	200
Mean (Average):	50
Standard Error of the Mean ($SE\bar{x}$):	50

Table 22: Mean and Standard Deviation of SCRUM/Agile/Kanban Methodologies do not compromises on Functionality, Time, Budget and Quality

75% of the respondents have said that they strongly agree and 25% of the respondents have said that they agree with SCRUM/Agile/Kanban Methodologies does not compromises on Functionality, Time, Budget and Quality

Do you think SCRUM/Agile/Kanban Methodologies provide complete customer satisfaction and customer retention?

Opinion	Respondents	Percentage
Yes	200	100
No	0	0
Total	200	100

Table 23: Do you think SCRUM/Agile/Kanban Methodologies provides complete customer satisfaction and customer retention

Sample Standard Deviation, s	141.42135623731
Variance (Sample Standard), s^2	20000
Population Standard Deviation, σ	100
Variance (Population Standard), σ^2	10000
Total Numbers, N	2
Sum:	200
Mean (Average):	100
Standard Error of the Mean ($SE\bar{x}$):	100

Table 24: Mean and Standard Deviation of SCRUM/Agile/Kanban Methodologies provides complete customer satisfaction and customer retention

100% of the respondents have said yes that SCRUM/Agile/Kanban Methodologies provides complete customer satisfaction and customer retention.

Key Findings

1. From this study and sample survey it was found that SCRUM, Agile and Kanban methodology benefits employees and IT organizations in the IT industry all over the world.
2. It is observed that the SCRUM and Agile methodology increases customer satisfaction rate and customer retention rate.
3. It is observed that the SCRUM methodology delivers products in time and is cost efficient for the given products.
4. The study has found out that SCRUM, Agile and Kanban methodology does not compromise on Functionality, Time, Budget and Quality of the product.

Advantages

SCRUM

1. SCRUM improves customer's satisfactions for organizations as it reduces the turnaround time.
2. Quality of product is increased by this methodology.
3. SCRUM methodology is extremely quick and can adapt to changes very easily and frequently.
4. SCRUM methodology has a nature to expect and accept the changes that come on the way of software development period.
5. It estimates the perfect development time for creating products and its cost effect.
6. Keep the project schedule on time.
7. It has an ideal nature of rapidly changing and accumulating requirements by the project customers.
8. This methodology always lists the top features and the next features in the form of product backlog and sprint backlog.
9. It never changes the schedule of any sprint.
10. In this methodology work proceeds and completion are more logically done through Definition of Done (DoD).

Agile

1. Customer satisfaction is the highest priority of agile methodology.
2. Changes in requirements are welcomed at any time of the development phase of the product.
3. It focuses on continuous delivery of valuable software products and quality deliverables of products.
4. Collaboration is a mantra.
5. Working modules/phases of software products is the primary measure of progress in agile methodology.

Kanban

1. Kanban methodology approach is extremely easy to implement. Hence there is no need for learning complex new tasks or either of putting the entire team through a training program.
2. Kanban methodology style of task management has been proven to work in different industries. This methodology is commonly used in software development environments and it can also be excellent in areas such as marketing, finance and healthcare too. It was first used in the automobile industry by the Toyota organization.
3. The Kanban board can be customized
4. Collaboration among team members is a huge challenge that all businesses need to face up across organizations in this modern world. Right set of tools can help your organization to do this, and Kanban methodology style of working is one of the greatest examples of something of this type, where everyone can see where their own tasks fit into the overall workflow of the project and who is waiting on output to carry out their own jobs. Impact of any member in the team falling behind can be easily seen.

Disadvantages

SCRUM

1. In this methodology documentation has become very minimal.
2. Dedication of all the team members in all SCRUM teams is extremely important.
3. SCRUM methodology's most essential need is teamwork.
4. If SCRUM team members do not cooperate well with each other, then each and every sprint in software development projects will face failures.

Agile

1. It is less predictable.
2. It needs more time for communication, collaboration and commitment.
3. It lacks necessary documentation for the project and this may lead to misunderstandings and difficulties down the road of development.
4. In this methodology, who isn't on board of the organization project then it can put a negative impact on the quality of the project.
5. Agile Methodology has a less-structured nature this means the projects can easily fall off track of the original scope of the project.

Kanban

1. Kanban methodology can be less useful in a dynamic setting.
2. In this methodology the board of Kanban does not indicate the time frames involved in completing the team tasks. Simply moves across the board from first column to second and then to the next, with no deadlines when the product or modules of the product need to be completed by the team.

Comparative Study

Parameter	AGILE	SCRUM
Definition	It is a project mindset that takes an iterative approach towards the accomplishments of a task or a project. Agile is an umbrella term	Scrum is one of the most popular Agile Frameworks used by project managers in the IT industry. Scrum is a framework that helps how one manages the task of a project end to end
Principles	Requirement changes are welcomed, delivering working modules of software frequently, always promoting sustainable development and Customer satisfaction,	Self-organization, as the Scrum processes relies on different individuals, Collaboration, Value-based prioritization, Time-boxing, iterative development
Methodology	This methodology is an iterative approach to software development	In this incremental builds are delivered to the end users every two to four weeks.
Prioritizes	Focuses on the requirements of a project	Focuses on Value-based
Collaborations	Collaboration between all the members of various cross-functional teams	Sprint planning, Daily sprint meetings and retrospectives
Alternatives	Waterfall	Kanban, Extreme programming and Crystal
Client satisfaction	Agile methodology motive is always to satisfy consumers by delivering valuable software products on a consistent basis	Scrum methodology works on the delivery of working modules of software product by end of the sprint by Definition of Done(DoD)

Table 25: Agile VS SCRUM

Parameter	KANBAN	SCRUM
Pillars	Effective, efficient, predictable	Transparency, adaptation, inspection
Roles	No roles defined	Scrum master, product owner, and development team
Delivery cycle	Continuous product delivery	Sprint cycle lasts one to four weeks
Tools	Jira Software, Trello, Asana, Kanbanize, SwiftKanban	Jira Software, Axosoft, VivifyScrum,
Artifacts	Kanban board	Product backlog, sprint backlog, product increments
Change policy	It can be incorporated any time	Not planned during sprint meeting

Table 26: SCRUM VS Kanban

Parameter	AGILE	KANBAN
Focus	This methodology processes focus consistent communication	Kanban forces smaller sprint lengths to divide items to fit within sprint boundaries
Dependency	Board of Story	Board of Kanban
Iterative Development	This methodology processes allow iterative development	This methodology processes does not allow iterative development
Visual checking	This methodology doesn't support for visually inspection for work in progress	This methodology visually checks all works in progress
Planning	Planning the sprint can consume the team's time for a day	To get started it needs very less organization set-up changes
Goal	Continuous integration, development, and testing are the goals of the Agile methodology approach.	The goal of the Kanban methodology approach is to enhance the overall team process.
QA	It has nothing to do at the early stages of a product hence it is overworked at the end stages of the product.	It is involved in every stage of product development to test the product under development on a regular basis.

Table 27: Agile VS KANBAN

Conclusion

The study has stated the different benefits of the SCRUM, Agile and Kanban methodology in the IT industry and the benefits for the employees of the IT organization and the benefits over the other traditional methodologies or models. The study has also proved through the survey of 200 respondents that SCRUM and Agile methodology is very beneficial for customer satisfaction and retention and reduces the project budget and time and delivers only working valuables or full functionality products in IT markets and other markets of the world. KANBAN visualizes the entire workflow of the product which is extremely easy to learn and understand and it has a smaller cycle time that delivers product features very fast. In The IT industry it is experienced that KANBAN and SCRUM methodology needs very less set-up changes of an organization and time to get started for any software development. Further studies or research can be carried on SCRUM, Agile and Kanban methodologies and other different methodologies available in the IT industry to boost the functionality and quality factors of products and its development in the IT industry.

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