

أثر أتمتة منهجية سكرم على سرعة الفريق في (تطوير البرمجيات)

The Impact of Scrum Methodology on Team Velocity in Software Development

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First Part: Introduction

List of Contents

First Part: Introduction	2
List of Table	4
List of Figure	4
Abstract	5
Introduction	6
Secon Part: Theoretical Framework of the Study	7
Chapter 1: Study Problem and its Importance	7
Study Problem	7
Statement of the Research Problem	7
To address this research problem, you may consider the following sub-questions or focus areas:	8
The Importance of the Study	8
Objectives of the Study	9
Main Objective	10
Specific Objectives	10
Study Questions.....	11
Main Research Question.....	11
Sub Questions	11
Previous Studies and Theoretical Framework.....	12
Introduction	12
Literature Review	12
Research Methodology	12
Data Collection	13
Data Analysis.....	13
Discussion.....	13
Conclusion	14
References	14
Appendices	14

Theoretical Premises of the Study.....	14
Methodology and Research Methods.....	15
The Curriculum and Research Methods Can be Utilized Together in Several Ways	15
Study Tools	16
Ensuring the Validity and Reliability of Data Collection Instruments.....	16
Tools Employed for Data Analysis	17
Study Limitation.....	17
Chapter 2: First Variable of the Study	18
Chapter 3: Second Variable of the Study	18
Third Part: Practical Study and Methodological Procedures	18
Chapter 4: Methodological Procedures	18
Sample Size and Sampling Method.....	19
Data Collection Method.....	19
Chapter 5: Field Results	20
Survey Validation by 2 experts	20
Reliability of the Questionnaire.....	21
Demographic Simple of the Study in Detail.....	21
Chapter 6: Result and Proposal Analysis	23
Conclusion	26
Recommendations	26
Forth Part: Appendixes	27
List of References and Preliminary Sources	27
Appendixes	29
Questionnaire in Arabic	29
Questionnaire in English	31
Abstract in Arabic	33

List of Table

Table 1: Reviewers' Comments on the Questionnaire	20
Table 2: Scale Statistics of Aggregate Questions.....	21
Table 3: Survey Reliability Statistics.....	21
Table 4: The Correlation Between Using Automated Scrum and Improving Performance Speed.....	23
Table 5: One-way ANOVA Hypothesis Test.....	24
Table 6: Descriptive Statistics of Independent and Dependent Variables.....	24
Table 7: Frequency of Using Automated Scrum to Manage Many Projects.....	25
Table 8: Frequency of Improving Performance Speed	25

List of Figure

Figure 1: Research Model.....	14
Figure 2 : Percentage of Employee Headcount.....	21
Figure 3: Percentage of Number of Branches.....	22
Figure 4: Percentage of Company Establishment.....	23

Abstract

This project explores the impact of Scrum methodology on team velocity in software development. Through a comprehensive analysis of various software development teams, their adoption of Scrum, and the resulting changes in velocity, we aim to uncover insights into the effectiveness of Scrum in enhancing team productivity. The study utilizes quantitative and qualitative data to provide a nuanced understanding of the relationship between Scrum implementation and team velocity, contributing valuable insights to the field of agile project management.

This project delves into a comprehensive examination of the influence exerted by the Scrum methodology on team velocity within the realm of software development. Through an in-depth analysis encompassing diverse software development teams, their adoption of Scrum practices, and the resultant alterations in velocity metrics, the study endeavors to unearth nuanced insights into the efficacy of Scrum in augmenting team productivity. Employing a judicious blend of quantitative and qualitative data, the research seeks to provide a multifaceted understanding of the intricate relationship between the implementation of Scrum principles and the velocity dynamics of software development teams. By shedding light on the intricacies of this association, the project aspires to contribute substantively to the evolving landscape of agile project management methodologies.

Introduction

The Scrum framework was first introduced in 1995 and it has developed over the years but the problem of wasted time in routine tasks wasn't solved. In recent years, there has been a growing interest in automating the Scrum workflow. This is due to a few factors, including the increasing availability of automation tools and technologies, and the need for teams to deliver value to customers more quickly. The issue of team velocity has been well-studied. However, there is limited research on the impact of automated Scrum on team velocity. The findings of this study will contribute to the existing knowledge base by providing insights into how automated Scrum can be used to improve team velocity. Automated Scrum is an approach that leverages automation tools and technologies to streamline and optimize the Scrum workflow. Scrum Teams should look for opportunities to save time and reduce costs by automating time-consuming processes. By understanding how automated Scrum can improve team velocity, teams can adopt this approach to deliver value to their customers more quickly and efficiently. This is especially true these days because of the emergence of artificial intelligence and other advanced technologies. The study will draw connections to prior research about enhancing the performance of Scrum teams, particularly research on team velocity and automated Scrum. The study will leverage the insights from prior research as well as [important research points*] to develop a better understanding of how automated Scrum can impact team velocity.

Secon Part: Theoretical Framework of the Study

Chapter 1: Study Problem and its Importance

Study Problem

The research problem “The impact of Scrum methodology on team speed in software development” is a relevant and important topic in the field of software development and project management. However, to formulate a comprehensive statement of the research problem, you may wish to provide additional detail and context to clarify the specific issues or questions you aim to address. Below is a revised version of the research problem:

Statement of the Research Problem

"The impact of the Scrum methodology on the team's speed in software development".

In today's fast-paced software development industry, Scrum methodology has gained popularity due to its flexibility and adaptability. However, it remains necessary to explore and understand the precise effects of Scrum on team velocity, a key performance metric in agile software development. This research aims to study how the Scrum framework affects team agility, considering various factors such as team dynamics, project complexity, and external dependencies.

To address this research problem, you may consider the following sub-questions or focus areas:

1. How does adopting the Scrum methodology affect team speed in software development projects?
2. What are the primary drivers or bottlenecks for team agility when using Scrum?
3. How do team dynamics, such as team size, experience, and collaboration, affect team agility in a Scrum environment?
4. What role does project complexity play in team speed when using Scrum?
5. Are there specific challenges and opportunities associated with Scrum that impact team agility?

By delving into these sub-questions and conducting a comprehensive study, valuable insights into how Scrum methodology impacts team agility can be provided, which can guide organizations in making informed decisions about their software development processes.

The Importance of the Study

The importance of Significant the impact of automating the Scrum methodology on the team's speed in software development lies in several points, including: Increasing the speed of software development: One of the most important goals of automating the Scrum methodology is to increase the speed of software development, by eliminating manual tasks that take a lot of time and effort, such as creating and managing the

development and testing environment, deploying code in production, and collecting and analyzing data.

Improving software quality: Automating the Scrum methodology can help improve software quality, by conducting testing continuously and automatically, which helps detect errors and fix them early.

Increase team efficiency: Automating the Scrum methodology can help increase team efficiency by freeing developers from manual tasks that can be automated, giving them more time to focus on more creative and valuable tasks.

Save money: Automating the Scrum methodology can help save money, by reducing the time and effort required for software development and improving software quality.

By examining the impact of automating the Scrum methodology on the team's speed in software development, it is possible to identify the factors that affect this effect and determine the best practices for automating the Scrum methodology to make the most of it.

Objectives of the Study

Research objectives help provide a clear direction and purpose for your study. Here are some research objectives related to "The Impact of Scrum Methodology on Team Velocity in Software Development":

Main Objective

To assess and understand the impact of Scrum methodology on team velocity in software development projects.

Specific Objectives

1. To examine how the adoption of Scrum methodology influences team velocity over a defined period.
2. To identify the key factors within Scrum that positively or negatively affect team velocity.
3. To investigate how variations in team dynamics, including team size, experience, and collaboration, relate to changes in team velocity when using Scrum.
4. To analyze the correlation between project complexity and team velocity when implementing Scrum.
5. To explore the challenges and opportunities presented by the Scrum framework and their impact on team velocity.
6. To provide recommendations and best practices for optimizing team velocity within the context of Scrum-based software development.
7. To offer insights for organizations seeking to improve their software development processes and enhance productivity through Scrum.
8. To contribute to the body of knowledge in agile software development and project management by providing empirical evidence and valuable insights regarding the relationship between Scrum methodology and team velocity.

The research objectives will guide this study and help ensure that critical aspects of the impact of Scrum methodology on team agility in software development are addressed. It also paves the way for collecting relevant data and drawing useful conclusions to contribute to the field of software development and project management.

Study Questions

When employed properly, research questions give the thesis authority, realism, and dependability. Consequently, we had to develop a set of questions that both clarify the research approach and focus on the areas that this study would investigate, namely the relationship between the automated scrum technique and the team velocity from several angles.

Main Research Question

What is the impact of automated scrum methodology on team velocity?

Sub Questions

1. How does automated reprioritizing of tasks influence team velocity?
2. What is the relationship between automated transparency and team velocity?
3. How does automated commitment affect team velocity?
4. What role do automated tasks play in enhancing team velocity?
5. How does automated transparency impact team velocity?

Previous Studies and Theoretical Framework

To conduct a comprehensive study on “The Impact of Scrum Methodology on Team Agility in Software Development” we will need a well-organized research framework. The proposed research structure that can be followed:

Introduction

- Background and context
- Research problem statement
- Research objectives
- Significance and relevance of the study
- Scope and limitations

Literature Review

- Introduction to Scrum methodology in software development.
- Team velocity as a key performance metric.
- Theoretical foundations and prior research on team velocity.
- Factors influencing team velocity.
- Previous studies on the impact of Scrum on team velocity.
- Theoretical framework.

Research Methodology

- Research design (quantitative, qualitative, mixed methods).

- Data collection methods (surveys, interviews, observations).
- Selection of participants (software development teams).
- Data analysis techniques.
- Ethical considerations.

Data Collection

- Data collection process.
- Description of the study participants.
- Data collection instruments (questionnaires, interviews, etc.).

Data Analysis

- Quantitative analysis of data (if applicable).
- Qualitative analysis of data (if applicable).
- Interpretation of results.
- Comparison of findings with existing literature.

Discussion

- Summary of research findings.
- Implications of the findings for Scrum practitioners.
- Comparison of findings with existing research.
- Practical implications and recommendations.

Conclusion

- Recap of the research problem and objectives.
- Key findings and contributions to the field.
- Limitations of the study.
- Directions for future research.

References

- List of all cited sources in the study.

Appendices

- Any supplementary materials (questionnaires, interview transcripts, charts, etc.).

This structure provides a clear outline for the research study, from introducing the topic to presenting the results and conclusions.

Theoretical Premises of the Study

There is a significant positive relationship between scrum methodology and team velocity in software development in KSA (HA).

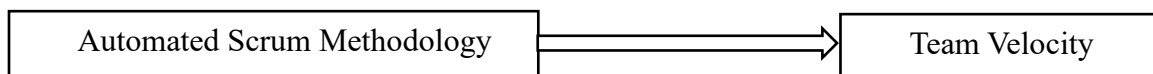


Figure 1: Research Model

Methodology and Research Methods

The research methodology applied in the study is a mixed method approach that combines quantitative and qualitative data collection and analysis techniques. This approach is well-suited for investigating the impact of Scrum methodology on team velocity because it allows for a comprehensive understanding of the phenomenon from both objective and subjective perspectives.

The curriculum for software development often includes coursework in Agile methodologies, such as Scrum. This research provides students with valuable information to apply Scrum in their projects. The study of Scrum's impact on team velocity is directly relevant to this curriculum, as it provides empirical evidence of the benefits of Scrum and helps students understand how to optimize their teams' performance.

The Curriculum and Research Methods Can be Utilized Together in Several Ways

- Curriculum-Informed Research: Use the curriculum as a framework for developing research questions and hypotheses.
- Research-Informed Curriculum: Use the findings of research to update and enhance the curriculum.
- Curriculum-Based Data Collection: Use classroom projects and assignments as opportunities to collect data on Scrum implementation and team velocity.

By combining these approaches, educators and researchers can create a synergistic learning environment that fosters both theoretical understanding and practical application of Scrum.

Study Tools

The following instruments can be used to collect data on the impact of Scrum methodology on team velocity in software development research:

- **Surveys:** Surveys can be used to collect data on team members' perceptions of Scrum, their satisfaction with the process, and their estimates of team velocity.
- **Interviews:** Interviews can be used to collect more detailed data on team members' experiences with Scrum, the challenges they face, and the factors that contribute to their team's velocity.
- **Observation:** Observation can be used to collect data on team members' behavior and interactions during Scrum ceremonies, such as sprint planning meetings, daily stand-ups, and sprint reviews.
- **Metrics:** Metrics such as sprint completion rates, on-time delivery, and bug counts can be used to track team velocity over time.

Ensuring the Validity and Reliability of Data Collection Instruments

- **Pilot test the instruments:** Pilot testing the instruments with a small group of participants can help to identify any problems and make necessary revisions.
- **Use multiple data sources:** Using multiple data sources, such as surveys, interviews, observation, and metrics, can help to triangulate the findings and increase confidence in the results.
- **Use a structured data collection process:** Having a structured data collection process can help to ensure that the data is collected consistently and accurately.

Tools Employed for Data Analysis

The following tools can be employed for data analysis in Scrum research:

- Quantitative data analysis software: Quantitative data analysis software such as SPSS or R can be used to analyze data from surveys and metrics.
- Qualitative data analysis software: Qualitative data analysis software such as NVivo or Atlas.ti can be used to analyze data from interviews and observation.

Study Limitation

In this research, the scope of the study focuses on Scrum methodology which is a type of agile method that allows the project manager or scrum master to handle the project team and accelerate the team's speed.

As is well known among the scientists no research is perfect thus this study's primary limitation is that the same methodology isn't applied frequently in the study's scope which refers to Saudia Arabia in software development.

Furthermore, In the case of the online thesis, there is a scientific gap in the relationship between the automated scrum in-depth use of the method and team velocity. In addition, a lot of researchers discuss Agile as a one package not separately as a Scum methodology as in ours.

Chapter 2: First Variable of the Study

The First Variable of the research is automated Scrum Methodology that represents the independent variable of the study. Nowadays, technology is rising and manage a lot of effort which indicate to accelerating of work and the time be more efficient.

Furthermore, by automation we mean that all methodology of Scrum be managed by computer which facilitates sharing information and that helps enhance teamwork in effective manner.

Chapter 3: Second Variable of the Study

The Second Variable of the research is teamwork velocity that represents the dependent variable of the study. Speeding procedures of work helps companies to produce more and thus the surplus and cashflow be better in many ways.

For the record, being more faster improves the status of the project and improve the competitive advantages of the companies.

Third Part: Practical Study and Methodological Procedures

Chapter 4: Methodological Procedures

The research methodologies took an approach of examining the use of automated scrum in software development and the impact on the performance of teamwork.

Once the grounds of the logic behind the use of automated Scrum were formed and why the need for it was created, we took a similar approach for the paper and the survey

understanding to break down an automated Scrum and establish a relationship with teamwork performance speed.

The Survey methodology reflected for companies in the software development field reflecting upon the reliability and applicability of the project and how it may relate to the actual practice of the method.

The general questions were based on levels of experience, how many employees, and when the establishment of the institution. The questions were phrased to question the transparency, speediness, efficiency of the teamwork where automated Scrum methodology was applied and what satisfaction of stakeholder be, and the impact faced those companies in terms of applying the methods and attached tools to it.

Sample Size and Sampling Method

In distributing the sample, we followed the distribution electronically by publishing 92 electronic copies, as the number of the study population reached 97 companies, and 80 of them responded.

80 companies and institutions specialized in software development participated in the study out of 97, from labor categories varying in number and organization establishment, in addition to the number of branches.

Data Collection Method

The questions were based on surveying companies' opinions on dealing with software development using automated Scrum and the extent of its impact on the work

team from multiple aspects, including performance efficiency and the extent of transparency among the work team. Emphasis was also placed on stakeholder satisfaction as well as the ease of availability of external resources, and the question was raised regarding lessons learned that could be facilitated by automating it. All of this aims to measure the extent of the impact on the speed of completion by the work team.

Chapter 5: Field Results

The questionnaire was conducted on a group of companies and institutions in the private sector to identify the impact of automating Scrum methodologies on the speed of the work team in software development in the city of Riyadh.

Survey Validation by 2 experts

The questionnaire was distributed to the sample after it was judged by arbitrators with academic and practical experience in the field of Agile. All questions were approved, and the recommendation was to add two questions as follow:

Question No.	The Question	Operation
18	Promote remote work with high efficiency	Adding
19	Provide the ability to benefit from the skills of freelancers	Adding

Table 1: Reviewers' Comments on the Questionnaire

Reliability of the Questionnaire

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
74.7875	259.511	16.10935	19

Table 2: Scale Statistics of Aggregate Questions

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.975	.966	19

Table 3: Survey Reliability Statistics

The results have yielded .975 on the Cronbach alpha because of the survey as shown in Table 3 giving a clear consisting valid scale of the questions and the variation providing satisfactory results authenticating the survey.

Demographic Simple of the Study in Detail

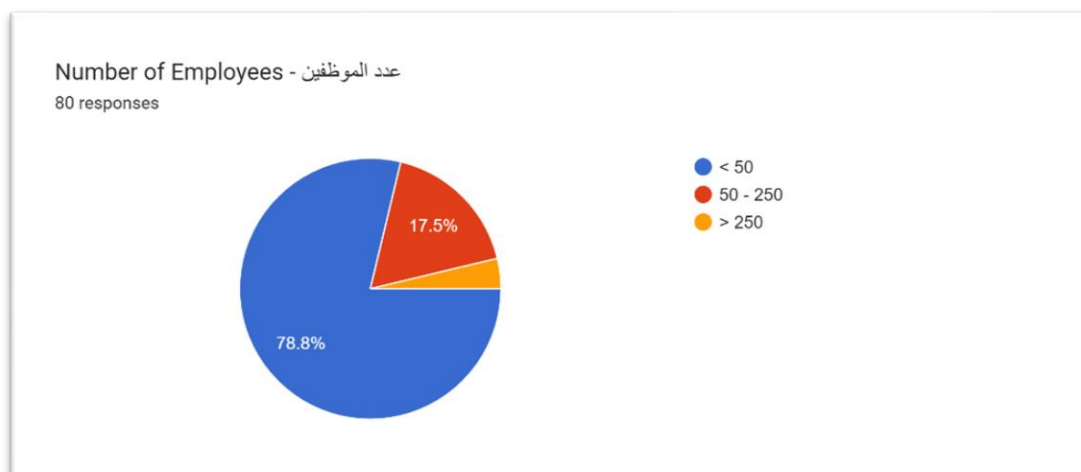


Figure 2 : Percentage of Employee Headcount

As shown in the image above, the majority of the sample in the city of Riyadh is less than 50 employees, at a rate of 78.8%, followed by a percentage of 17.5% belonging to the numerical category of 50 to 250 employees, and the last at a rate of 3.7%, which is the lowest percentage of the numerical category greater than 250 employees.

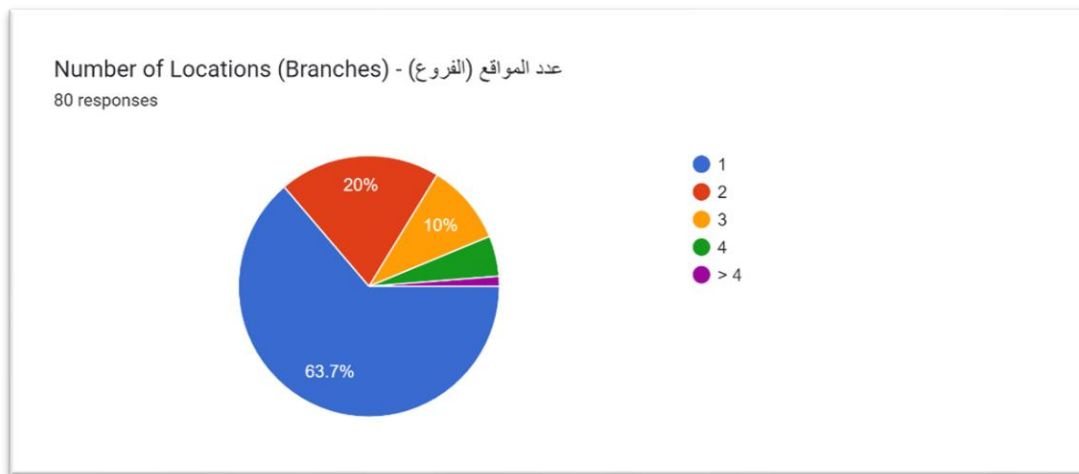


Figure 3: Percentage of Number of Branches

As shown in the image above, the majority of the sample in the city of Riyadh is one branch only, at a rate of 63.7%, followed by a percentage of 20 % belonging to the two branches, then 10% of them was 3 branches, followed by 4 branches get a percentage of 5%, and the last at a rate of 1.2% which is the lowest percentage of the numerical category greater than 4 branches.

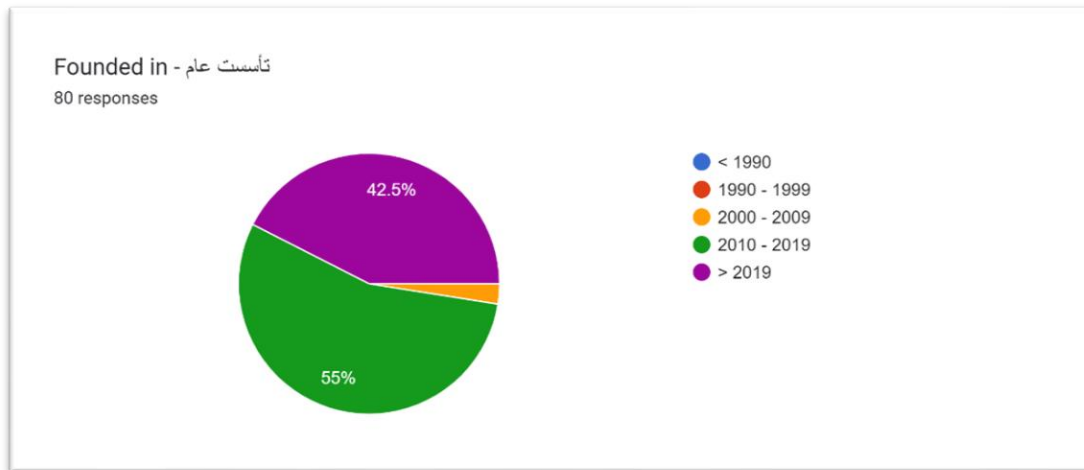


Figure 4: Percentage of Company Establishment

As shown in the image above, the close percentages were limited to the time categories between 2010 to 2019, which is the highest at 55%, followed by the time category greater than 2019, and finally, the lowest percentage is 2.5% for the category from 2000 to 2009.

Chapter 6: Result and Proposal Analysis

Correlations			
		Using automated Scrum to manage many projects	Improving performance Speed
Using automated Scrum to manage many projects	Pearson Correlation	1	.848**
	Sig. (2-tailed)		<.001
	N	80	80
Improving performance Speed	Pearson Correlation	.848**	1
	Sig. (2-tailed)	<.001	
	N	80	80

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4: The Correlation Between Using Automated Scrum and Improving Performance Speed

As shown in Table 4, the Pearson Correlation was 0.848 which was referred to the strong direct correlation between using automated scrum to manage many projects and improving performance speed.

ANOVA					
Improving performance Speed					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	70.144	4	17.536	60.315	<.001
Within Groups	21.806	75	.291		
Total	91.950	79			

Table 5: One-way ANOVA Hypothesis Test

It is clear from the results shown in Table 5 there is statistically significant at the significant level of 0.05 between using automated Scrum to manage many projects and improving performance speed when α less than 0.001 indicates that the probability of obtaining the observed result by chance is less than 0.1%, therefore the hypothesis is accepted.

Statistics			
		Using automated Scrum to manage many projects	Improving performance Speed
N	Valid	80	80
	Missing	0	0
Mean		4.2625	4.2750
Median		5.0000	5.0000
Mode		5.00	5.00
Std. Deviation		1.04025	1.07885
Range		4.00	4.00

Table 6: Descriptive Statistics of Independent and Dependent Variables

Using automated Scrum to manage many projects					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	5.0	5.0	5.0
	Disagree	3	3.8	3.8	8.8
	Neutral	2	2.5	2.5	11.3
	Agree	30	37.5	37.5	48.8
	Strongly agree	41	51.2	51.2	100.0
	Total	80	100.0	100.0	

Table 7: Frequency of Using Automated Scrum to Manage Many Projects

Improving performance Speed					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	4	5.0	5.0	5.0
	Disagree	3	3.8	3.8	8.8
	Neutral	5	6.3	6.3	15.0
	Agree	23	28.7	28.7	43.8
	Strongly agree	45	56.3	56.3	100.0
	Total	80	100.0	100.0	

Table 8: Frequency of Improving Performance Speed

Tables 6, 7, and 8 show the results of most respondents were strongly agree and agree options in both Independent and dependent variables which indicate that a positive direct relationship between using automated scrum and improving performance speed. Thus, the more automated Scrum in software development projects the more performance speed is improved.

Conclusion

The study showed that there is a strong positive relationship between the use of Scrum automation methodologies and the speed of team production by improving performance, enhancing self-confidence, transparency among the work team, stakeholder satisfaction, and flexibility in using human resources in software applications in the city of Riyadh.

Thus, the answer to the research question is yes. There is a positive relationship between the use of automation of Scrum methodologies and the speed of team production, meaning that the more proficient the company is in using automation of Scrum methodologies, the more this leads to accelerating the software production process through the work team.

Recommendations

Researchers revealed that there are gaps in research on the Scrum automation method and its impact on multiple aspects in different fields. Accordingly, the most prominent recommendations are as follows:

- Research among the work team and the extent of the impact of using the automation of the Scrum methodology on professional development.
- Research among the work team on the extent of positive motivation.
- Researching the relationship between the project manager and the work team.
- Research between stakeholders and project manager.
- Researching the extent to which the work team responds to continuous changes.

Forth Part: Appendixes

List of References and Preliminary Sources

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Appendixes

Questionnaire in Arabic

مقدمة وتعريف عن الاستبانة

هذه الاستبانة قدمها مجموعة من الباحثين وهم (عبدالله آل النور، فايزة العدلوني، وحمدان العنزي) كبحث في مرحلة الماجستير بجامعة ميدأوشن عن تأثير أتمتة سكرم على سرعة فريق العمل في تطوير البرمجيات.

سكرم هي طريقة من طرق الأجايل التي تساعد القائد وفريق العمل على تأدية المشروع على أن يتم بشكل مرن ورشيق ومن أشهر الأمثلة على البرامج التي توتمت عملياته برنامج جيرا.

هذه الاستبانة تستخدم مقياس ليكرت الخماسي بمعنى تكون الإجابة اختيارية على النحو التالي: موافق بشدة، موافق، محايد، غير موافق، وغير موافق بشدة.

تم تحديد خصائص مجتمع الدراسة كما يلي: القطاع الخاص، المكان الرياض، النشاط تطوير البرمجيات.

أنواع الأسئلة

أسئلة ديمغرافية

بمعنى أسئلة معلومات شخصية المبحوث وهي كما يلي:

1. عدد الموظفين
2. عدد الفروع
3. تأسست عام

أسئلة خصائص العينة

تدرس الاستبانة أثر استخدام أتمتة منهجية سكرم مثل برنامج جيرا على سرعة الفريق في تطوير البرمجيات

1. سبق لنا التعامل باحترافية مع مثل هذه البرامج.
2. عملنا على مشاريع متعددة في مجال البرمجيات باستخدام مثل هذه البرامج.
3. ساعدنا على تنظيم الوقت والتركيز على مهامنا.
4. ساهم في زيادة التواصل بين مدير المشروع وفريق العمل.
5. حسن أدائنا في زيادة سرعة التنفيذ.
6. أضاف الشفافية بين فريق العمل.
7. تحسين كفاءة استخدام الموارد.
8. ساعدنا على أعداد الدروس المستفادة لأعمالنا السابقة.
9. عزز من قدرتنا على إدارة الأعمال والمهام بكفاءة عالية.
10. قلل من إهدار وقتنا في إنجاز المهام.
11. ساعد في العثور على الانحرافات بشكل مبكر.
12. زاد من فرصتنا في إثبات مهاراتنا في سوق العمل.
13. ساعد في استخراج التقارير الدقيقة والصحيحة.
14. زاد رضى أصحاب المصلحة.
15. عزز العمل عن بعد بكفاءة عالية.
16. وفر القدرة على الاستفادة من مهارات ممارسي العمل الحر.

Questionnaire in English

Introduction and Definition of the Questionnaire

This questionnaire is presented by a group of researchers (Abdullah Alannoor, Fayza Aladlani, and Hamdan Alanazi) as a master's degree at Midocean University about the impact of Scrum automation on the speed of the work team in software development.

Scrum is an agile method that helps the leader and the work team carry out the project in a flexible and agile manner. One of the most famous examples of programs that automate its processes is Jira application.

This questionnaire uses a five-point Likert scale, meaning the answer is optional, as follows: Strongly agree, Agree, Neutral, Disagree Strongly, and Disagree.

The characteristics of the study population were determined as follows: private sector, Riyadh city, software development activity.

Question Types

Demographic Questions

Meaning questions about the respondent's personal information, are as follows:

1. Number of Employees
2. Number of Locations
3. Founded in

Questions About Sample Properties

The questionnaire examines the impact of using an automated Scrum methodology such as Jira on the team's velocity in software development.

1. We have previously dealt professionally with such programs.
2. Innovating multiple projects in areas such as these programs.
3. Help us organize the time required for the required tasks.
4. Increase communication between the project manager and the teamwork.
5. My performance improved by increasing my speed.
6. Provide transparency among teamwork.
7. Has Improved the efficiency of resource utilization.
8. Help us record the expressions in our previous works (learned lessons).
9. Enhancing our confidence in the ability to manage work and tasks with high efficiency.
10. Reduce wasting time completing tasks.
11. Help find project deviations early.
12. We have increased our chances of proving our skills in the marketplace.
13. Help in extracting accurate and correct reports.
14. Increased stakeholder satisfaction.
15. Promote remote work with high efficiency.
16. Provide the ability to benefit from the skills of freelancers.

Abstract in Arabic

المستخلص

هذا المشروع يستكشف تأثير منهجية Scrum على سرعة الفريق في تطوير البرمجيات. من خلال تحليل شامل لمختلف فرق تطوير البرمجيات، وتبنيها لمنهجية Scrum ، والتغيرات الناتجة عنها في السرعة، نهدف إلى كشف النقاب عن رؤى حول فعالية Scrum في تعزيز إنتاجية الفريق. يستخدم الدراسة بيانات كمية ونوعية لتوفير فهم متنوع للعلاقة بين تنفيذ Scrum وسرعة الفريق، مساهمة بذلك برؤى قيمة في مجال إدارة المشاريع السريعة

يستكشف هذا المشروع دراستاً شاملة لتأثير منهجية Scrum على سرعة الفريق في ميدان تطوير البرمجيات. من خلال تحليل شامل يشمل فرق تطوير البرمجيات المتنوعة، واعتمادها لممارسات Scrum ، والتغيرات الناتجة في مقاييس السرعة، يسعى البحث لاكتشاف رؤى معقدة حول فعالية Scrum في زيادة إنتاجية الفريق. باستخدام مزيج حكيم من البيانات الكمية والكيفية، يهدف البحث إلى توفير فهم متعدد الجوانب للعلاقة المعقدة بين تنفيذ مبادئ Scrum وديناميات سرعة فرق تطوير البرمجيات. من خلال إلقاء الضوء على تفاصيل هذا الترابط، يطمح المشروع إلى المساهمة بشكل كبير في المشهد المتطور لطرق إدارة المشاريع السريعة.