AGILE PROJECT MANAGEMENT, TEAMWORK, AND USER SATISFACTION: A STUDY OF IT SECTOR IN BOSNIA AND HERZEGOVINA

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Abstract

The aim of this empirical study was to investigate the relationship between project management, teamwork, and SCRUMBAN user satisfaction in Bosnia and Herzegovina's IT sector. For this, a conceptual model and hypotheses were developed based on the literature review. This study used a literature-based survey as the measurement instrument. The target population was comprised of software developers, project managers, QA testers, and UI/UX designers. In total, 217 surveys were completed by respondents. Based on the regression results, it found that project management and teamwork have a strong and positive impact on SCRUMBAN user satisfaction in Bosnia and Herzegovina's IT sector.

Keywords: Project Management, Teamwork, Agile Methodologies, SCRUM, KANBAN, SCRUMBAN, Bosnia and Herzegovina

INTRODUCTION

Information systems and technology are becoming virtually as widely used and accessible as labor, approaching the point where they resemble commodities. Databases and various software platforms are included in information systems (Dewett, 2001).

Agile project management, which is based on Agile software development practices, considers project failure to be the most costly element of software development. Software that never ships, missed deadlines, unrealized marketable features, and quality failures are a few examples (Augustine, S. et al., 2005). According to Augustine (2005), change must be controlled rather than avoided because it occurs for a reason. Planning, designing, and documentation that go beyond the bare minimum are considered waste in agile project management (Anderson et al., 2003). As per Anderson (2003), such a process concentrates on offering functional features to a paying customer. In his research, Anderson (2003) also stated that it builds supporting subsystems and refactors the code base as necessary to support the functional features (Anderson et al., 2003).

Small companies have to be fast and flexible in the highly competitive IT industry (Martin, Robert C. 2003). Adaptation to clients, and their needs is imperative here, and it is no longer sufficient to merely type in a detail at the outset (Neil Perkin, and Peter Abraham. 2017). Agile software development offers a way to organize the complex process of program development for multi-participant while allowing for steady project changes (Rigby, D., Sutherland, J., & Takeuchi, H., 2016, May 1). Within the specialist community, dexterous computer program improvement is well acknowledged, but there is a lack of understanding of how such ventures accomplish effective coordination. This is recognized as basic in worthwhile software projects (Boehm B., 2002).

Agile development of software had a critical impact on how program improvement is carried out (Boehm B. and Hansen W., 2001). A variety of advancements in how software designers plan and facilitate their work, how they communicate with clients and outside partners, and how software development is organized in little, medium-sized, and huge businesses from the broadcast communications and healthcare businesses to gaming and intelligently media have gotten to be the umbrella term (Martin, Robert C. 2003).

Software development teams frequently use a systems development methodology (SDM), which is defined as a documented collection of policies, processes, and procedures, to enhance the software development process in terms of higher productivity for information technology (IT) personnel and higher quality of the fully completed IT solutions (Chan F.K.Y, and Thong J.Y.L 2008).

SDMs are continually changing to meet new user requests, and adapt to advancing technologies. Agile techniques, a new generation of SDMs, are allegedly better adapted for managing the dynamic corporate environment (Chan F.K.Y, and Thong J.Y.L 2008).

Agile approaches, on the other hand, answer the problem of an uncertain environment by understanding the importance that knowledgeable individuals and their relationships bring to software creation (Nerur S, Sridhar, and Balijepally, VenuGopal., 2007).

Agile and waterfall are the two principal methodologies of improvement (Williams, Laurie, and Cockburn, Alistair, 2003). They are commonly connected to the development of software, and thus indeed to project management (Sommerville, 2011; Martin, Robert C., 2003). The key contrast between agile and waterfall is that whereas agile projects are completed iteratively in a circle, waterfall projects are completed consecutively (Boehm, 2002). Agile, and waterfall methodologies both bear their collection of benefits and disadvantages. Generally, both can be the support of a development group for apps. Which one to select is extremely dependent on the kind and circumstances of the project (Martin, Robert C. 2003).

There are two fundamental components of the agile methodology: coordination and time (Williams, Laurie, and Cockburn, Alistair, 2003). Agile breaks the project into individual deliverable pieces rather than setting up a timetable for one enormous software development extension. Such 'time-boxed' stages are called 'sprints' and last for a few weeks. The input from the past handle is utilized to plan the following one until a sprint is completed (Martin, Robert C. 2003).

The most popular and most frequently used agile methodologies are

➔ Scrum

➔ Lean Software Development

➔ Kanban

➔ Extreme Programming (XP)

➔ Crystal

➔ Dynamic Systems Development Method (DSDM)

Considering the fact that in Bosnia and Herzegovina most IT companies apply SCRUMBAN which is a hybrid of SCRUM and KANBAN, in this study, we will focus on this specific agile method.

Objectives of this study are: (1) To investigate the effects of project management and teamwork on the benefits of SCRUMBAN in IT companies in BiH; (2) To measure teamwork of IT companies in BiH; (3) To evaluate project management activities in IT companies in BiH; (4) To identify and evaluate benefits of SCRUMBAN in terms of user satisfaction.

LITERATURE REVIEW

Project Management

Each project has its starting and end, so it is possible to call them a temporary effort to form a product, benefit, or result, but the impact of implemented projects can be afterward on a social, financial, and environmental level (Watt, A., 2014). In project management, knowledge, abilities, tools, and techniques are applied to meet project requirements (Walker, A., 2015). Every project is special and there's no way to characterize the perfect project structure since it can alter inside the same organization, let alone in bigger frameworks (Walker, A. 2015).

The project is assigned to a project manager who works alongside the project group to realize the project objectives. (Watt, A., 2014). The project manager as an individual must have information about project management, the ability to make and accomplish performance, and a personality that befits such a role. To reduce the chance of disappointment and increase the probability of a successfully implemented project, appropriate project management techniques, and apparatuses ought to be chosen (Walker, A., 2015). When making this choice, it is fundamental to know the venture exceptionally well, and its partners and keep in mind the changes that may happen. Many project management techniques can be gathered into two expansive bunches, conventional and agile methodologies (Watt, A., 2014).

Digital technologies are developing very rapidly and influence all organizations and are the premise of all patterns within the world of project management (Alter, S.1996) Numerous software-based software development procedures have been created and have a major impact on long-term extended management (Alter, S.1996).

The fast development of digital technologies has driven a new industrial revolution called Industry 4.0. With its viewpoints on the Internet of Things, large amounts of information, automation, and machine learning do not right now have a huge impact on project management, but they'll certainly have in the future (Alter, S.1996).

Teamwork performance

For experts in organizational psychology and organizational behavior, the subject of how technology is affecting work and teamwork performance is extremely important given the quick advancements and growing reliance on it (Montealegre & Cascio, 2016).

The performance in teams depends on individual contributions and the products of collective work (Katzenbach, J. R., & Smith, D. K.1993, March 1). Teams are recognized according to their characteristics. The team can be analyzed from three aspects: its structure, dynamics, and development. and meeting the social and group needs of team members (Highsmith J. and A. Cockburn. 2001).

There are many benefits to introducing teams to organizations. Teams can facilitate business expansion and enable a faster flow of information leading to increased productivity. The abilities of team members are intensively and constantly developing, and he has the opportunity to show and prove them (Highsmith J. and A. Cockburn. 2001). The role of the leader in the team is reduced to a minimum. Most managers see the team as rowers in the top eight. To achieve the goal, everyone must be "as one". No one must row harder or weaker, faster or slower than the others so as not to jeopardize the success of the whole (Katzenbach, J. R., & Smith, D. K.1993, March 1). Teamwork is not created automatically and is not the result of the imposition of a single leader. It is the result of working together, recognizing the importance of teamwork, working as a team, and consciously discovering patterns of working together that members perceive as stimulating and satisfying. Team members need to talk to each other about how to work as a team and monitor their group work. It is called collective self-control, honesty, and maturity, which is not widely found in the culture of teamwork (Katzenbach, J. R., & Smith, D. K., 1993,)

Scrum

The Scrum process programming framework is used for managing complex development projects. This framework is not a method or technique for software development, but rather a framework for various processes and techniques (e.g. extreme programming) (Highsmith J. and Cockburn A., 2001). It consists of Scrum Teams and the rules, events, artifacts, and roles associated with them. Scrum teams and their roles within them. A Scrum Team is composed of a Product Owner, a Development Team, and a Scrum Master (Kniberg, H., & Skarin, M., 2010)

Using Scrum, products are delivered iteratively and incrementally, maximizing feedback. It is the product owner's responsibility to maximize the value of the product and the work of the development team (Kniberg, H., & Skarin, M., 2010). Different organizations, teams, and people achieve this differently. A product owner is solely responsible for managing the Product Backlog. Which includes a clear explanation to the development team of the vision, goals, and items on the product backlog (Reddy, A. 2015). The development team works according to the instructions of the owner therefore the whole organization must respect his decisions. The Product Owner is the owner of the product backlog and is required to effectively manage its items (Kniberg, H., & Skarin, M., 2010). At the end of each Sprint, the development team which consists of professionals who do a specific job delivers a new product increment. Development team members are the only ones who create product increments (Reddy, A. 2015). The Scrum Master is responsible for explaining and implementing scrum. Scrum Masters accomplish this

by ensuring that scrum teams adhere to scrum's theory, practice, and rules (Kniberg, H., & Skarin, M., 2010), (Reddy, A. 2015).

Kanban

A Kanban framework is part of the Agile methodology. In the late 1940s, engineer and businessman Taiichi Ohno developed it for Toyota, the automotive industry in Japan (Kniberg, H., & Skarin, M., 2010). It was created as a simple planning system, whose goal was the optimal supervision and management of work and stocks at each stage of lean production (Ladas, C. 2009). Kanban frameworks are unique among Agile methodologies in that they are compatible with existing organizational structures (Kniberg, H., & Skarin, M., 2010)

Using the Kanban board forms the basis of the Kanban methodology. This tool visualizes the entire project, making it easier to follow its progress (Walker, A., 2015). Using this graphic approach, a new member or external entity can see what is currently happening, which tasks have been completed, and which tasks are still to be completed (Kniberg, H., & Skarin, M., 2010). Kanban systems are simple in design and flexible in nature. By simply defining the process steps in columns and documenting work tasks with tabs, you can begin to experience the benefits of the Kanban methodology (Kniberg, H., Skarin, M., 2010). The basic elements of the Kanban board are as follows:

➔ Columns - which represent defined steps in the process.

➔ Cards - which represent work tasks that move through the process

Kanban board indicates:

➔ current tasks being performed

➔ tasks to be performed in the future

➔ tasks that have been completed

Divided columns are interconnected and tasks are gradually withdrawn from the far left column (future tasks) to the far right column (completed tasks). Kanban measures the work cycle ending with the Work in Progress (WIP) principle. In WIP, there are some limitations and a predefined status (Reddy, A. 2015). An important principle of kanban is limiting WIP in order to maintain consistent standards. The team needs to perform current tasks in the prescribed order (Ladas, C. 2009). At any given time, Kanban requires strict limits on the scope of work in progress. The number of cards in an active column is limited by teams. Until the constraint is met, no new work can be entered until the task has been completed and moved to the next

column. Through this system, teams are able to identify bottlenecks and work together to resolve them (Kniberg, H., Skarin, M., 2010)

The Kanban methodology follows a set of principles and practices for managing and improving business processes as one evolutionary method that promotes gradual improvements in an organization's processes (Kniberg, H., Skarin, M., 2010) If you follow these principles and practices, you will be able to successfully use kanban to maximize the benefits of your business process (Ladas, C. 2009). The four basic principles of the Kanban methodology: (Kniberg, H., Skarin, M., 2010)

➔ Start an existing workflow

➔ Agree to gradual change

➔ Respect current roles, responsibilities, and job titles

➔ Encourage leadership at all levels

Scrumban

Scrumban is a project management framework that incorporates key elements from two famous agile methodologies: Scrum and Kanban. Scrumban combines Scrum's structure and regular procedures with Kanban's flexibility to improve team agility, efficiency, and productivity. Scrumban combines Scrum's ceremonies with Kanban's visualization, WIP limits, pull system, and continuous flow (Reddy, A., 2015; Ladas, C. 2009) . Companies that are transitioning from Scrum to Kanban, or those who have never tried Agile, will find such an amalgamation useful (Kniberg, H., & Skarin, M., 2010)

The term Scrumban was coined by Ladas, C (2009), author of "Scrumban: Essays on Kanban Systems for Lean Software Development".

The Scrumban hybrid enables teams to meet their specific requirements by combining the best of both worlds (Walker, A., 2015). Scrumban is a good way to transition from scrum to kanban, though many teams choose to simply remain in Scrumban (Reddy, A., 2015). As a less restrictive technique than scrum, scrumban is more similar to kanban in that it can be applied to a number of applications (Kniberg, H., & Skarin, M., 2010).

With the increasing popularity of various agile frameworks, a growing number of project management tools now support agile methodology (Kniberg, H., & Skarin, M., 2010). Scrumban is no exception, as teams may now select from a variety of solutions. Such tools make project management easier and faster, as well as provide additional insights into the process and eliminate the need to save project information in many locations (Reddy, A., 2015).

Table 1. Differences between Scrum, Kanban, and Scrumban (Teamhood, 2020)

|	SCRUM	KANBAN	SCRUMBAN
ITERATIONS	1-4 week sprints	Continuous work alongside shorter releases	Continuous work with short planning cycles and longer release cycles
WORK ROUTINES	Push and pull principles, early binding to team member	Pull principle, late binding to team member	Pull principle, late binding to learn members
SCOPE LIMITS	Sprint limits total work amount	Work in progress limits	Work in progress limits
ESTIMATIONS	Must be done before a sprint	Optional	Optional
PERFORMANCE METRICS	Burndown	Cumulative flow diagram, lead and cycle time	Average cycle time
CONTINUOUS IMPROVEMENT	Sprint retrospective	Optional	Short Kaizen event as an option
MEETINGS MEETINGS	Sprint planning, daily scrum, retrospective	Can be avoided	Short Kaizen event
TEAM MEMBERS	Cross-functional team	Cross-functional team members, specialization is allowed	Specialization or preference to tasks
TASK SIZE	Not bigger than a Sprint	Any size	Any size
NEW ITEMS IN ITERATION	Forbidden	Allowed whenever queue allows it	Allowed whenever queue allows it
OWNERSHIP	Owned by a team	Supports multiple teams ownership	Supports multiple teams ownership
BOARD	Defined/reset each sprint	Persistent	Persistent
PRIORITIZATION	Through backlog	Optional	Recommended on each planning
ROLES	Scrum master, product owner, team	Not defined, may vary	Not defined, may vary
RULES	Constrained process	Only a few constraints, flexible process	Start slightly
FIT FOR	Team working on product or project which is longer than a year	Support and maintenance teams, continuous product manufacturing	Startups, fast-pace projects

Benefits of Scrumban

➜   One of the big benefits when it comes to scrumban is that team size does not matter. They do not have to adjust the sprint limits if there is an unplanned change in the composition of the team if during a sprint one of the team members gets sick or something unplanned happens and takes two days off during the sprint (Reddy, A. 2015).

➜   In Scrumban you can visualize the steps in your workflow, which brings with it a multitude of benefits when working. This makes it easier to identify areas for improvement and eliminate not-so-useful steps, which immediately helps you not to waste time on some unnecessary steps (Schwaber, K., Sutherland, J. 2017)

➜   Thanks to the constant improvement of the Scrumban environment, there are no more monotonous retrospectives. For this reason, team members have the opportunity to express their concerns about obstacles (Schwaber K., and Sutherland J. 2017)

➜   One of Scrumban's most important goals is to maintain a continuous workflow. This means that after you push the story into different stages, the rest of the work is done using the withdrawal approach (Reddy, A. 2015)

➜   It is important to note the benefit that Scrumban does not limit work in progress (WIP) over time. Instead, it limits WIP for each phase. It is this that solves problems with team composition and makes swarming natural. Swarming in agile is the act of gathering and performing tasks quickly and efficiently (Reddy, A. 2015)

Based on the literature reviewed and presented above, for this study, we propose the following hypothesis:

H1: Project Management affects SCRUMBAN user satisfaction.

H2: Teamwork affects SCRUMBAN user satisfaction.

Figure 1. Proposed Research Model
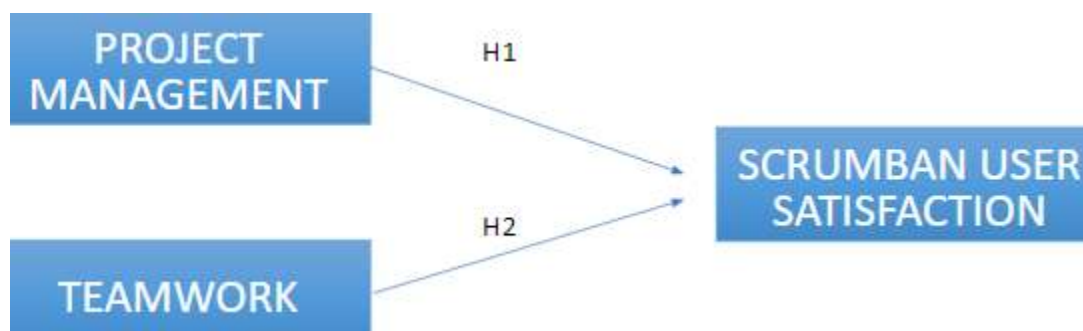
METHODOLOGY

Measurement Instrument

A structured survey was used to collect the primary data for this study. The questionnaire was comprised of five demographic questions, four items measuring Project Management in the IT sector, four items measuring User Satisfaction, and ten items measuring Teamwork. The questionnaire consisted of 23 questions divided into four sections.

Sample

A non-random selection process was used to select the IT companies operating in Bosnia and Herzegovina. The research was conducted in the period of January and February 2022. The survey was completed by 217 respondents.

Statistical Methods Used for Analysis

In order to analyze the collected data statistically, the Software Package for Social Sciences (SPSS) was used, and the analysis included the following statistical operations: factory data analysis, reliability test, descriptive statistics, and regression analysis.

RESULTS

Demographics

The study involved 217 respondents in total. The number of male participants is slightly higher than the number of female participants. In terms of education level, experience, employee number, and years of experience in agile methodologies, the sample was well distributed. Table 2 presents the sample characteristics.

Table 2. Sample Characteristics

VARIABLE	DEMOGRAPHICS	NUMBER	VALID PERCENT
GENDER	Male	185	84.10%
	Female	35	15.90%
EDUCATION LEVEL:	Primary School	1	0.40%
	High School	24	10.80%
	Bachelor	138	61.90%
	Master	54	24.20%
	PhD	3	1.30%

EXPERIENCE:	Less than one year	25	11.40%	Table 2...
	1-3	76	34.70%	
	3-5	56	25.60%	
	5+	62	28.30%	
NUMBER OF EMPLOYEES	1-9	3	1.30%	
	10-49	74	33.20%	
	50-249	94	42.20%	
	250+	46	20.60%	
EXPERIENCE WITH AGILE METHODOLOGIES	Less than 1	44	19.80%	
	1-3	73	33.80%	
	3-5	58	26.10%	
	5+	45	20.30%	

Table 3 represents Factor Loadings and Coefficient Alpha for all items and dimensions of variables. Cronbach's (1951) coefficient alpha is widely used to determine the reliability of multi-item scales and assess the internal consistency of model constructs. Based on the table, one can conclude that Cronbach's Alpha values indicate a reliable instrument for each dimension (see Table 3).

Table 3. Factors Loading and Coefficient Alpha

Variables & Items	Factor Loading	Chronbach's Alpha
1. PROJECT MANAGEMENT IN IT SECTOR		0.84
The scope of the project is clearly established and controlled.	0.832	
Responsibility for each part of the project implementation is clearly defined and assigned.	0.855	
Project activities are coordinated and properly organized.	0.851	
There is a formal management process that needs to monitor and monitor activities.	0.751	
2. SCRUMBAN USER SATISFACTION		0.919
Agile methodologies provide the results and reports I need.	0.845	
Agile methodologies present results and reports in a useful format.	0.876	
3. TEAMWORK		0.889
Different balanced or multi-functional team members have been selected for agile methodologies.	0.601	

The project has an experienced and reputed project manager who is committed to agile methodologies.	0.616	Table 3…
The team leader is clearly determined.	0.761	
The team leader is accepted by all team members.	0.773	
Team leader instructions have always been expressed and direct.	0.810	
Team roles were different without ambiguity.	0.774	
None of the team members have changed their roles.	0.633	
When a team member needs help, team members helped.	0.619	
The leader makes sure his instructions were always understood.	0.823	
Team members pointed to mistakes in a very constructive way.	0.749	

In terms of means and standard deviations, all dimensions provided satisfactory results. According to correlations, items are neither over-related nor over-rated among each other. An overview of the means, standard deviations, and correlations can be found in Table 4.

Table 4. Mean, Standard Deviations, and correlations

VARIABLES	MEAN	SD	PM	SB	TW
Project management	4.0264	0.74413	1		
S. User Satisfaction	4.1674	0.66561	0.682	1	
Teamwork	4.1407	0.66264	0.685	0.704	1

We notice that respondents evaluated their agreement with offered statements in a similar way for all three variables, as there is no significant difference in mean values presented in the table above. All mean values indicated that respondents were mainly agreeable with the statements for all variables. Standard deviation values are below 1 which indicates that there are no extreme differences in respondents' opinions. Correlations among all variables are neither over-correlated nor under-correlated among each other. All correlations are positive which is an important indicator that the proposed model is adequate.

Table 5. Hypothesses Testing

#	Hypotheses	Sig.	Beta	Status
H1	Project Management affects SCRUMBAN user satisfaction.	0.000*	0.378	Supported
H2	Teamwork affects SCRUMBAN user satisfaction.	0.000*	0.445	Supported

*P <0.05, significant at 95% confidence interval

H1 has been supported with a p-value of 0.000 which is below 0.05 and effects are statistically significant at 95% confidence interval. A beta value of 0.378 indicates that by increasing project management by 1 unit, SCRUMBAN user satisfaction will increase by 0.387. This means that managers should continuously improve their project management practices to increase SCRUMBAN user satisfaction.

H2 has been supported with a p-value of 0.000 which is below 0.05 and effects are statistically significant at a 95% confidence interval. A beta value of 0.445 indicates that by improving teamwork by 1 unit, SCRUMBAN user satisfaction will increase by 0.445. This means that managers should continuously improve their teamwork to increase SCRUMBAN user satisfaction.

CONCLUSION

In order to investigate the relationship between project management, teamwork, and the benefits of agile methodologies in the IT sector of Bosnia and Herzegovina, a literature review was conducted and two hypotheses were presented and tested in order to investigate the relationship between project management, teamwork, and agile methodologies. During the course of this study, a structured survey was used as a measurement instrument, which was prepared based on a literature review. A survey was conducted among the employees of 217 Bosnian IT companies. The results of this study indicated a significant and positive impact of project management and teamwork improvement on SCRUMBAN user satisfaction. Therefore, for best results, it is recommended to IT companies continuously work on teamwork improvement as well as project management quality improvement. The main limitation of this study is the relatively small sample size and we recommend that future researchers focus on a larger sample size. Project managers should use agile methodologies because the highest priority is client satisfaction, which is achieved by regularly delivering better, more valuable, and better quality software. The advantage of agile methods is that they accept requests even during the late development phase. Agile processes enable successful adaptation to changed requirements, which results in an advantage for clients over competitors. One of the many advantages of agile methodologies is that managers and developers must collaborate daily throughout the project. Scrumban was developed to determine the best way to boost productivity and cut waste while enhancing visibility and boosting overall success. Scrumban seeks to keep the work flowing continuously. There are no longer boring retrospectives in the Scrumban setting because of continual improvement. Instead, the team members are given the option to express their worries regarding obstacles. One of the biggest benefits of scrumban is

that the project progress is easier to explain to the stakeholders, and others in the organization, as you can map your workflow and process.

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