

Decision-making Process in Agile Methodologies related to IT Projects

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Abstract

The purpose of the article is to investigate the relationship between decision-making types and the management model used by project managers in project management. The goal was to discover whether the project managers that use SCRUM methodology adapts to shared decision-making as the literature describes.

First, will be presented the theoretical background about: decision-making process; decision-making on projects; project manager's necessary abilities; definition of project success and the SCRUM methodology. After that, the methodology used in this investigation and the research results will be presented.

Introduction

Every decision-making process involves making choices. Many of them between opposing factors such as the choice between reason and emotion, the longest way and the shortest or insurance and dangerous path.

In project management the same issues are presented when planning and running a project: how will be the schedule, which tasks are priorities that fits best feature, as will be the delivery of the product, among other issues.

With the advent of agile methodologies, the project manager, hitherto supreme master in project decisions takes on a new role within the unit projects, where every decision is made collaboratively. The question that arises is whether this new democratic process brings positive results for satisfactory completion of the project.

Research Problem, Objectives and Plan

The research seeks to identify the process of shared decision-making, characteristic of agile methodologies, positively success influences of technology projects. The analysis will be based on the decision-making suggested by SCRUM Framework and the project's success in the IT environment model.

This work chose to structure the research in three phases. The first phase was a literature search, covering decision-making, Agile Methodology, SCRUM framework and successful project. In the second phase we applied questionnaires in IT companies adopting SCRUM and PMBOK to: (a) measure the level of adherence of the decision process suggested by the framework adopted, and (b) whether the projects met the five variables measuring the success project: time, cost, scope, quality and customer satisfaction.

The survey research with closed questionnaire was applied to Project Managers and Scrum Masters. The sample included companies of different sizes and from various market segments. The total sample size was ninety-one respondents. The last phase was the analysis

and discussion of the results, where the relationships between the decision process and the shared success of the projects were discussed.

Literature review

Decision-making Process

Much has been studied in the literature about how to improve the process of decision-making by rational and structured processes [e.g. 1, 2]. The goal of decision analysis through structured processes is to help the person who decides to think systematically about complex problems to improve the quality of decision [3]. According to this, the decision analysis consists of a framework for dealing with difficult decisions where the incorporation of subjective judgment is very important. In this approach there is a decomposition of the problem into smaller and less complicated parts, since each part of the understanding and subsequent rebuilding can provide a better situation for decision making.

The decision analysis theory can be divided into two branches: prescriptive theory and descriptive theory [4]. In prescriptive theory, researchers develop models and methods that lead to optimal decision-making. This theory is based on the concept that individuals try to be rational in their decisions, despite the uncertain environment. According to Bazerman and Moore [5], individual judgment is limited by its rationality and decision making could be better understood by describing and explaining real rather than focusing only on prescriptive decision analysis decisions. The authors note that cost and time constraints limit the amount and quality of information available, as well as decision makers retain only a small amount of usable information in your memory. The authors also point out that the limitations of intelligence and misperceptions restrict the ability of decision makers have to accurately calculate the ideal among the universe of available alternatives choice.

Already in the descriptive theory, the researchers describe how decisions are actually made, within the limitations of time, information and existing criteria, assessing personal judgments that are affected by heuristics and cognitive and emotional biases. According to Bazerman and Moore [5], with the descriptive approach to decision-makers can understand the decision processes them, which would help clarify where the errors would probably be committed. Furthermore, the authors state that the optimal decision in a given situation usually depends on behaviors of others, and that there is a lot of advice on how to make good decisions, but most people do not follow them as they do not really understand how decisions are taken and therefore do not appreciate the need to improve their decision-making process. Yet according to the authors, people have various simplifying strategies, or rules of thumb when making-decisions - called heuristics. And the rules that guide our judgment, heuristics serve as a mechanism to cope with complex environments that surround our decisions.

According to Bazerman and Moore [5], most of us are not aware of the existence of the heuristic and its continuing impact on our decision making process. Thus, we fail to distinguish between situations where they are beneficial and situations in which they are potentially harmful. According to the authors, get rid of the biases is an extremely difficult process that must be closely monitored and guided by a psychological framework for change. The authors also underscore the partial success to get rid of the bias using groups instead of individuals, training on statistical reasoning and making people accountable for their decisions.

Decision Making on projects

The decision making theory was included in the PMBOK [6] 4th edition as one of the interpersonal skills necessary to the project manager. The focus on the details of the decision making in this reference document is the prescriptive aspect, considering the need of the

project manager to understand the decision making process in their steps: defining the problem, defining criteria, generation of problem solving, ideas for action, action planning solution, solution evaluation planning and evaluation of the outcome and the process.

To Kerzner [7], there are three characteristics for projects decision-making: certainty, risk and uncertainty. The easiest way to decision making is the certainty, since all necessary information is available to assist in making the right decision. The decision certainly implies that the manager knows with 100% accuracy and the expected results with every decision. This can be shown in a table of benefits, calculated mathematically.

Higher profits are generally accompanied by higher risks and therefore higher probability of losses. Decision-making with risk means there is no dominant strategy for all states of nature and therefore likely to be attributed to the occurrence of each state of nature. The risk can be seen as a result that can be described within established confidence limits.

The best strategy to be chosen is the strategy with the highest expected value, in which this expectation is the sum of the benefits likely to occur. The difference between risk and uncertainty is that risk and uncertainty are likely no significant odds. In decision making with risk, uncertainty implies that there can be no single dominant strategy.

To Keeney [8], we need to find better ways to find the soft aspects of the decision, known as intangible and subjective. There is still many things need to be done to help people make better decisions. The ideal would be developed concepts, procedures and training to help the manager to identify what is important to him at the time decision.

Agile Methodology and SCRUM

In the early 90s, the concept of agile software development methodologies in response to heavy waterfall methods, which were criticized by the development be intensely regulated, regimented and micromanaged emerged.

After the release of the agile manifesto by Fowler and Highsmith [9], some were characterized as agile methodologies: Rational Unified Process, Scrum, Crystal Clear, Extreme Programming, Adaptive Software Development, Feature Driven Development, and Dynamic Systems Development Method (DSDM).

When Jeff Sutherland [10] created the SCRUM process in 1993, he took the term "scrum" borrowed from the analogy made in 1986 by Takeuchi and Nonaka study [11], "The New New Product Development Game", published by Harvard Business Review. In this study, the authors compared the high performance and functions of multidisciplinary teams with the scrum formation used by teams of Rugby.

The Scrum works as follows:

- The product owner (PO) creates and prioritizes a list of desires called product backlog.
- The PO, the ScrumMaster and development team get together and make the Sprint Planning. At this meeting, the development team handle small pieces that are high on the wish list, and decide how to implement those parts.
- The team has a certain amount of time, called sprint, to complete the work - usually two to four weeks. However, the team meets daily to track progress, called the Daily Scrum.
- During the work course, the Scrum Master keeps the team focused on the goal.
- At the end of the sprint, the work should be potentially shippable, and ready to get in the hands of the customer or be presented to a stakeholder.
- The sprint ends with a sprint review meeting that analysis what has been done and what will be delivered, and sprint retrospective, where the development team discuss what went bad and good, always aiming to improve the work.

- Just as the sprint began, the team chooses again another piece of the product backlog and begins working again.

The cycle repeats until enough items in the product backlog have been completed, the budget finished or completed term. What milestones mark the end of the work, are determined by the project. No matter what time the design for the Scrum ensures that the most valuable part of the project was delivered.

The Scrum framework is grounded in theories of empirical process control. Empiricism asserts that knowledge comes from experience and decision-making based on what is known decisions. The Scrum employs an iterative and incremental approach to optimize predictability and risk control.

The daily meetings, called daily scrum, improve communications, eliminate parallel meetings, identify and remove impediments to development, and the main: highlight and promote quick decision-making. Only what has happened can be used for a decision as to what will come [12].

In the concept of agile methodologies, business people and those who develop must work together daily throughout the project, sharing decision making and running it collaboratively [9].

Project Success

The literature presents various forms and criteria for evaluating project success. The most traditional one is based on the "iron triangle" or "triple constraint", which refers to the demands of time, cost and scope [e.g. 13, 14, 15].

Project quality is directly affected by the balance of these three factors, whose relationship is such that if one of these factors changes at least one other factor will be affected. Based on this, a successful project happens when the originally proposed scope is completed, if it was delivered on time and costs thereof did not exceed the budget.

These dimensions are still considered fundamental in evaluating the success of a project [16]. However, over the years, these criteria, often seen as basic criteria, have been criticized as limited. Using these three criteria to evaluate the success of a project is not considered wrong, but neither can be considered the best way [14].

As expected, different studies have identified different success factors, and there is a lack of consensus among researchers and authors on the criteria for judging the success of a project and the factors that influence success.

According to Kerzner [17], the success of a project includes not only the basic criteria but also activities related to the completion of the project, which include: customer acceptance, minimum or mutually agreed changes in scope, no disturbance to the main workflow of the organization and no changes to the corporate culture.

According to Meredith and Mantel [15], in today's business world, with greater emphasis on customer satisfaction, we have to retrain project managers to extend their criteria for success of a project and include a fourth item: the use and satisfaction of the client. This suggests that the success of the project is a much broader concept than some managers may have initially thought.

Methodology

Population and Sample design

The work includes empirical data obtained through a questionnaire sent to people who work with projects, to identify if the process of shared decision making, peculiar to SCRUM methodologies, influenced the success of the project more than the centralized decision making process, peculiar to the PMBOK methodologies.

Research Design and Data Collection

In this research, we use the respondents perceived success of the project taking into account the variable cost, time, scope, quality and client satisfaction. We chose these criteria because they are the most cited among the various definitions found. The Project Manager or Scrum Master will define project success based on his point of view and it will be validated through the questionnaire he is going to answer.

When filling out the questionnaire the respondent was asked to choose the latest completed project in which he has participated and considered fully satisfactory, ie, the most recent successful completed project that he has participated.

The demand for completed projects is justified by the fact that only after its closure it is possible to evaluate the success of the project. On the other hand, the requirement that limited the project to the last one completed with success was necessary to avoid a bias in the results since without this restriction people tend to choose projects that have been most successful.

Thus, the questionnaire aimed to identify, among some decision-making factors mentioned by the literature, the extent to which each of them is in fact being influenced by this new mode of shared decisions. From this result it is possible to identify major gaps in performance of this new model of project management in relation to decision-making. In addition, the questionnaire also seeks to investigate how people evaluate the importance of decision-making in this setting.

Data analysis and Results

There were in total ninety-one respondents, mostly between 28 and 37 years old, male, from the IT department and working in a company from the technology sector. The projects mostly had between three months to one year duration and professionals with between three to six years of experience.

In the sample, the division of use of methodology was 46% using PMBOK and 54% using SCRUM. Most of the respondents used SCRUM on the referred project on the questionnaire, followed by the PMBOK, which was also analyzed in this study in a comparative manner.

Results on decision-making during project planning:

Table I: SCRUM Master (SCRUM) vs. Project Manager (PMBOK)

How significant is the decision of the <u>SCRUM Master</u> in project planning (SCRUM)?	%	How significant is the decision of the <u>Project Manager</u> in project planning (PMBOK)?	%
Insignificant	2.86	Insignificant	2.86
Somewhat significant	8.57	Somewhat significant	11.43
Indifferent	11.43	Indifferent	2.86
Significant	51.43	Significant	28.57
Very significant	25.71	Very significant	54.29

Table II: Product Owner (SCRUM) vs. Client (PMBOK)

How significant is the decision of the <u>Product Owner</u> in project planning (SCRUM)?	%	How significant is the decision of the <u>Client</u> in project planning (PMBOK)?	%
Insignificant	2.86	Insignificant	2.86
Somewhat significant	5.71	Somewhat significant	5.71
Indifferent	5.71	Indifferent	0.00
Significant	17.14	Significant	25.71
Very significant	68.57	Very significant	65.71

Table III: Developer in SCRUM vs. Developer in PMBOK

How significant is the decision of the Developer in project planning (SCRUM)?	%	How significant is the decision of the Developer in project planning (PMBOK)?	%
Insignificant	0.00	Insignificant	8.57
Somewhat significant	11.43	Somewhat significant	5.71
Indifferent	5.71	Indifferent	5.71
Significant	54.29	Significant	62.86
Very significant	28.57	Very significant	17.14

The results indicate a greater importance during the project planning of the decision-making of the Project Manager on a project governed by PMBOK than in SCRUM by the Scrum Master. One can also see a slightly greater importance of the Developer in SCRUM, when compared to the Developer in PMBOK in the above phase.

Results on the success of the project without segmentation of methodologies:

Table IV: Success of the project considering time, scope, cost, client satisfaction and quality

Satisfaction Indicator	Time	Scope	Cost	Client Satisfaction	Quality
Not satisfactory	3.03	3.03	0.00	1.52	1.52
Somewhat satisfactory	15.15	7.58	16.67	6.06	1.52
Indifferent	6.06	3.03	25.76	9.09	9.09
Satisfactory	50.00	57.58	43.94	53.03	60.61
Very satisfactory	25.76	28.79	13.64	30.30	27.27

Legend: Table IV describes the respondent's perception about the success of the project, considering some variables (time, cost, scope, client satisfaction and quality). The numbers are percentages.

All respondents were informed at the beginning of the questionnaire to take into consideration the last project that was considered by them a "project successfully delivered". However, there were high rates of projects with time and cost indifferent or unsatisfactory. This demonstrates that most of respondents in our sample may have been accustomed to delays and over budget projects.

These factors were not part of the sample did withdraw the rating of project success. However, there was a high rate in the items quality and customer satisfaction. This shows that, increasingly, professionals working with projects are not just looking at the triangle cost-time-scope, but are also concerned with the quality of what is delivered.

Results on decision-making in the project:

Table V: Decision-making in SCRUM vs. PMBOK

How was the decision-making? (SCRUM)	%	How was the decision-making? (PMBOK)	%
Concentrated on the Scrum Master	0.00	Concentrated on the Project Manager	7.69
Shared between the Scrum Master and the Product Owner	33.33	Shared between the Project Manager and the Client	76.92
Shared between the Scrum Master and the Developer	12.12	Shared between the Project Manager and the Developer	15.38
Everyone	54.55	Everyone	0.00

No respondent described the decision-making as being concentrated on the Scrum Master when using SCRUM methodology, while when using the PMBOK, no respondent chose to describe the decision-making process as being made by "everyone".

The opposing view, shows that literally decision-making in the PMBOK is not shared by all project stakeholders. Over fifty percent who responded that "all" share the decision-making in SCRUM, collaborate with the previously established hypothesis and the literature

on the subject, in which it states that decision-making in SCRUM is shared. This is confirmed within the sample.

Results on decision-making vs. project success:

Table VI: Project variables behavior in SCRUM vs. in PMBOK

Satisfaction Indicator	Time		Scope		Cost		Client Satisfaction		Quality	
	PMK	SCM	PMK	SCM	PMK	SCM	PMK	SCM	PMK	SCM
Not satisfactory	3.85	0.00	7.79	0.00	0.00	0.00	0.00	2.94	0.00	2.94
Somewhat satisfactory	23.08	11.76	3.85	11.76	26.92	5.88	7.69	5.88	0.00	2.94
Indifferent	7.89	2.94	3.85	2.94	19.23	28.47	3.85	14.71	3.85	11.76
Satisfactory	38.46	55.88	50.00	55.88	42.31	50.00	57.69	44.12	69.23	50.00
Very satisfactory	26.92	29.41	34.62	29.41	11.54	17.65	30.77	32.35	26.92	32.35

Legend: Table VI describes the project variables (time, cost, scope, client satisfaction and quality) behavior in both methodologies, PMBOK (PMK) and SCRUM (SCM). The numbers are percentages.

Analyzing the results of the crossing of the methodology and the success factors of the project, we found some interesting and intriguing facts.

Since agile methodologies focus on the delivery and participation of the team and the client, from design and even during execution of the project, the numbers were favorable when we analyze the success of the project in a more rigid form, with cost, time and scope. However, the methodology characterized as "non-agile", the PMBOK, had more satisfactory results in the items delivered product quality and customer satisfaction.

The results showed the analysis of a sample where SCRUM, an agile methodology, was more efficient compared to the PMBOK in respect to the project deadline, the project scope and the defined cost.

However, it was less efficient in respect to the quality and satisfaction of the customer. A question for future research is to investigate whether it is possible to be agile and deliver a high quality final product.

Conclusion

The survey results suggest that, in reality, the process of shared decision making is used by technology teams that adopt the SCRUM methodology. It was also found that in this methodology developers have participate more in the decision-making in planning and the execution of the project. This compared to the teams that use the technology PMBOK.

On project success, the survey indicated that SCRUM was more satisfying than the PMBOK in the categories: planned cost at the beginning of the project and realized cost, project schedule planned and realized time delivery, and initial scope versus what was delivered. It is assumed that in our sample, SCRUM was more efficient than the PMBOK in respect to time, cost and scope.

However, we also evaluated the level of satisfaction concerning the project in relation to customer satisfaction and quality of software development. In these instances the SCRUM methodology showed less satisfactory results than the results of the PMBOK.

This paper presented results related to a specific sample and may not be subject to other market sectors. This opens precedent for further studies to be conducted in different business sectors and internal areas on how decision-making will influence the projects using agile methodologies.

References

1. March, J. G. (1978). Bounded rationality, ambiguity, and the engineering of choice. *The Bell Journal of Economics*, 587-608.
2. Thaler, R. H. (2000). From homo economicus to homo sapiens. *The Journal of Economic Perspectives*, 14(1), 133-141.
3. Clemen, R. T. (1996). *Making hard decisions: an introduction to decision analysis*.
4. Neale, M. A., & Bazerman, M. H. (1985). The effects of framing and negotiator overconfidence on bargaining behaviors and outcomes. *Academy of Management Journal*, 28(1), 34-49.
5. Bazerman, M. H., & Moore, D. A. (2008). Judgment in managerial decision making.
6. Project Management Institute. (2008). A Guide to the Project Management Body of Knowledge: PMBOK® Guide. Project Management Institute.
7. Kerzner, H. R. (2003). *Project management: a systems approach to planning, scheduling, and controlling*. Wiley.
8. Keeney, R. L. (2004). Making better decision makers. *Decision Analysis*, 1(4), 193-204.
9. Fowler, M., & Highsmith, J. (2001). The agile manifesto. *Software Development*, 9(8), 28-35.
10. Sutherland, J. (2004). Agile development: Lessons learned from the first scrum. *Cutter Agile Project Management Advisory Service: Executive Update*, 5(20), 1-4.
11. Takeuchi, H., & Nonaka, I. (1986). The new new product development game. *Harvard business review*, 64(1), 137-146.
12. Schwaber, K., & Sutherland, J. (2011). The scrum guide.
13. Pinto, J. K., & Slevin, D. P. (1987). Critical factors in successful project implementation. *Engineering Management, IEEE Transactions on*, (1), 22-27.
14. Atkinson, R. (1999). Project management: cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International journal of project management*, 17(6), 337-342.
15. Meredith, J. R., & Mantel Jr, S. J. (2011). *Project management: a managerial approach*. Wiley.
16. Papke-Shields, K. E., Beise, C., & Quan, J. (2010). Do project managers practice what they preach, and does it matter to project success?. *International Journal of Project Management*, 28(7), 650-662.
17. Kerzner, H. R. (2013). *Project management: a systems approach to planning, scheduling, and controlling*. Wiley.